North Central Region Water Network Seed Grant Final Report

Title:_Pathways for Information Transfer between Manure Nutrient Management Agriculture Professionals 2015

Abstract:

How does manure nutrient management information flow? The "Pathways" project's goals were to understand and delineate pathways for effective information dissemination and use among various agricultural professional audiences that facilitate successful integrated (research/outreach/education) projects and programs. The major activity associated with this project was a national survey taken by 964 manure nutrient management professionals addressing the relevance of information sources (inputs), information products (outputs) and collaborators (links). The survey data provided the following insights: (1) the manure nutrient management field is increasingly female; (2) most organizations focus their efforts on one or two tasks related to manure nutrient management; however, University and Extension professionals tended to select more tasks per person than other organizations; (3) the most relevant sources of information among all survey respondents were Farm or Field Setting, Science-based Sites and Consultation, and the least relevant were Research Paper or Technical Document, Classroom Setting and Social Media. Mind-mapping software was used to aggregate the broad array of results. The mind-map exercise was invaluable for the team members involved, but the utility of this map was not completely understood by the larger agricultural professional community when presented in a national webinar. This supports the survey result showing lower relevance for decision tools, but also spurs additional work to further investigate implications of these potential communication links. This project was the cumulative work of a North Central Region team who performed data analysis and mind-mapping, as well as a national team who helped test and refine the survey, and provide feedback on project steps and results throughout. Based on the North Central Region Water Network survey, this work created new collaborations and increased Extension/outreach capacity in the North Central region and beyond.

Report Body:

Purpose or Need:

While manure is recognized in the agricultural industry as a valuable source of nitrogen, phosphorus and organic material for plant growth, the point and non-point source discharge of nutrients and bacteria can be substantial if manure is not managed properly. To this end, a significant amount of effort and money has been put into development of manure nutrient management research and programs. Manure nutrient management is also part of several states' nitrogen and phosphorus reduction strategies for reducing the nutrient load on the Mississippi River and the Gulf of Mexico (Mississippi River/Gulf of Mexico Watershed Nutrient Task Force, 2008; EPA, 2014).

There are barriers, however, that prevent the flow of important, timely information between research projects and educational programs and the appropriate audience type, thus limiting the impact and usefulness of those efforts. Additionally, education strategies differ between persons and projects (i.e. Shepard, 1999), organizations and regions meaning they need to be received by the end user in the correct format for effective implementation. Furthermore, the success of educational outreach and programs are affected by voluntary versus mandatory adoption (Poe et al., 2001), highlighting the need for tailored programing and content delivery.

A map of the pathways between information producers and users is vital, along with identification of end user format and language necessary for comprehension and implementation. By providing a pathway to audience types and needs, organizations can realistically identify the target groups for specific project outcomes and produce tailored products, information sources, and formats for end users. In addition, this hierarchal pathway allows organizations to select project partners from specific agencies in their regions to communicate with directly and produce a tailored and more impactful product.

Project Goals:

The overall goals of this project were to establish documented pathways for effective information dissemination and use among various agricultural professional audiences that facilitate successful integrated (research/outreach/education) projects and programs. The specific goals were:

1. For North Central Region project team and agricultural professionals to understand how manure nutrient management information is gathered and shared and the barriers to sharing (NCRWN Goal to increase multi-state connectivity and learning among university professionals and partners);
2. To provide agricultural professionals who develop outreach and education programs the information they need to understand inter-disciplinary terminology around manure nutrient management (NCWRN Goal to build capacity and expand successful Extension programming); and
3. Develop a model for effective pathways of information dissemination of manure nutrient management from research to implementation (NCWRN Goal to build capacity and expand successful Extension programming).

Methods and Activities:

The major activities and methods used to address the project goals were as follows:

- *North Central and National Working Group*
    - The project team demonstrates collaboration between university researchers, extension educators and partners. The project team consists of a core, North Central Team responsible for the grant activities, as well as a National Team who have consistently provided input to the survey development, data review, and dissemination processes. Table 1 lists the project team members who have contributed through regular meeting participation.
    - Table 2 lists the additional connections to this project. These participants have expressed interest in the Pathways project since its inception in 2013, and have remained on the mailing list for project updates.
    - Monthly web/phone based conference calls were conducted.

