NATURAL RESOURCE ATLAS FOR NORTHEASTERN MINNESOTA

A SUMMARY REPORT OF INTERVIEWS WITH TARGET END USERS

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and
Mae Davenport, Ph.D.

January 9, 2018

Center for Changing Landscapes
UNIVERSITY OF MINNESOTA
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Natural Resources
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Table of Contents

List of Tables

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Executive Summary

The following report details the findings from analysis of interviews with eleven target "end users" of the Natural Resource Atlas for Northeastern Minnesota tool and database being developed by Natural Resource Research Institute (NRRI). Engaging potential end users of the Atlas during the development phase provides crucial guidance for the design process as well as insight into the needs and preferences of the end user community. Participants were drawn from three sectors: state agencies, industry, and nonprofits. Analysis of the interviews focused on four primary categories: perspectives on existing data, challenges and limitations related to existing data, perspectives on digital tools, and envisioning an ideal online digital tool. Potential Atlas users primarily used data relating to the location and quality of natural resources, agencies and their activities, and people and their activities. Participants described using these data for restoration, conservation, development, and understanding the availability and conditions of natural resources. Analysis of participant interview pointed to three limitations commonly encountered in the current data landscape: accessibility of data, technical ability required to analyze data, and limited availability of data overall. Participants also expressed concern about the credibility of data. Both publicly and privately produced data were described as potentially skewed because of political agendas, selective modeling inputs, or particular end goals. When describing an ideal online tool, participants presented a range of ideal processing and modeling abilities, including the ability to input new data types, and to produce high quality outputs. The analysis detailed in this report points to four key takeaways that can inform the next phase of the project aimed at meeting the needs of target end users:

- Provide a clear statement of purpose indicating the goal of the Atlas website and analysis tool, as well as detailing what the Atlas does and does not do
- Ensure transparency around data sourcing and quality control mechanisms
- Develop a statement describing how the Atlas meets currently unmet needs, specifically in data and output sharing, and fostering coordination and cooperation within and across organizations
- Include useful and aesthetically pleasing output capabilities

Introduction

This report describes findings from interviews with target "end users" of the Natural Resource Atlas tool and database being developed by the Natural Resource Research Institute (NRRI). The Natural Resource Atlas for Northeastern Minnesota is a web-based tool and database intended to facilitate communication among and decision making by industry, agencies, nonprofits, and the public. The Atlas uses a flexible Geographical Information System that enables complex environmental issues to be investigated from multiple viewpoints. The Atlas integrates data from multiple fields including geology, biology, ecology, and the social sciences; information covers topics associated with minerals, forests, water quality, climate, land use, infrastructure, and population demographics. The Atlas will also include a Decision Support System to enable users to apply knowledge gained in decision-making.

The overarching goal of end-user engagement is to support the development and design of the Atlas and to ensure that the web-based tool and database meet end users' needs. Guided conversations with natural resource-related decision-makers who are prospective users of the Atlas provide a depth and breadth of understanding around potential barriers and opportunities for the development and use of the Atlas.

Methods

Eleven interviews were conducted in summer 2017 with representatives of 10 different organizations that are active in northeastern Minnesota and engaged in natural resource management decision-making. An interview script and set of questions (Appendix A & B) guided the discussions. Interviews were conducted in person or over the telephone and lasted 20-40 minutes. Interviews were audio-recorded and the interviewer kept field notes. After each interview, participants were asked to complete a short quantitative survey and a demographics form (Appendix C). Individual interview findings were aggregated and summarized. In order to protect anonymity, data are not linked to specific interviewees or organizations.

Interview Findings Summary

Interviewees were asked a series of questions about their roles in their organizations, the types of data they use, and challenges or limitations they experience when using existing digital data analysis and modeling tools. Interview findings are organized into five sections:

- participant roles and data usage
- perspectives on existing trend data,
- challenges and limitations related to existing data,
- perspectives on digital tools, and
- envisioning an ideal online digital tool.

Participant roles and data usage

Interviewees included representatives of industry; nonprofit organizations; and state, county, and tribal resource agencies. Participants described using data and digital tools in a variety of ways and on a range

of topics related to their work. Data were used in four primary areas: regional economic development, natural resource conservation and restoration, mining, and environmental review.

Participants working on regional economic development described using data for community development broadly and natural resource tourism specifically, as well as for the recruitment of new businesses into the area—primarily in the timber, aviation, and mining sector. Interviewees working in natural resource conservation and restoration detailed their use of data in working with private landowners to further conservation goals. These conservation and restoration efforts focused on water quality and protection, as well as the protection of wildlife and habitat, and the restoration of wild rice. Participants working in mining development use data and digital tools for the exploration and reclamation aspects of mining operations. Participants across sectors identified work related to environmental review. Participants described using data for formal environmental impact statements, reviews of stream and water projects, as well as assessments of timber and mining operations and infrastructure impacts to resources.

