LIVING THE TAME LIFE IN WICKED TIMES - ENVIRONMENTAL AND NATURAL RESOURCE MANAGEMENT IN A RAPIDLY CHANGING WORLD

By

Patricia Ann McKay

A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

Community, Agriculture, Recreation and Resource Studies – Master of Science

2013

ABSTRACT

LIVING THE TAME LIFE IN WICKED TIMES - ENVIRONMENTAL AND NATURAL RESOURCE MANAGEMENT IN A RAPIDLY CHANGING WORLD

By

Patricia Ann McKay

Improved environmental and natural resource (ENR) outcomes rely upon the integration of natural, social and economic systems. This research attempts to close gaps in the literature from both an academic and applied research approach - filling what appears to be one of the largest questions left in the literature: *How to transform to a more sustainable paradigm that can better tackle wicked problems for more durable ENR outcomes?* This research develops and tests a comprehensive best practice governance model for improved outcomes where practitioners operate in a highly technical arena that is quasi-legislative and quasi-judicial in executing public laws and programs. The governance model was adapted and derived from an integration of business, governmental and non-governmental models (i.e., the Natural Resource Based View, Hart, Milstein and Caggiano, 2003; United Nations (2011) governance criteria; the National Research Council (1996) participatory decision deliberation process). These models recognize the importance of both scientific analysis and personal value systems in advancing solutions for wicked problems. This research used a complex governmental program to compare current perceptions and preferences for capacities to improve ENR outcomes from internal and external governmental perspectives.

DEDICATION

This research is dedicated to the future of humanity and Dr. James H. McKay.

ACKNOWLEDGEMENTS

I am forever grateful to my advisor Dr. Christine Vogt and committee members Dr. Patricia Norris and Dr. Laurie Thorp. Each of these committee members helped me navigate my lifelong learning and academic pursuits at Michigan State University after spending decades as an environmental practitioner. Each committee member brought diverse perspectives that helped implement this exploratory study that is both quantitative and applied. Dr. Sandra Batie, a scholar of wicked problems and applied knowledge of state ENR programs, and Dr. Vogt were instrumental in assisting me define the scope of this study.

I am also grateful for the support of my former colleagues, the research partners at Michigan Department of Environmental Quality, survey respondents, my dear supportive friends, and my family. Without their support, this study could not have been conducted.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

KEY TO ABBREVIATIONS

CSI - Collaborative Stakeholder Initiative

ENR - Environmental and Natural Resource

IRB - Institutional Research Board

MDEQ - Michigan Department of Environmental Quality

NRBV - Natural Resource Based View

RBT - Resource Based Theory

RRD - Remediation and Redevelopment Division

SES - Social-Ecological Systems

TAPs - Technical Assistance Team

CHAPTER 1
INTRODUCTION

The context of environmental and natural resource (ENR) issues, policies and programs continue to evolve given the dynamic challenges and resource limitations of today, while safeguarding the environmental health and quality of life for current and future generations. With improved communication and transportation, the nation evolved from a subsistence and agrarian culture to hierarchical structures and segmented and technology driven industrialized markets (Tedlow, 1990). The market externalities (e.g., degradation of air and water quality) rose to the level of public concern. As the nation evolved, rigorous ENR protection standards and statutes were passed in the late 1970's and 1980's (Menon and Menon, 1997). Historically handled as contentious but a relatively separate and distinct domain (i.e., not integrated with other domains), ENR problems have since evolved into complex matters that are tied to socio-economic domains. Environmental advocacy and business interests became contentious at times with some viewing traditional environmental regulations as having questionable success rates (Menon and Menon, 1997).

Addressing complex and evolving matters exceed the forecasting and management capacity of any one sector or jurisdiction. ENR management is no longer able to hide behind the cloak of pure science; ENR management has been pushed into the realm of socio-economic policy. Unlike easy problems, these problems may not be solved. The cross domain-cutting problems call for new theories, management approaches and skill sets to tackle complex risk-based issues. Trade-offs and negative consequences are

likely inevitable (Keeney, 2002). Rittel and Webber (1973) call these complex issues wicked problems.

To illustrate these phenomena a brief history of the studied program is provided. In response to the state of Michigan's growing number of sites of uncontrolled contamination (approximately 10,000 known sites in 2010), hundreds of millions of dollars were spent on studies associated with the contamination. At the same time, few legacy sites reached the stage where risks to human health, safety, welfare and the environment were being reduced. The regulatory focus was on getting the site specific diagnosis right through the science or technology, with little priority during the investigation phase on reducing overall relative risks. The focus on understanding the full nature and extent of the contamination allowed contamination to remain unabated in the environment. The state's approach to contaminated site management cost the program necessary support and allowed contamination to spread during the investigation stage, prolonging human and environmental exposure and increasing cleanup costs.

Much like other parts of the nation, many businesses were beginning to address their operational externalities. There was also increasing pressure on Michigan's government by stakeholders and its Governor to deliver improved and integrated ENR outcomes given increased demands on Michigan's limited resources. Numerous stakeholder processes were undertaken in the state since the mid 1990's that identified similar problems, but with little ENR improvement. Michigan's governor called for the re-invention of government in a 2011 ten-point initiative. Part of that initiative was an employee survey that identified the largest portion of ENR employees (48%) as being

critical of the agency and difficult to lead, while having the greatest opportunity to convert to motivated program champions (PricewaterhouseCoopers LLP, 2012). However, many program leaders lamented that they did not know how to transform their employees or the programs to improve staff morale or ENR outcomes. Michigan, as with other states and nations, entered into 'uncharted waters' as cultures evolved from the industrialized era to one which is more interconnected and globalized with new challenges.

This thesis developed a best practice governance model for improved ENR outcomes. Current and desirable ENR program capacities were researched using this model and associated capacities. This study and contributes to the emerging bodies of research on individual capacities and organizational governance for improved ENR outcomes. The assessment of individual ENR practitioner skills sets and organizational governance will assist in the application of integrative and collaborative governance concepts. This research will assist the studied ENR program, and possibly others, in strengthening ENR program governance understanding. This study identified areas for employee and organizational governance development, and opportunities to increase awareness and knowledge of approaches and investments that lead to improved ENR outcomes in 'wicked situations and times.'

1.1. Statement of the Problem

What seemed to be lacking was a rubric for assessing capacities that support and nurture improved ENR outcomes. This research attempted to close the gap in the literature from both an academic and applied research approach – filling what appears to be one of the largest questions left in the literature: *How to transform to a more*

sustainable paradigm that can better tackle wicked problems for more durable ENR outcomes?

This study developed an improved ENR governance model and identified factors, sub-factors and specific competencies that should lead to improved ENR outcomes. This study aimed to understand current and preferred wicked ENR management capacities in an attempt to close the gaps between existing capacities and preferences for improved ENR outcomes. The development of this governance model for improved ENR was done through both literature and the author's experience. This research then tested the exploratory model and associated competencies through a study of current and preferred capacities of the previously referenced state of Michigan ENR clean up and redevelopment program. This program was identified by the state and stakeholder review process as being ripe for building capacities to address wicked ENR problems.

This research assessed the status of this program's evolution and development of contemporary skills - from solving tame problems to managing wicked problems. Three capacity factors were hypothesized to influence improved wicked problem outcomes: 1) individual performance; 2) organizational cultures and structures; and 3) the decision-making and decision-implementation processes (e.g., decision management). The four variables (the three independent variables or factors and the dependent variable - improved outcomes) included selected sub-factors and items (e.g. specific and measurable competencies.)

Figure 1 depicts the theoretical relationship among the three factors and the ability to improve ENR outcomes. When individual performance, organizational culture and

structure and decision processes align with wicked ENR management capacities, ENR outcomes should improve.

Figure 1. Wicked ENR Problem Management Capacity Factors for Improved Outcomes

The selected factors embrace and draw upon numerous emerging interdisciplinary bodies of literature to identify, define and assess best practices for individual decisions and collective action toward improved ENR governance. Theories regarding organizational management, human behavior and performance, and governance, as well as grounded research and case studies were studied and investigated to garner an understanding of best management practices associated with wicked problems. The related elements of the capacities that make up the factors are referred to as sub-factors and competencies. Competencies are the actual level of measurement that

constitutes the governance model. Figure 2 depicts the capacity scaffolding in support of the factors.

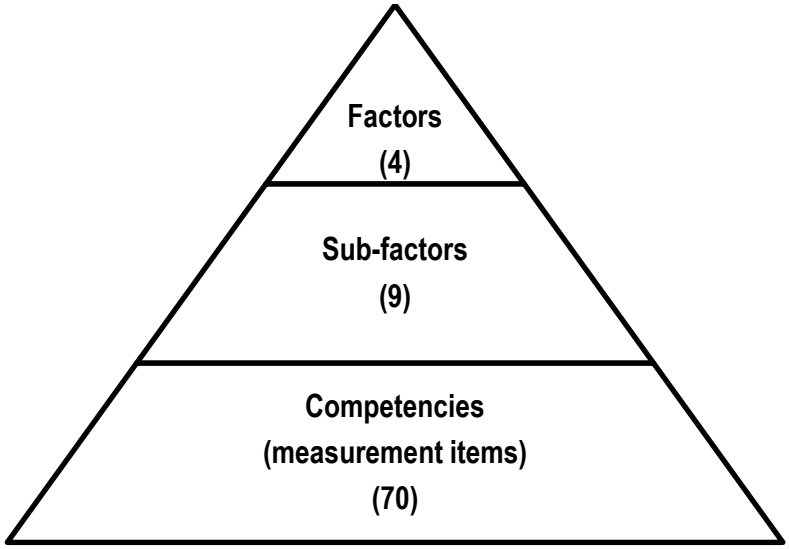


Figure 2. Capacity Scaffolding Associated with Improving ENR Outcomes

1.2. Purpose of the Study

The purpose of this study was to develop and test a governance model that may contribute to the evolution of ENR management for improved outcomes given wicked problems. Today's ENR problems reflect critically important, but often competing, social, economic and environmental values and objectives. Contemporary ENR management systems must be able to differentiate between simple and complex problems and successfully apply appropriate skill sets. Tackling wicked problems with enduring management approaches requires a large diversity in knowledge and an awareness of system dynamics - a set of related parts performing as a dynamic whole (Brown et al., 2010; Hart and Dowell, 2011; Rittel and Webber, 1973). Wicked problems can be contrasted with tame problems, which are typically solved by single disciplines using standard analytical approaches and linear solutions (Batie, 2008; Rittel

and Webber, 1973). Wicked problems derive most of their complexity in their breadth and nexus with human values (Matso et al., 2008; Patterson, 2006).

This research contributes to the emerging bodies of research regarding governance for improved ENR outcomes through:

- Exploring and defining attributes of wicked ENR problems.
- Researching and identifying qualities (i.e., capacities) of effective ENR wicked problem management.
- Identifying components of and providing an integrated ENR governance model that focuses on improved ENR outcomes.
- Identifying specific factors, sub-factors and competencies within the governance model necessary to manage wicked problems.
- Identifying and assessing individual practitioner skills sets and organizational governance applying integrative and collaborative governance concepts.

This research and the data associated with Michigan's ENR program can be used as baseline data and assist in the identification and prioritization of areas of individual employee and organizational development and barriers to improved ENR outcomes.

1.3. Significance of the Study

Governance models that link the management of wicked problems from both the structural and individual stand point to the interaction of natural, social, and economic domains are lacking (MSG and GESI, 2009). Wicked problems present new, complicated, moral, and ethically challenging issues that defy easy resolution (Lubchenco, 1998). Many contemporary problems do not fit into the classical structures or norms of progress and prosperity (Bruntland, 1987). Government's capacity to forecast, adjust and respond is being exceeded (Arvai et al., 2006; Batie, 2008). A great demand remains for understanding how organizations can affect desirable

change, while remaining relevant and competitive with the challenges that confront them (Sharma et al., 2007; Wustenhagen et al., 2008). Given the dynamic and complex social-ecological systems (SES) associated with ENR wicked problems, there remains a chasm between academic theory and operating realities (Fink, 2012; Goldsmith and Kettl, 2009; Williams, 2009). The practice of wicked problem management is moving faster than theory or models can be developed (Dunphy et al., 2007; Holliday, 2010; Schwandt and Marquandt, 2000). This highlights the complexities of delivering enhanced ENR management tools and understanding from the academy.

Additionally, numerous ENR stakeholder processes have been conducted since the mid-1990s to develop opportunities to enhance Michigan's ENR management. A number of strategies emerged from these efforts (Michigan Department of Environmental Quality and Michigan State University Extension, 2012):

- Assess the means to improve ENR management transactions to meet the current and future public interest given the changes in Michigan's economy and resource limitations.
- Maximize return on investment by focusing on those things that matter and reduce or eliminate management elements that provide little corresponding improvement.
- Encourage active and positive interactions and partnerships with the public and those affected by ENR management.
- Focus on outcomes and the measurement of progress and success.

These strategies articulate stakeholder interests and demonstrate a continuing demand for improved ENR management from an 'applied' approach.

Both academic and applied research is necessary to improve ENR outcomes. Evidence of factors that improve ENR outcomes are mainly anecdotal or based on specific and

often limited elements or studies (e.g., a narrow context or application or elements of a specific case study). New and different means to increase understanding and improve conflict resolution mechanisms are needed to address the increasingly tenuous and often contentious relationships among ENR management policies, capital accumulation, and conservation or environmental protection (Davidson and Frickel, 2004; European Environmental Agency (EEA), 2010; Metzenbaum, 2002).

While this investigation focuses on ENR management issues, it builds upon business and social science research that has studied ways of addressing wicked problems. These disciplines are further ahead of ENR management approaches and utilize integrated governance theories and approaches to address wicked matters. The interdisciplinary theory includes work by Arvai et al. (2002); Brown et al. (2010); Goldsmith and Kettl (2009); Hart and Dowell (2011); Hart et al. (2003); Kjaer (2010); Kotter (1995); MSG and GESI (2009); Rittel and Webber (1973); as well as work by numerous other scholars and the author's own governmental and policy development experience.

Taking an interdisciplinary approach, this study developed a more comprehensive ENR governance model with key competencies selected to estimate capacity indices (i.e., factors and sub-factors). This model forms a relatively comprehensive institutional governance model that assessed capacities (current and preferred) for improved ENR outcomes associated with contemporary wicked problems. This study tested this exploratory model on one governmental program using internal and external practitioners' current perceptions and preferences for the future.

1.4. Delimitations

The probabilistic governance model was delimited to key capacities and competencies for improved ENR outcomes; it was not designed to capture all capacities and competencies referenced in the literature. This governance model focused on practitioners operating in a highly technical arena that is quasi-legislative and quasi-judicial in executing public laws and programs; it was not focused on what may be referred to as the general public participation model for non-practitioners (Bingham et al., 2005).

To maintain context, this research was delimited to one complex program area within the State of Michigan's ENR program: the state's cleanup and redevelopment program. This program is charged by the executive and legislative branches with the authority to manage, regulate and fund the cleanup and redevelopment of polluted areas that are not otherwise regulated by other regulatory programs. Simply, this program is charged with addressing sites of contamination where regulations were not sufficient or where the contamination is not regulated by other more specific programs (i.e., such as a program that regulates the quality of air, soil or water, or the safe disposal of waste).

This program has been undergoing an active and visible transformation as part of the new reinvented organization (per the Governor's ten-point plan). Keeping the focus within this population will support a sufficient and meaningful data set without expanding the study scope to programs that may be in different stages of transition or transformation.

The survey scope was delimited to the identified capacity indices; it was not expanded to budgetary, or governance factors influenced by other branches of government (e.g., legislative or judicial). Nor did it include other local, state, or federal ENR programs.

The study population included presently active internal (program stewards) and external (stakeholder) professional practitioners (i.e., two sectors) of one complex State of Michigan ENR program to improve the richness and legitimacy of the data and bring internal and external views to the process, consistent with contemporary ENR governance theory. To provide a contemporary snapshot, the population did not include ENR professional practitioners who were not currently active in the complex issues associated with the program.

1.5. Limitations

This research was limited by the following factors. The studied population was not randomly selected and is likely to reflect a population undergoing transition - where a subset of the population has received more exposure to governance concepts and approaches (e.g. intervention). Therefore, there will be variability and stratification within this population complicating the generalization of the results to other populations.

The survey data reflect stewards' and stakeholders' perceptions and preferences. Perceptions and preferences are subject to framing effects, heuristics and biases and therefore do not represent absolute truths or facts (Arvai et al., 2004; Tversky and Kahneman, 1981 and 1992).

The contexts of wicked problems are typically unique (i.e., to program and culture); therefore, findings regarding capacities for improved ENR outcomes may be informative but not generalizable.

The exploratory capacities are determined by selected causation-based competencies and are based on criterion-related validity obtained through literature review (Babbie, 1989). The three independent capacity variables and the dependent capacity variables have not been tested in this manner and context before; therefore, potential unanticipated exceptions to the posited relationship proposed in the probabilistic model may occur. Being factors of an integrative governance system, the indices and selected capacities are likely to overlap and may not be separate and distinct (Graham et al., 2003). This model may need additional measurement development which is outside the scope of this proposed study.

Numerous stakeholder processes recommended modifications to the studied organization's governance processes. The population may have felt over-studied with little improvement to ENR outcomes. This factor, coupled with the questionnaire mechanism (electronic survey), may have resulted in a high level of avoidance and non-response, especially if the population or subsets of the population felt that their efforts were not meaningful or useful. Those who choose not to respond to the survey may have a different set of perceptions or preferences that would affect their survey responses and the resulting data.

The researcher has worked in this program as a state-employed environmental manager; and, as an external consultant for collaborative stakeholder processes and for

non-governmental clients. This knowledge and experience may present biases in the research, including its methodology and conclusions.

Based on recent surveys of the studied organization, the majority of employees are dissatisfied or disengaged and rather difficult to lead (PricewaterhouseCoopers LLP, 2012). This attitude may also result in non-participation or less support and acknowledgement of transitions and contemporary governance components.

Further, given the often political nature of state government, contemporary politics may influence test subjects' responses, especially since the research is associated with the Governor's initiatives to reinvent state government and the test population can be affected by frequent legislative and executive actions.

1.6. Assumptions

It was assumed that the program is undergoing transition from one that has tended toward an insular hierarchical structure to one that is more integrated, socially engaged and responsively structured to reflect network-based governance systems.

The observations leading to those assumptions include:

1) National organizational trends and the rise of non-state actors in ENR management (Chandler, 1977; Eccles et. al., 2011; EEA, 2010; Hart and Dowell, 2011);

2) Published employee surveys, regulatory review and stakeholder participation processes undertaken by the state program (MDEQ and MSUE, 2012; Michigan Office of Regulatory Reinvention, 2011; PricewaterhouseCoopers LLP, 2012); and

3) The author's understanding of the program's evolution.

Likewise, and consistent with hierarchical structures and the evolution of ENR management, the ENR program may be more adept at solving tame problems than managing wicked problems (Kjaer, 2010; Rhodes, 1999; Roberts et al., 1994).

Assumptions embedded in this research are drawn from attributes of a hierarchical structure and the assessment of the problems as if tame rather than wicked. Assumptions are based on the literature, reported stakeholder processes, published State of Michigan reports, and the author's recent participation in a collaborative stakeholder initiative (MDEQ and MSUE, 2012; Michigan Office of Regulatory Reinvention, 2011; Selin et al., 2007). These are referred to as associated assumptions and include the following:

- A heavy reliance on science at the staff level for decision-making.
- Lack of understanding that science can be biased and fallible.
- Underdeveloped use of collaboration skill sets.
- Underdeveloped use of integrative and critical thinking skills.
- Underdeveloped appreciation of the benefits of collective problem solving as a means to ensure the durability of ENR outcomes.
- Underdeveloped capacity to identify and manage wicked problems with enduring results.
- Underdeveloped capacity-building skill sets for improved wicked problem management.
- Underdeveloped systems of accountability.
- Tenuous organizational trust.
- Underdeveloped legitimacy both internal and external to the organization.
- Over reliance on centralized decision-making created unbalanced power constructs, reducing the reliance on knowledge and knowledge capacity building.
- Underdeveloped capacity to improve program outcomes.
- Transition and decision-making is hard at the individual level as individuals rely upon framing, heuristics and biases which may short circuit more enduring and sustainable approaches to wicked ENR problem management.
- Implementation and effective adaptive management strategies are likely not meeting expected improved ENR outcomes.

The underdevelopment of skill sets is not intended as a personal critique but rather a reflection of the overall organizational governance structure and culture (e.g., an employee may have a certain tested capacity, but not the opportunity to use it).

1.7. Hypotheses

This study was designed to test the following hypotheses (H) across the four capacity factors:

H1. There will be a significant difference in current and preferred capacities between the steward and stakeholder populations.

> H1a. Preferred capacities held by the steward population will be significantly higher than current capacities.
>
> H1b. Preferred capacities held by the stakeholder population will be significantly higher than current capacities.

H2. The stakeholder population will have higher expectations for government's alignment with wicked problems compared to the steward population.

> H2a. Current capacity expectations will be rated lower by the stakeholder population compared to the steward population.
>
> H2b. Preferred capacity expectations will be rated higher by the stakeholder population compared to the steward population.

H3. The studied ENR program is currently more adept at solving tame problems than managing wicked problems.

Table 1 provides a sample diagram of the research variables (i.e., factors), and the population. Also included in the table are competency categories (i.e., capacity sub-factors) selected for this study.

Each of the four factor categories includes selected specific and desirable sub-factors that further identify and define desirable ENR problem management capacity indices.

These sub-factors are comprised of specific items that reflect competencies derived from the literature review and the studied program's goals. The assessment was coded such that data could be gathered regarding both current and preferred capacities. The survey indices of the survey were scaled to reflect the capacity to tackle tame problems to wicked problems (i.e., 1-5 with capacities closer to 1 being associated with tame problems and capacities closer to 5 being associated with the capacity to manage wicked problems). Consistent with the goal of collaboration, both internal and external ENR practitioners assessed (e.g., selected a value for) the current and preferred competencies across all four capacity indices.

Table 1. Sample Diagram of the Research Variables and the Populations

Capacity IV-independent variable DV-dependent variable Scale of 1 reflects a tame problem capacity Scale of 5 reflects a wicked problem capacity	**Stewards (internal to organization)**		**Stakeholders (external to organization)**	
	Independent sample T tests (current; preferred)			
	Paired sample T tests		Paired sample T tests	
	Current (tame)	Preferred (wicked)	Current (tame)	Preferred (wicked)
Individual Performance (IV) (13 specific test competencies, scaled on a 1-5 Likert scale) Competency groupings: • Networked based governance • Capacity building	Population Mean	Population Mean	Population Mean	Population Mean
Organizational Culture and Structure (IV) (25 specific test competencies scaled on a 1-5 Likert scale) Competency groupings: • Leadership • Legitimacy • Governance	Population Mean	Population Mean	Population Mean	Population Mean
Decision and Implementation Process (IV) (27 specific test competencies scaled on a 1-5 Likert scale) Competency groupings: • Scoping • Participants • Deliberation	Population Mean	Population Mean	Population Mean	Population Mean
Improved ENR Outcomes (DV) (5 specific test competencies, scaled on a 1-5 Likert scale) Competency group: • Improved ENR indices	Population Mean	Population Mean	Population Mean	Population Mean

The table reflects population means that imply that all members of the population provide a response that is scored using a Likert scale. In actuality, sample means were calculated based on those respondents who provided responses. Means were calculated by adding up the one to five values for each respondent and dividing by the

number of responses. General trends were noted based on the Likert scale (i.e., moving from tame problems solving capacities to wicked problem management capacities). Demographic trends and other qualitative data obtained through the surveys (i.e., comment sections) are also summarized.

1.8. Definitions of Terms

The following terms are defined to clarify their use in this research with some providing insight into desirable capacities to improve ENR outcomes:

Adaptation

Adaptation is the ability to adjust responses to the changing internal and external drivers to maintain stability (Folke et al., 2010).

Adaptive Management

Adaptive management is a patient and systematic accumulation and assessment of data and deliberate management of stakeholder values to build consensus (Allan and Curtis, 2003; Miller, 1999). Used appropriately, active adaptive management provides the flexibility to move policy alternatives forward in the face of uncertainty, while constantly reevaluating advances in knowledge and experience during implementation at pre-determined intervals (e.g., institutionalized monitoring) (Arvai et al., 2006; Simpson and Weamert, 2007). The precise policy goal and means by which it can be achieved can be assessed and modified as experience is gained and new knowledge is created (Arvai et al., 2006).

