Codebook: Lake Champlain Basin Water Quality Policy Implementation Networks in Vermont

Data Context: Water Quality Management in the LCB

Vermont continues to struggle to meet its Clean Water Act requirements within the Lake Champlain Basin (LCB). Recent events, including the overturning of Vermont's phosphorus TMDL in court, and the imposition of a new TMDL in 2015/2016 have heightened the attention placed on this issue. The Research on Adaptation to Climate Change (RACC) project's objective is to provide research to enhance the understanding of the water quality issue in the LCB and the relation of this issue to climate change.

The University of Vermont, through Vermont EPSCoR and a grant provided by the National Science Foundation (EPS-1101317), has conducted two surveys of the organizations involved in making and implementing water quality management policy in the LCB. Governance in the Lake Champlain Basin consists of partnerships between private, non-profit, and public entities at all levels of the government (Osherenko, 2014; Scheinert, Koliba, Hurley, Coleman, & Zia, 2015). Organizations were identified through an extensive qualitative case study approach, using a mixture of interviews, focus groups, and mediated modeling sessions to identify the relevant organizations in the LCB. A total of 207 relevant organizations and governmental programs were identified using this process.

Potential participants were identified in advance by first identifying the appropriate organizations to include in the survey. Participants were selected from organizational staffs and approached through individual outreach. Each participant who responded to the outreach effort either completed the survey for their organization or referred our outreach team to another contact at that organization. Participants who agreed to complete the survey were provided with a personalized link to an online survey containing 18 questions, many with sub-parts. The survey was conducted in 2014 (Scheinert et al., 2016) and again in 2015.

Questions 1 and 2 were used to verify identities and organizational affiliations. Results from these questions are not provided here, in accordance with IRB requirements. Questions 3-6 ask about organizational characteristics, particularly staffing and budgets. Questions 7-13 ask about organizational activities, are coded is 2-mode network matrices, and are reported in the 'Bimodal matrices' datasets. Questions 14 and 15 ask about organizational interactions. The results are coded as unimodal network data and are reported in the 'Edgelist' and 'NSQ' datasets. Questions 16-18 pose hypothetical questions about organizations' expected responses to potential policy interventions. Questions 3-6 and 16-18 are reported in the 'Survey' datasets. Finally, organizational characteristics, including capacity, sector, jurisdiction, and jurisdictional level are reported in the 'Org Data' dataset.

Data Files

- Organizational data: "LCB WQM Org Data.xlsx"
- Network Datasets:

    - "LCB WQM NSQs 2014.xlsx"
    - "LCB WQM NSQs 2015.xlsx"
    - "LCB WQM Edgelists 2014.xlsx"
    - "LCB WQM Edgelists 2015.xlsx"
    - "LCB WQM Bimodal matrices 2014.xlsx"
    - "LCB WQM Bimodal matrices 2015.xlsx"
- Additional survey datasets:
    - "LCB WQM Survey 2014.xlsx"
    - "LCB WQM Survey 2015.xlsx"

LCB WQM Organizational data

The survey identified 207 organizations that participate in the LCB Water Quality Management network (LCB WQM Network). Each respondent represented one organization and the survey contained a complete of organizations involved, organized as an alter roster. The organizational dataset contains the list of organizations and their attribute data, coding in the follow variables:

- System number: unique identifier for each organization in the list
    - Number has alphanumeric labels for the organization's *Group, Capacity, Sector, Jurisdiction, and Capacity*
    - Organizations were sorted by their official names. A count was taken for organizations with the same alphanumeric identifier, based on the organizational attributes listed in the preceding bullet. Organizations were then assigned two-digit count numbers, starting at '00' for the first-listed organization with that alphanumeric identifier. This produced a unique system number for each organization.
    - Organization names are omitted, in compliance for IRB requirements to protect the identity of survey respondents.
    - The order for the letter and number go in order from letter, category 1, 2, 3, and then 4. An example: A government organization (**G)** consisting of 50 employees with a budget of $10,000 (**2)** which works on research (**8**) within Vermont (**1)** Counties (**3)** would be anonymized to be **G2813**. An additional two digits would be added afterwards to account for duplication. If there are 15 other organizations that have sequences of G2813 than 01-15 would be added to the end of their sequence; G281301 – G281315. If there are no duplications than 00 were added to the end.
- Group
    - Organizations were identified by a broad group assignment. This was used to group organizations during the survey process
    - Values include:
        - Government programs
        - NGOs and other non-governmental regional and state-wide organizations
        - Winooski-basin organizations
        - Missisquoi-basin organizations