Table 1. Interview Participant Demographics

		N	Percent
Gender	Male	4	40
	Female	6	60
Age	Median	43	-
	Minimum	34	-
	Maximum	60	-
Years worked at organization	Median	6.5	-
	Minimum	3	-
	Maximum	32	-
Formal education	Did not finish high school		
	Completed high school		
	Some college but no degree	1	10
	Associate or vocational degree		
	College bachelor's degree		
	Some college graduate work		
	Completed graduate degree (MS or PhD)	8	80

Common data uses

Participants described using data for restoration, conservation, development, and understanding the availability and conditions of natural resources. Participants engaged in restoration and conservation work described using data to develop criteria and work plans for stream restoration, strategic planning and prioritizing of conservation areas, and evaluating the success of initiatives over time. Those participants who focused on economic development and natural resource extraction described using both demographic and resource availability data to direct investments and development efforts, forecasted population and visitation data for promotion and marketing, and geologic data to determine areas for exploration. Participants also described using data on resource availability, conditions, and

changes over time to produce environmental impact statements, determining the causes of changes over time, and assessing resource health and availability.

Commonly used data

Commonly used data fell into three broad categories: location and quality of natural resources, agencies and their activities, and people and their activities. Location and quality of natural resource data consisted primarily of geographic information systems (GIS) data, and focused on water, soil, minerals, and wetlands. This data was used by different participants for either development or conservation purposes. Maps of surface geology and data pertaining to mineral and land titles were also commonly used. Data on agencies and their activities focused on existing planning efforts. Maps of existing plans for conservation, wildlife management, and pollution mitigation, were used by some participants to enhance internal conservation planning, and for others to determine areas best suited for new development and resource-based projects. Data pertaining to people and their activities included demographic data on population trends and workforce readiness, as well as trails and recreation data, visitor use data, and private land use data. The format and collection method for these types of data varied, including data extracted from federal census, participant-led collection of location-specific use data, and data aggregated from other local organizations.

Perspectives on existing trend data

Participants expressed the importance of data related to changes in human, ecological, and landscape systems over time. Data on ecological trends, specifically in wildlife populations, forest health, water quality and wild rice yields, were described by participants as useful in both planning and evaluation processes. Similarly, landscape scale trends such as erosion data, land use changes, and shifts in topography over time were described as helpful in planning restoration and development projects, and also in measuring the success of past conservation and restoration initiatives. Data detailing changes in demographics – both population broadly and workforce specifically – were described by some participants as useful for understanding longer-term development trends and securing industry investment in the region. Interviewees also described outdoor recreation visitor behavior trend data as useful for both projected marketing efforts and evaluating past initiatives. Many participants expressed interest in better trend data pertaining to natural resource risks. Primarily interviewees described a need to better understand the urgency of different threats, and how those threats might reverberate through an ecological or social system over time

Challenges and limitations with existing data

Participants described several challenges with existing data, which were organized into three broad categories: accessibility of data, technical ability required to analyze data, and limited availability of data overall. Participants expressed challenges to accessing data such as the costs of acquiring good data and certain types of data not existing in digital formats – specifically surface and mineral title data and maps. Some interviewees described challenges associated with a lack of awareness of what data were available, and the challenges of parsing available data to access the appropriate data layers, types, or

scales. Additionally, participants described procedural or organizational challenges to accessing data. The need to build relationships with other organizations, barriers to getting information from private entities, and the tendency for some organizations and agencies to be territorial about data were all described as limitations to accessing existing data.

Participants also described challenges related to accessing and using data due to the limited technical ability of staff members. ArcGIS was mentioned as a tool requiring specific training and abilities, and some interviewees expressed frustrations in using ArcGIS to its full potential, because they were self-taught, or others in their organization were self-taught. Some participants also described difficulties using data from particular sources or platforms, mainly federal data and the National Wetlands Inventory and Soils web applications.

Some challenges described by participants were linked to the lack of certain types of data overall. Interviewees mentioned needing finer scale ecological data, sediment source data, data on water quality trends, and data to describe and assess the linkages between natural systems.

Credibility

Data credibility was also a concern for some participants, with credibility often in the eye of the beholder. Interviewees voiced concerns about the skewing of data due to political agendas, selective modeling inputs, or particular end goals; the concerns of those from the public sector focused on private data, and those from the private sector focused on public data. Participants expressed a desire for transparency in the sources of data and how they were collected. Additionally, public data – particularly geologic data -- were described by some users as collected using old technology or infrequently updated.