Table 1. Pathways Project Team members. A * denotes members who were part of the North Central Team project administration, data analysis and Mind Map development.

Name	Organization Affiliation	Email
Erin Cortus*	South Dakota State University	erin.cortus@sdstate.edu
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Mary Berg	North Dakota State University	mary.berg@ndsu.edu
Theresa Pella	Central States Air Resources Agencies	tpella@censara.org
Brent Auvermann	Texas A&M University	b-auvermann@tamu.edu

Table 2. Pathways Project Affiliates who were regulary updated on project activities and encouraged to provide feedback.

Name	Organization Affiliation	Email
April Leytem	USDA ARS	april.leytem@ars.usda.gov
Dan Ludwig	Pennsylvania State University	dan.ludwig@pa.usda.gov
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Tommy Bass	Montana State University	tmbass@exchange.montana.edu
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- Engagement in the project (among other items) was assessed through an end-of-project (EOP) survey administered by the North Central Region Water Network (referred to as the NCRWN EOP survey). The survey was sent to all persons listed in Table 1 and Table 2. There were 10 completed surveys from Project Team and 3 completed by affiliates. The surveys of team members and affiliates were combined for discussion of outcomes.

- *Survey*
  - The purpose of the Pathways Survey was to evaluate the relevancy and barriers to information sources, dissemination methods, and partnerships among organizations. The relevancy questions were measured on a five-point scale, and the barrier questions were ordinal in nature. The survey questionnaire also included personal questions, such as level of knowledge, level of importance, years of experience, type of organizations associated with, age group, gender, and state.

- The Pathways Survey was shared via QuestionPro using a purposeful snowball sampling technique to distribute the online survey instrument, using the mailing lists of several professional and producer organizations and listservs associated with manure management. The survey results were combined with data collected in a South Dakota Pilot Test funded by the South Dakota SARE organization (see http://articles.extension.org/pages/73243/pathways-for-effective-manure-nutriment-management-information-sharing-and-education-between-agricul for summary).
- Statistical analysis was performed in SPSS using correlation and factor analysis. Being categorical variables, the association between the two variables was calculated using the Spearman's rho correlation. Factor analysis (principal components extraction with varimax rotation) was used to detect the clusters of variables that were correlated.
- The National and South Dakota Pilot Test surveys were deemed exempt under federal regulation 45 CFR 46.101 (b) and approved by the South Dakota State University Institutional Review Board (IRB-1402010-EXM and IRB-1502001-EXM).
- There were 964 surveys started, with 777 completed in entirety. The respondents were geographically distributed among 49 states (98%), four Canadian provinces (1%) and 1% of respondents did not specify. Over 50% of the responses were from six states: PA (13.2%), SD (9.4%), NE (7.7%), ND (7.2%), OH (7.0%) and OK (6.4%). The distribution in age and gender of respondents are shown in Figure 1. Note the visible trend of increasing female engagement in manure nutrient management in the younger age categories.