Agency

Agency is used to indicate where business is done or decisions are made, taking into account more than a 'firm' but where or with whom the action, standing, influence,

power and access exists (e.g., who is empowered to pursue the goals, Norris and Urban-Lurain, 2011). Cohen and Levithal (1990) proffer that acquisition and assimilation of knowledge by an organization is influenced by the "*structure of communication between the external environment and the organization, as well as among the subunits of the organization, and also on the character and distribution of expertise within the organization* (p. 132)." Interface functions can be centralized with personnel acting as gate keepers; or diffuse with a broad array of exposure and receptors of new knowledge. The ideal capacity for growth in innovation and problem solving is to have diffuse learning throughout an organization with some overlap; but not too much redundancy in expertise (Cohen and Levinthal, 1990; National Research Council, 1996). Broad access and diversity is preferred (Arvai et al., 2002; Cohen and Levinthal, 1990; Hart and Dowell, 2011; Ostrom, 1999; Parissi, 2010; Rittel and Weber, 1973; United Nations, 2011).

Capacity

Capacity is a context-based competency of desirable attributes associated with managing wicked ENR problems. Capacity means the ability to hold, receive or absorb available knowledge (Cohen and Levinthal, 1989; Criscoulo and Narula, 2008). The literature refers to this concept as adsorptive capacity. An organization's absorptive capacity is largely a function of its level of prior knowledge and the organization's ability to exploit it for creative problem solving (Cohen and Levinthal, 1990). Cohen and Levinthal (1990) proffer that knowledge diversity facilitates the innovation process by enabling the individual to make novel associations and linkages. Organizational problem-solving (e.g., effective wicked problem management) is tied to an individual's

continuous incremental learning, the organization's overall diversity in learning and the ability to make associations and linkages that have never been considered before (Bradshaw, Langley, and Simon, 1983; Cohen and Levinthal, 1990).

Current

Current as used as in this research means belonging to the present time (Morris, 2001). In the context of this study it means what the respondents observed.

Effective Management

Effective management can be defined by good governance. Good governance (in a social context) has eight major characteristics. "*It is participatory, consensus oriented, accountable, transparent, responsive, effective and efficient, equitable and inclusive and follows the rule of law. It assures that corruption is minimized, the views of minorities are taken into account and that the voices of the most vulnerable in society are heard in decision-making. It is also responsive to the present and future needs of society* (United Nations, 2011; p.1)." The goal of good governance is collective decision-making that is informed as much as possible by both relevant data and understanding of, and respect for, what's at stake for those close to the issue (National Research Council, 1996). At the state level good ENR governance includes safeguarding the public, environmental health and quality of life for current and future generations (e.g., inter-generational equity) (State of Michigan, 2011). Inherent in a good governance model are the concepts of sustainability, resilience and adaptive management. Governance frameworks can be sustainable, dependent on the overall effectiveness of the governance system, and the inclusion of interrelationships among, social, environmental and economic factors (Thompson, 2007).

External

External means a stakeholder who is an environmental practitioner whose main employment is outside of the organization being studied (Morris, 2001). External practitioners are one of two sectors studied.

Governance

Governing and governance is a process of decision-making and decision-implementation, including no action, which involves actors and takes place through different mechanisms (Brown et al., 2010; Kjaer, 2010; United Nations, 2011). In this study governance includes government (and the elements that make up the government e.g., its staff) and its interaction with other practitioners.

Government

Government is a form of governance that gives structure and order to society (Mehan, 2011). Government in our nation and state has evolved from civil societal governance to formal political institutions at federal, state and local levels (Mehan, 2011). Government is the agent of collective power in society - a hierarchy of power and control (Brown et al., 2010). Government is often the selected response to failed markets or social problems and presents its own sets of limits for individual actors and at a collective level (Lipsky, 2010; Weimer and Vining, 2010).

When government fails, non-governmental entities can respond to failed markets or social problems (e.g., the Red Cross). Since the public continues to demand relevance and value from governmental ENR management, there is a growing desire to reinvigorate civil society to push for change. However the frameworks and networks

that might have existed in the past are dormant (Brown et al., 2010; MDEQ and MSUE, 2012; Norris and Urban-Lurain, 2011; Parissi, 2010; Putnam, 2000).

Internal

Internal means a steward who is an environmental practitioner whose main employment is within the organization being studied (Morris, 2001). Internal practitioners are one of two sectors included in this study. For the purpose of this study, the organization is synonymous with the program division (i.e., the Remediation and Redevelopment Division of the Michigan Department of Environmental Quality) unless referring to the state department as a whole.

Organization

Organization means a business or government (e.g., a government bureau) or a group organized for a specific purpose (Morris, 2001). The terms organization, enterprise, firm and institution are synonyms. Organizations often reflect associated social rules and power constructs (e.g., agency as defined above).

Practitioner

Practitioner means a person who practices ENR governance, for example, a government worker, an environmental consultant, environmental lawyer, or a non-profit, or for-profit environmental specialist (Morris, 2001).

Preferred

Preferred as used as in the survey means to chosen as more desirable (Morris, 2001). In the context of this study it means the respondents preferences or preferred observations.

Resilience

Resilience is the capacity to avoid inadvertent or unmanaged transformation (Folke et al., 2010; Walker and Salt, 2006). Resilience thinking is seeing systems, linkages, thresholds, trends and cycles that influence processes and decisions (Walker and Salt, 2006).

Stakeholder

A stakeholder is a person with a stake in a public health or environmental problem: parties who will share in assuming the risks, costs, and benefits of a decision and its outcomes as well as those who wield influence over the process (Arvai et al., 2002; Roberts et al., 1994). This research differentiates an external practitioner or stakeholder from an internal steward.

Steward

Steward is a person who manages another's property such as a governmental employee managing the state's resources. In this context it refers to an ENR practitioner internal to the studied organization (Morris, 2001).

Sustainability

Sustainability used in this research means serving current demands without eroding the potential to meet future needs so that ecological processes, on which life depends, are maintained and the total quality of life, now and in the future, is improved (Brown et al., 2010; Bruntland, 1987). Coupled with sustainability are the concepts of resilience and adaptation.

Sustainability advocates proffer the need to reconnect space and time and re-embed social relations and engage more adroitly in the reflexive reordering of knowledge

(Brown et al., 2010; Griffith 2002). Sustainability policy requires a reconciliation of development goals, social needs and ecological resources toward a just, healthy and sustainable future (Brown et al., 2010).

Tame and Wicked Environmental and Natural Resource Problems

There are two categories of ENR problems: tame and wicked (Rittel and Webber, 1973).

Tame Problems

Tame problems share the following characteristics: 1) the scope of choice is discrete and bounded; 2) no ambiguity exists regarding relationships between alternative actions, choices or desired outcomes; and 3) improving information on which decisions are based promises insight into understanding the various choices, relationships of alternative courses of action, and desired outcome (Pielke, 2007). The complexities can be solved by one sector, jurisdiction or domain using standard analytical approaches of their disciplines and solutions tend to be linear (Batie, 2008). The basis for decisions is scientific information (e.g., a single discipline), which is evaluated and from which alternatives are compared (Pielke, 2007). Tame problems have solutions and end-points (Rittel and Webber, 1973).

Wicked Problems

Rittel and Webber (1973) began to label problems as wicked in the late 1960s and early 1970's. A professional's job was "*once seen as solving an assortment of problems that appeared to be definable, understandable and consensual* (p.156)." Now the relatively easy problems have been dealt with and scholars understand the interdisciplinary nature of many of our current problems (Arvai et al, 2006; John, 1997; Rittel and

Webber, 1973). The 1960's were an inaugural era that questioned the nation's trajectory and sought purpose (Rittel and Webber, 1973*). "Plurality of objectives held by pluralities of politics makes it impossible to pursue unitary aims....The difficulties attached to rationality are tenacious, and we have so far been unable to get untangled from their web. This is partly because the classical paradigm of science and engineering....is not applicable to the problems of open societal systems (*Rittel and Webber, 1973; p. 12)." Simply stated, today's problems lack certainty in 'facts' and resolution of one factor may have untenable consequences.

Wicked problems are intractable issues found in many disciplines (Batie, 2008). Wicked problems require the ability to forecast for which our intelligence is insufficient to the task and involve nearly all public policy issues (Rittel and Webber, 1973). Wicked problems are: 1) complex and interdisciplinary in scope with high uncertainty; 2) value laden; and 3) evolving and dynamic. Wicked problems require policy decisions, as opposed to science based decisions, that reconcile values for collective and cohesive goals to be developed and implemented - achieving the desired outcome (Brown et al., 2010; Ebbin, 2003). Conversations become more critical as values become more diverse and problems become more complicated (Brown et al., 2010; Vogt et al., 2003).

Challenges posed by wicked problems include deviation from normal scientific research and the problem-solving characteristics of human behavior. Normal scientific research builds on established theory, rarely challenging or testing its underlying assumptions (Kuhn, 1996). Likewise and further complicating this dilemma is general human behavior whereby human choice is typically limited by factors that are not necessarily

rational - tending toward familiarity, heuristics and biases (Schwartz, 2005; Tversky and Kahneman, 1981, 1992).

Wicked problem solving requires transcending normal behavior and culturally embedded barriers through cross-cultural learning and an acceptance of broader citizen standing (e.g. truer democracy) (Brown et al., 2010; Dryzek and Stevenson, 2011). Wicked problem solving is a dynamic and interactive process with no definitive end-point. Interim solutions are achieved by consensus and the implementation of management measures.

1.9. Summary

Chapter 1 provides the general problem statement, the purpose of the study and the scope of the research. Chapter 2 provides the elements, from review of the literature, of the best practice governance model based on contemporary governance theory for improved ENR outcomes. Specific assessment factors, sub-factors and competencies associated with the best practice governance model are also identified.

CHAPTER 2
REVIEW OF RELATED LITERATURE

A best practice wicked problem ENR governance model with associated capacities was sought to assess program capacities (current and preferred) for improved outcomes. According to several authors, practice is leading theory in the development of wicked problem management (Bingham et al., 2005; Dunphy et al., 2007; Holliday, 2010; Schwandt and Marquandt, 2000). Further, there are few, if any, models that: 1) link the management of wicked problems from both the individual and structural stand points; and 2) link the interaction of natural, social, and economic domains (MSG and GESI, 2009). This research uses an interdisciplinary approach to build a wicked problem (e.g., more contemporary) governance model for improved ENR outcomes. This literature review builds on the descriptions and definitions provided in Chapter 1. This literature review:

- *Identifies basic governance models and contemporary governance theory evolution;*
- *Identifies components of and provides an integrated governance model that focuses on improved outcomes;*
- *Identifies specific factors/capacities, capacity indices and competencies within the governance model necessary to manage wicked problems; and,*
- *Identifies and assesses individual practitioner skills sets and organizational governance applying integrative and collaborative governance concepts*.

2.1 Governance Models and Contemporary Governance Theory

Governance and its associated outcomes are affected by the culture, structures, and capacities of individuals within the social construct. Social culture influences

organizational structures. Organizational structures and cultures affect modes of communication, values and messages, knowledge capture, worldviews and social roles (Criscuolo and Narula, 2008; Jurin, Roush and Danter, 2010). Understanding the culture's worldview is essential for successful analyses of an organization (Jurin et al., 2010).

There are numerous governance models. For the sake of this research there are three generally accepted governing structures: markets, hierarchies and networks (Kjaer 2010; Rhodes, 1999). Many variations of these governance structures could simultaneously exist within any organization. Table 2 depicts governance attributes including the basis of relationships, degree of dependence, medium of exchange, means of conflict resolution, and culture. These structures determine social rules, associated power constructs, and information asymmetries. Each of these structures provides the organizational framework by which matters may arise and are governed (i.e., decisions are made and implemented).

Table 2. Three General Governing Structures

	Markets	**Hierarchies**	**Networks**
Basis of relationships	Contracts and property rights	Employment relationship	Resource exchange
Degree of dependence	Independent	Dependent	Interdependent
Medium of exchange	Prices	Authority	Trust
Means of conflict resolution	Haggling and the courts	Rules and commands	Diplomacy
Culture	Competition	Subordination	Reciprocity

Source: Kjaer (2010) and Rhodes (1999).

Different phases of development require different strategies to survive (i.e., be sustainable) (John, 1997). Certain governance structures are better suited for certain circumstances – affecting overall governance and outcomes (Kjaer, 2010). Based on literature and stakeholder processes, a more collaborative governance structure is the desirable model (i.e., network-based, recognizing the government context in which it must operate). Industrialized societies are transitioning or are in need of transition to manage contemporary problems and address contemporary factors (Brundtland, 1987; Jurin et al., 2010). Pro-environmental paradigms are increasing, but not without internal and social conflict associated with historic consumerist lifestyles (Corraliza and Berenguer, 2000; Dunlap et al., 2000; Jurin et al., 2010). Evolution is also underway in the business sector.

Refinement of strategy requires more inward research and development, while paradigm shifts and innovation are based on joint ventures and strategic external alliances (Criscuolo and Narula, 2008; Hart et al., 2003; Kotler, 1982). External alliances build new individual and organizational knowledge and capacities (Criscuolo and Narula, 2008). As the ENR governance system evolves, traditional elements (e.g., markets, hierarchies) including competition, efficiency, or shifts in the control or a rebalancing of private and public control could be evident or reconsidered (Weimer and Vining, 2010).

Most existing governance models tend to address technology production and tame problem management, assuming decision errors can be tolerated and the cost of the errors are not as great as the value of the information gained through experiential learning (Roberts et al., 1994). The majority of these governance models only partially

analyze the full range of options or concerns and fail to comprehend, consider or include trade-offs and social policy implications (Gregory et al., 2006; Jurin et al., 2010; Kellon, 2011; Lindblom, 1959; Weimer and Vining, 2011). Segmented strategies can have catastrophic impact and are not sufficient for good governance and improved ENR outcomes in wicked times (Hart and Dowell, 2003). Given the dynamic and complex social - ecological systems (SES) associated with ENR wicked problems, there remains a chasm between academic theory and operating realities (Fink, 2012; Goldsmith and Kettl, 2009; Williams, 2009). This research attempts to close the identified gaps in literature from both an academic and applied research approach, filling what appeared to be one of the largest questions left in the literature: *How are wicked problems addressed for effective/more durable ENR outcomes?* This research contributes to the theory and methods on ENR governance and its application for wicked problem management.

2.2 Analysis of Wicked ENR Problems and Improved Outcomes

ENR outcomes are dependent upon the capacity of the organization, including the leaders and practitioners, to practice good governance. The practitioners and their leadership must tackle the problem at the appropriate level of understanding and engagement, handling it as a tame or wicked problem as the true scope of the problem dictates (e.g., a systems approach to wicked problems) (Brown et al., 2010; EEA, 2010; Hart and Dowell, 2011; Rittel and Webber, 1973). Additionally, ENR management is facing a broad range of resource limitations (human, financial, resource supply, knowledge asymmetries, and external and often global forces) (Hart et al., 2003). Increasing modes of communication, technologic advances and the rise of environmental awareness and corporate social responsibility have been accelerating in

recent years (Eccles et al., 2011; EEA, 2011). These phenomena provide a growing imbalance in information held by both governmental and non-governmental sectors, and evolving concepts of governance (EEA, 2011). Effective and durable management will help sustain limited and dwindling resources. Emerging research demonstrates that capacity building and sustainability practices are beneficial to an organization in the long run (Ceres, 2010; Cohen and Levinthal, 1990; Criscuolo and Narula, 2008; Dryzek and Stevenson, 2011; Eccles et al., 2011; Hart and Dowell, 2011; Metzenbaum, 2002). Not pursuing durability (based on theories and practices associated with capacity building and sustainability) is based somewhat on information poverty and can be overcome with strategies and practices that build value by moving toward more sustainable governance models that include knowledge sharing and a more structured process of 'decision deliberation' (Criscuolo and Narula, 2008; Hart et al., 2003; Kjaer, 2002; National Research Council, 1996; Renn et al., 1993).

2.3 Components of an Integrated ENR Governance Model for Improved Outcomes

Contemporary governance models are complex and involve many elements of network governance. The literature indicates that models that link the management of wicked problems from both the structural and individual stand point, as well as link the interaction of natural, social, cultural and economic domains are necessary components of a systems approach, however few, if any, actually exist (MSG and GESI, 2009). Much of the governance theory associated with wicked problems has arisen in the context of planning and business domains prior to arising in the context of ENR management.

One such model can be derived from the Natural Resource Based View (NRBV) framework. NRBV is the business world evolutionary approach from addressing tame to wicked problems. The tame business approach was based on Resource Based Theory (RBT), which emerged initially as a means to study a firm's internal capacity to maintain market advantage. RBT has been an antecedent of firm growth (Hart and Dowell, 2011; Penrose, 1959). The resources in RBT include the physical and financial assets, employee skills, and organizational capabilities, which stem from resources and routines upon which a firm can draw (Hart and Dowell, 2011; Karim and Mitchell, 2000; Winter, 2000). In 1995, Hart proffered that RBT had a major omission - the external component including interaction between the firm's and the external environment. While an internal view of a business might have been acceptable in earlier times, by 1995, to have a competitive advantage, a firm's strategy needed to be rooted in capabilities that facilitate environmentally sustainable economic activity (Hart and Dowell, 2011). NRBV emerged as a complimentary component of RBT, including the assessment of the reduction in market externalities (e.g., pollution) and the link between pollution prevention and firm profitability (Hart and Dowell, 2011). After fifteen years of research in the arena of dynamic capabilities, NRBV theories remain relevant and can inform research and assist in our understanding as resources and SES evolve (Hart and Dowell, 2011).

Elkington (1997) states that enterprises can contribute to sustainable development by delivering simultaneously economic, social, and environmental benefit - the so called triple bottom line (Hart et al., 2003). Governance models and strategies can bring

wealth that drives capacity and sustainability, lowering overall costs and risks and increasing fiscal security (Eccles, Ioannou and Serafeim, 2011; Hart et al., 2003).

Figure 2 provides a diagram of the role of participants (e.g., stewards, stakeholders) in the NRBV governance model. The diagram contains four quadrants that overlay a shaded base square. The base square depicts the temporal component (e.g., evolution over time) facilitated by the interactions of the internal stewards and external stakeholders. The four quadrants describe the key elements of the model, beginning in the top right corner and proceeding clockwise.

Quadrant I - using internal and external resources, a shared roadmap is developed to meet unmet needs. The result is an improved future ENR outcome.

Quadrant II - integrating external and internal views builds capacity through knowledge sharing, removing the information asymmetry between an organization and society - building transparency, trust and connectivity.

Quadrant III - reducing waste and externalities while improving resource efficiencies today for future cost and risk reduction.

Quadrant IV – developing capacities through innovation and increasing sustainable competencies and positioning for the future.

The NRBV model aligns with the ten good governance criteria identified by the United Nations, and by Nobel Laureate Elinor Ostrom's research (Eagles et al., 2012; Ostrom, 1999; United Nations, 2011; United Nation Development Program, 1997).

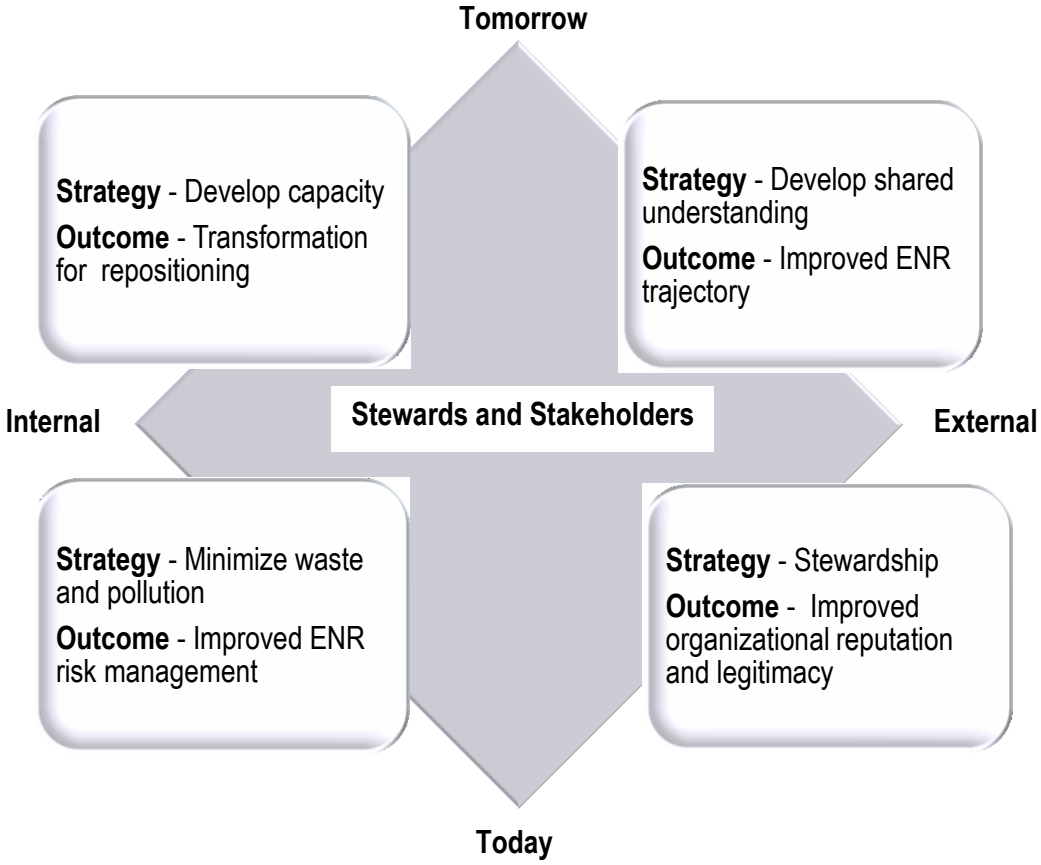


Figure 3. Diagram of the Role of Participants in the Natural Resource Based View (NRBV) Governance Model

Source: Adapted from Hart, Milstein and Caggiano, 2003

This figure contains slight color and shading to depict components of the integrated NRBV governance model. For interpretation of the references to color in this figure, the reader is referred to the electronic version of this thesis.

The principles of good governance are not separate and distinct and therefore overlap or require modification based on the unique complexities and social context (Graham et al., 2003). All exercise the effectiveness of power in governance.

The United Nations criteria include: 1) public participation, 2) consensus orientation, 3) accountability, 4) transparency, 5) responsiveness, 6) effectiveness, 7) efficiency, 8) equity, 9) rules of law, and 10) strategic vision (Eagles et.al., 2012). These best practice governance criteria derive from open democratic, network-based governance.

They include good communication to establish legitimate boundaries for an increased level of adaptation and cooperation with joint/mutually beneficial outcomes. Failing et al. (2004) states there is utility in combining expert judgment processes and stakeholder values with adaptive management (AM) to improve the likelihood that proposed experimental approaches deliver net value to society.

By acknowledging and validating the collective decision making capacity of the community (e.g., network based governance), one validates the truth that lies outside the power bastions of an organization, helping to guide more objective and sustainable decision-making and decision-implementation (Parissi, 2010). Understanding these governance components help inform how and where decisions are made, an element in the transition from tame to wicked problem governance.

2.4 Specific Factors, Capacities and Competencies for Improved ENR Outcomes

This section identifies specific factors/capacities, capacity indices and competencies within the network based governance model necessary to manage wicked problems. The contemporary governance model for tackling wicked ENR problems is participatory (e.g., network based decision-making and implementation) and relies upon collective action and multiple disciplines to harness resources and human capabilities for change and management of complex SES problems (Hart et al., 2003; Kjaer, 2002; Matso et al., 2008; Renn et al., 1993; Rittel and Webber, 1973). Transformation to a more sustainable paradigm can only be achieved through social change with increased focus on, investment in, and participation of human capital and a participatory decision deliberation process that recognizes the importance of both scientific analysis and personal value systems in advancing solutions for public problems (Middendorf and

Busch, 1997; National Research Council, 1996). The integrative and collaborative best practice governance model is iterative and continues to build competencies for increased awareness and knowledge for improved management capacities and improved outcomes.

Synthesizing ENR governance and contemporary interdisciplinary literature review resulted in the selection of the following governance capacity indices: 1) individual performance; 2) organizational culture and structure, 3) decision management; and 4) improved outcomes. Other elements support these capacity factors (i.e., sub-factors and competencies) for a broad and integrative governance system.

When individuals, organizations and related processes align with appropriate wicked management capacities (e.g., a best practice governance model), ENR outcomes should improve. Table 3 identifies the selected best practice governance factors.