Data sharing

Some participants reported a willingness or public mandate to share data. Others expressed a need to limit data sharing in order to maintain a competitive advantage, protect culturally sensitive data, or a preference for sharing data outputs over raw data. The sharing of data outputs – maps, models, and graphs – was more frequently mentioned than sharing raw data. Reporting was a large part of output sharing for many participants, including internal reports, reports to funders, agencies, and the community. Participants working in the private sector described being unlikely to share outputs because of legal ramifications associated with any potential market manipulation.

Perspectives on digital tools

Existing tools: attributes and examples

Participants were asked what display or analysis tools they use to visualize, synthesize or manipulate data and what the best and worst things are about those tools. Tools listed included: ArcGIS, Google Earth, Vulcan and LeapFrog software, HubSpot, Northland Connection, Minnesota Board of Water and Soil Resources (BWSR) pollution reduction calculator, MidsLids, Excel, River Morph, Computer-Aided Design (CAD), MN GIS and MN Compass. A few participants described hiring contractors to do complex

analysis rather than conducting analysis in house. Some participants also mentioned using maps to make decisions, specifically mining, zoning, land use, and wetland maps.

When asked to describe the best things about existing tools, participants mentioned 3D visualizations, site-specific outputs, and easy production of outputs for reporting and visual aids. When describing the worst things about existing tools, participants mentioned difficulty in loading all useful data onto one platform, the need for special training to adequately use existing tools, challenges when different organizations use different tools, and the concern that existing tools may allow data to be manipulated or skewed.

Envisioning an ideal online digital tool

When asked to envision a data tool specifically for their work, participants described a range of ideal processing and modeling abilities, ability to input new data types, and high quality outputs. Some participants envisioned a digital tool with the ability to perform complex syntheses of data types, specifically allowing for the weighting of different types of data, ability to visualize cumulative impacts, and the capacity to overlay diverse kinds of data, for example visitation and weather data. Modeling capabilities were also mentioned by a number of participants, primarily regarding climate change, streams, and stormwater and sanitation. Some participants envisioned a tool with scaling abilities -- both the ability to visualize multiple scales of view at once, and the ability to generate site-specific visualizations to produce a "snapshot" of resource conditions. A few participants hoped for a tool that could incorporate specific types of data, including spectral analysis calibrated for specific land cover, including wild rice, digitized mineral rights and maps, and occupancy data. One participant summarized their ideal tool as "like Northland Connection, but better."

Quantitative Survey Findings

At the conclusion of each interview, participants were asked to complete a two-question quantitative survey. Participants were asked to rank the factors that might influence their use of the Natural Resource Atlas. Table 2 shows the results for the question "What natural factors would most affect your use of the Natural Resource Atlas for Northeastern Minnesota?" The factor ranked consistently as "most important" was "content and transparency," a dimension of credibility. Measures of data relevance were consistently ranked of high importance, with "relevance of outputs to my work" as the second highest ranked factor overall. Availability of data and ease of use were also rated highly by participants.

Table 2. Factors that my influence the use of a Natural Resource Atlas

What factors would most affect your use of the Natural Resource Atlas for Northeast Minnesota?	n	Mean °	St Dev
Content and transparency [c]*	10	4.10	3.34
Relevance of outputs to my work (e.g., maps) [r]	10	4.40	2.91

		N	Mean	SD
Data format [r]		10	4.70	2.21
Scale relevance [r]		10	4.80	2.74
Availability of data [u]		10	4.80	3.55
Ease of use [u]		10	5.00	2.65
Ability to customize outputs [r]		10	5.60	2.46
Ability to use in outreach and other communication [u]		10	6.20	3.39
Shelf-life of data [u]		10	6.80	3.39
Documentation of models used [c]		10	8.30	2.36
Peer-reviewed citations supporting data tool [c]		10	8.60	3.098

°Duluth atlas post-interview survey. Ranked importance on a scale of 1-11, with 1 being most important, 11 being least important. The lower the mean, the higher the importance.
¨[c] credibility, [r] relevance, [u] usability

The second survey question was "How do you think you would use the Natural Resource Atlas?" Participants overall were most likely to use the Natural Resource Atlas to identify ecologically sensitive and culturally sensitive areas. Identifying the mineral potential of lands had the third highest rating, followed by identifying areas for urban development, and prioritizing land to set aside for conservation.