    - Values were assigned based on the institutional role that organizations play in the LCB WQM network
- **2014 Completed**: whether or not this organization completed a survey during the 2014 survey process
- **Capacity**: A measure of the organization's size. See list of values and their definitions below
- **Sector**: This variable identifies non-overlapping categories for the legal and economic category into which an organization fits. It is based on the 3-category model of economic sectors (public, private, non-profit). See the list of values below.
- **Jurisdiction**: This variables records the political jurisdiction in which an organization is located and operates. See the list of values below.
- **Jurisdictional Level**: This variable records the geo-political scope over which an organization's actions have an impact. See the list of values below.

Organizational Coding Scales

System Number Lettering

G – Government
N – Non-Governmental Organization
W – Winooski
M – Missisquoi

Organization Capacity (Scheinert, 2012)

1: Very small organizations (all jurisdictions)

- Those with expected staffs of around 10 members or less
- Groups of insufficient size to maintain a website or web presence

2: Small organizations (all jurisdictions)

- Organizations that would staff up to about 50 people or budgets in thousands to 10s of thousands of dollars, annually
- Includes local-level government offices
- Small staff state-level organizations
- INGO's that only function or can only function in one location at a time

3: Medium sized organizations (all jurisdictions)

- Staffs between 50 and 100 or budgets at or exceeding $500,000/year
- Includes state-level political parties
- State-level agencies
- INGO's working in a limited number of countries

4: Large domestic organizations and large international organizations (not government)

- Large staffs or budgets exceeding $5,000,000/year
- Organizations backed by a single foreign government
- INGO's working in many countries

5: Large international organizations (public only) that draw on resources of multiple governments, allowing for budgets of many millions of dollars per year

Sector (Koliba, Reynolds, Zia & Scheinert, 2015)

1. Federal Governing Actors
2. State/Provincial Governing Actors
3. Regional/Geo-governing Actors
4. Local/Municipal Governing Actors
5. Private (For-Profit) Enterprise
6. Non-Governmental and Non-Profit Organizations
7. Citizen Actors
8. Research Actors
9. International Governing Actors

Jurisdiction (Koliba et al., 2015)

1. Vermont
2. New York
3. Quebec
4. US
5. Canada
6. International

Last resort codes:

7. (Aggregate Sector-Identified Actors (Identifiable Sector but no jurisdiction))
8. (Unclear or otherwise unusable jurisdiction information)

Jurisdiction Level (Comfort, Oh, Ertan & Scheinert, 2010)

1. Village/Sub-town
2. Town/Municipality
3. County
4. Sub-state regions (example: RPCs)
5. Watershed
6. State
7. National
8. International

Network Datasets

Non-Square Networks and Edgelists

Each participant who took the survey was asked to rank their involvement with each of the other 206 organizations through five different types of interaction. The ranking system consists of three numbers: 0 – No interactions, 1 – Non-routine interactions, and 2 – Routine interactions. The five types of interaction, or subnetworks (Scheinert et al, 2015), are:

- Information Sharing
- Technical Assistance Provision
- Reporting to
- Financial Resource Sharing
- Project Coordination Collaboration

Once collected, network data were coded into two different formats. First, data were coded into a series of non-square network matrices, labeled as "NSQs" for "non-square's." Each NSQ contains the data for one subnetwork in one year, either 2014 or 2015. The rows represent respondents' answers to the survey. The columns represent respondents' potential partners. This format provides a cleaned version of the raw survey results for network interactions. This format is most useful as a tool for creating networks limited to just those organizations that interact with any one policy tool, action arena, or domain (see below).