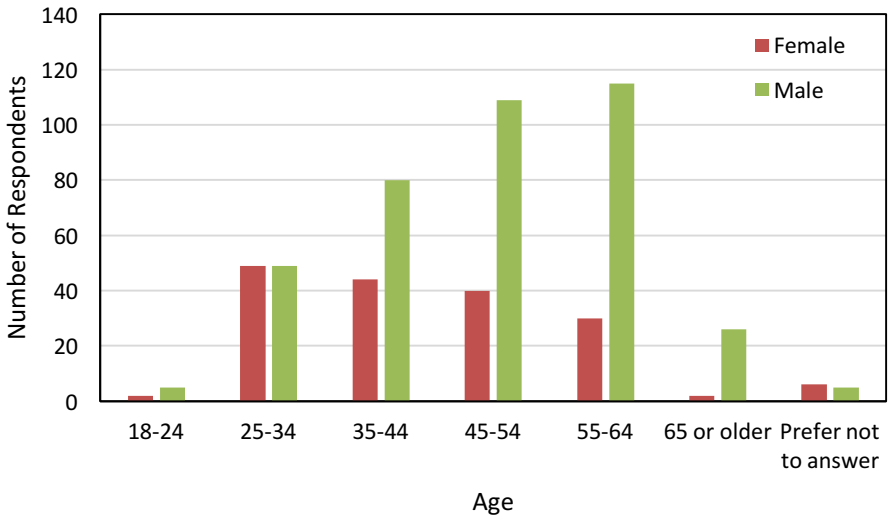

Figure 1. Distribution of age and gender of respondents to the Pathways Survey of manure nutrient management professionals.

- The distribution of organization types represented in the survey data are shown in Table 3. The organizational categories with more than 10% of the total survey populations' responses were University/Extension, Government Non-Regulatory Agencies, Government Regulatory Agencies, Producers, Special Government and Sales/Private Enterprise.

Table 3. Categories of organizations affiliated with manure nutrient management and their response to the Pathways Survey.

Organization	Count	Count (Complete Response)	Proportion of Responses, %
University/Extension	189	158	24.3
Government Non-Regulatory Agency	155	130	19.9
Government Regulatory Agency	106	94	13.6
Producer	97	52	12.5
Special Government	88	72	11.3
Sales or Private Enterprise	85	53	10.9
Commodity or Advocacy Group	16	10	2.1
Private Service Group	15	9	1.9
News/Media	9	7	1.2
Tribal Government	3	2	0.4
Other	14	7	1.8
No Response	187		
Total	964	594	

- *Presentation at the 2015 Waste to Worth Conference: "The Pathways Project"*
    - The purpose of the presentation was to share the project need, goals and methods with the conference attendees, including those who make or influence environmental management decisions on livestock and poultry farms. The presentation was delivered midway through the survey deployment, so the conference and presentation were also a means to spur survey participation and network development.
    - The presentation was delivered on April 3, 2015. The conference proceedings are available at: http://articles.extension.org/pages/73244/the-pathways-project.

- *Mind Map Exercise*
    - The purpose of this exercise was to graphically depict the links between organizations, based on data generated through the survey. Various software were tried, and ultimately Mind Jet was selected. North Central Team members worked closely to integrate the data analysis results in the map. The Mind Map exercise was hindered in part but the sheer amount of data to convey.
    - The product is available in modifiable pdf form (see Deliverables).

- *Livestock and Poultry Environmental Learning Center (LPELC) Webinar: "Pathways for Effective Information Transfer Between Manure Management Professionals"*
    - The purpose of the webinar was to present the results of a national survey on how manure nutrient management professionals, learn, share and collaborate, and how to use this information to guide information transfer in the future.
    - The webinar was broadcast on November 20, 2015. Recordings of the webinar are archived at http://articles.extension.org/pages/73367/pathways-for-effective-information-transfer-between-manure-management-professionals.
    - An online exit survey was completed by approximately 20 viewers. The survey followed a standard format used by the LPELC, with some additional questions to include civil rights reporting information and application of information. The survey is referred to as the LPELC Webinar survey.
    - Pre-registration was not required. There were 46 sites connected, with 50 viewers. Based on percentage of respondents to the LPELC Webinar Survey, 69% of the audience was male; 93% of the audience was white and 7% Asian.

- *Publications*
    - An article for the *Journal of Extension* is in preparation.

Outcomes:

NCRWN Goal 1. Strengthen existing or create new collaborations between university researchers and extension educators.