Table 3. Selected Governance Factors

Best Practice Governance Factors			
Individual Performance	Organization culture and structure	Decision management	Improved ENR outcomes

2.4.1 Individual Performance

Individuals are key players in organizational decision-making and implementation. Individuals hold their own culture, concepts of reality, values, attitudes, behaviors and practices (Jurin et al., 2010). Individual characteristics can stifle transformation or reform activities (Lipsky, 2010). Knowing that wicked problems defy simple answers and require collaboration, innovation and adaptive management is especially challenging. Tversky and Kahneman (1981) demonstrate that human decision-making

is not necessarily based on rational choice and is tied to how the problem is framed. Schultz II and Holbrook (1999) believe that some people may choose to respond cooperatively based on altruistic behavior and place collective welfare above self-interest. However, understanding environmental behavior is dauntingly complex (Stern, 2000). Schultz II and Holbrook (1999) recommend that problems should be framed in ways that: 1) make effective wicked ENR problem management relevant; and 2) urge actors to embrace the realities of social interdependence, rather than egocentric independence. As the SES and associated decisions become more complex, reliance on rote menus or imitation of less appropriate decision models becomes less effective. Therefore, development of a work force that learns through alliances and a more deliberative and collaborative decision process becomes a more efficient option (Criscuolo and Narula, 2008).

One of the fundamental tenets of network governance is to build new knowledge and skill sets through a more participatory and integrative approach to governance. Collaboration with new and a broader set of participants can increase collective understanding and bring new ways of thinking and technologies to the process which in turn can change historical worldviews (EEA, 2011, Fischer, Ury and Patton, 1991; Peterson, 2013; Metzenbaum, 2002, 2006; Renn, 1993).

Focusing on new world views and innovation rather than a historic conflict or forced compromise changes the interaction of the group and moves it from a focus of conflict and diversity to one of a shared goal. Work that comes from these efforts and is more likely to be supported by stewards and stakeholders is more likely to succeed through

implementation. These efforts and decisions are likely to be more durable and improve the ENR trajectory (Petersen, 2013).

2.4.2 Organizational Culture and Structure

Individual and organizational leadership and associated culture and values influence the recognition of new information, and how or if information is assimilated and applied. This determines the scope of information in play and how decisions are made and implemented - affecting the success of the decision (e.g., effectiveness of wicked problem management) (Arvai et al., 2006; Cohen and Levinthal, 1990; Gregory et al., 2006; Kjaer, 2010; Roberts et al., 1994). Organizational leadership and its culture, including the individuals and their values, steer the organization's governance system and its ability to marshal social capital. These same factors determine which participants (e.g., actors and their world views) have access to the decision-making and implementation structures and processes (EEA, 2011; Norris and Urban-Lurain, 2011; Senecah, 2004; Shriberg, 2002; Williams, 2009).

Likewise, organizational leadership is critical to marshaling social capital and transitioning an organization to a more strategic and sustainable form of governance. Leadership influences foundational understandings and the degree to which wicked problems are addressed. This in turn affects the durability of decisions and implementation regarding wicked problems. Effective governance in this realm stems from structures that facilitate both flexibility and reliable decision-making (Roberts et al., 1994).

Leadership needs to create a clear vision that can provide a reliable target for the flexible, but structured, decision processes, as well as hold individuals and

organizations accountable (Goldsmith and Kettl, 2009; Kotter, 1995; Metzenbaum, 2002). This leadership is important where practitioners operate in a highly technical arena that is quasi-legislative and quasi-judicial in executing public laws and programs. Lack of leadership is one of the largest barriers in moving toward improved ENR governance (Williams, 2009).

Leadership gains traction or establishes necessary credibility through legitimacy. In the context of governance, legitimacy is an over-arching element that combines a number of specific factors (e.g., behavioral, process) that impact the credibility and durability of decisions. Legitimacy includes individual and organizational attributes such as trust, fairness, objectivity, transparency and accountability to all who share in the decision (Bertels, 2006; Brown et al., 2010; Ceres, 2010; Daub, 2010; O'Boyle, 2010; Parissi, 2010). According to Kjaer (2010), legitimacy is generated through both those who are asked to comply with the governance process and the effectiveness of the process to produce tangible results (e.g., improved ENR outcomes).

Legitimacy derives from an acceptable balance between democracy (e.g., active citizen endorsement) and efficiency (e.g., balance effort with importance and complexity of the ENR problems with supported policy outcomes) (Kjaer, 2010). Interpersonal trust is built by the perceived legitimacy and fairness of the negotiation process - more so than any historic track record of producing mutual agreeable policy (Leach and Sabatier, 2005).

A higher level of stakeholder support is observed when the decision process is participatory and perceived as procedurally just, even if the outcome has adverse

effects (Arvai et al., 2002). Regardless of technical issue resolution, for governance systems to be successful, trust needs to be developed among the decision-makers, those who implement the decisions and civil society (Leach and Sabatier, 2005). Legitimacy and trust must be built at the individual and the organizational levels.

2.4.3 Decision Management

Performance manifests itself under all factors (i.e., individual performance, organizational culture and structures, decision management and improved ENR outcomes. For the purpose of this specific discussion, and to differentiate between performances within the individual or organizational factor, this section focuses on a structured participatory decision model adapted from the National Research Council (1996).

Structured, participatory decision processes can support the legitimacy (e.g., trust) of policy decisions, resulting in increased positive externalities (Arvai et al., 2002). Research demonstrates that a structured decision making approach leads to a more thoughtful and better informed decision (Arvai et al., 2002). These structured participatory and informational sharing frameworks can help analyze, evaluate and provide prescriptions for evolutionary change and overcome inherent human heuristics and biases (Arvai, 2004; Dryzek and Stevenson, 2011). Clear guidance on implementing such an approach is lacking (Arvai et al., 2002).

A structured, participatory decision process framework is dialogue-based and recognizes the importance of both scientific analysis and personal value systems in advancing solutions for public problems. Stakeholders in a public health or environmental problem gather in small groups to analyze scientific information and

weigh the benefits and trade-offs of various approaches to improving the problem. The goal is collective decision-making that is informed as much as possible by both relevant data and understanding of, and respect for, what's at stake for those close to the issue (National Research Council, 1996). Given the complexity of the systems, a culture of inclusivity is essential to provide specialized knowledge, along with individual and organizational knowledge, for a systems approach to create legitimate (e.g., supported) transition and successful governance systems (Bertels, 2006; Brown et al., 2010; Henricks, 2010; Kellon, 2010). Research suggests that when individuals and groups are recognized as active participants, they are more likely to identify with a project and take on more responsibility for the project's success (Ostrom, 1999; Parissi, 2010).

Likewise, external positive attention has been found to be motivating and can illuminate and inform a broader audience - building mutual understanding, experiential learning and a stronger foundation and trust within the community (Arvai et al., 2002; Dryzek and Stevenson, 2011; Metzenbaum, 2002). A systems approach allows for a variety of disciplines to establish innovative connections for creative problem management and facilitates participation and process democratization. The breadth of democratization improves the extent of human capacity (Davidson and Frickel, 2004; Weidner, 2002). Well-structured decision frameworks tend to bring participants into the process at early stages and afford an iterative/flexible process.

One of first steps in this decision framework is the identification of the wicked ENR problem. The wicked ENR problem should be of large importance or magnitude; and participants and decision makers should be cognizant of mega trends (e.g., future relevance, context) (Gregory et al., 2006; MSG and GESI, 2009). In a deliberate

democracy, public opinion may only drive change when its effects are large, visible, and immediate (Dryzek and Stevenson, 2011).

A next step in this decision process is framing the wicked ENR problem within the decision-making context (Allan and Curtis, 2003; Dewulf et al., 2007). This includes the development of a rudimentary understanding of the issue or problem in the context of the desired outcome (Allan and Curtis, 2003; MSG and GESI, 2009). The desired outcome often has to be measured against an overall objective or organizational goal (Avai et al., 2002; Kotter, 1995). The problems must be relevant and have decision maker buy-in to a stakeholder process (MSG and GESI, 2009). If the problem complexities are too great for the process, consideration should be given to parse the problem into more manageable parts (Gregory et al., 2006).

Concurrent with problem framing is the selection of participants with a stake in the decision or the process – including the decision maker(s). Selection should include all relevant stewards and stakeholders whose expertise and values or concerns matter in the context of an impending decision, allowing for an appropriate level of reflection on the problem to reach a more durable solution (Allan and Curtis, 2003). Conflicting values should be integrated, putting environmental and economic values in a positive sum relationship (Mol et al., 2009).

Wicked problems are intractable issues that are interdisciplinary in scope with high uncertainty, value laden, evolving, and dynamic. Managing the risks and uncertainties requires the development of contingencies with known probabilities (risk management) and contingencies with unknown probabilities (uncertainties) (Weimer and Vining,

2011). Managing wicked problems for improved and durable outcomes given the complexities should involve 'strategic inquiry' (Vogt, Brown and Isaacs, 2003). This approach raises awareness and builds skills, knowledge and capacity for change, as well as the ability to implement the change (Allan and Curtis, 2003). By clarifying the steward's and stakeholder's values and objectives, the problem and alternatives can be refined and collective understanding can be increased (Fischer, Ury and Patton, 1991). The structured participatory decision-making process allows for innovation and an expansion of alternatives, consistent with the interest-based negotiation processes touted in the book *Getting to Yes* (Fischer et al., 1991). The participatory decision process should employ the best available technical information to characterize the risks, uncertainty and consequences of the alternatives (i.e., including the status quo or no action alternative) (Fischer et al., 1991; Weimer and Vining, 2010).

The alternatives and the consequences should be weighed, deciding upon the best approach (or providing an array of possible approaches) (Arvai et al., 2002; Kettl, 2002; Thomas-Larner, 2007). *"Decision analyses, cost-benefit analyses, multiple-objective programming, or any analysis of a multiple-objective decision must include value trade-offs. To determine useful value trade-offs for a decision, there are two requirements. First, focus your efforts on the substance of the value trade-off issues of that decision. Second, avoid errors and biases in the assessments of the value judgments necessary to quantify the value trade-offs. In short, first do the right thing and second, do it right"* (Keeney, 2002, p. 935).

The decision-making should incorporate effective and efficient implementation including reflective accountability with a meaningful monitoring and assessment process (Bunnell

and Dunsworth, 2004; Kjaer, 2010; Metzenbaum, 2002). Accountability is achieved by defining who is accountable to whom and defining the mechanism of accountability including monitoring (Kjaer, 2010). The ability to carry through with decisions and expectations is another key component. This is accomplished with realistic decisions and implementation plans that can align with the governance and government systems (e.g., individual and organizational capacity) (Gregory et al., 2006; Hart 2003). The ability to carry the action forward requires adequate planning, motivation and leadership, making the best use of participant's time and building social capital (Kjaer, 2010).

If action doesn't follow the planning, motivation is lost and desired outcomes are not achieved (Kjaer, 2010; Mehan, 2012; Metzenbaum, 2002). Finally to build social capital and support, unforeseen program failures should be embraced and not be penalized, promoting risk management approaches without penalty (Allan and Curtis, 2003).

This structured participatory governance process is outside the scope of most people's normal heuristics. However, knowledge emerges in response to the questions posed, knowledge shared and alternatives developed (Vogt et al., 2003). A structured decision approach works to provide insight, or 'decision aiding', for participatory decision processes to capture important stakeholder objectives for the creation and selection of SES policy alternatives (Arvai et al., 2002). Providing insight to decision makers about the values, beliefs, perspectives, and preferred tradeoffs of stakeholder groups democratizes decisions and legitimizes ENR policy.

2.4.4 Improved ENR Outcomes

The items selected for improved outcomes reflect capacities identified in the literature and stated program goals that parallel sustainability goals. Additionally, major capacity elements that lend to the legitimacy of the process emerged as topics of interest. According to Kjaer (2010), individual and organizational legitimacy are generated through those that are asked to comply with the governance process and the effectiveness of the process in producing tangible results (e.g., improved ENR outcomes).

The selected capacity indicators for improved outcomes are the capacity to adjust given patient and systematic accumulation and assessment of data and deliberate management of stakeholder values to build consensus (Allan and Curtis, 2003; Miller, 1999). Having the metrics to measure and assess outcomes and ENR trajectories is another key element as is balancing competing socio-economic demands with ENR management given limited resources. The final capacities of improved outcomes are measured by the demonstration of sustainable intergenerational equity and improvement to the overall quality of life (Arvai et al., 2008; MDEQ, 2013, United Nations, 2011.)

2.5 Literature Review Summary and Scale Development References

A synthesis of emerging ENR governance and contemporary interdisciplinary literature informed the development of a 'best practice' governance model and the selection of capacities that should improve ENR outcomes associated with wicked problems. The selected capacity factors are: 1) individual performance; 2) organizational culture and structure; 3) decision-making and decision-implementation processes (i.e., decision management); and 4) improved outcomes. Each of these four factors includes selected

specific and desirable competencies that further identify and define desirable ENR problem management capacities. These competencies were categorized into sub-factors. These competency items provide the base measurement scales for this study. Table 4 illustrates the measurement connection between the capacity factors, sub-factors and the competencies.

Table 4. Governance Capacity Factors, Sub-factors and Associated Competency Measures

Capacity Factor	Capacity Sub-Factor	Measurement
Individual Performance	Networked based governance Capacity Building	8 competencies 5 competencies
Organizational Culture and Structure	Leadership Legitimacy Governance	7 competencies 8 competencies 10 competencies
Decision Management	Process Scoping Participation Deliberation	12 competencies 6 competencies 9 competencies
Improved ENR Outcomes	Indicators of Improved ENR Outcomes	5 competencies

Reference summaries for the factors, sub-factors and competency items complied under this exploratory study, are provided in Tables 5-8. These tables provide more insight into the specific measurement, organized by factor and sub-factor. These components (factors, sub-factors and competencies) are not distinct; they overlap and build upon each other (Graham et al., 2003). Each influences how wicked problems are manifested, identified and managed. According to the literature, if effectively applied, each of these elements can contribute to building more durable/sustainable ENR outcomes. These tables reflect the wording of the specific tested items, however some of the wording has been modified to allow for the tables to comply with formatting requirements.

Table 5. Individual Performance Measures Identified in the Literature

Individual Performance	
Networked based governance	
Embrace self-empowerment.	Arvai et al.,2002; Bradshaw et al., 1983; Cohen and Levinthal, 1989 and 1990; Criscuolo and Narula 2008; Davidson and Frickel, 2004; Goldsmith and Kettl, 2009.
Understand organizational objectives.	Arvai et al., 2002; Goldsmith and Kettl, 2009; Kotter 1995; Metzenbaum 2006.
Embrace conflicts and address in a constructive manner.	Arvai et al., 2002; Bertels 2006; Goldsmith and Kettl, 2009; Hendricks, 2010; Kellon, 2010; Kotter, 1995; Mol et al., 2009.
Take calculated risks to improve ENR outcomes.	Goldsmith and Kettl, 2009; Kotter, 1995; National Research Council, 1996; Weimer and Vining, 2011.
Receive support and respect within the organization including when values differ.	Arvai et al., 2002; Dryzek and Stephenson, 2011; Goldsmith and Kettl, 2009; Kotter, 1995; Leach and Sabatier, 2005; Metzenbaum, 2002 and 2006.
Receive support and respect outside the organization including when values differ.	Arvai et al., 2002; Goldsmith and Kettl, 2009; Kotter, 1995; Leach and Sabatier, 2005.
Have the ability to mediate differing interests to reach broad consensus on what is in the best interest of the group (stewards and stakeholders and within legal and delegated authority).	Arvai et al.,2002; Criscuolo and Narula 2008; Goldsmith and Kettl, 2009; Mol et al., 2009, Schultz II and Holbrook, 1999.
Assist in producing environmental results that take into account competing business, citizen, scientific and community views.	Arvai et al., 2004; Goldsmith and Kettl, 2009.

Table 5 (cont'd)

Capacity building (Individual Performance cont'd)	
Expand perceptions and understanding when exposed to divergent perspectives.	Allan and Curtis, 2003; Arvai et al., 2004; Cohen and Levinthal, 1990; Criscuolo and Narula 2008; Hart et al., 2003; Kotler, 1982.
Seek and develop new insights, technologies and knowledge in socio-economic trends through work and extracurricular activities, experiential learning and education.	Allan and Curtis, 2003; Arvai et al., 2004; Cohen and Levinthal, 1990; Criscuolo and Narula 2008; Hart et al., 2003; Kotler, 1982.
Assess the nature of a problem, and its causes and elicit a collaborative analysis and recommendation.	Arvai et al., 2004; Bertels 2006; Hendricks, 2010; Kellon, 2010.
Seek feedback and are reflective about activities and interactions.	Allan and Curtis, 2003; Bunnell and Dunsworth, 2004; Kjaer, 2010; Metzenbaum 2002.
Create an environment that encourages creative thinking and innovation, and design and implement new or cutting edge program elements and processes.	Allan and Curtis, 2003; Cohen and Levinthal, 1990; Criscuolo and Narula 2008; Hart et al., 2003; Keeney, 1994; Kotler, 1982.

Table 6. Organizational Culture and Structure Measures Identified in the Literature

Organizational Culture and Structure	
Leadership	
Has a clear mission.	Arvai et al., 2004 Goldsmith and Kettl, 2009; Kotter, 1995; Metzenbaum 2002, 2006.
Has a mission statement that is understood by most staff (internal to the organization).	Arvai et al., 2004 Goldsmith and Kettle, 2009; Kotter, 1995; Metzenbaum 2002, 2006.
Has a mission statement that is understood by stakeholders (external to the organization) who engage with the organization.	Arvai et al., 2004 Goldsmith and Kettl, 2009; Kotter, 1995; Metzenbaum 2002, 2006.
Is responsive and its decision-making and implementation is consistent with its mission.	Arvai et al, 2004; Goldsmith and Kettl, 2009; Kotter, 1995; Metzenbaum 2002, 2006.
Moves constructively forward - considering the scientific, cultural and social complexities of its decisions.	Arvai et al., 2004; Kotter, 1995; Jurin et al., 2010.
Works constructively to handle complaints and criticism.	Kjaer, 2010; Mehan, 2012; Metzenbaum 2012.
Minimizes waste, expense and effort.	Eccles et al, 2011; Hart et al., 2003.

Table 6 (cont'd)

Legitimacy (Organization cont'd)	
Takes responsibility for its actions.	Bertels, 2006; Brown et al., 2010; Ceres 2010; Daub 2010; Eagles, et al., 2012; O'Boyle, 2010; United Nations 2011: United Nations Development Program, 1997.
Operates in an equitable and fair manner.	Eagles, et al., 2012; Ostrom, 1999; United Nations 2011: United Nations Development Program, 1997.
Is inclusive in its outreach and engagement including those with a stake in the matter.	Parissi, 2010; United Nations 2011: United Nations Development Program, 1997.
Is transparent in its operations.	Bertels, 2006; Brown et al., 2010; Ceres 2010; Daub 2010; Eagles, et al., 2012; O'Boyle, 2010; Parissi, 2010; United Nations 2011; United Nations Development Program, 1997.
Builds trust.	Bertels, 2006; Brown et al., 2010; Ceres 2010; Daub 2010; Eagles, et al., 2012; O'Boyle, 2010; Parissi, 2010; United Nations 2011; United Nations Development Program, 1997.
Builds understanding.	Allan and Curtis, 2003; Bertels, 2006; Brown et al., 2010; Ceres 2010; Daub 2010; Eagles, et al., 2012; O'Boyle, 2010; Ostrom, 1999; Parissi, 2010; Renn, 2012; United Nations 2011; United Nations Development Program, 1997.
Is accountable.	Bertels, 2006; Brown etal., 2010; Ceres 2010; Daub 2010; Eagles, et al., 2012; Kjaer, 2010; O'Boyle, 2010; Parissi, 2010; United Nations 2011; United Nations Development Program, 1997.
Operates lawfully.	Ostrom, 1999; United Nations 2011; United Nations Development Program, 1997.

Table 6 (cont'd)

Governance (Organization cont'd)	
Embraces decentralized decision-making, allowing staff closest to the issues, who hold the applicable expertise, collaborating to reach a decision.	Kjaer, 2010; United Nations 2011; United Nations Development Program, 1997.
Focuses on the most important problems to safeguard the public, environmental health, and quality of life for current generations.	Arvai et al., 2004; Brundtland, 1987; Gregory et al., 2006; Jurin et al., 2010.
Focuses on the most important problems to safeguard the public, environmental health, and quality of life for future generations.	Arvai et al., 2004; Brundtland, 1987; Dryzek and Stephenson, 2011; Gregory et al., 2006; Jurin et al., 2010.
Embraces flexibility and adaptability in approaches to gather new information while achieving the organization's mission.	Goldsmith and Kettl, 2009; Jennings, 1994; Kotter, 1995; Metzenbaum, 2002.
Encourages the integration of individual ideas, values and perspectives in achieving the organization's mission.	Arvai et al., 2002; Keeney, 2002.
Supports and rewards beneficial innovation.	Allan and Curtis, 2003; Kotter, 1995.
Supports and rewards calculated risk-taking by staff.	Allan and Curtis, 2003; Kotter, 1995.
Promotes training which relies upon strategies to integrate divergent information to achieve a goal rather than a set of menu (prescriptive) driven tasks (e.g., promotes critical thinking).	Arvai et al., 2002.
Encourages staff to develop support networks to improve staff's and the organization's knowledge base.	Kjaer, 2010; Parissi, 2010.
Uses technology to improve communication, increasing collective knowledge and awareness.	European Environmental Agency, 2011.

Table 7. Decision Management Measures Identified in the Literature

Decision Management	
Process Scoping	
Timely identifies problems and prioritizes them in relation to the magnitude of the problems' relative impact.	Arvai et al., 2004.
Manages problems according to the problems' impact.	Arvai et al., 2004; Kotter, 1995.
Is responsive to participants' competing values, priorities and time frames.	Arvai et al., 2004.
Sufficiently frames (e.g., describes) problems for management according to an overall programmatic goal/mission statement.	Arvai et al., 2004; Trversky and Kahneman 1981, 1992.
Provides sufficient guidance with flexibility to allow for new concerns or information to inform decision-making.	Arvai et al., 2004; Goldsmith and Kettl, 2009; Jennings, 1994; Kotter, 1995; Metzenbaum, 2002.
Embraces new information to improve the basis for decisions.	Arvai et al., 2004
Provides sufficient flexibility to allow for new concerns or information to improve implementation processes.	Arvai et al., 2004; Roberts et al., 1994.
Interest and momentum are maintained in policy discussions and decisions.	Kjaer, 2010; Kotter, 1995.
Appropriate participation is maintained throughout the duration of decision-making processes.	Metzenbaum, 2002.
Appropriate participation is maintained throughout decision implementation.	Metzenbaum, 2002.
Appropriate assessment tools are developed and implemented.	Gregory et al., 2006.
Decision-making and implementation processes are scaled appropriately given the relevance and urgency of the situation and decision.	Dryzek and Stephenson, 2011; Gregory, et al., 2006; Kotter 1995; MSG and GESI, 2009.

Table 7 (cont'd)

Participation (Decision Mngt. Cont'd)	
Decision-makers	Kotter 1995; MSG and GESI, 2009.
Decision implementers.	Curtis and Allan, 2003; Kotter, 1995; Ostrom 1999; Parissi, 2010
Persons who may share in the risk.	Curtis and Allan, 2003,
Persons with the necessary scientific, economic/financial, and social perspective and expertise.	Hart et al., 2003; Kotter 1995;.MSG and GESI, 2009.
Persons with unique knowledge.	Brown et al., 2010.
Persons with diverse knowledge.	Brown et al., 2010; Hart et al., 2003; Parissi, 2010.
Deliberation	
An appropriate number of relevant alternative recommendations are explored and developed.	Arvai et al., 2002 and 2004; Fischer, Ury and Patton, 1991.
Alternative approaches are utilized and assessed that document and use verifiable data or documented reason.	Arvai et al., 2002, 2004; National Research Council, 1996.
Alternative approaches are assessed and utilized that build consensus prior to reaching a decision among those who share in the risks and benefit from the decision.	Arvai et al., 2002, 2004; National Research Council, 1996.
Alternative approaches that are accompanied by an alternatives array which address risks, uncertainties and trade-offs are assessed and utilized.	Arvai et al., 2002, 2004; Keeney, 2002; National Research Council, 1996.
Alternative approaches that manage uncertainties through contingency plans are assessed and utilized.	Arvai et al., 2002, 2004; Keeney, 2002; National Research Council, 1996.
Alternative approaches that can be documented and articulated in an understandable manner, and implemented within the capacity of available resources are assessed and utilized.	Arvai et al., 2002, 2004; National Research Council, 1996.
Alternative approaches that are based on processes that follow a structured and participatory process that is perceived as fair and relevant to the issue at hand are utilized.	Arvai et al., 2002, 2004; National Research Council, 1996.
Alternative approaches that align with the organization's strategic mission statement are utilized.	Arvai et al., 2002, 2004; Kotter 1995; National Research Council, 1996.
Monitoring and assessment processes are designed and established to compare predicted effects with observed outcomes.	Kjaer, 2010; Kotter 1995; Metzenbaum, 2002.