Second, the data were coded into edgelists, following the standardized format for network data. Each edgelist contains all the network links, or edges, observed in one subnetwork in one year. The edgelist files are labeled as such.

Bimodal Matrices: Policy Tools, Action Arenas, Domains, and Accountability Mechanisms

Along with being asked for their interactions with other organizations, survey respondents were presented with lists of policy tools, action arenas, policy domains, and accountability mechanisms. For the action arenas, domains, and accountability mechanism, respondents were asked which items on the list which with they engage. For policy tools, the question was asked in three parts:

1. Policy tools that the respondent's organization uses
2. Policy tools where the respondent's organization facilitates other organizations' use of the tool
3. Policy tools that are used on the respondent's organization

Each list of tools, action arenas, domains, and accountability mechanisms was then coded as a separate bimodal network, linking the respondent's organization to the indicated tools, arenas, domains, and accountability mechanisms. Each matrix contains either one set of the three types of tool relationships listed above, the action arenas, the domains, or the accountability mechanisms. Each row is one survey response. Each column is one item on the appropriate list, either a tool, arena, domain, or mechanism.

Policy Tools

- Community Action
- Conservation Easements
- Contracting
- Cost Sharing
- Grants
- Litigation
- Loans/Guarantees
- Permitting
- Public Information
- Regulation Enforcement
- Tax Incentives
- Technical Assistance

Action Arenas

- Lake Champlain Basin Program (LCBP) planning and reporting, including the Executive committees, TAC, and CAC activities and State of the Lake and Opportunities for Action reports
- EPA-Initiated TMDL, including monitoring, modeling, drafting, State MOU, Joint DEC-AAFM Agricultural Work Group ("Ag Workgroup"), and implementation
- Vermont Tactical Basin Planning (TBP) committees, including the former watershed councils, and implementation
- Regional Planning Commission (RPCs) regional planning activities
- Municipal stormwater management and technical assistance provision
- Agricultural technical assistance provision
- Transportation infrastructure project planning and implementation
- Legislative committees in the Vermont State House and Senate covering agriculture
- Legislative committees in the Vermont State House and Senate covering natural resources, water resources, and energy
- Legislative committees in the Vermont State House and Senate covering economic development
- Legislative committees in the Vermont State House and Senate covering transportation
- The Vermont Green Infrastructure Roundtable, including the Google Group, Steering Committee, and Working Groups

Policy Domains

- Agricultural land management
- Wastewater
- Stormwater runoff
- River corridors

- Forestry
- Development

Accountability Mechanisms

- Feedback from federal, state or local elected officials
- Feedback garnered from public hearings, citizen input and other forms of citizen participation
- Outcomes of court cases or quasi-judicial rulings
- Feedback from shareholders or owners of your organization
- Feedback from consumers of your services
- Direct oversight from an administratively superior organization or unit
- Professional codes of conduct, principles of best practice
- Feedback from peer or partnering organizations or units

Additional Survey Data: "LCB WQM Survey 2014.xlsx" and "LCB WQM Survey 2015.xlsx"

These datasets contain the data for questions 3-6 and 16-18 for the respective survey year, either 2014 or 2015. All missing data is coded as '-99' and represents a non-answer from the survey respondent. These data are coded using the following variables:

anon.id: the anonymous ID assigned to the respondent's organization

q3: "How many people does your organization employ full time?"

1. Less than 5
2. Between 5 and 10
3. Between 10 and 20
4. More than 20
5. Decline to Answer

q4: "How many people does your organization employ part-time?"

1. No part time workers
2. Less than 10
3. Between 10 and 20
4. Between 20 and 30
5. More than 30
6. Decline to Answer

q5: "Does your organization utilize any support from volunteers?"

0. No
1. Yes
2. Decline to Answer

q6: "What is the size of your organizational annual budget?"

1. Less than $50,000

2. More than $50,000, less than $100,000
3. More than $100,000, less than $500,000
4. More than $500,000, less than $1,000,000
5. More than $1,000,000
6. Decline to Answer

Q16: "In what ways would you anticipate your organization responding to the following interventions? Would your organization pursue any of the following strategies?"