Existing collaborations were strengthened and new relationships were formed between university researchers and extension educators. The indicator is the formation and maintenance of the Project Team shown in Table 1. Project participants included eight different state Extension services, half of which were from the North Central Region. This outcome is further supported by the NCRWN EOP survey. The NCRWN EOP survey indicates that as a result of the Pathways Project, and using a scale of 1 (not at all) to 4 (a large extent), participants increased awareness of people in other states who are working on similar topics (mean = 3.15), formed new working relationships with University extension professionals across states (2.85), deepened existing working relationships with University Extension professionals across states (3.15) and are interested in engaging in future North Central region collaborative efforts (3.00). Qualitative evidence was provided during a Project Team Call, where participants noted the inclusion of Dr. Jacquet and Mr. Kasu on the project team was an introduction for many to the social science perspective, and in turn, an introduction to the wonderful world of manure for the social scientists. Another participant appreciated the expansion from the air quality field she normally works in to the water quality field.

A related indicator of the power of the collaboration crucial in this project was the double in survey responses before and after the 2015 Waste to Worth conference.

NCRWN Goal 2. Increase multi-state connectivity and learning among university professionals and partners.

North Central Region project team and agricultural professionals better understand how manure nutrient management information is gathered and shared and the barriers to sharing was achieved (Project Goal 1). One of the key results of the survey informs this understanding. As shown in Figure 2, the average relevancy of different information sources varied from an average relevance of 3.15 for Field or Farm Setting and Science-Based Sites, to 1.65 for Social Media. Decision Tools ranked lower than expected as well, at an average relevance of 2.53. There were variations in relevance among organizations, but most organizations followed similar trends.

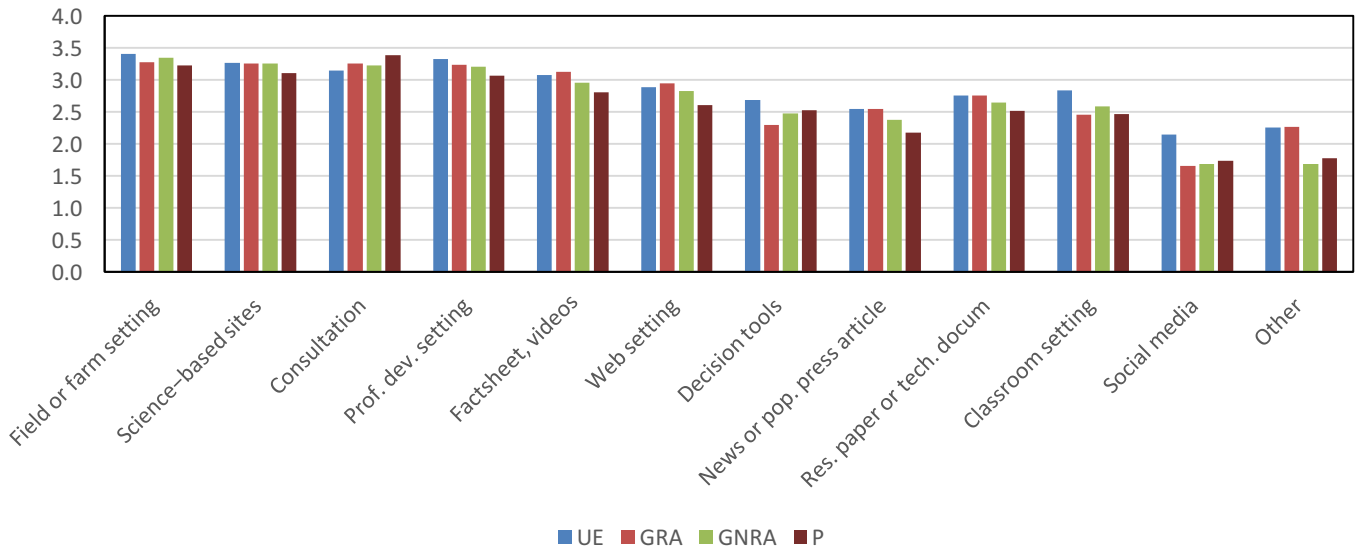

Figure 2. Average relevance on a scale of 0 (do not use/not relevant) to 4 (very relevant/useful) of various information sources among organizations (UE: University/Extension; GRA: Government Regulatory Agency; GNRA: Government Non-regulatory Agency; P: Producer).