Table 8. Improved ENR Outcome Measures Identified in the Literature

Improved ENR Outcomes	
Improved ENR indicators	
Adaptive management concepts are practiced to improve ENR outcomes.	Arvai et al., 2006; Folke et al, 2010; Hart et al., 2003; Kotter 1995.
Metrics indicate overall durability (e.g., improved ENR longevity) in ENR in the state.	Gregory et al.,, 2006; Kjaer, 2010; Metzenbaum, 2002.
Competing socio-economic and ENR demands are well balanced for an improved ENR outcome.	Arvai et al., 2004, Brundtland, 1987; Eccles et al., 2011; Elkington 1997; Hart et al., 2003;
Socio-economic demands and ENR problems are being managed without eroding the potential to meet future demands.	Stated state goal; Eccles et al., 2011; Elkington, 1997; Hart et al., 2003.
ENR management outcomes are improving the quality of life in the state.	Stated and state goal; Eagles et al., 2012; Hart et al., 2003; Ostrom 1999; Jurin et al., 2010; United Nations 2011; United Nations Development Program, 1997.

The selected factors, sub-factors and capacity items support the exploratory best practice governance model for improved ENR outcomes. Combined, they form the measurement elements by which reliability testing and face validity of the exploratory best practice governance model are assessed. They also form the measurements for the hypothesis testing. The identified capacities assess one state program's capacity to manage wicked problems for improved outcomes. Chapter 3 discusses the analytical methods utilized in this study and the test population.

CHAPTER 3
METHODS

This chapter provides the procedural steps for conducting the research. The procedural steps include: 1) arrangements for conducting the study; 2) test instrument; 3) selection of subjects; 4) administration of the survey instrument; 5) development of measurement tools 6) treatment of the data; and 7) a summary.

3.1 Arrangements for Conducting the Study

The study was initiated upon receipt of an exempt status under Michigan State University Institutional Review Board (IRB) Human Research Protection Program pursuant to 45 CFR 46.101(b). In compliance with the IRB approval, participant consent was obtained through the introduction to the survey instrument (see Survey Instrument, Appendix A).

Once the IRB approval was received and the thesis proposal was approved by the advising committee, the proposal was vetted with state program managers (e.g., Michigan Department of Environmental Quality, January 2013). The test instrument was discussed and revised for the purpose of: 1) transferring respective local knowledge; 2) improving reliability and usability of the research data for improved ENR outcomes; and 3) facilitating the respective agency partners' (State of Michigan and Michigan State University) support for the study.

3.2 Test Instrument

An electronic questionnaire/survey was developed based on the literature review and distributed using Qualtrics software. Qualtrics collects responses in a way that supports

data management (e.g., using Microsoft Excel, SPSS). The survey instrument provided an overview of the study and the context in which the respondents were to view the survey questions. The survey was the mechanism for participant consent. The test instrument was structured for both statistical and non-statistical analysis. The statistical (quantitative) portion of the survey was organized into the four capacity indices: individual performance, organizational culture and structure, decision management, and improved ENR outcomes. These capacity indices (factors) were further subdivided into sub-factors. Seventy test questions were developed from the literature review to assess current and preferred capacities for factors and sub-factors.

Additional questions gathered: 1) demographic information which provided insight regarding the respondents; and 2) individuals' preferences and program information through open-ended questions. These data were also summarized.

3.3 Selection of Subjects

The studied populations included both internal (state government program stewards) and external (private, public or non-profit stakeholders) practitioners of a State ENR division that manages wicked problems. The studied program is the state's cleanup and redevelopment program. Study participants were further defined as currently active practitioners with technical, scientific, legal, financial, or management experience within the context of the studied program. Currently active respondents were defined as having worked in or with the program within the two years prior to the survey. This period was chosen to coincide with the new governance initiatives at the state level.

Both sectors of practitioners were included to: 1) reflect the best practice governance model (i.e., include both internal stewards and external stakeholders); and 2) improve

the richness and legitimacy of the data. The names and email addresses for the populations were obtained from the state ENR agency through the program director and the program's Freedom of Information Act coordinator.

3.4 Administration of the Survey Instrument

The formal survey was introduced to the respondents through both a joint letter of invitation and a survey launch letter from the State of Michigan division head and Michigan State University's primary investigator. These letters were sent one week apart in February 2013. These letters helped explain the purpose and benefits of the survey in short communications prior to survey engagement. Two follow-up reminders were sent with a link to the survey for completion within two weeks of the survey transmittal. A third reminder was sent with a short extension (e.g., three days). Copies of these correspondences can be found in Appendix B Survey Correspondence.

The survey invitation and the survey launch notification were forwarded by some of the recipients to other practitioners not in the survey population data base. This resulted in one new external email address and thirteen additional external volunteer respondents being added to the survey population per public requests. The volunteers helped add to the external survey population perspectives. A copy of the letter used to add the survey volunteers is provided in Appendix B Survey Correspondence.

Due to the low number of survey respondents identifying themselves as external stewards, on March 11, 2013, the state program leadership encouraged 10 external respondents (three new and seven existing potential survey respondents) to participate in the survey. This late addition resulted in the survey response period being extended

three days from its original response period. The study population, survey invitations and survey dates are summarized in Table 9.

Table 9. Survey Dates and Population

	Internal	External	Volunteers[a]	Total
Survey invitation February 20, 2013	177	123		300
Survey launch February 26, 2013	177	123	10	310
Volunteers added, one email addition February 27, 2013		1	3	4
State invites new respondents March 11, 2013		3		3
Total Population	177	127	13	317

[a] All survey volunteers (including the three additional invitations) were from the external population increasing the total external survey population.

Table 10 provides a summary by sector (internal and external practitioner) of the persons invited to participate in the survey and those who responded to the survey. Internal respondents are those persons assigned to work in the program division for the State of Michigan (as opposed to staff who may work in the studied program but are assigned to another state department or division).

As shown in Table 10, 317 survey invitations were sent. One hundred and two (317-215) surveys expired (e.g., were not acknowledged, received or opened by the recipients). Two hundred and fifteen (215) surveys were collected via the electronic survey instrument. These collected surveys represent an overall response rate of 68% (215/317). These 215 surveys were in varying stages of completion at the close of the survey. One hundred and seven surveys (107) were submitted as complete (i.e.,

finalized) through the survey software. Table 10 depicts the response rates for both populations for partial and completed surveys. Overall, internal populations had a higher response rate than the external population. The survey initiation and completion data indicate some survey fatigue or a reduction in response rates. The highest survey response rate was early in the survey (n=135). This indicates that approximately 80 surveys (215-135) may have been opened but not necessarily taken by the respondent. The data indicates an approximate 20% drop to n=107 at the end of the survey scaled items.

Table 10. Survey Respondents

	Internal[a]	External[a]	Total[a]
Invitations	177 (100%)	140 (100%)	317 (100%)
Responded	131 (74%)	84 (60%)	215 (68%)
Completed	70 (40%)	37 (26%)	107 (34%)
Partial completion	61 (34%)	47 (34%)	108 (34%)
Expired	46 (26%)	56 (40%)	102 (32%)

[a] Data are provided by survey response category, with the survey population number followed by the percentage in parentheses.

Response rates for internal practitioners were 74% with 40% completing the survey. Response rates for the external population were 60% with 26% submitting the survey as complete. Partial completion means that these surveys were not submitted by the respondent as a fully completed survey (meaning the responses could no longer be modified). These incomplete (or not finished) surveys where combined with the fully completed surveys to obtain the benefit of the data. Expired surveys include those where no data were collected by Qualtrics (i.e., the survey instrument was never opened by the recipient).

Table 11 provides a comparison of completed with partially completed surveys. While the response rates were too low for a statistically valid sample relative to the number of responses provided with partially completed surveys, an independent T test was conducted to compare the two samples. No significant differences were evident between these samples. The data from both samples were included in this research and hypotheses testing.

Table 11. Comparison of Completed and Partial Completed Surveys

Capacity Factor[a]	Capacity Preference Category[b]	Completed Mean (SD)	Partial Completion Mean (SD)	Independent T Test Complete vs. Partial Completion[c]	df
Individual Performance	Current Capacity (n=104/28)	3.0 (.63)	3.1 (.63)	.305	130
	Preferred Capacity (n=104/28)	4.4 (.40)	4.3 (43)	.377	130
Organizational Culture and Structure	Current Capacity (n=104/18)	3.0 (.65)	3.1 (.60)	.705	120
	Preferred Capacity (n=104/18)	4.4 (.43)	4.3 (.34)	.413	120
Decision Management	Current Capacity (n=104/5)	3.0 (.62)	3.1 (.81)	.627	107
	Preferred Capacity (n=102/5)	4.4 (.42)	4.2 (.49)	.453	105
Improved Outcomes	Current Capacity (n=104/3)	2.7 (.72)	2.3 (1.22)	.371	105
	Preferred Capacity (n=101/2)	4.1 (.51)	4.4 (.83)	.454	101

[a] Five-point scale from (1) strongly disagree to (5) strongly agree.

[b] n=fully completed surveys over partially completed survey data.

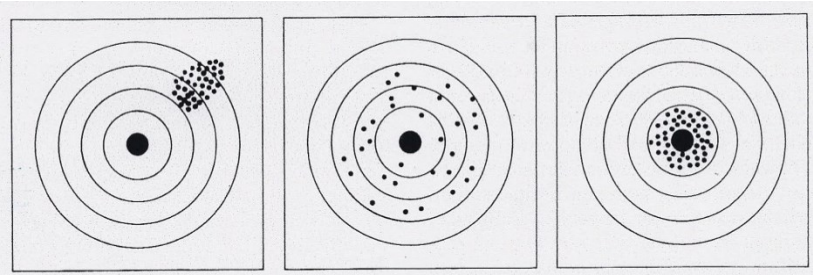
[c] *** p<.001, ** p<.01, *p< .05; one-tailed mean comparisons.

3.5 Development of Measurement Tools

Capacity factors, sub-factors and competencies were selected through the literature review. These capacities are presented in Section 2.5 along with source references. The survey instrument is comprised of four main capacity factors. These factors are composed of sub-factors with associated competencies. The structure of the factor, sub-factor and competency framework were kept intact as an a priori framework for analysis and hypotheses testing. This research was intended to develop a reliable governance model with face validity. It was not the intent of this researcher to test the construct validity of the exploratory measures. While not a scientifically valid measure, respondent feedback is often used to assess 'face validity' (Babbie, 1989) . Face validity, or logic validity, means that the items appear on their face to indicate reasonable measures of the intended component with general consistency in perceptions within the populations (Babbie, 1989) ascertains whether the measure appears to be assessing the intended construct of the study. A discussion of the survey's face validity is discussed in Chapter 4.

Figure 4 provides a pictorial analogy of validity and reliability. "*Reliability refers to the likelihood that a given measurement procedure will yield the same description of a given phenomenon if that measurement is repeated.*…*Validity refers to the extent to which a specific measurement provides data that relate to commonly accepted meaning of a particular concept* (Babbie, 1989, p.127). The first target depicts findings that are reliable but not valid; the second target depicts findings that are valid but not reliable; and the third target depicts valid and reliable findings. High accuracy in validity and reliability (i.e., target 3, below) in the measurement tool (i.e., the survey and its scales)

is an indicator of precision or the exactness of the attribute observations measured in the study.



1) Reliable but not Valid; 2) Valid but not Reliable; 3) Valid and Reliable

Figure 4. Analogic Depiction of Reliability and Validity

Source: Adapted from Babbie, 1989, p.126

The internal consistency of the constructed factors and sub-factors of this research were tested with Cronbach's Alpha. Reliability refers to the likelihood that a person would provide the same responses if they completed the survey at two different times (e.g. test-retest reliability) (Babbie, 1989; Field, 2009). In this research, reliability testing was used to assess whether the factor and sub-factor items were sufficiently similar to support the capacity groups. Cronbach's Alpha is the most common measure of scale reliability.

To reduce the complexity and size of the survey instrument, the sub-factors were allocated based on a logical distribution while minimizing duplication. Care was taken to differentiate the type and means by which capacity was being built or decisions being made among these three capacity factors. While there is overlap in this index structure, redundancies were removed without losing the overall scope of the exploratory

governance model being tested (broad in scope as opposed to detailed in limited elements).

The survey scope was reduced by request of the advisory committee. The survey instrument was then reviewed with the study partner, further modified, and then pre-tested. The pre-test population represented both experiential understanding of government operations as well as more remote knowledge of governmental operations. Persons invited to participate in the survey pretest were excluded from the survey invitation. The pre-test participants were provided by the state department and the author.

Forty-one respondents were requested to participate in the pre-test. Twenty-two respondents provided data that were used to improve the test instrument. The pre-test respondents represented eight who claimed to be stewards, five who selected the question that stated that they were stakeholders, with the remainder not selecting a response to this question. Pre-test subjects were asked to complete a preliminary version of the survey and provide suggestions within a short (e.g., seven day) time period. The pre-test population provided input regarding the layout, comprehensibility and the time necessary to complete the survey. Through reassessment, the format and flow of the survey were revised. The pre-test was used to test the reliability of the survey items. The reliability of the sub-factors in the pre-test was not as definitive as the main test case. The pre-test reliability of a few sub-factor groups, specifically those related to social and behavior sciences (e.g., networking and leadership) did not exceed the 0.7 Cronbach's Alpha. This is likely a reflection of the pre-test population. The pre-test population represented a variety of environmental and natural resource

backgrounds – but was not necessarily representative of the test population (i.e., not as familiar with the current program and governance issues as was reflected in the thesis study population). A higher percentage of respondents in the pre-test population commented on the length and complexity of the survey than those respondents in the main test population. The majority of the test population respondents reflect interested and engaged practitioners willing to provide meaningful feedback for the benefit of the program. This can be observed through the survey reliability testing and the quantity of responses and themes presented by the open-ended questions.

The final main study survey instrument was composed of 70 Likert scale capacity questions (each measured the two studied contexts: current perceptions and preferences). Potential survey scales were researched, but lacking earlier similar studies, this survey does not imitate other tested survey instruments. This survey is based on a priori knowledge of indicators to achieve and transform from solving tame problems to managing wicked problems for improved ENR outcomes.

Respondents were instructed to complete the survey evaluating a state program and its associated factor capacities from the view point of a specific wicked problem. The specific problem was the state's publicized program reinvention, requiring the balancing of environmental matters with social and economic matters for improved ENR outcomes.

The index specific competencies were structured according to a Likert scale. The Likert scaled competencies reflect the capacity to tackle tame problems to wicked problems (i.e., a five point scale with capacities closer to 1 being associated with tame problem

approaches and capacities closer to 5 being associated with the capacity to manage wicked problems). An example of this approach can be illustrated by the relative rating given to performing predefined tasks (tame problem solving, value of 1) to leading strategic, collaborative and decisive negotiations (wicked problem management, value of 5).

The questionnaire was designed using two different standardized intensity structures to support unambiguous scaling (Babbie, 1989). Table 12 depicts the study's Likert scaling.

Table12. Likert Scaling

Questionnaire Capacity Intensity Scales					
Capacity category	Tame	Less tame	Neutral	Less wicked	Wicked
Value	1	2	3	4	5
Relative scale	Never	Rarely	Sometimes	Often	Almost always
Balanced scale	Strongly disagree	Disagree	Neutral	Agree	Strongly agree

Additional questions were added to the survey instrument that focused on: 1) demographics to secure information regarding the backgrounds of the survey respondents; and 2) individuals' perceptions of the survey and program information through open-ended questions.

3.6 Treatment of the Data

This is an original exploratory survey based on factors and sub-factors developed from the literature. The survey values selected by the internal stewards and external stakeholders and the values for current capacity and preferred capacity were held

separate and distinct for evaluation. The values selected by the respondents were managed by respondent (anonymously) and measurement item (i.e., each competency), sub-factor and factor. SPSS was used to transform the respondent item values into sub-factor values. The sub-factor values were transformed into factor values. Cronbach's Alpha test for reliability was used to test the survey's factor and sub-factor groupings for internal consistency. A Cronbach Alpha value of 0.7 to 0.8 is an acceptable value (Field, 2009). A value of less than 0.7 can be expected when the items being measured are diverse in content (Field, 2009). Although the pre-test populations revealed less strong reliability, all factor and sub-factor groupings in this study exceeded 0.7. Due to the number of items in the independent factor groupings (e.g., individual performance, organizational culture and structure, and decision management), the total factor Cronbach's Alpha are not included. Increasing the number of items included in reliability testing typically increases the Cronbach's Alpha (Field, 2009). Table 13 provides the Cronbach's Alpha for the sub-factors by factor groupings. Data were analyzed separately for the two study populations (e.g., internal and external) across two contexts (e.g., current and preferred capacities). This table reveals that the sub-factor scales pass the Cronbach's Alpha reliability test (i.e., all values >0.7), meaning the structure of the survey was found to be reliable.

Table 13. Cronbach's Alpha Values by Capacity Factors and Sub-factors Across Current and Preferred Contexts

Factors and Sub-factors	Number of survey items	Current Capacity		Preferred Capacity	
		Internal	External	Internal	External
Individual Performance	13 total				
Network based governance capacities	8	.814 n=78	.890 n=42	.827 n=79	.791 n=42
Capacity building	5	.861 n=81	.881 n=44	.839 n=78	.867 n=44
Organizational Culture and Structure	25 total				
Leadership	7	.818 n=77	.785 n=41	.917 n=75	.824 n=39
Legitimacy	8	.925 n=75	.886 n=41	.917 n=72	.904 n=39
Governance	10	.864 n=73	.888 n=40	.912 n=69	.903 n=39
Decision Management	27 total				
Process scoping	12	.926 n=61	.926 n=32	.945 n=62	.916 n=34
Participation	6	.867 n=63	.867 n=33	.904 n=65	.795 n=33
Process deliberation	9	.955 n=62	.932 n=34	.942 n=58	.931 n=34
Improved Outcomes	5 total				
Improved Outcomes	5	.834 n=69	.823 n=34	.768 n=61	.845 n=34

Descriptive statistics were used to examine the sample data (e.g., mean, standard deviation for each item (competency), each capacity sub-factor, and each capacity factor. Since all analysis was performed on populations larger than 30, this study relies upon the Central Limit Theorem – sampling should be normal when sample sizes or populations studied exceed 30 (Fields, 2009).

Data were statistically analyzed to assess the correlation (i.e., Pearson's Correlation) between the independent variables (e.g., individual performance, organizational culture

and structure, and decision management) and the dependent variable (i.e., improved outcomes).

Independent sample T tests and paired sample T tests were utilized to test the hypotheses. When conducting independent T tests SPSS two populations are being compared. SPSS tests to see if the two populations are homogeneous by using Levene's Test for Equality of Variances (Field, 2009). In cases where the assumption of homogeneity for the two populations has been broken, (i.e., identified by a 'Sig.' value of <.05 in the SPSS data set), alternate values used that take into account the break in population homogeneity. In this research, this condition has been identified by a superscript '^' and a footnote that reads: '^ Equal variance not assumed.' One-tailed T testing ($\alpha < .05$, .01 and .001) was used to test the hypotheses (i.e., differences between current and preferred contexts and internal and external populations). One-tailed T testing increases the power of the statistical significance by considering a more precise test (i.e., greater than, rather than greater or less than). The paired sample T test was used when comparing current to preferred within the specific population (e.g., steward or stakeholders). The independent T test was used when comparing the two specific populations over the context of current or preferred capacities. Data tables in this study use degrees of freedom (df) to reflect study population numbers. Paired sample T test degrees of freedom where df=n-1. Independent sample T Test degrees of freedom where $df=(n_1-1) + (n_2-1)$.

3.7 Summary

This research uses a new exploratory model to assess ENR governance capacities in a complex ENR state program. The methods tested the reliability of the best practice

model, and analyzed the survey data including the hypotheses. The methods discussed in Chapter 3 provide the ground work for Data Analysis and Findings in Chapter 4.

CHAPTER 4
DATA ANALYSIS AND FINDINGS

This research aimed to study capacities for improved wicked problem outcomes. A best practice model was developed based on the literature. This best practice model utilized individual performance, organizational culture and structure, and decision management factors as capacity indicators for improved wicked ENR problem outcomes. The focus of this research was designed to assess current and preferred perceptions of two populations (i.e., internal stewards and external stakeholders of one complex ENR program). Specifically, this study was designed to test: 1) whether the studied ENR program was currently more adept at managing and solving tame problems than wicked problems; 2) significant differences in current and preferred capacities; and 3) differences in the studied populations (internal and external) perceptions and preferences. It was not the intent of this researcher to test the validity of the best practice model; however, capacity factor and sub-factor correlation testing was conducted. Strengths and opportunities for improved ENR governance are identified as are commonalities or disparities among the respondent sectors.

The capacity item scales reflect skills and decision processes associated with solving tame problems to managing wicked problems per contemporary literature reviews. The analyses of the data are presented according to the following topics: 1) survey populations; 2) hypotheses testing: 3) correlation testing; 4) population demographics and findings obtained through open-ended questions; and 5) a summary of the findings.

4.1 Survey Populations

In total, 215 surveys were collected with varying degrees of completeness. The total response rate was 68%. Table 10 of Section 3.4, provides a summary of the survey response rates. Overall, internal populations had a higher response rate than the external population. Two hundred and fifteen (215) surveys were collected with 107 surveys fully completed by the respondents. Figures 4 and 5 provide graphic depictions of the number of current and preferred responses by population sector (i.e., internal and external). These tables use the quantity of responses for the first item by factor as shown in Tables 19-22 which summarize the means and the number of test populations that responded.

The highest total (i.e., internal and external combined) survey response rate for an individual item was the first item related to current capacities (n=135; 87 internal and 48 external respondents). The highest number of respondents answering questions associated with improved ENR outcomes were n=107 (71 internal and 36 external respondents). Preferred capacity item response rates for these same survey items were slightly lower. The beginning survey response rates were n=132 (85 internal and 47 external respondents). The end of survey response rates were n=101 (66 internal respondents and 35 external respondents). The scaled items indicate approximately a 20% reduction in current test item response rates and a 23% reduction in the preferred test item response rates.

The combined total response rates (internal and external) from Tables 4 and 5 are provided in Table 6. These totals reveal a little more than a 10% reduction in total response rates at the beginning of the question associated with the third capacity,

Decision Management. The total population responding to current capacities was n=121, and n=101 for preferred capacities. The response rates fell to n=108 and n=106 respectively at the beginning of the subsequent survey block associated with decision management. The last survey question of the final survey block related to current ENR outcomes remained at n=107 for current capacities and 101 for preferred capacities. The factor reporting reveals that there was an increase in the difference between current and preferred response numbers as the survey progressed. The highest differences per item occurred in the last portions of the survey, Improved Outcomes. The second highest was for Decision Management. A simple analysis suggests some survey fatigue or reduced interest in completing the survey. Further analysis of the data included in Figures 4 and 5, and Table 14 indicates that respondents skipped questions, with the avoidance of current or preferred capacity questions not being a recognizable pattern though out the survey.