Table 3. Potential uses of Natural Resource Atlas

How do you think you would use the Natural Resource Atlas?	N	Mean*	SDª	Not at all likely	Somewhat likely	Moderately likely	Very likely
How likely would you be to use the Atlas to identify ecologically sensitive areas?	10	3.30	1.05	10%	10%	30%	50%
How likely would you be to use the Atlas to identify culturally sensitive areas?	10	3.20	1.03	11%	11%	33%	44%
How likely would you be to use the Atlas to identify mineral potential of lands?	10	2.80	1.22	20%	20%	20%	40%
How likely would you be to use the Atlas to identify areas for urban development?	10	2.50	1.26	30%	20%	20%	30%
How likely would you be to use the Atlas to set priorities for setting aside land from development for conservation?	10	2.20	1.03	30%	30%	30%	10%

Source: Questions 2a-2e; Duluth Digital Atlas

*Responses based on a 4 point scale from not at all likely (1) to very likely (4). The higher the mean, the more likely the use.
ª SD=Standard deviation

Conclusions

Based on interviews with 11 representatives of organizations who are active in northeastern Minnesota in natural resource decision making, some specific recommendations for the Natural Resources Atlas emerged. First, end users would benefit from a clear statement of the Atlas website and analysis tool's purpose with supporting detail of what the Atlas does and does not do. Transparency around data quality and certainty is important. Second, end users desire a comprehensive and easy-to-navigate list of data and data layers that are available through the Atlas with notations of their original sources. Third, to increase usership, a statement of how the Atlas meets currently unmet needs—in enhancing data and output sharing, strengthening coordination and cooperation within and across organizations, and in building capacity in organizations with limited resources. Finally, target users would like a tool that has useful and aesthetically pleasing output capabilities. Participants described specific value in a tool that can produce graphs, charts, and maps with high resolution, easy labeling, and sharp-looking design.

Appendices

Appendix A: Phone Contact Script

Natural Resource Atlas for Northern Minnesota

Script for Initial Contact

"Hello, my name is _____, and I am a graduate student conducting research on natural resource decision-making and digital tools usage among organizations that have been identified as potential end users of the Natural Resource Atlas for Northeast Minnesota, which is being developed by the Natural Resource Research Institute of the University of Minnesota Duluth, in collaboration with other university researchers. This involves creating a web-based digital tool that will "facilitate informed communication and decision making by industry, agencies, non-profits, and the general public", turning "data into useful information" for potential uses like "the identification of mineral, forestry, water and tourism opportunities; the identification of areas that should be considered for ecological restoration or enhanced protection; and the provision of scientifically sound data to industry, agencies, and the public." I am working for Mae Davenport, Associate Professor in the Department of Forest Resources at the University of Minnesota, who is heading up the social science component of the project. I know the NRRI has contacted you previously about this project and the possibility of an interview; would you be willing to meet next week for a 30-60-minute interview to share with me details about your work and how you make decisions and prioritize projects on a day-to-day basis? Would you be willing to schedule a time to speak in-person next week?"

If yes: "Thank you. Now, being based out of the Twin Cities myself, next week I'm hoping to travel to Duluth and the Iron Range to conduct several interviews. This has the potential to make scheduling a little tricky, which is why I'm going to ask you about specific days times rather than your availability more broadly (which is what I would otherwise do). Regardless, I'm really hoping to be able to meet at a time that's convenient for you. Would you be available _____? (Set date, time, and location). I am going to send you a confirmation email with date, time and location information of the interview. The email will also include all of my contact information, in case you have any questions or concerns in the meantime. The email I have on file for you is: _____; is that correct? And, in case I am experiencing some kind of hold-up or having trouble locating your office the day of the interview, is this the best phone number for you?

a.   If yes, "Thank you. I look forward to meeting with you."

b.   If no, "What would be the best email address to use to get in touch with you?

c.   If no: "Ok, thank you for your time. Good bye."

If they seem unsure: "Just to be clear, participation is completely voluntary and if you decide to participate you can withdraw at any time. Your identity will remain confidential and we won't include any information that would make it possible to identify you in any related report we produce. We're only talking to a limited number of potential target users, so capturing your perspective is pretty

important to us. Can I ask what you concerns about participating might be?" (Try to address their concerns.

If they want to know why they are being asked to participate: "After gaining an understanding of I've been conducting background research and see that you are a [position in organization] OR [Name of person] recommended I contact you. Since we are only able to conduct a limited number of interviews, capturing your perspective is important."

If they want to know how the information will be used: "We are trying to understand the critical capacities that communities need to respond to water resource problems. We'll be putting together a final report that identifies community needs and assets to share with community leaders, educators and water resource professionals. You information will be kept confidential and there will not be any identifying information in the report."