The first indicator was that the NC project team and agricultural professional increased their understanding of where manure nutrient management information is obtained by different audiences. The LPELC webinar audience survey showed that all respondents deepened their understanding of how people get their manure nutrient management information, with 78% indicating they moderately to significantly improved their understanding. Key take-away messages from the webinar, provided by webinar attendees include:

- "Social media is not relevant"
- "You have to understand your audience to effectively communicate with them"
- "Reinforces the message that I have been saying for years that research follows the money rather than addressing producer needs"
- "It is hard to replace one-on-one consultation and relationship building for helping my producer clients learn and understand NM concepts"

An additional indicator was that the NC project team increased their understanding of the relevancy of the different types of products for different nutrient management audiences The NCRWN EOP survey indicates that as a result of the Pathways Project, and using a scale of 1 (not at all) to 4 (a large extent), participants increased their understanding of where manure nutrient management information is obtained by different audiences (mean = 3.69), increased their understanding of the relevancy of the different types of products for different manure management audiences (3.46), increased their understanding of the importance of cross-audience collaboration for nutrient manure management (3.69) and increased their understanding of the relationships between audiences that use and disseminate manure nutrient management information (3.54). Some select examples provided by survey respondents include:

- "We were all very surprised to see the low relevance of decision tools and other web-based applications for survey participants. Our project goal was to build such a tool! We have since learned that how we "market" or use the developed mind map will be critical to its success"
- "The relationship between different stakeholders and the press, Extension and government agencies wasn't that apparent to me before the project"
- The results of this project helped to solidify what we recommend our Extension agents do: work together with agency folks to reach a broader audience"

NCRWN Goal 3. Build capacity of universities to address multi-state water-related issues and opportunities, including: Expanding successful extension programs to additional states; and Generating new funding for extension programming through competitive grants, contracts for services, or fee-based programs.

The project was designed to build capacity of agricultural professionals by first providing inter-disciplinary terminology around manure nutrient management. This was a focus within the NC Team Meetings, and one participant responded on the NCRWN EOP survey that "using same terminologies among different audiences is important". This concept was also discussed during the Waste to Worth 2015 conference both formally and informally, and several conference attendees gave us terms to add to the library. A final document has not yet been prepared for sharing with a wider audience.

However, the main goal of this project was to develop a model for effective pathways of information dissemination among manure nutrient management professionals. The NC and core team (Table 1 members) increased their understanding of the relationships between organizations, information use and dissemination methods. The mind-

mapping exercise was suggested by a few of the team members, and was an eye-opening experience. The amount of data collected was substantial, and given the wide array of both organizations and methods, the links were numerous. At the same time, as mentioned earlier, the relevance of decision tools by the majority of the audiences we work with was low, so our expectations did shift mid-project! Several respondents indicated the process was perhaps more enlightening than the final mind-map. When asked about the most important benefits to participating in this project in their extension/outreach role, comments on the NCRWN EOP survey included:

- "Learning about mind mapping and its applications…lots of possibilities emerging that may add significant value to competitive grant proposals"
- "For me, this was a new way of thinking about the whole process of creating programs and planning them"
- "Visually see the pathways of communication/education and related demands or expectations regarding waste and nutrient management helps me to better the development of related programs".

The NCRWN EOP survey comments also demonstrated the project's potential to impact water quality: 46% of respondents felt they increased their ability to provide educational programming; 54% felt they are more aware of opportunities to apply/communicate science-based information; 62% have increased their ability to work collaboratively; and 69% have increased their access to experts. Further comments support the capacity built for supporting state and regional work:

- "Knowing how people in our region want to receive information will help me be most effective when designing educational programs"
- It has provided additional resources in working with farm owners and has provided for some potential contacts for future work"
- "A presentation by one of the group's members to air quality state and federal environmental managers exposed the managers to a-related air quality programs that they can tap into for building upon their own work to meet Clean Air Act requirements"