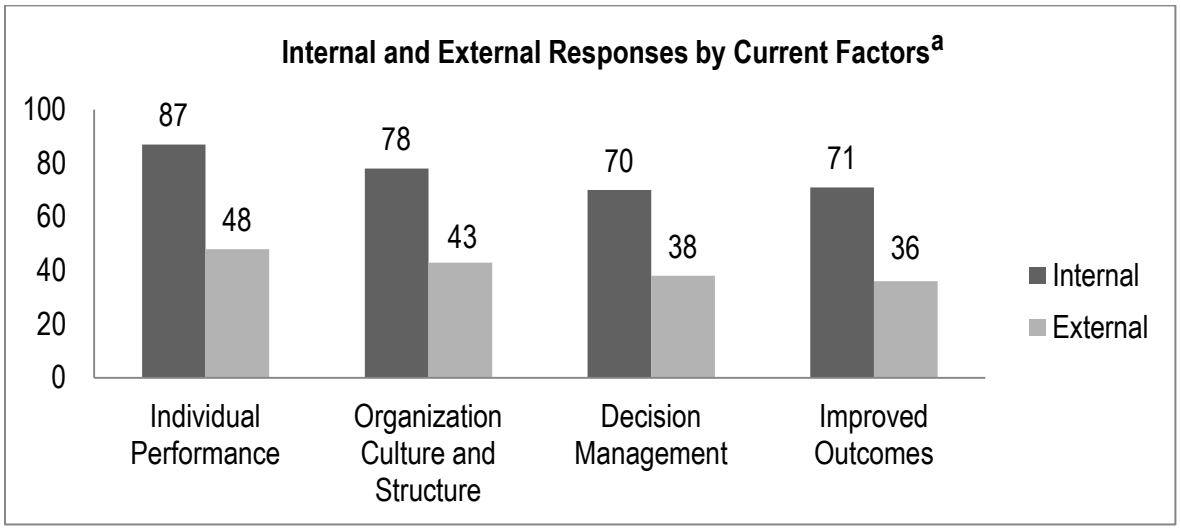


Figure 5. Current Capacity Factor Response Rates

[a] The number of respondents was taken from the number of responses at the beginning (first capacity assessed) of the first three factors and the last item response rate for the fourth factor (the end of the itemized portion of the survey.

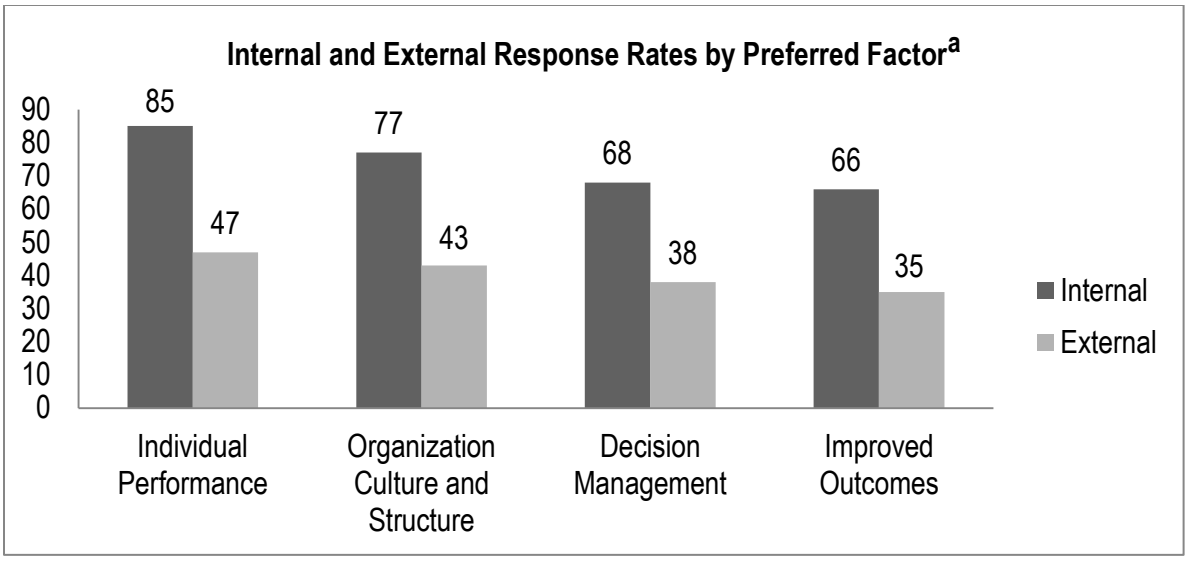


Figure 6. Preferred Capacity Factor Response Rates

[a] The number of respondents was taken from the number of responses at the beginning (first capacity assessed) of the first three factors and the last item response rate for the fourth factor (the end of the itemized portion of the survey.

Table 14. Summary of Total Response Rates

Capacity Factor	Current Response Rates[a]	Preferred Response Rates[a]
Individual Performance	135	132
Organizational Culture and Structure	121	120
Decision Management	108	106
Improved ENR Outcomes	107	101

[a] The number of respondents was taken from the number of internal and external respondents at the beginning (first capacity item assessed) for the first three factors and the last capacity item for the fourth factor.

Tables 15 and 16 provide a portrait of the survey population by experience associated with the program, education level and gender. Forty-two percent of the internal practitioners do not have professional work experience external to the studied program. Eighty percent of the external practitioners have not worked within (internal) the studied

program. The majority of respondents had more than fifteen years of experience working in the studied program: 77% of the internal practitioners and 53% of the external practitioners.

Table 15. Summary of Respondent's Professional Experience

Professional Experience	**Internal n=84**		**External n=35**	
Work sector	Internal	External	Internal	External
No experience in work sector	Not Applicable	42%	80%	Not Applicable
Zero to two years	6%	12%	6%	7%
More than two years, but less than 5 years	3	16	0	4
Five years or more, but less than 10 years	3	8	6	21
Ten years or more, but less than 15 years	11	9	0	15
Fifteen years or more	77	13	8	53
Total	100%	100%	100%	100%

Practitioners from both the internal and external population were well educated with all holding a minimum of a university degree. Generally, the internal practitioners' highest degree achievement was at the master level (31%) with one doctorate degree. Twenty-nine percent of the external employees held master degrees, 20% held professional degrees, and 3 held doctorate degrees. In summary, 32% of internal respondents held more than a 4 year degree were; 52% of external respondents held more than a 4 year degree. The majority of the respondent population was male (64% of internal practitioners and 62% of external practitioners).

Table 16. Summary of Respondent's Education Level and Gender

Education and Gender	Internal	External
Highest level of education	n=70	n=35
Less than 4 years of college	0%	0%
Four year college degree	42	40
Some post graduate work	26	8
Master degree	31	29
Doctoral degree	1	3
Professional degree	0	20
Total	100%	100%
Gender	n=70	n=34
Female	36%	38%
Male	64	62
Total	100%	100%

4.2 Hypotheses Testing

Hypotheses were tested with the survey data to test the following hypotheses (H)

across the four capacity factors to determine if the following relationships were evident:

H1. There will be a significant difference in current and preferred capacities between the steward and stakeholder populations.

H1a. Preferred capacities held by the steward population will be significantly higher than current capacities.

H1b. Preferred capacities held by the stakeholder population will be significantly higher than current capacities.

H2. The stakeholder population will have higher expectations for government's alignment with wicked problems compared to the steward population.

H2a. Current capacity expectations will be rated lower by the stakeholder population compared to the steward population.

H2b. Preferred capacity expectations will be rated higher by the stakeholder population compared to the steward population.

H3. The studied ENR program is currently more adept at solving tame problems than managing wicked problems.

The following discusses each stated hypotheses.

H1. There will be a significant difference in current and preferred capacities between the steward and stakeholder populations.

> H1a. Preferred capacities held by the steward population will be significantly higher than current capacities.
>
> H1b. Preferred capacities held by the stakeholder population will be significantly higher than current capacities.

One-tailed, paired sample T tests were estimated to compare each capacity item, sub-factor and factor according to 1) all preferred capacities versus current capacities for the internal population; and 2) all preferred external capacities versus current capacities for the external population. The summaries of paired sample T tests are in Table 17 for the capacity factors and Table 18 for the sub-factors. These tables summarize the means, T values, degrees of freedom, and significance of the means testing. Data on the left side provides a comparison of current and preferred capacities by each population. There was significant difference ($p<.001$) between the current and preferred capacities for the factors and sub-factors among both populations (internal and external practitioners). Therefore H1 is supported for both the factor and the sub-factor capacity levels for internal (H1a) and external (H1b) populations.

Table 17. Summary of Factor Means by Current and Preferred Capacity for Internal and External Populations

Capacity Factor[a]	Current Capacity	Preferred Capacity	Current Capacity	Preferred Capacity	Paired T Test t	df	Context	Independent T Test t	df
	Internal (I) Mean (SD)	Internal (I) Mean (SD)	External (E) Mean (SD)	External (E) Mean (SD)	Preferred vs. Current			Internal vs. External	
Individual Performance	3.15 (.59)	4.36 (.42)			(I) 18.14***	84	Current	3.18***	130
			2.80 (.64)	4.33 (.36)	(E) 15.10***	46	Preferred	.48	130
Organizational Culture and Structure	3.14 (.64)	4.40 (.44)			(I) 15.74***	78	Current	2.61**^	120
			2.84 (.58)	4.36 (.37)	(E) 15.74***	42	Preferred	.55	120
Decision Management	3.13 (.61)	4.41 (.43)			(I) 15.29***	68	Current	2.35*^	107
			2.81 (.60)	4.29 (.40)	(E) 11.92***	37	Preferred	1.47	105
Improved Outcomes	2.70 (.74)	4.11 (.53)			(I) 12.45***	68	Current	-.59	105
			2.77 (.70)	4.15 (.48)	(E) 9.47***	33	Preferred	-.40	101

[a] Five-point scale from (1) strongly disagree to (5) strongly agree.

^ Equal variance not assumed; *** p<.001, ** p<.01, *p< .05; one-tailed Independent sample T Test mean comparisons.

Table 18. Summary of Sub-factor Means by Current and Preferred Capacity for Internal and External Populations

Capacity Factor	Sub-factors[a]	Current Capacity Internal (I) Mean (SD)	Preferred Capacity Internal (I) Mean (SD)	Current Capacity External (E) Mean (SD)	Preferred Capacity External (E) Mean (SD)	Paired T Test t Preferred vs. Current	df	Context	Independent T Test t Internal vs. External	df
Individual Performance	Networking	3.15 (.61)	4.36 (.54)	2.85 (.59)	4.37 (.39)	(I) 13.56*** (E) 15.49***	86 46	Current Preferred	2.64** -.091	133 132
	Capacity Building	3.22 (.73)	4.36 (47)	2.78 (.69)	4.33 (.44)	(I) 15.84*** (E) 13.62***	84 45	Current Preferred	3.29*** .309	129 129
Organizational Culture and Structure	Leadership	3.08 (.66)	4.39 (.49)	2.76 (.62)	4.33 (.40)	(I) 15.02*** (E) 14.45***	78 41	Current Preferred	2.56** .77	119 119
	Legitimacy	3.40 (.82)	4.50 (.44)	3.03 (.65)	4.44 (.39)	(I) 11.40*** (E) 13.84***	77 42	Current Preferred	2.53** .66	120 119
	Governance	2.95 (.67)	4.35 (.47)	2.73 (.66)	4.29 (.45)	(I) 16.52*** (E) 12.60***	77 40	Current Preferred	1.70** .69	118 117
Decision Management	Scoping	3.06 (.65)	4.40 (.44)	2.75 (.67)	4.31 (.37)	(I) 15.15*** (E) 12.14***	68 37	Current Preferred	2.24^* .93	107 105
	Participants	3.29 (.59)	4.46 (.48)	3.06 (.70)	4.34 (.46)	(I) 14.31*** (E) 9.57***	68 36	Current Preferred	1.54 1.20	105 103
	Deliberation	3.02 (.79)	4.38 (.49)	2.67 (.65)	4.18 (.51)	(I) 12.76*** (E) 9.62***	66 34	Current Preferred	2.09* 1.68*	104 100
Improved Outcomes	Outcomes	2.70 (.74)	4.11 (.53)	2.77 (.70)	4.15 (.48)	(I) 12.45*** (E) 9.47***	68 33	Current Preferred	-.59 -.40	105 101

[a] Five-point scale from (1) strongly disagree to (5) strongly agree.

^ Equal variance not assumed; *** p<.001, ** p<.01, *p< .05; one-tailed Independent sample T Test mean comparisons.

H2. The stakeholder population will have higher expectations for government's alignment with wicked problems compared to the steward population.

> H2a. Current capacity expectations will be rated lower by the stakeholder population compared to the steward population.
>
> H2b. Preferred capacity expectations will be rated higher by the stakeholder population compared to the steward population.

Independent T tests were conducted to compare the differences between internal and external respondents by factor, sub-factor and item for current and preferred capacities. Tables 17, 18 and Tables 19 through 22 summarize the means, T values, degrees of freedom, and significance of the means testing respectively by factor, sub-factor and item. The right side of Tables 17 and 18 compare internal and external perceptions and preferences of current and preferred capacities. Tables 19 through 22 provide a summary of item means by population and capacity.

The hypothesis H2a is supported for 3 of the four current capacity factors (e.g., partial acceptance). All current capacities except for those associated with improved outcomes are statistically significant ($p < .05$). Differences between current capacities for individual performance were more significant ($p < .001$), decision management less significant ($p < .05$), and organizational culture and structures fell in between these factors ($p < .01$). Consistent with the hypothesis of external stakeholders having higher expectations, the external population tended to rank current capacities of the studied program much lower than that of the internal stewards. This is consistent with hypothesis H2a.

The hypothesis H2a is supported for seven of the nine current sub-factors (all sub-factors except Participation and Improved Outcomes). Again, the external population tended to rank current capacities of the studied program much lower than that of the

internal stewards. The most significant differences ($p < .001$) were with current Capacity Building (a sub-factor of Individual Performance). Current Scoping and Deliberation capacities (associated with the factor of Decision Management) were less significant ($p < .05$). Current Networking (associated with Individual Performance); and Leadership, Legitimacy and Governance (associated with Organizational Culture and Structure) fell in between ($p < .01$) those with most and least statistical significance.

The two study populations have more commonality with the preferred capacities (H2b) than with current capacities (H2a). Hypothesis H2b is found to not be supported by the data for all preferred capacity factors and sub-factors except the sub-factor of Deliberations ($p < .05$). This data indicates that the programs preferred capacity to address wicked problems has more commonality among the studied populations than hypothesized.

H3. The studied ENR program is currently more adept at solving tame problems than managing wicked problems.

A factor, sub-factor and item ranking was conducted. The Likert scaled competencies reflected the capacity to tackle tame problems to wicked problems (e.g., a five point scale with capacities closer to 1 being associated with tame problem approaches and capacities closer to 5 being associated with the capacity to manage wicked problems). A ranking of 3 is neutral – associated with a capacity of being neither tame nor wicked. Current capacity mean scores (i.e., the 70 surveyed competencies) for internal stewards averaged 3.03, while the mean scores for the stakeholders averaged 2.81. These scores represent capacities being closer to tame (external perceptions) or neutral

(internal perceptions). Therefore the hypothesis H3 is found to be supported by the data for current capacities.

Preferred capacities for the internal stewards averaged 4.37 while the mean score for the external stakeholders was 4.30. This commonality may equate to shared goals and preferences regarding individual performance, organizational culture and structure, decision management and ENR outcomes. The increased ranking from current capacity perceptions to preferred capacity preferences reflects the studied populations' interest in moving toward those capacities aligned with skills associated with the ability to tackle wicked problems.

The hypotheses tests revealed that both populations share, across the spectrum of the survey, significant differences between current perceptions for individual staff, organizational culture and structure, decision management and improved ENR outcomes. Internal stewards' highest rated currently observed sub-factor capacities were Legitimacy (mean = 3.40), Participants (mean =3.29), and Capacity Building (mean=3.22). External stakeholders highest rated currently observed capacities were Participants (mean=3.06), Legitimacy (mean= 3.03), and Networking (mean=2.85).

Internal stewards' lowest rated current capacities were Improved Outcomes (mean=2.70), Governance (mean=2.95), and Deliberation (mean=3.02). External stakeholders lowest rated current capacities were Deliberation (mean=2.67), Governance (mean=2.73) and Scoping (mean=2.75). External perceptions of Improved Outcomes fell next lowest (mean=2.77). As indicated above, both sectors statistically align with both current perceptions of and preferences for Improved Outcomes.

Preferences between the populations based on factor data averaged 4.32 (internal, standard deviation 0.14) and 4.28 (external, standard deviation 0.09) revealing strength in the preferences across the factor scales. Review of the sub-factor ranking by population reveals internal preferences range from a lowest rank associated with Improved Outcomes (mean=4.11) to a highest ranking associated with Legitimacy (mean=4.50). External preferences lowest and highest rankings were similar (Improved Outcomes, mean=4.15; Legitimacy mean=4.44).

Table 19 (Summary of Item Means by Population and Capacity - Individual Performance), Table 20 (Summary of Item Means by Population and Capacity - Organization Culture and Structure), Table 21 (Summary of Item Means by Population and Capacity - Decision Management), and Table 22 (Summary of Item Means by Population and Capacity - Improved Outcomes) provide the actual items that respondents were asked to rate. The items are presented, generally, according to the order found in the survey, with minor adjustments to the survey question wording to support document formatting.

Tables 19 through 22 provide the comparison of the populations (internal and external) by capacity item (e.g., competencies) ratings across the two contexts – current and preferred. Tables 19 through 22 are organized by factor and sub-factor - providing detail and lending insight into the factor and sub-factor analysis. This comparison was statistically tested using a one-tailed independent sample T test. Hypotheses analysis in this research was not conducted at the item level. However, a discussion of the items is included in Chapter 5 when the author discussed observations outside of the statistical testing context.

Table 19. Summary of Item Means by Population and Capacity – Individual Performance

Individual Performance (staff)[a]	Current Capacity			Preferred Capacity		
Networked based governance	**Internal**	**External**	**Independent T Test t**	**Internal**	**External**	**Independent T Test t**
Embraces self-empowerment.	3.65 n=87	2.90 n=48	5.13***	4.22 n=85	4.06 n=47	1.12
Understand organizational objectives.	3.36 n=86	3.36 n=47	.14^	4.64 n=85	4.74 n=47	-.95
Embrace conflicts and address in a constructive manner.	3.34 n=86	2.93 n=46	2.63^**	4.47 n=85	4.54 n=48	-.75
Take calculated risks to improve ENR outcomes.	2.84 n=81	2.31 n=48	3.39***	4.06 n=83	4.04 n=47	.13^
Receive support and respect within the organization including when values differ.	3.11 n=83	3.13 n=47	-.39	4.63 n=84	4.36 n=47	2.47*
Receive support and respect outside the organization including when values differ.	2.56 n=84	2.75 n=48	-1.19	4.39 n=84	4.38 n=48	.05
Have the ability to mediate differing interests to reach broad consensus on what is in the best interest of the group (stewards and stakeholders and within legal and delegated authority).	2.93 n=83	2.59 n=46	1.76*	4.30 n=83	4.30 n=46	-.12
Assist in producing environmental results that take into account competing business, citizen, scientific and community views.	3.31 n=81	2.85 n=47	2.24*	4.44 n=82	4.49 n=47	-.60

Table 19 (cont'd)

Individual Performance cont'd	Current Capacity			Preferred Capacity		
Capacity building	**Internal**	**External**	**Independent T Test t**	**Internal**	**External**	**Independent T Test t**
Expand perceptions and understanding when exposed to divergent perspectives.	3.25 n=83	2.80 n=46	3.01**	4.33 n=83	4.37 n=46	-.50
Seek and develop new insights, technologies and knowledge in socio-economic trends through work and extracurricular activities, experiential learning and education.	3.11 n=82	2.93 n=44	.90	4.24 n=80	4.20 n=46	.31
Assess the nature of a problem, and its causes and elicit a collaborative analysis and recommendation.	3.45 n=84	2.99 n=46	2.85^**	4.43 n=84	4.47 n=45	-.50
Seek feedback and are reflective about activities and interactions.	3.31 n=84	2.71 n=46	3.34***	4.38 n=84	4.32 n=47	.44
Create an environment that encourages creative thinking and innovation, and design and implement new or cutting edge program elements and processes.	3.01 n=84	2.43 n=46	3.05**	4.42 n=83	4.30 n=47	1.02

[a] Five-point scale from (1) strongly disagree to (5) strongly agree.

^ Equal variance not assumed; *** p<.001, ** p<.01, *p< .05; one-tailed Independent sample T Test mean comparisons

Table 20. Summary of Item Means by Population and Capacity – Organizational Culture and Structure

Organizational Culture and Structure[a]	Current Capacity			Preferred Capacity		
Leadership	**Internal**	**External**	**Independent T Test t**	**Internal**	**External**	**Independent T Test t**
Has a clear mission.	3.15 n=78	3.26 n=43	-.77	4.49 n=77	4.40 n=43	.78
Has a mission statement that is understood by most staff (internal to the organization).	3.30 n=78	2.88 n=42	2.43**	4.44 n=78	4.24 n=42	1.65*
Has a mission statement that is understood by stakeholders (external to the organization) who engage with the organization.	2.83 n=78	2.76 n=41	.28	4.33 n=78	4.22 n=41	.87
Is responsive and its decision-making and implementation is consistent with its stated mission.	3.03 n=78	2.52 n=42	2.91**	4.33 n=78	4.31 n=42	.11
Moves constructively forward - considering the scientific, cultural and social complexities of its decisions.	3.01 n=78	2.50 n=42	2.89**	4.33 n=78	4.36 n=42	.13
Works constructively to handle complaints and criticism.	3.40 n=78	2.81 n=42	3.2***	4.38 n=78	4.37 n=41	.04
Minimizes waste, expense and effort.	2.83 n=77	2.40 n=43	2.52*	4.42 n=76	4.38 n=42	.21

Table 20 (cont'd)

Organizational Culture and Structure cont'd	Current Capacity			Preferred Capacity		
Legitimacy	**Internal**	**External**	**Independent T Test t**	**Internal**	**External**	**Independent T Test t**
Takes responsibility for its actions.	3.57 n=79	3.00 n=43	3.41***	4.56 n=75	4.37 n=43	1.80*
Operates in an equitable and fair manner.	3.29 n=79	3.15 n=41	.788	4.53 n=76	4.43 n=42	.78
Is inclusive in its outreach and engagement including those with a stake in the matter.	3.30 n=78	3.32 n=32	.02^	4.42 n=77	4.40 n=40	.36
Is transparent in its operations.	3.29 n=77	2.81 n=42	-2.2*	4.40 n=75	4.31 n=42	.67
Builds trust.	3.16 n=77	2.74 n=43	2.27*	4.47 n=77	4.44 n=43	.09
Builds understanding.	3.22 n=77	2.81 n=43	2.21*	4.49 n=76	4.45 n=42	.17
Is accountable.	3.46 n=76	2.70 n=43	4.03***	4.47 n=77	4.40 n=42	.46
Operates lawfully.	3.95 n=77	3.86 n=42	.53	4.66 n=77	4.56 n=43	.83

Table 20 (cont'd)

Organizational Culture and Structure cont'd	Current Capacity			Preferred Capacity		
Governance	**Internal**	**External**	**Independent T Test t**	**Internal**	**External**	**Independent T Test t**
Embraces decentralized decision-making, allowing staff closest to the issues, who hold the applicable expertise, collaborating to reach a decision.	3.19 n=78	2.62 n=42	2.43**	4.31 n=77	4.24 n=42	.42
Focuses on the most important problems to safeguard the public, environmental health, and quality of life for current generations.	3.10 n=78	2.81 n=42	1.37	4.49 n=76	4.33 n=42	1.19
Focuses on the most important problems to safeguard the public, environmental health, and quality of life for future generations.	2.72 n=77	2.81 n=42	-.79^	4.55 n=75	4.33 n=42	1.78*
Embraces flexibility and adaptability in approaches to gather new information while achieving the organization's mission.	3.17 n=77	2.55 n=42	3.35***	4.37 n=75	4.40 n=42	-.43
Encourages the integration of individual ideas, values and perspectives in achieving the organization's mission.	3.00 n=77	2.67 n=42	1.74*	4.32 n=75	4.19 n=41	.93
Supports and rewards beneficial innovation.	2.90 n=78	2.54 n=41	1.91*	4.29 n=76	4.20 n=40	.63
Supports and rewards calculated risk-taking by staff.	2.55 n=77	2.10 n=41	2.42**	4.11 n=74	4.20 n=40	-.67
Promotes training which relies upon strategies to integrate divergent information to achieve a goal rather than a set of menu (prescriptive) driven tasks (e.g., promotes critical thinking).	2.84 n=76	2.78 n=41	.16	4.38 n=74	4.15 n=40	2.0*

Table 20 (cont'd)

Organizational Culture and Structure cont'd	Current Capacity			Preferred Capacity		
Governance cont'd	**Internal**	**External**	**Independent T Test t**	**Internal**	**External**	**Independent T Test t**
Encourages staff to develop support networks to improve staff's and the organization's knowledge base.	3.12 n=78	3.15 n=40	-.47^	4.34 n=76	4.25 n=40	.75
Uses technology to improve communication, increasing collective knowledge and awareness.	3.09 n=78	3.05 n=41	.21	4.38 n=76	4.34 n=41	.27

[a] Five-point scale from (1) strongly disagree to (5) strongly agree.