If they want to know what the study is for: "This project is aimed at understanding the critical capacities communities need to respond to water resource problems. We're collecting social data to assess the needs and opportunities in your community and identify strategies that could be used to address community problems. This will lead to an improved understanding of local perspectives around water resource management."

If they want to know who is supervising the research: "Mae Davenport is the supervisor for the interview portion of this project. She is an associate professor in the Department of Forest Resources at the U of M. If you would like to contact her directly I can give you her phone number [612-624-2721] or email address [mdaven@umn.edu]."

If they ask about IRB: The research project has been approved by the IRB/Human Subjects Committee.

Appendix B: Interview script and questions

Natural Resource Atlas for Northeast Minnesota Development Needs Assessment

Interview Guide, updated July 13, 2017

1. To start, please tell me a little about the work you do in your organization.

2. What types of information or data are most important to your work?
   A. How do you put that information to use?
   B. Do you use trend data to inform your priorities and decisions? Why or why not?
      - If you do use trend data, how often do you use it and in what way?
      - How valuable is trend data now or would it be in the decision-making process?

3. What are some of the biggest challenges or limitations you face in getting or using the data you need to make decisions or set priorities?
   A. Is the information you need available?
   B. Are the data sources credible?
   C. Is it in the appropriate scale?
   D. Are the data easy to use?

4. What display or analysis tools do you use to visualize, synthesize or manipulate data?
   A. What are the best things about those tools?
   B. What are the worst things about those tools?

5. What are some of the data outputs (e.g., maps, tables, statistics, new data layers) of your work?
   - Do you share data outputs with others inside or outside your organization?

6. Do you share data with others inside or outside your organization?

7. If you could customize a data tool specifically for your work (e.g., acquiring, displaying, and analyzing data), what would that tool look like?
   - How would it differ from the tools you are using now?

Appendix C: Survey and background information questions

Natural Resource Atlas for Northeast Minnesota Development Needs Assessment

Background Survey Form, updated July 13, 2017

To answer the first two questions on this survey, please read the description below.

The Natural Resource Atlas for Northeast Minnesota will be a web-based tool and database that will facilitate informed communication and decision making by industry, agencies, non-profits, and the public. The Atlas will use a flexible Geographical Information System that allows complex environmental issues to be investigated thoroughly from multiple viewpoints. The Atlas will integrate data from multiple disciplines including geology, biology, ecology, and the social sciences; information will cover topics associated with minerals, forests, water quality, climate, land use, infrastructure, and population demographics. It will help to highlight and visualize the interdependencies between these different data through maps, graphical and tabular summaries, as well as the application of statistical methods. The Atlas will also include a robust Decision Support System to enable users to apply knowledge gained in decision making.

1. **What factors would most affect your use of the Natural Resource Atlas for Northeast Minnesota? Please rank the following factors based on their importance to you in evaluating a new data tool on a scale from 1 to 11, one being most important, 11 being least important.**

Dimensions	Factors	Ranking (1-10), 1 = most important, 11 = least important
Credibility	Content and transparency	
	Documentation of models used	
	Peer-reviewed citations supporting data tool	
Relevance	Scale relevance	
	Data format	
	Relevance of outputs to my work (e.g., maps)	
	Ability to customize outputs	
Usability	Availability of data	
	Ease of use	

	Shelf-life of data	
	Ability to use in outreach and other communication	

2. How do you think you would use the Natural Resource Atlas?

How likely would you be to use the Atlas to…	*Not at all likely*	*Somewhat likely*	*Moderately likely*	*Very likely*
Identify areas for urban development	☐	☐	☐	☐
Identify mineral potential of lands	☐	☐	☐	☐
Set priorities for setting aside land from development for conservation	☐	☐	☐	☐
Identify ecologically sensitive areas	☐	☐	☐	☐
Identify culturally sensitive areas	☐	☐	☐	☐

3. What organization(s) do you work for? _____

4. What is your position there? _____

5. How many years have you worked for this organization? _____

6. In what geographic area do you primarily work or have responsibility for in your work?

_____

7. In what year were you born? _____

8. What is your gender? *(Please check one option)*
- ❑ Male
- ❑ Female
- ❑ Other
- ❑ Prefer not to respond

9. What is the highest level of formal education you have completed? *(Please check one option)*
- ❑ Did not finish high school
- ❑ Completed high school
- ❑ Some college but no degree
- ❑ Associate or vocational degree
- ❑ College bachelor's degree
- ❑ Some college graduate work
- ❑ Complete graduate degree (Master or PhD)
- ❑ Prefer not to respond

10. Do you have any other comments about the development of the MN Atlas Data Tool?