Question 16 asks about organizations' potential responses to interventions. It is designed to elicit information about how organizations would change their programmatic activities in response to each intervention. Each question asks about a different intervention:

- **q16a**: Enhance an agronomic technical assistance program using case management approaches to farm outreach whereby teams of technical assistance providers drawn from a variety of federal, state, local and nonprofit providers work together to coordinate all efforts to promote farm productivity and ecosystem services.
- **q16b**: Develop incentives and market mechanisms to promote technologies to reclaim phosphorus from farms, runoff, wastewater, and solid waste.
- **q16c**: Expand the resources dedicated to programs at ANR-DEC and AAFM-ARM to enforce existing regulations.
- **q16d**: Expand the coverage of stormwater management regulations for transportation networks, municipalities, and private landowners while extending standards and requirements, such as requiring the use of green infrastructure and low impact development.
- **q16e**: Tax imports of high-phosphorus fertilizers and animal feed, the proceeds from which will be used to fund programs in ANR-DEC and AAFM-ARM that protect water quality.
- **q16f**: Where nutrient management plans are required, require farms to assess their use of imported nutrients in an effort to decrease overall regional nutrient imports.
- **q16g**: Restructure cost share, loan, and grant program application processes at state and federal agencies to remove obstacles and reduce the burden on applicants applying for these programs.
- **q16h**: Increase the amount of money available at state and federal agencies for loan, cost share, and grant programs such that all water quality-related programs at ANR-DEC and AAFM-ARM can be fully funded for program applicants and operations.
- **q16i**: Refocus decision making about water quality planning to regional- or watershed-level organizations, such as regional planning commissions, that are a better match to the regional and watershed level scope of land and water resource management.
- **q16j**: Fund a public source of information on Best Management Practices (BMPs) for agriculture, stormwater, wastewater, forestry, development, and river corridor management for organizational decision support around water quality and the provision of ecosystem services at the tactical basin level.
- **q16k**: Expand investments in Vermont's Better Backroads program for backroads construction and maintenance.
- **q16l**: Fund a statewide program that incentivizes increasing water storage capacity on farmland to aid in flood mitigation.

- **q16m**: Expand funds dedicated to researching creative technological solutions such as bio-mimicry.
- **q16n**: Develop a market for distributing and trading permits for phosphorus loading.

The data for variables q16a-q16n are coded using the following ordinal scale. All the variables for question 16 use this same scale:

1. Decrease programs affected by the intervention
2. No changes
3. Pursue related opportunities to continue existing efforts
4. Adjust current programs
5. Establish new projects or programs

Q17: "In what ways would you anticipate your organization changing partnerships to respond to these changes?"

For q17a-q17n, each respondent was presented with an interaction and given three options for how to respond. Respondents then indicated whether or not they thought their organization would respond in that way. Interventions are represented by the letters, *a-n*, in the question name and correspond to the letter assigned to each intervention in Q16. Response options are number 1-3 and represent options for how organizations might adapt their choice of network and interaction partners:

1. Seek New Clients
2. Seek New Partners
3. Seek New Sponsors

All q17 variables are coded as dummy variables; a 0 indicates that an organization would not take the indicated action in response to the indicated intervention while a 1 indicates that an organization would take the indicated action in response to the indicated intervention. For example, a code of 1 for variable q17a1 would indicate that the respondent thinks their organization would seek new clients in response to a policy to enhance an agronomic technical assistance program using case management approaches to farm outreach whereby teams of technical assistance providers drawn from a variety of federal, state, local and nonprofit providers work together to coordinate all efforts to promote farm productivity and ecosystem services.

q18: "Finally, we recognize these last questions are hypothetical and subject in nature, so we would like to know how confident you feel about your responses. Please rate your confidence from 1 to 5, with 1 being little or no confidence and 5 being very high confidence."

Values for q18 are scaled from 1-5 to represent respondents' confidence in their answers for questions 16 and 17.