^ Equal variance not assumed; *** p<.001, ** p<.01, *p< .05; one-tailed Independent sample T Test mean comparisons

Table 21. Summary of Item Means by Population and Capacity – Decision Management

Decision Management[a]	Current Capacity			Preferred Capacity		
Process Scoping[b]	**Internal**	**External**	**Ind. T Test t**	**Internal**	**External**	**Ind. T test T**
Timely identifies problems and prioritizes them according to the magnitude of the problem.	2.93 n=70	2.61 n=38	1.69*	4.43 n=68	4.29 n=38	1.15
Manages problems according to the problems' impact.	2.96 n=70	2.45 n=38	2.78**	4.41 n=68	4.32 n=38	.76
Is responsive to participants' competing values, priorities and time frames.	3.44 n=68	2.59 n=37	3.89***	4.27 n=67	4.32 n=38	-.50
Sufficiently frames problems for management according to an overall programmatic statement.	3.23 n=70	2.76 n=38	2.71**	4.30 n=67	4.18 n=38	.87
Provides sufficient guidance with flexibility to allow for new concerns or information	2.94 n=70	2.73 n=37	1.09	4.32 n=68	4.35 n=37	-.37
Embraces new information to improve the basis for decisions.	3.31 n=68	2.76 n=37	2.41**	4.42 n=67	4.38 n=37	.19
Provides sufficient flexibility to allow for new concerns or information to improve processes.	3.25 n=69	2.61 n=36	2.88**	4.33 n=67	4.41 n=37	-.79
Interest and momentum are maintained in policy discussions and decisions.	3.00 n=67	2.88 n=34	.47	4.37 n=67	4.23 n=35	1.15
Appropriate participation is maintained throughout the duration of decision-making processes.	2.94 n=68	2.89 n=35	.10	4.48 n=67	4.28 n=36	1.63*
Appropriate participation is maintained throughout decision implementation.	2.94 n=67	2.91 n=35	.19	4.45 n=66	4.31 n=36	1.21^
Appropriate assessment tools are developed and implemented.	2.82 n=66	2.76 n=34	.11	4.40 n=67	4.29 n=35	.85
Decision-making and implementation processes are scaled	2.91 n=67	2.85 n=34	.10	4.39 n=67	4.40 n=35	-.26

Table 21 (cont'd)

Decision Management cont'd	Current Capacity			Preferred Capacity		
Participation	**Internal**	**External**	**Independent T Test t**	**Internal**	**External**	**Independent T Test t**
Decision-makers	3.81 n=70	3.35 n=37	2.78^*	4.50 n=68	4.38 n=37	.91
Decision implementers.	3.56 n=70	3.30 n=37	1.45	4.57 n=68	4.35 n=37	1.80*
Persons who may share in the risk.	2.93 n=68	2.92 n=37	.06	4.51 n=67	4.39 n=36	.77
Persons with the necessary scientific, economic/financial, and social perspective and expertise.	3.10 n=68	2.91 n=35	.82	4.44 n=66	4.49 n=35	-.52
Persons with unique knowledge.	3.13 n=69	2.97 n=34	.69	4.38 n=68	4.17 n=35	1.54
Persons with diverse knowledge.	3.11 n=66	2.71 n=34	2.35*	4.40 n=67	4.17 n=35	1.60*

Table 21 (cont'd)

Decision Processes cont'd	Current Capacity			Preferred Capacity		
Deliberation[b]	**Internal**	**External**	**Ind. T Test t**	**Internal**	**External**	**Ind. T Test t**
An appropriate number of relevant alternative recommendations are explored and developed.	3.16 n=67	2.64 n=36	2.93**	4.44 n=63	4.29 n=35	1.16
Alternative approaches are utilized and assessed that document and use verifiable data or reason.	3.22 n=67	2.80 n=35	2.31*	4.44 n=63	4.20 n=35	1.85*
Alternative approaches are assessed and utilized that build consensus prior to reaching a decision among those who share in the risks and benefits.	2.82 n=68	2.66 n=35	.95	4.38 n=64	4.20 n=35	1.29
Alternative approaches that are accompanied by an alternatives array which address risks, uncertainties and trade-offs are assessed and utilized.	3.03 n=65	2.43 n=35	3.32***	4.43 n=63	4.14 n=35	2.18*
Alternative approaches that manage uncertainties through contingency plans are assessed and utilized.	3.06 n=67	2.56 n=36	2.29*	4.29 n=63	4.06 n=35	1.69*
Alternative approaches that can be documented and articulated in an understandable manner, and implemented within the capacity of available resources are assessed and utilized.	3.09 n=68	2.72 n=36	2.02*	4.37 n=65	4.23 n=35	1.07
Alternative approaches are based on processes that follow a structured and participatory process, and perceived as fair and relevant to the issue at hand.	2.93 n=67	2.71 n=35	1.28	4.35 n=65	4.17 n=35	1.39
Alternative approaches are used that align with the organization's strategic mission statement.	3.03 n=66	2.83 n=35	1.19	4.35 n=63	4.18 n=29	1.21
Monitoring and assessment processes are designed and established to compare predicted effects with observed outcomes.	2.74 n=68	2.65 n=34	.28	4.36 n=66	4.15 n=34	1.53

[a] Five-point scale from (1) strongly disagree to (5) strongly agree.

[b] Some of the questions have been shortened to allow for a concise table. The survey contains the actual questions.

^ Equal variance not assumed; *** p<.001, ** p<.01, *p< .05; one-tailed Independent sample T Test mean comparisons

Table 22. Summary of Item Means by Population and Capacity – Improved Outcomes

Improved Outcomes	Current Capacity			Preferred Capacity		
Improved Outcome Capacities	**Internal**	**External**	**Independent T Test t**	**Internal**	**External**	**Independent T Test t**
Adaptive management concepts are practiced to improve ENR outcomes.	3.06 n=69	2.83 n=36	.96	4.12 n=66	4.14 n=35	-.19
Metrics indicate overall durability (e.g., improved ENR longevity) in ENR in the state.	2.57 n=70	2.73 n=34	-.78^	3.90 n=67	4.03 n=34	-.84
Competing socio-economic and ENR demands are well balanced for an improved ENR outcome.	2.41 n=70	2.50 n=36	-.61	4.07 n=67	4.09 n=34	-.13
Socio-economic demands and ENR problems are being managed without eroding the potential to meet future demands.	2.41 n=70	2.56 n=36	-1.04	4.05 n=64	4.11 n=35	-.51
ENR management outcomes are improving the quality of life in the state.	3.01 n=71	3.03 n=36	-.46	4.39 n=66	4.37 n=35	-.07

[a] Five-point scale from (1) strongly disagree to (5) strongly agree.

^ Equal variance not assumed; *** p<.001, ** p<.01, *p< .05; one-tailed Independent sample T Test mean comparisons

4.3 Capacity Factor Correlation

Capacity factor correlation was conducted to test and assess the best practice governance model developed for this research. The capacity factors and sub-factors were analyzed using Pearson's correlation testing in SPSS to assess the strength of the relationship between the independent variables (i.e., capacities) with the dependent variable (Improved Outcomes) (see Tables 23 and 24). The correlation analysis revealed a moderately strong and significant association amongst the variables. All correlations were $.48 < r < .61$, p (one-tailed) $< .01$. Correlation values (r) of less than .3 are weak; values between .3 and .7 are moderate; and values .7 to 1 are considered strong. The strongest correlations were found between Improved Outcomes were with the factors of Organization Cultures and Structures, and Decision Management. The weakest association was between Individual Performance and Improved Outcomes ($r=.48$. $p< .01$).

Table 23. Pearson's Correlation for Current Factor Capacities

Capacity Factor[c]	Individual Performance (IV)[a]	Organizational Culture and Structure (IV)[a]	Decision Management (IV)[a]	Improved Outcomes (DV)[b]
Individual Performance (IV)[a]	1	.830**	.779**	.481**
Organizational Culture and Structure (IV)[a]	.830**	1	.766**	.602**
Decision Management (IV)[a]	.779**	.766**	1	.544**
Improved Outcomes (DV)[b]	.481**	.602**	.544**	1

[a] IV means independent variable: [b] DV means dependent variable. [c] Listwise assumptions where n=106. This analysis used the listwise SPSS option which excludes all data that has relevant missing values. ** Correlation is significant at the 0.01 level (1-tailed).

Table 24 presents sub-factor level correlation values. There is less strength in the associations between the independent variables and the dependent variable of Improved Outcomes as revealed though the factor correlation. An exception is associated with the sub-factor of Governance where r = .64, p (one-tailed) < .01; and the sub-factor of Scoping where r =.56, p (one-tailed) < .01. All other sub-factors were lower than the factor correlations. The Individual Performance factor correlation (r =48) is higher than its sub-factors (Network r=.40; Capacity Building r=.37). Organizational Culture and Structure factor correlation (r=.60) is higher than two of its sub-factors (Leadership r=.49; Legitimacy r=.53). Decision Management factor correlation (r=.54) is higher than two of its sub-factors (Participation r=.48; and Deliberation (r=.47).

Table 24. Pearson's Correlation for Current Sub-Factor Capacities

Capacity Sub-factors[c]	Individual Performance IV)[a]		Organizational Culture and Structure (IV)[a]			Decision Management (IV)[a]			Improved Outcomes (DV)[b]
	Net.	Cap.	Lead.	Legit.	Gov.	Scope	Part.	Delib.	Outcomes
Network (Net.)	1	.620**	.628**	.466**	.570**	.692**	.607**	.527**	.398**
Capacity Build (Cap.)	.620**	1	.486**	.478**	.527**	.587**	.515**	.616**	.368**
Leadership (Lead.)	.628**	.486**	1	.723**	.765**	.734**	.573**	.595**	.486**
Legitimacy (Legit.)	.466**	.478**	.723**	1	.735**	.688**	.533**	.603**	.529**
Governance (Gov.)	.570**	.527**	.765**	.735**	1	.748**	.590**	.610**	.638**
Scoping (Scope)	.692**	.587**	.734**	.688**	.748**	1	.800**	.738**	.561**
Participation (Part.)	.607**	.515**	.573**	.533**	.590**	.800**	1	.665**	.476**
Deliberation (Delib.)	.527**	.616**	.595**	.603**	.610**	.738**	.665**	1	.471**
Improved Outcomes	.398**	.368**	.486**	.529**	.638**	.561**	.476**	.471**	1

[a] IV means independent variable: [b] DV means dependent variable; [c] Listwise n=103; ** Correlation is significant at the 0.01 level (1-tailed). This analysis used the listwise SPSS option which excludes all data that has relevant missing values.

4.4 Additional Survey Questions

Three additional scaled and four open-ended questions were included in this study to better understand the survey population and assist in interpreting the results of the hypotheses tests. Three topic areas selected for the additional questions were: 1) resurveying questions asked of internal staff in 2012 through the PricewaterhouseCoopers LLP survey to assess progress or change; 2) assessing the status of the population's perceptions about science (as an indicator of openness to divergent values and understanding); and 3) evaluating the level of resources dedicated to the program.

Pricewaterhouse Coopers (PWC) LLP 2012 Internal Staff Questions.

The research partners requested that this survey (launched February, 2013) repeat nine questions that were studied in 2012. These nine questions reflected areas where agreement scores fell below expected benchmarks. This 2012 survey was conducted by PWC on behalf of the State of Michigan to assess overall organizational/workforce health. It focused on three survey indicators: overall agreement, employee engagement, and intent to stay employed with the State of Michigan. Questions were scaled on a 5-point Likert scale (e.g., Strongly Disagree, Disagree, Neutral, Agree and Strongly Agree). Table 25 provides a summary of the 2012 agreement scores and the new 2013 agreement scores. Agreement scores are a measurement of the percent of responses in the Agree and Strongly Agree portions of the Likert scale. The State sponsored survey included a wider population than this ENR capacity survey. The overall response rate for the State sponsored survey for the entire ENR department (more than this study population) was 81% (n=927). The studied division's population in

this engagement survey was n=223. The internal population responding in this specific set of survey questions reflects a 53% response rate (n=69; 69/131).

Table 25. Comparison of PWC 2012 and 2013 Results for the Remediation Division

Statements	Agreement Scores[a]	
	2012[b]	2013[c]
I believe I have the opportunity for growth in my current job.	n= 223 32%	n=69 32%
Managers in my department make decisions in a timely fashion.	33%	46%
The State of Michigan empowers employees to make appropriate decisions that are in the best interest of the State.	30%	26%
I am confident department leadership is leading us in the right direction for success.	29%	29%
Leadership is creating a culture of continuous improvement.	35%	35%
I believe that government reinvention is not about eliminating people.	39%	48%
Department leadership is interested in the well-being of employees.	35%	42%
Department leadership gives employees a clear picture of the direction my department is headed.	39%	35%
Department leadership is trustworthy.	39%	41%

[a] Percentages of those selecting Agree and Strongly Agree;

[b] PricewaterhouseCoopers LLC Survey, 2012; RRD n=223;

[c] MSU Study, internal RRD practitioners only (e.g. as subset of the 2012 survey population) n=69.

Statements that reveal increases over the last survey include:

- Managers in my department make decisions in a timely fashion (33%, 2012; 46%, 2013).
- I believe that government reinvention is not about eliminating people (39%, 2012; 48%, 2013).
- Department leadership is interested in the well-being of employees (35%, 2012; 42%, 2013).
- Department leadership is trustworthy (39%, 2012; 41%, 2013).

Statements that reveal decreases over the last survey include:

- The State of Michigan empowers employees to make appropriate decisions that are in the best interest of the State (30%, 2012; 26%, 2013).
- Department leadership gives employees a clear picture of the direction [their] department is headed (39%, 2012; 35%, 2013).

Conclusions drawn from this data should recognize that the survey populations are different between the 2012 and 2013 surveys (e.g., all staff versus a distinct subpopulation). Additionally, the scope of the questions is broader than this capacity survey (questions refer to the state and department versus the specific program within a division).

Perceptions of Science-based Management.

To study the role of science in complex decision making, respondents were asked whether science can be biased. This question was used as a broad indicator of the population's understanding of the role of science in complex decision-making. Figure 6 shows the largest segment (48%) of internal stewards believe that science can be biased, whereas the majority (51%) of external stakeholders selected 'sometimes' science can be biased. Twelve percent of the internal population and 9% of the external population did not perceive science as being biased.

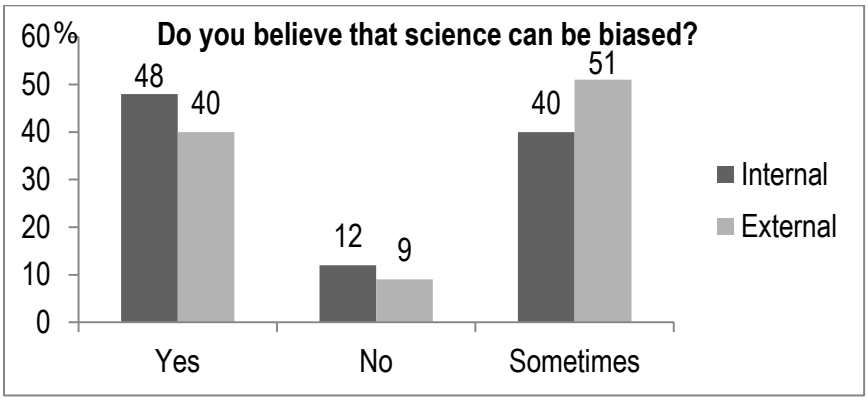


Figure 7. Beliefs about Biases in Science

Preferences related to Program Resources.

To assess the adequacy of resources that are focused on the program the respondents were asked if the program's dedicated resources are commensurate with societal risks posed by contaminated property. Both populations indicated that the program's dedicated resources are not commensurate with societal risks. Figure 7 indicates that there is support from both sectors for more resources. Eighty-one percent of the internal practitioners and fifty-seven percent of the external respondents feel more resources are necessary. Five percent of the internal and 29% of the external populations indicated that resources were commensurate with societal risks posed by the contaminated property. Seven percent of the internal population indicated that fewer resources are needed, with the same percentage being undecided. Three percent of the external population indicated fewer resources are needed. Eleven percent of the external population was undecided.

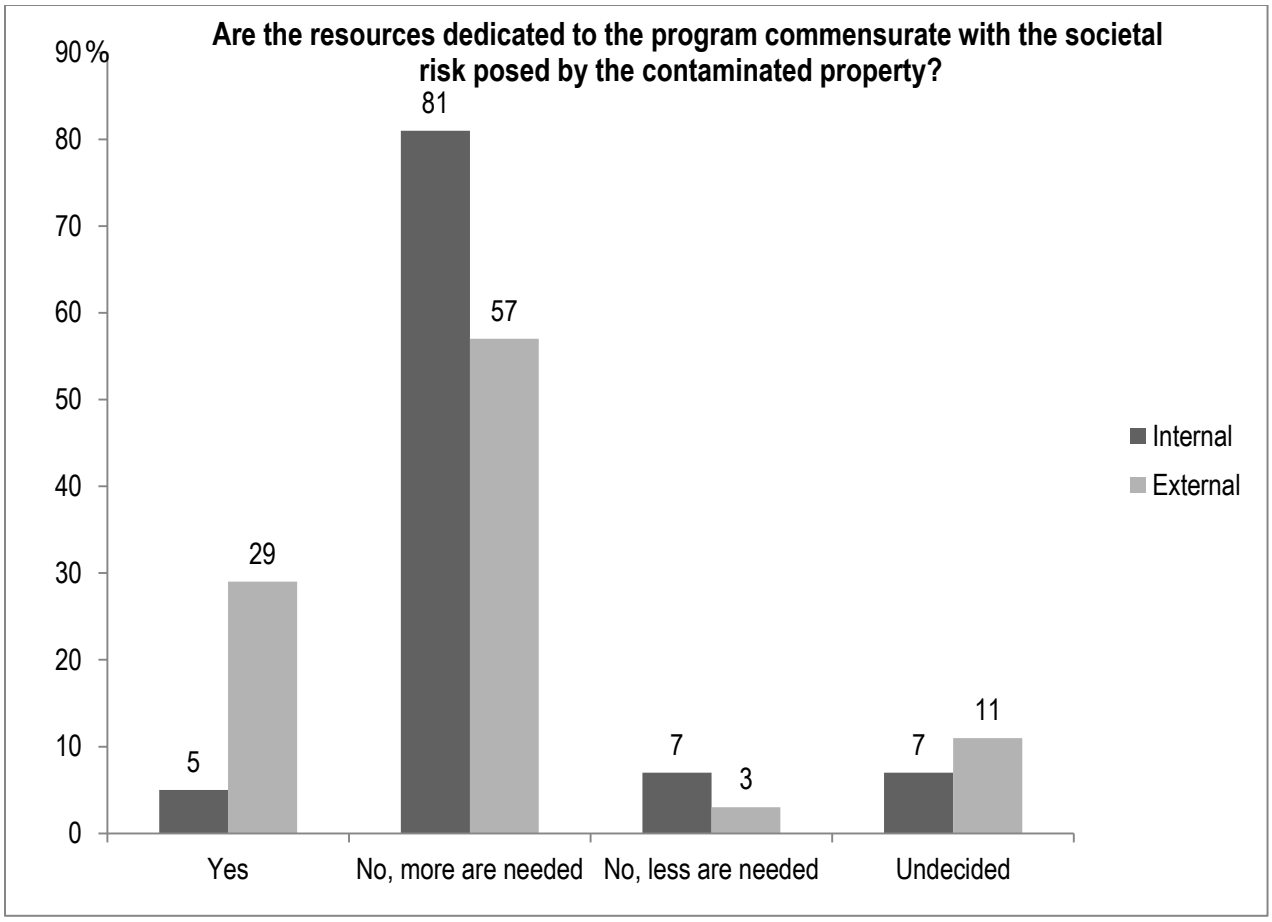


Figure 8. Resource Allocations

Open-ended Questions.

Open-ended questions were asked to augment the scaled items. In this discussion, the questions are followed by the number of responses, the main themes of the respondents' comments, and the category which received the majority of the comments segmented by study population. Where applicable the responses are categorized by this study's capacity factors and sub-factors. Other categories were developed if a number of comments warranted a new category (e.g., Program Costs and Funding). Other comments were placed under Uncategorized Statements. The summaries of the open ended questions segmented by sector are provided in Appendix C. Exact

comments have been provided with minor editing to help with readability. Some indication of the commenters' program experience has been provided while protecting the respondents' identity. No additional qualitative coding or analysis has been done since this was not the primary focus of this thesis.

Question1. *Effective governance is defined as being "participatory, consensus oriented, accountable, transparent, responsive, effective and efficient, equitable, inclusive; follows law and is responsive to the present and future needs of society (United Nations, 2011; United Nations Development Program, 1997). What one question or issue did you feel was missing from this survey that would help identify the means to improve environmental and natural resource outcomes?* (n=68)

Response themes:

- Internal practitioner themes include ENR Outcomes, Organizational Culture and Structure, Decision Management and Uncategorized Statements.
- External practitioner themes include ENR Outcomes, Organizational Culture and Leadership, and Uncategorized Statements.

Majority response category: Decision Management (internal stewards); Organization Culture and Structure (external stakeholders).

Questions 2. *What types of factors, capacities or activities have the biggest impact on effective ENR management and improved outcomes? Your responses can include external and internal pressures or influences that are outside the scope of this survey?* (n=77)

response themes:

- Internal practitioner themes include ENR Outcomes, Decision-makers and Influencers, Organizational Culture and Structure, Program Costs and Funding, and Uncategorized Statements.

- External practitioner themes include ENR Outcomes, Organizational Culture and Structure, and Uncategorized Statements.

Majority response category: Organizational Culture and Structure (internal stewards and external stakeholders).

Question 3. *Of the activities you mentioned, please identify the one which has the biggest impact?* (n=63)

Response themes:

- Internal practitioner themes include Stakeholders and Politicians, Program Costs and Funding, Organizational Cultures and Structures and Uncategorized Statements.

- External practitioner themes include ENR Outcomes, and Organizational Culture and Structure, and Uncategorized Statements.

Majority response category: Stakeholders and Politicians (internal stewards and external stakeholders).

Question 4. *Is there anything else you would like to add before submitting this survey?* (n=58)

Response themes:

- Internal practitioner themes include ENR Outcomes, and Organizational Cultures and Structures, and Uncategorized Statements.

- External practitioner themes include ENR Outcomes, and Organizational Cultures and Structures, and Uncategorized Statements.

Majority response category: Organization Culture and Structure (internal stewards and external stakeholders).

4.5 Summary of Findings

This research identified capacities that the literature suggested contribute to improving ENR outcomes given wicked problems. An exploratory best practice governance model was developed to test selected capacities (factors and sub-factors) in an applied setting. This study tested the model through internal and external practitioner perceptions and preferences of current and preferred capacities to manage wicked problems. The study's survey instrument was scaled to assess capacity to manage wicked ENR problems. The scales ranged from the capacity to tackle tame problems to wicked problems (e.g., a five point scale with capacities closer to 1 being associated with tame problem approaches and capacities closer to 5 being associated with the capacity to manage wicked problems). A ranking of 3 is neutral, associated with a capacity of neither tame nor wicked.

The best practice wicked ENR problem governance model shows promise on three fronts: 1) the reliability testing was moderately strong, 2) correlation testing showed moderately positive relationships between the three independent variables (as factors) and the improved outcomes (i.e., dependent variable), and 3) the general consistency in perceptions and preferences within the study populations, even though the external population tended to rank current capacities lower than the internal population.

Reliability indicates the degree to which an assessment tool produces stable and consistent results; it does not indicate that the test instrument is measuring the intended construct. This research was not designed to test the validity of the test instrument or

its application. While not a rigorous measure, respondent feedback is often used to assess 'face validity.' Face validity ascertains that the measure appears to be assessing the intended construct under study. The similarity in responses and the general feedback provided in the open-ended questions provides a level of 'face validity.'

Correlation tests revealed medium to medium high correlation values (range of $.77 < r < .83$, p (one-tailed) < .01) for the independent variables of individual performance, organizational culture and structures, and decision making capacities. The correlation among these independent variables and the dependent variable of outcomes was less strong. The strongest correlation with dependent variable of improved outcomes was with organizational culture and structure and decision management. The correlation between individual performance and outcomes was positive and significant but less strong ($r=.48$). Sub-factor correlation testing revealed a wider range of r values (range of $.36 < r < .77$, p (one-tailed) < .01).

Three hypotheses were tested:

H1. There will be a significant difference in current and preferred capacities between the steward and stakeholder populations.

H2. The stakeholder population will have higher expectations for government's alignment with wicked problems compared to the steward population.

H3. The studied ENR program is currently more adept at solving tame problems than managing wicked problems.