Outside of the project team, the application of the Mind-map specifically was met with some hesitation, but also curiosity. In the LPELC webinar survey on a scale of 1 (not at all likely) to 5 (more likely), there were four selections of 1, six selections of 2, four selections of 3, and one selection of 5. When asked how they would use the Mind Map in their work, open-ended comments indicated uses would be:

- "Developing my 2016 POW [plan of work]"
- "Not sure at this time. I need to study it a little more to determine possible applications"
- "Understanding how my target audience prefers to be communicated with"
- "How best to reach producers directly"

NCRWN Goal 4. Leverage institutional and financial resources outside of the university in the short and long term.

In the short-term, total Extension match to this project was $15,885 in salary/benefits, and partner match was $6,066.

In the NCRWN EOP survey, 3 respondents indicated this project has spurred pending or unsuccessful funding applications, and 50% indicated plans to apply for additional funding.

Deliverables:

Pathways Survey: Pathways Survey.doc

LPELC Webinar: archived webinar is available at http://articles.extension.org/pages/73367/pathways-for-effective-information-transfer-between-manure-management-professionals. See LPELC Webinar Evaluation Summary.pdf for evaluation results.

2015 Waste to Worth Presentation: http://articles.extension.org/pages/73244/the-pathways-project.

Mind Map: example is shown in Figure 3. For complete map see Pathways in nutrient management education 121715.pdf

NCRWN EOP Survey: see NCRWN EOP Survey.pdf for end of project evaluation summary and comments.

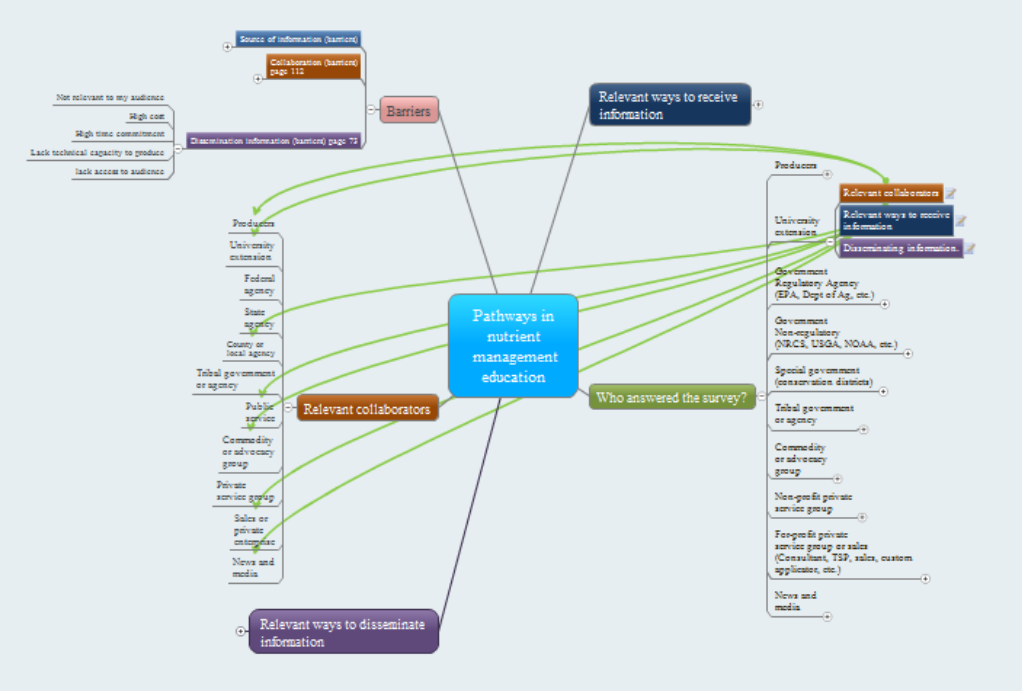

Figure 3. Example links between the University/Extension audience and relevant information sources, using the mind map of the Pathways survey results.