This study found significant differences between current capacities and preferred capacities among both study populations. Current factor capacity mean scores for internal stewards averaged 3.03, while the mean scores for the stakeholders were

significantly lower for all factors except Improved Outcomes, averaging 2.81. All current sub-factor capacity ratings were significant ($p<.05$) except Participants and Improved Outcomes. The average ratings for current factors and sub-factors represent capacities being closer to tame (external perceptions) or neutral (internal perceptions).

Preferred factor capacities for the internal stewards averaged 4.37 while the mean score for the external stakeholders was 4.30. The difference in the factor scoring was not significant. Preferred capacity sub-factor analysis showed a slight significant difference in the sub-factor of Deliberation under the factor of Decision Management.

The commonality in preferred capacities and high level of agreement within the test population suggests recognition of the need to manage wicked problems consistent with the scales developed for this test instrument.

Review of sub-factors and associated competencies indicates some significant differences. Using the sub-factors and individual capacity items provides specificity to the various strengths and opportunities to improve ENR outcomes. For instance, internal practitioners favored Capacity Building (mean=3.22) and external practitioners favored Networking (mean=2.85) as their top rated sub-factor under Individual Performance. Additionally, Participants (i.e., inclusion in Decision Management), and Legitimacy (Organizational Culture and Structures) were the highest scored sub-factors across both populations. Governance (Organizational Culture and Structure), and deliberation (Decision Management) were on the low end for both populations. External practitioners also rated Scoping (Decision Management) on the low end.

The means scores for the current factors and sub-factors were in the range of neutral (scale value of 3). External respondents rated the current program capacity at an overall mean=2.81; internal respondents rated mean=3.03. This indicates that the program‘s current capacity is perceived as less than ideal for tackling wicked problems.

In summary, this study indicates: 1) statistical reliability of items supporting factors and sub-factors derived from the literature and a compilation of best practice capacities; 2) high correlation among the capacities, with moderate positive correlation between the independent variables and the dependent variable (e.g., improved outcomes); 3) commonality within the test sample in preferences for working toward improved outcomes; 4) statistically significant evidence that current capacities within the studied program were significantly below preferred capacities, with significant differences between the test populations with externals rating current capacity ratings lower than internals in all factor capacities except for improved outcomes; and 5) the majority of both populations (87% internal; 51% external) indicated that the program’s dedicated resources are not commensurate with societal risks posed by contaminated property and that more resources are needed.

There are observable changes since the State of Michigan 2012 Employee Engagement Survey conducted by PricewaterhouseCoopers LLP. While the State of Michigan engagement survey included all state program staff, it did not include the perspectives of external stakeholders. This study only includes a subset of staff who work in the studied program. The findings presented by this study are mixed (e.g. increases, decreases and no change in tested engagement elements).

Numerous responses (266 in total) were received for the open ended questions. These responses provide insight into the perceptions and preferences of the respondents and questions that could be considered for further research.

CHAPTER 5
CONCLUDING SUMMARY AND RECOMMENDATIONS

This chapter summarizes the purpose of the research and associated limitations and delimitations, provides conclusions of the study based on research findings, provides recommendations for both future research and ENR management application, and provides a concluding summary.

5.1 Purpose of this Research

This research contributes to the emerging bodies of research regarding governance for improved ENR outcomes. The focus of this research was to develop a best practice governance model and test the model with one complex ENR program's capacity to improve wicked problem outcomes through identified capacities.

The interdisciplinary theory that framed this research and the development of the best practice governance model included work by Arvai, McDaniels and Gregory (2002); Brown et al., (2010); Goldsmith and Kettl (2009); Hart and Dowell (2011); Hart, Milstein and Caggiano (2003); Kjaer (2010); Kotter (1995); Michigan Sea Grant and Graham Environmental Sustainability Institute (2009); and Rittel and Webber (1973), as well as the author's own governmental and policy development experience.

Current and preferred capacities of three capacity factors were hypothesized to improve wicked problem outcomes: 1) individual performance: 2) organizational culture and structure; and 3) decision management. These three independent variables and the dependent variable, improved outcomes, were supported by sub-factors and competencies (survey items) which were developed based on literature.

The best practice wicked ENR problem governance model showed promise on three fronts: 1) the reliability testing was moderately strong, 2) the correlation testing showed moderately positive relationships between the three independent variables (as factors) and the outcomes or dependent variable, and 3) face validity with general consistency in perceptions within the study populations, even though the external population tended to rank current capacities lower than the internal population. These findings contribute to the field of ENR governance research.

This research tested the exploratory model though the current perceptions and preferences of internal and external practitioners with current experience in a complex ENR program. They were instructed to assess the internal progam aspects only. Generally, this study was designed to test: 1) whether the studied ENR program was currently more adept at solving tame problems than managing wicked problems; 2) significant differences in current and preferred capacities (context); and 3) differences in the studied populations (internal and external) perceptions of the program.

This research was conducted in the spring of 2013 using an electronic survey instrument. The survey included seventy Likert scaled questions focused on specific current and preferred capacities of the studied program. The Likert scale consisted of a five point scale with capacities closer to 1 being associated with tame problem approaches and capacities closer to 5 being associated with the capacity to manage wicked problems. Additional questions gathered demographic information regarding the study population and their individual perceptions and preferences. Survey data were analyzed with reliability and correlation testing, descriptive statistics, and T test of means.

Numerous stakeholder processes were conducted to identify ways to improve the studied program with little improvement to program and ENR outcomes. During discussions regarding the PricewaterhouseCoppers LLC 2012 survey, program managers of this state program lamented that while problems were identified, they were not certain how to make improvements. This is similar to the findings in this study and literature review that reveal a great demand for understanding how organizations can affect desirable change, while remaining relevant and competitive with the challenges that confront them (Sharma et al., 2007; Wustenhagen et al., 2008). Since this study provides scaffolded capacities (items that support and inform sub-factors that in turn support and inform factors), managers can look to the results of the specific factors, sub-factor and specific item levels to prioritize capacity building for improved ENR outcomes.

5.2 Study Limitations and Delimitations

The survey response rates were acceptable, with some survey fatigue or reduction in survey completion. There was no significant difference in Likert scaled response selections between the population that completed the survey and those who initiated but did not complete the survey. This finding was based a comparison of means (Independent T Test) for the questions that were completed by both populations. While there is no data for an analysis of the non-responders (those who never opened the survey), an extrapolation of the data, leads to an inference that those not completing the survey rated the current independent variables slightly higher than those completing the survey, and the dependent variable slightly lower. The preferred capacities were rated slightly lower for the independent variables and slightly higher for the dependent variable. The length and topics covered in the survey may have inadvertently created a

select survey population, meaning that the respondents represent a more engaged population, especially those completing the survey and providing the written responses to the open ended questions.

This study relied upon respondent perceptions and preferences that are subject to heuristics, framing and biases and did not imitate other surveys. Therefore, while the results are reliable they may not be accurate (except in relation to the respondent's perceptions, which are also important). The survey was found to have face validity.

This research was delimited to one ENR program where practitioners operate in a highly technical arena that is quasi-legislative and quasi-judicial in executing public laws and programs. ENR programs may have commonality, but they are each culturally, structurally and context specific. While this research may be informative, it may not be generalizable to other programs. The nature of the survey and the limited study population may not reflect wider program perceptions and preferences. The delimitations on the study population were designed to focus on the applicability of a best practice model using practitioners who were exposed to the studied program and its on-going transformation. The studied program is in an evolutionary stage, shifting from a hierarchical structure to one that is more participatory and collaborative (e.g., having the elements of network based governance). Capacities associated with network based governance include an open and interdependent exchange of resources using trust, diplomacy and reciprocity rather than authority, rules and commands, hierarchical employment relationships and subordination (Kjaer, 2010; Rhodes, 1999).

5.2 Conclusions

The research indicated that both internal and external practitioners are currently observing each factor, sub-factor and item at less than their preferred level. The studied program is perceived to be using capacities that are closer to neutral or tame problem management than being aligned with the capacity to tackle wicked problems. Both sectors share similar desires to move toward capacities through competencies aligned with tackling wicked problems.

The paired sample T test indicated that the comparisons of current and preferred means for all competency items for both populations were highly significant ($p<.001$). The analysis of the survey results indicates significant differences between the internal and external population perceptions for three of the four current capacity factors (e.g., individual performance, organizational culture and structure, and decision management). There was more commonality between the two populations with the capacity factor of Improved Outcomes. Review of the sub-factors indicated one more area of commonality – Participants (inclusiveness in decision making). All remaining current sub-factor differences were significant ($p< .05$). The areas of difference included the sub-factors of Networking, Capacity Building, Leadership, Legitimacy, Governance, Scoping (e.g., problem framing and scoping), and Deliberations.

Both sectors rated preferred capacities similarly indicating commonality in desired program capacities. There was no significant difference between the internal and external populations' preferred factor capacities. This indicates that both sectors desire much the same in the program given this exploratory best practice model. Only the sub-factor associated with decision Deliberation was significant ($p< .05$). This relative

commonality may equate to shared goals and preferences regarding individual performance, organizational culture and structure, decision management and ENR outcomes. The increased ranking from current capacity perceptions to preferred capacities reflect the studied populations' interest in moving toward those capacities associated with the ability to tackle wicked problems. This study and its findings give the program information on which it can build consensus and partnerships.

The hypotheses testing were conducted at the factor and sub-factor level. Hypotheses analysis in this research was not intended at the item level. However, the specific test item data can lend insight into the various competencies associated with the studied program. The following observations are made by reviewing the overall current capacity data (factors, sub-factors and item/competencies) and comparing them to the overall mean scores (i.e., internal mean of 3.03 and external mean of 2.81) as well as the authors understanding of the program's evolving culture and structure.

Based on knowledge of the program's history and the data obtained through this study, it appears that the studied program has made progress toward addressing the stakeholders' and governor's concerns. The program is moving toward networked based governance but could make improvements in the areas the organization's structure and culture, and decision management. To provide structure to this brief discussion, the items identified in Section 1.3 as stakeholder concerns are used as the framework. The data that is highlighted likely supports more than one bullet point. For the sake of brevity, not all the item data is summarized nor repeated.

1. *Assess the means to improve ENR transactions to meet the current and future public interest given changes in Michigan's economy and resource limitations.*

    - Areas that received the highest response values (e.g., more likely to align with wicked problems solving capacities) included those competencies associated with the program's Legitimacy, Networking and Participation. From an external stakeholder perspective the program is inclusive, and operates in a lawful and equitable manner. Both internal and external stakeholders indicate that the level of participation is rated higher than average for decision makers, decision implementers, and persons with the necessary scientific, economic and social perspective. Internal respondents indicated that those that share the risk may not be included. External respondent's scoring indicates that persons with diverse knowledge may not be included.
    - Internal participants indicate that they felt empowered and understand the organizations objectives. However the scoring for the organization in support of these capacities does not appear as high.
    - The steward and stakeholder reported values indicate less than desirable capacity for individual risk taking, ability to receive support and respect outside the agency, and ability to mediate differences. Stakeholder values indicate that capacities associated with individual reflection and feedback, organizational trust, and accountability are relatively low.

2. *Maximize return on investment by focusing on those things that matter and reduce or eliminate management elements that provide little corresponding improvement.*

    - The stewards indicate that at the individual level, they are assisting in producing environmental results that take into account competing business, citizen, scientific and community views. External respondents rated the program capacity for individual performance slightly above their average score. However similar factors under organizational culture and structure and ENR outcomes are not rated as high.
    - Internal and external respondents rated high the observed individual performance factor of assessing the nature of a problem, and its causes and elicit a collaborative analysis and recommendation. This capacity was rated lower by both sectors when referring to the organizations capacity to do the same.
    - There was unanimity among the respondents that the program's mission statement is not understood by stakeholders. Both internal and external respondents indicated lower values for current leadership capacities (organizational factor) for moving constructively forward and minimizing waste, expense and effort.
    - External respondent values were relatively low for items associated with individual use of creativity and observed expansion of perspectives when confronted with divergent perspectives. The organization's governance scored low in a similar competency - focusing on the most important

problems, and encouragement of integration of individual ideas, values and perspectives in achieving improved outcomes.

- External respondents indicated that the organization does not embrace decentralized decision-making nor flexibility and adaptability. There was unanimity between the sectors for the organizations focusing on the most important problems to safeguard the public, environmental health and the quality of life for current generations. However, the stewards (with stakeholders providing a value close to their mean) tend to perceive that the organization is not taking into account future generations. Similarly the sectors tended to score lower the organizations observed capacities to encourage the integration of individual ideas, values and perspectives in achieving the organizations mission, capacity to support and reward beneficial innovation and calculated risk taking as well as the promotion of training which relies upon strategies to integrate divergent information to achieve a goal rather than a set of prescriptive task (i.e., promote critical thinking). This is contrasted with stewards feeling empowered at the individual level.

3. *Encourage active and positive interactions and partnerships with the public and those affected by ENR management.*

    - Networking and Participation were scored higher than the averages as were the organizations encouragement of staff to develop support networks to improve knowledge and the use of technology to increase collective awareness. Leadership scores and governance scores indicate

lower values for the organization being responsive and managing decisions consistent with its stated mission.

- The subsequent problem scoping and decision management scores were lower for both populations.

4. *Focus on outcomes and the measurement of progress and success.*
    - Outcome scoring was one of the lowest factors for both sectors. With the balancing of socio-economic issues and metrics being the lowest competencies. Adaptation and improving the quality of life scored higher (but close to neutral).
5. *Researcher observations*.

Returning to the governance model, this research hypothesized that three factors contribute to improved ENR outcomes: Individual performance, organizational culture and structure, and decision management. As the agency evolves, the capacities of the individuals and the organization must evolve to support the capacities derived from the literature to support the decision management associated with wicked ENR problems. It appears that the Individual Performance has some relative alignment with identified sub-factor capacities (Capacity Building from an internal perspective and Networking from an external perspective). It also appears that the organization is beginning to align with the sub-factors of Legitimacy. Additionally, the individuals and the organization are aligning with capacities for Participation. What would then follow, given the model are competencies associated with Decision Management and the organizational sub-factor of Governance. The competencies associated with these factors appear to be an area where movement may be needed to improve ENR outcomes.

Both sectors rated organizational governance, decision scoping, decision deliberations and outcomes low. External respondents also rated the program's scoping sub-factor (e.g., problem framing, process and assessment tools) lower than the average. Based on the survey data, it appears that the program has yet to provide sufficient training and the tools to embrace decentralized decision management. Both sectors' scoring indicates that the organization does not move constructively forward- considering the scientific, cultural and social complexities of its decisions. Observations regarding the additional scaled and open ended questions would also suggest that the program is still in need of focusing on organizational management and training to support both the staff and decision management for improved ENR outcomes. Both sectors rated the program ability to address competing socio-economic and ENR demands low as well as program metrics that indicate overall durability of improving ENR in the state. The sectors gave higher scores for program adaptability and ENR outcomes improving the quality of life in the state.

Similar observations can be drawn from data associated with the programs ability to be flexible and responsive to competing values, priorities and time frames. Individual Performance capacities were rated higher than the organizations capacity to support similar competencies. Perhaps these capacities are more evident internally and individually and will eventually become more evident externally as the program continues to broaden its participation and worldview, moving from a relative insular and hierarchical structure to one more aligned with network based governance. Growth in innovation, flexibility, creativity, critical thinking, taking

calculated risks, and furthering the understanding and skills to mediating divergent perspectives and values will help further decision management capacities. This in turn should foster a narrowing of the gap that exist between internal and external current perceptions. It can also move them both toward their shared preferences that align with tackling wicked problems. These in turn may improve ENR outcomes.

In summary, the program seems to have increased its engagement with the public. It now needs to focus on complimentary capacities to improve ENR outcomes. The respondent preferences are aligned. With agreement on competencies to improve the ENR outcomes, the program could be making headway and is moving from being more in line with addressing tame problems to one more aligned with managing wicked problems.

5.3 Recommendations

This exploratory research provides insight and opportunities for future research and ENR program assessment. Following are recommendations grouped according to the two aspects of this study 1) research (e.g., development of the best practice model and the survey scales, and 2) ENR program practice (e.g., testing and application of the model).

1) Research Methods and Theory

   a. Share and utilize the results of this research to increase awareness of knowledge, approaches and investments that can: i) assist others in the identification of areas for employee and organizational governance development; and ii) improve ENR outcome capacity building in 'wicked situations and times.'

b. Conduct one or more longitudinal studies or apply and assess the application of treatments to this program, observing changes to current and preferred capacities and outcomes between internal and external practitioners.
c. Further study the relationship between the independent capacities and the dependent capacity (e.g., improved ENR outcomes) using more sophisticated multivariate statistics.
d. Test this model and survey instrument in another context to assess its broader applicability. Use in another context could provide a basis for comparison relative to internal and external practitioners' perceptions and preferences of wicked problem management capacities for improved outcomes.
e. Review the modifications suggested by the respondents in the open-ended questions and incorporate them as deemed necessary prior to any subsequent use of this test instrument.
f. Further test the survey scales used in this study using a more complete set of validity tests.
g. Assess the use of shorter but multiple surveys to study current and preferred ENR capacities.
h. Assess the impact of other matters not part of this governance model such as budgetary, or the legal or judicial matters that my also impact ENR governance.

2) ENR Program Applied Practice

a. Share the survey results with the survey participants and the studied program for the benefit of providing more insight into the program management of practitioner current perceptions and preferences.

b. Use these research results as baseline data and assist in the identification and prioritization of areas of individual employee and organizational development and barriers to improved ENR outcomes. Consideration should be given to building on commonalities and further growth toward shared goals for improved ENR outcomes as well as employee training which relies upon strategies to integrate divergent information to achieve a goal rather than a set of prescriptive task (i.e., promote critical thinking).

5.4 Summary

This thesis contributes to the emerging bodies of research on individual capacities and organizational governance for improved ENR outcomes. Further, this research attempted to close gaps in the literature from both an academic and applied research approach - filling what appears to be one of the largest questions left in the literature: *How can a program transform to a more sustainable paradigm that can better tackle wicked problems for more durable ENR outcomes where practitioners operate in a highly technical arena that is quasi-legislative and quasi-judicial in executing public laws and programs?* This research contributes to the theory and methods on ENR governance and its application for wicked problem management. This research provides a picture of the studied program that can be used to further understanding of areas for employee and organizational governance development, and identify opportunities to increase awareness and knowledge of approaches and investments

that lead to improved ENR outcomes in 'wicked situations and times.' In summary, this study contributes to the body of literature regarding ENR governance and improving outcomes by which future ENR governance and research can benefit.

APPENDICES

APPENDIX A

SURVEY INSTRUMENT

THIS VERSION OF THE SURVEY HAS BEEN MODIFIED FROM THE ACTUAL QUALTRICS SURVEY. THE QUALTRIC SURVEY WAS NOT SUFFICIENTLY COMPATIBLE WITH MICROSOFT WORD TO MAINTAIN LEGIBILITY

Governance Survey

THANK YOU FOR YOUR INTEREST IN TACKLING COMPLEX ENVIRONMENTAL AND NATURAL RESOURCE (ENR) PROBLEMS FOR IMPROVED OUTCOMES FOR MICHIGAN.

This survey may take approximately twenty-five minutes to complete. When taking this survey you may save your work and return to this survey so long as you return on the same computer that allows for cookies to be enabled during the open survey period. Access will be denied if you try to access it from another computer. This survey closes at 6 PM on March 12, 2013.

INTRODUCTION

This survey is being conducted as a partnership between Michigan State University's Department of Community, Agriculture, Recreation and Resource Studies and Michigan Department of Environmental Quality (MDEQ). This survey contains questions about environmental and natural resource management associated with the integration and reinvention of the State's cleanup and redevelopment program. Your participation is voluntary. You may withdraw at any time, or you may refuse to answer any particular question.

If you choose to participate in this survey, your responses will be kept confidential and your privacy will be protected to the maximum extent allowable by law. By completing this survey, you indicate your voluntary consent to participate in this research. Research results will be used in a thesis for completion of a Master of Science degree under the direction of Dr. Christine Vogt. The survey results will inform efforts to strengthen ENR program governance understanding in academic research, education, and practice. If you have any questions about the survey, please contact Ms. Patricia McKay at 517-775-0852, e-mail – mckaypa1@msu.edu or Dr. Christine Vogt at 517- 432-0318; e-mail – vogtc@msu.edu.

THE SURVEY

ENR problems are becoming more complex, entering the realm of socio-economic issues and exceeding the forecasting and management capacity of any one sector or jurisdiction. These complex matters are considered wicked problems. Wicked problems are 1) interdisciplinary in scope with high uncertainty; 2) value laden; and 3) evolving and dynamic. Wicked problems require sensitivity to differing values and science for collective and cohesive adaptive management plans to be developed and implemented - approaching or achieving the desired outcome.

State of Michigan government, including the ENR programs, has been challenged to reinvent itself - balancing environmental matters with social and economic issues for improved outcomes.

The Governor's ten-point plan for Michigan includes:
1) creating more and better jobs; 2) leveraging our new tax system; 3) reinventing government; 4) keeping our youth-our future here; 5) restoring our cities; 6) enhancing our national and international image; 7) protecting our environment; 8) revitalizing our education system; 9) reinventing our health care system; and, 10) winning Michigan through relentless positive action.

Balancing these environmental and socio-economic issues with the cleanup and redevelopment program's more complex problems is a difficult and wicked task. This ten-point plan can be used as an example of tackling wicked problems when participating in this survey.

<u>With the Governor's ten-point plan and the realities of the state's cleanup and redevelopment program in mind, please answer the questions which follow a few brief definitions of terms and acronyms used in this survey</u>.

DEFINITIONS

Capacity: Capacity is the ability to hold, receive or absorb available knowledge and the ability to exploit existing knowledge for creative problem solving.

Current: Current as used as in the survey means belonging to the present time. (Current capacities should be observed/actually present as opposed to a perceived potential.)

DEQ: Department of Environmental Quality, a State of Michigan department.

ENR: Environmental and natural resource.

Preferred: A preferred capacity is one that is more desirable. (A preferred capacity should be viewed as a perceived desirable and achievable potential.)

RRD: Remediation and Redevelopment Division within the DEQ.

This survey may seem long. Complex issues do not lend themselves to simple surveys. Your thoughtful participation will improve MSU's and DEQ's understanding of ENR governance perceptions regarding improved ENR outcomes for Michigan.

Section 1. There are five sections of questions. These questions ask about your current general observations and what you would prefer to observe when the cleanup and redevelopment program is tackling wicked problems. When more than one factor is listed within one question (e.g., a compound question), please answer based on the totality of all listed factors.

The first block of questions relate to the general and collective individual capacity of staff. Later you will be asked similar questions regarding the organizational culture and structure. One way to differentiate between an organizational culture and its staff capacities might be to think about the individual performance of staff (as a collective whole) versus the governmental organization. A third set of question ask about decision-making and implementation processes. These three factors (individual performance, organizational culture and structures, and decision management/governance) affect outcomes.

[Note to thesis readers: The first 70 measurement items consisted of Likert scaled items with current and preferred categories of measurement per each listed item.]

Q 1.1. Please answer the following questions as you currently assess DEQ RRD staff capacities as a whole AND how you would prefer to observe the same capacities when tackling wicked problems.

- Staff embraces self-empowerment.
- Staff understands organizational objectives.
- Staff embraces conflicts and addresses them in a constructive manner.
- Staff takes calculated risks to improve ENR outcomes.

- Staff receives support and respect within the organization including when values differ.
- Staff receives support and respect outside the organization including when values differ.
- Staff has the ability to mediate differing interests to reach broad consensus on what is in the best interest of the group (stewards and stakeholders and within legal and delegated authority).
- Staff assists in producing environmental results that take into account competing business, citizen, scientific and community views.

Q 1.2. Please answer the following questions as you currently assess DEQ RRD staff capacities (as a whole) AND how you would prefer to observe the same capacities when tackling wicked problems.

- Staff expands its perceptions and understanding when exposed to divergent perspectives.
- Staff seeks and develops new insights, technologies and knowledge in socio-economic trends through work and extracurricular activities, experiential learning and education.
- Staff assesses the nature of a problem, and its causes and elicits a collaborative analysis and recommendation.
- Staff seeks feedback and is reflective about activities and interactions.
- Staff creates an environment that encourages creative thinking and innovation, and designs and implements new or cutting edge program elements and processes.

Section 2. The following questions allow you to tell us about your current experiences and your preferences regarding the DEQ RRD organization - its culture and structure. When one or more factors are listed within one statement (e.g., a compound statement), answer based on the totality of all listed factors.

Q 2.1. Please answer the following questions as you currently assess DEQ RRD organizational capacities as a whole AND how you would prefer to observe the same capacities when tackling wicked problems. The organization:

- Has a clear mission.
- Has a mission statement that is understood by most staff (internal to the organization).
- Has a mission statement that is understood by stakeholders (external to the organization) who engage with the organization.

- Is responsive and its decision-making and implementation is consistent with its stated mission.
- Moves constructively forward - considering the scientific, cultural and social complexities of its decisions.
- Works constructively to handle complaints and criticism.
- Minimizes waste, expense and effort.

Q 2.3. Please answer the following questions as you currently assess DEQ RRD organizational capacities as a whole AND how you would prefer to observe the same capacities when tackling wicked problems. The organization:

- Takes responsibility for its actions.
- Operates in an equitable and fair manner.
- Is inclusive in its outreach and engagement including those with a stake in the matter.
- Is transparent in its operations.
- Builds trust.
- Builds understanding.
- Is accountable.
- Operates lawfully.

Q 2.4. Please answer the following questions as you currently assess DEQ RRD organizational capacities as a whole AND how you would prefer to observe the same capacities when tackling wicked problems. The organization:

- Embraces decentralized decision-making, allowing staff closest to the issues, who hold the applicable expertise, to collaborate to reach a decision.
- Focuses on the most important problems to safeguard the public, environmental health, and quality of life for current generations.
- Focuses on the most important problems to safeguard the public, environmental health, and quality of life for future generations.
- Embraces flexibility and adaptability in approaches to gather new information while achieving the organization's mission.
- Encourages the integration of individual ideas, values and perspectives in achieving the organization's mission.
- Supports and rewards beneficial innovation.
- Supports and rewards calculated risk-taking by staff.

- Promotes training which relies upon strategies to integrate divergent information to achieve a goal rather than a set of menu (prescriptive) driven tasks (e.g., promotes critical thinking).
- Encourages staff to develop support networks to improve staff's and the organization's knowledge base.
- Uses technology to improve communication, increasing collective knowledge and awareness.

Section 3. The following questions will allow you to tell us about current experiences and your preferences regarding the DEQ RRD's organizational decision management. Again, when one or more factors are listed within one statement - answer based on the totality of all listed factors. The definition of wicked problems and the Governor's ten-point plan are provided below if you wish to refresh yourself regarding the survey introduction.

Wicked problems are 1) interdisciplinary in scope with high uncertainty; 2) value laden; and 3) evolving and dynamic. Wicked problems require sensitivity to differing values and science for collective and cohesive adaptive management plans to be developed and implemented - approaching or achieving the desired outcome.

The Governor's ten-point plan includes:

1) creating more and better jobs; 2) leveraging our new tax system; 3) reinventing government; 4) keeping our youth-our future here; 5) restoring our cities; 6) enhancing our national and international image; 7) protecting our environment; 8) revitalizing our education system; 9) reinventing our health care system; and 10) winning Michigan through relentless positive action.

Q 3.1. When tackling wicked problems I believe that the DEQ RRD cleanup and redevelopment organization:

- Timely identifies problems and prioritizes them in relation to the magnitude of the problems' relative impact.
- Manages problems according to the magnitude of the problems' impact.
- Is responsive to participants' (stewards and stakeholders) competing values, priorities and time frames.
- Sufficiently frames (e.g., describes) problems for management according to an overall programmatic goal/mission statement.
- Provides sufficient guidance with flexibility to allow for new concerns or information to inform decision-making.
- Embraces new information to improve the basis for decisions.

- Provides sufficient flexibility to allow for new concerns or information to improve implementation processes.

Q 3.2. Please answer the following questions regarding the inclusion of participants (current and preferred) by the DEQ RRD when tackling wicked problems.

- Decision-makers.
- Decision implementers.
- Persons who may share in the risk.
- Persons with the necessary scientific, economic/financial, and social perspective and expertise.
- Those with unique knowledge.
- Those with diverse knowledge.

Q 3.3. The following questions relate to DEQ RRD governance (decision-making and implementation). Please provide your current and preferred perceptions of these governance capacities when the DEQ RRD tackles wicked problems.

- Interest and momentum are maintained in policy discussions and decisions.
- Appropriate participation is maintained throughout the duration of decision-making processes.
- Appropriate participation is maintained throughout decision implementation.
- Appropriate assessment tools are developed and implemented.
- Decision-making and implementation processes are scaled appropriately given the relevance and urgency of the situation and decision.

Q 3.4. Please provide your current and preferred perceptions of these governance capacities when the DEQ RRD tackles wicked problems.

- An appropriate number of relevant alternative recommendations are explored and developed by RRD.
- Alternative approaches that document and use verifiable data or documented reason are assessed and utilized by RRD.
- Alternative approaches that build consensus prior to reaching a decision among those who share in the risks and benefits from the decision are assessed and utilized by RRD.
- Alternative approaches that are accompanied by an alternatives array which address risks, uncertainties and trade-offs are assessed and utilized by RRD.
- Alternative approaches that manage uncertainties through contingency plans are assessed and utilized by RRD.

- Alternative approaches that can be documented and articulated in an understandable manner, and implemented within the capacity of available resources are assessed and utilized by RRD.
- Alternative approaches that are based on processes that follow a structured and participatory process that is perceived as fair and relevant to the issue at hand are utilized by RRD.
- Alternative approaches that align with the organization's strategic mission statement are utilized by RRD.
- Monitoring and assessment processes are designed and established by RRD to compare predicted effects with observed outcomes.

Q 4.1. The following questions relate to DEQ RRD program outcomes relative to the Governor's ten-point plan and vision for Michigan.

(Note - when one or more factors are listed within one statement - answer based on the totality of all listed factors.)

- DEQ RRD practices adaptive management concepts to improve ENR outcomes.
- Metrics indicate overall durability (e.g., improved ENR longevity) in ENR in the state.
- Competing socio-economic and ENR demands are well balanced for improved ENR outcomes.
- Socio-economic demands and ENR problems are being managed without eroding the potential to meet future demands.
- DEQ RRD ENR management outcomes are improving the quality of life in Michigan.

Section 5. Thank you for your patience. You are almost done. The following questions will allow us to manage the survey data. For instance, without this information we will not be able to: 1) distinguish between response received from within the DEQ with those provided by the external stakeholders; or, 2) understand if other influences are driving the responses that may be external to the scope of this survey. Other demographic information is being obtained to understand the survey population.

[End of Likert scaled questions]

Q 5.1. What is your gender? (Given the option to select female or male.)

Q 5.2. Many people have work experience both internal and external to the DEQ. Please answer this question based on your current (internal or external) representation.

- A state of Michigan employee (internal steward) working in (or with) the DEQ cleanup and redevelopment program.
- A position external (stakeholder) to the State of Michigan.
- Neither.

6.1. The following nine questions are included to revisit areas identified in the internal employee engagement survey as needing improvement. Only state staff is being asked this set of questions. Similarly worded questions were asked to obtain perceptions internal and external to the DEQ.

- I believe I have the opportunity for growth in my current job.
- Managers in my department make decisions in a timely fashion.
- The State of Michigan empowers employees to make appropriate decisions that are in the best interest of the State.
- I am confident department leadership is leading us in the right direction for success.
- Leadership is creating a culture of continuous improvement.
- I believe that government reinvention is not about eliminating people.
- Department leadership is interested in the well-being of employees.
- Department leadership gives employees a clear picture of the direction my department is headed.
- Department leadership is trustworthy.

Q 5.3. What is the highest level of education you have completed?

- High school
- Some college
- 2-year college degree
- 4-year college degree
- Some graduate degree course work
- Master Degree
- Doctoral Degree
- Professional Degree (JD, MD)

Q 5.4. How many years have you worked as a state steward, internal to the DEQ cleanup and redevelopment program?

- None
- 0-2 years
- More than two years, but less than five years
- 5 years or more
- 10 years or more, but less than 15 years
- 15 years or more

Q 5.5. How many years have you worked as a stakeholder, external to the DEQ cleanup and redevelopment program?

- None
- 0-2 years
- More than two years, but less than five years
- 5 years or more
- 10 years or more, but less than 15 years
- 15 years or more

Q 5.6. Do you believe that science can be biased?

- Yes
- No
- Sometimes

Q 5.7. Are the resources dedicated to the cleanup and redevelopment program in Michigan commensurate with the societal risk posed by contaminated property?

- Yes
- No, more resources are needed
- No, less resources are needed
- Undecided

Q 5.8. This question relates to your participation in the recent remediation and redevelopment program reinvention initiatives.

- Where you a participant in the DEQ,RRD Collaborative Stakeholder Initiative?
    - Yes
    - No

[Note to thesis readers: Respondents were then asked to select from the following list the response that best reflected their participation: Groundwater Surface Water Interface, Vapor Intrusion, Free Product, Rules, Cleanup Criteria, Due Care, Brownfield, none of these.]

- Have you been a participant in the DEQ, RRD Technical Assistance Team?
    - Yes
    - No

  [Respondents were then asked to select from the following list the response that best reflected their participation: Groundwater Surface Water Interface, Vapor Intrusion, Free Product, Rules, Cleanup Criteria, Due Care, Brownfield, none of these.]

Q 5.9. Effective governance is defined as being "participatory, consensus oriented, accountable, transparent, responsive effective and efficient, equitable, inclusive; follows law and is responsive to the present and future needs of society (United Nations, 2011; United Nations Development Program, 1997)."

What one question or issue did you feel was missing from this survey that would help identify the means to improve environmental and natural resource outcomes? (The research associated with this survey utilizes the concept that effective ENR governance should equate to improved ENR outcomes).

Q 5.10. What types of factors, capacities or activities have the biggest impact on effective ENR management/improved outcomes? Your response can include external and internal pressures or influences that are outside the scope of this survey.

Q 5.11. Of the activities you mentioned, please identify the one which has the biggest impact?

Q 5.12. Is there anything else you would like to add before submitting this survey?

THANK YOU SO MUCH FOR THE TIME YOU HAVE TAKEN TO COMPLETE THIS SURVEY. YOUR INPUT IS INVALUABLE.

<u>WHEN YOU HIT THE FORWARD BUTTON YOUR SURVEY WILL BE SUBMITTED AND YOU WILL NOT BE ABLE TO MAKE CHANGES.</u>

Please make any necessary changes prior to submitting your survey.

References:

United Nations. (2011). What Is Good Governance. *United Nations Economic and Social Commission for Asia and the Pacific*. United Nations. <http://www.unescap.org>. 11 Oct. 2011. Web.

United Nations Development Program. (1997). *Governance for Sustainable Human Development.* <http://mirror. undp.org/magnet/policy>. 18 Feb. 2013. Web.

We thank you for your time spent taking this survey.
Your response has been recorded.

APPENDIX B

SURVEY CORRESPONDENCE

THESE VERSIONS OF THE SURVEY INVITATION AND SURVEY LAUNCH LETTERS HAVE BEEN MODIFIED FROM THE ACTUAL LETTERS. THE LETTERS AND THEIR FORMATING, INCLUDING THE ENTITIES RESPECTIVE LOGOS, WERE NOT SUFFICIENTLY COMPATIBLE WITH THESIS FORMATING REQUIREMENTS.

SURVEY INVITATION LETTER

February 20, 2012

Dear Environmental Practitioner,

Michigan State University (MSU) and Michigan Department of Environmental Quality (MDEQ) invite you to participate in an important new survey designed to assess the perceptions of persons working in and with the State of Michigan's (State) cleanup and redevelopment program. The cleanup and redevelopment program, along with other State programs, is intended to: 1) provide environmental stewardship, safeguarding public health and quality of life; 2) be a full partner in Michigan's economic recovery; and, 3) provide unmatched customer service.

The survey is a collaborative effort between MSU and MDEQ and is being conducted to help understand current and preferred capacities associated with improving environmental and natural resource (ENR) outcomes consistent with program and State goals for government re-invention. While ENR management and its associated evolution is a complex matter, this survey focuses on three tightly associated and overlapping capacity components: 1) staff performance as a collective whole; 2) organizational culture and management structures; and, 3) decision making and implementation. The survey also asks questions to understand the population of respondents and their perceptions of important ENR governance matters including factors that were not included in the main survey.

The results of this study will provide a picture of MDEQ's cleanup and redevelopment program allowing management adjustments to improve ENR outcomes consistent with the program's authorities, capacities, and further understanding of ENR governance given the management complexities and resource limitations.

You will be hearing more about this survey shortly. Your individual response will be confidential. Responses will be reported in the aggregate. Thank you for your help.

Sincerely,

Dr. Christine Vogt
Community, Agriculture, Recreation and Resource Studies
Michigan State University

Mr. Robert Wagner, Chief
Remediation and Redevelopment Division
Michigan Department of Environmental Quality

SURVEY LAUNCH LETTER

February 26, 2013

Dear Survey Recipient,

Recently you received an e-mail from us describing a survey. This survey is being conducted to strengthen the understanding of internal and external practitioner perceptions of environmental and natural resource (ENR) governance capacities in the State of Michigan's (State) cleanup and redevelopment program.

Michigan's environment and natural resources contribute to the health and quality of life of Michigan's residents and the State's economic well-being. To capture the most accurate perceptions of the State's cleanup and redevelopment program, this survey builds upon recent internal surveys, but focuses on internal and external program practitioners who are in the position to implement the regulatory aspects of the program. The survey will build a portrait of current and desired program capacities in the area of program staffing, program organization (structure and culture), and decision making and implementation processes followed when addressing complex and integrated problems.

The individual results of the survey will be confidential and aggregated to provide how the three factors (staffing, organization, and associated governance) play a role in the ENR program outcomes. The results will inform efforts to strengthen ENR program governance understanding in academic research, education, and practice.

Your thoughtful input is essential in obtaining meaningful input. Thank you in advance for being part of this ENR survey and research.

Sincerely,

Dr. Christine Vogt

Community, Agriculture, Recreation and Resource Studies
Michigan State University

Mr. Robert Wagner, Chief

Remediation and Redevelopment Division
Michigan Department of Environmental Quality

RESPONSE TO REQUESTS TO BE ADDED TO THE SURVEY

Thank you for your interest in the DEQ RRD Survey Invitation. We are delighted to add you to this survey population.

The study population criteria was developed by MSU to secure current and preferred environmental management perceptions associated with improving environmental and natural resource outcomes consistent with the cleanup and redevelopment program and State goals for government reinvention. DEQ provided the email addresses that best met the survey population criteria based on existing compiled lists of environmental practitioners who have contemporary experience addressing complex issues in the program. While many environmental practitioners work with the cleanup program, DEQ did not compile a new list of environmental practitioners solely for this survey. The list of survey invitees reflects those that work within the program (DEQ staff) and those external to the program. The external participants are: 1) part of the Freedom of Information database for the State's cleanup and redevelopment program; or 2) part of a stakeholder process within the last two years. A few persons were included in a survey pretest. Persons who were invited to participate in the survey pretest are excluded from this survey invitation.

The survey is scheduled to be launched next week. A copy of the invitation letter is attached.

APPENDIX C

RESPONDENTS' COMMENTS
(Internal and External Sectors)

RESPONDENTS' COMMENTS

All written responses are included in this section, including those that indicated no response (e.g., no or none). All responses are included to provide greater disclosure, while providing anonymity to the responders.

The following provides a compilation of the four open ended questions provided by the respondents. They have been separated into internal and external sectors for the responses. Additionally, where the responses were numerous and had similar themes, they have been grouped together under a common heading. There is no order to the comments within the themed groups. Comments placed under Organizational Culture and Structure may include comments that touch on items queried under Individual Performance in this study. Given the overlap in the various capacities being assessed, and the breadth of some of the responses, comments incorporate numerous themes. Therefore, the following categorization is not precise. It is solely an attempt to help organize responses for ease in review and assessment. In a few instances, the author split comments between themes, if they could be separated without losing context.

Internal Practitioner Responses

Question 1. *Effective governance is defined as being "participatory, consensus oriented, accountable, transparent, responsive, effective and efficient, equitable, inclusive; follows law and is responsive to the present and future needs of society (United Nations, 2011; United Nations Development Program, 1997). What one question or issue did you feel was missing from this survey that would help identify the means to improve environmental and natural resource outcomes?*

Table 26. Internal Responses to Question 1

ENR Outcomes	Are the long-term costs associated with not improving ENR outcomes or specifically, eroding environmental protection, in order to improve socio-economic conditions truly being weighed in this analysis? (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Do you believe government reinvention is about improving ENR outcomes? (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Will risk management by leaving contamination in the ground result in future EXPENSIVE cleanups? (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	How effective is the RRD's program compliance program (ie. enforcement)? (Respondent: Over 15 years of experience internal to the program.)
	Why is the government and stakeholders so keen on leaving contamination in the air, soil, water, and fauna that could cause more cancer outbreaks and other medical issues to our communities. (Respondent: Over 15 years of experience internal to the program.)
	Do the leadership of the DEQ, the governor's office and the legislature have any idea of the true human costs that are occurring in our state because of contamination of our food sources, air and to resources by new complex chemicals that are unregulated? Are they looking at human health data that clearly shows that we and our future generations are truly in trouble? (Respondent: Over 15 years of experience internal to the program.)
	How will the current risks be managed and monitored for the future? (Respondent: Between 10 and 15 years of experience internal to the program.)
	A question related to sustainability practices in the cleanup and redevelopment program (i.e. to evaluate how effectively RRD incorporates or encourages use of sustainability practices in the program). (Respondent: Over 15 years of experience internal to the program.)
	Do you believe that 2012 amendments to Part 201 and Part 213 of 1994 P.A. 451, as amended, were helpful in protecting ENR? (Respondent: Over 15 years of experience internal to the program.)

Table 26 (cont'd)

Organizational Culture and Structure	Questions about the department mission and upper management were useful, but there could have been some questions regarding effectiveness of mid-management. In my opinion, mid-managers spend way too much time developing and interpreting policy and not enough time managing staff. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Local vs. Lansing Management; big difference between the reactions and actions taken by the different layers of management. (Respondent: Between 5 to 10 years working internal to the program.)
	How do we commit available resources to environmental causes on the basis of objective, commensurate factors? (Respondent: Over 15 years of experience internal to the program.)
	Questions that would distinguish between District Offices and RRD as a whole. Working as both in RRD and as a consultant, it seems that there is inconsistency in decision making between RRD districts. (Respondent: Two years or less working internal to the program.)
	Full integration of the data quality objective process and systematic planning into the program. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Is there a disconnect between the views of upper management, middle management and the "workers"? (Respondent: Over 15 years of experience internal to the program.)
	Do you feel resources used to manage risks are greater than resources required to eliminate risks? (Respondent: Between 10 and 15 years of experience internal to the program.)
	Effective education of Michigan's legislature, to appreciate & experience what their disembowelment of Michigan's environmental laws are doing, and the impacts those actions have had and will have for future Michiganders. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Should it be RRD's responsibility to regulate the remediation of properties where other DEQ divisions have allowed discharges under permits, or in violation of permits, that have resulted in the creation of a facility? (Respondent: Over 15 years of experience internal to the program.)
	To ensure the success of any regulatory agency, the agency must be provided similar tools, quality of staff, and level of pay provided to the regulated community. I'm convinced the quality, or lack thereof, of our department resides within a resource gap between the State of Michigan and the regulated community. Why isn't this issue being discussed? (Respondent: Two years or less experience internal to the program.)
Decision management	Is the general public well informed about how decisions are currently made concerning ENR? (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	A question about the degree to which political pressures have affected governance? (Respondent: Over 15 years of experience internal to the program.)
	Totally devoid of political influences governing decisions that affect department ENR governance. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Governance (laws) starts with the legislature. You're missing that input. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Why are we disassociating the Department from the needs of the lowest socioeconomic stakeholders with decisions and outcomes that benefit only those with a higher stature? (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)

Table 26 (cont'd)

Decision Management cont'd	The survey gave no recognition that DEQ, and RRD in particular, is not the master of its ship. Regardless of current management's attempts AND intent, we are pawns to the current political climate. Surveys such as this, that attempt to claw in rewards for the attempt, when we know how loudly we are being ignored and not 'succeeding', are frustrating at best. (Respondent: Between 10 and 15 years of experience internal to the program.)
	Do you think external stakeholders provide more influence on the direction of the department than they should? (Respondent: Over 15 years of experience internal to the program.)
	We should not be following UN definitions - each state has unique characteristics that must be taken into account and a generalized "we do things this way" should not be used. (Respondent: Between 2 to 5 years working internal to the program.)
	The issue of the private sector rewriting our rules & ignoring our input during the CSI process. Now we have poorly written rules that are not very protective of our environment, & staff is spending inordinate amounts of time attempting to interpret these rules for the department & stakeholders. Our time would be best spent on doing our actual jobs, especially since we are working with less staff. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Do you let your personal philosophy interfere with the DEQ goals when different? Or do your promote the DEQ's and Governor's goals even when you do not personally support those goals? Or, more simply, do you support the DEQ's and Governor's goals in most cases or rarely? (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Moral issues. (Respondent: Over 15 years of experience internal to the program.)
	I have two: 1) Whether we feel that we have the ability to properly characterize a problem so that a wise decision can be made. You can't make proper decisions or evaluate environmental outcomes if you don't fully understand the problem. 2) Whether central or de-centralized decision making was preferred and whether staff/organization was better equipped for one over the other. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Certain changes by the Legislature in how GSI issues are handled, conflicts with the Federal Rules & Program oversight as implemented by our State for discharges to the waters of the State. It puts MS4 communities in legal jeopardy to stay within Federal law to keep their MS4 status (plus degrades the waters of our State). Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	I'm not sure. Some employees and stakeholders are set in their ways, that may be good in some cases, but how do we get them to be more engaged and responsive? (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	The CSI process was too politically driven with short sighted goals, which may ultimately limit the successful implementation of any resulting legislative and policy changes. The question/issue that was missed was the influence on effective governance due to politics /lobbyist/special interest groups representing the regulated community. (Respondent: Between 10 and 15 years of experience internal to the program.)
	Whether staff of the RRD feel that building consensus with respect to anything the Division does is worthy of our effort. Consensus can rarely be achieved for any issue and there are times when the RRD just needs to be the decision maker based on the current set of facts in order to move the situation along. The public trust component that is consistently missing from the discussion. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)

Table 26 (cont'd)

Uncategorized Statements	Perhaps providing specific examples of barriers to addressing wicked problems. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	I feel that "resources" could be better defined as to questions relating to adequacy (i.e. financial, staff or both). (Respondent: Over 15 years of experience internal to the program.)
	The introduction to your survey includes definitions. You need to look up the definition for "wicked". Webster defines it as morally bad or wrong or done with evil intent. I did not answer any of your survey questions which used this word because I cannot imagine an environmental issue that is "wicked". As a result, the first half of your survey in my opinion is seriously flawed. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs. [Author's note: comment noted for future reference. The description of a wicked problem was in the introduction to the survey – just not under the definitions.]
	Survey complete from a general perspective. (Respondent: Between 10 and 15 years of experience internal to the program.)
	Good survey, well done. Thank you. (Respondent: Over 15 years of experience internal to the program.)
	Can't think of anything -- nicely done! (Respondent: Over 15 years of experience internal to the program.)
	No comment. (Respondent: Two years or less working internal to the program.)
	None. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	None. (Respondent: Two years or less working internal to the program.)
	None. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)

Question 2. *What types of factors, capacities or activities have the biggest impact on effective ENR management and improved outcomes? Your responses can include external and internal pressures or influences that are outside the scope of this survey.*

Table 27. Internal Responses to Question 2

ENR Outcomes	RRD has no meaningful way to measure ENR outcomes. We are not a permitting agency but I don't think the measures in general take into account the environment. They are measures of how many requests were fulfilled. (Respondent: Over 15 years of experience internal to the program.)
	Is doing more with less getting anything accomplished? Is the public trust being violated? (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Unable to cleanup our environment for the future and out kids. This is due to politics. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Politics. Individual ENR outcomes are often not in the public interest due to the politics of the situation. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	External pressures have the biggest impact on ENR outcomes, and not improved outcomes.(Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Development of meaningful metrics to evaluate outcomes. (Respondent: Over 15 years of experience internal to the program.)
	It appears that the direction of state government is being driven by legislators and their vocal backers with very specific agendas and short attention spans. This is not beneficial for long term resource protection or future generations of Michigan citizens. We need long term thinking and there may be some short term inconvenience or even cost, if we are to get it right. (Respondent: Over 15 years of experience internal to the program.)

Table 27 (cont'd)

Decision-makers and Influencers	Anti-regulatory factions; funding for the ENR programs; lack of understanding by governing authorities outside the agencies of what value the program provides and has provided for many years. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Managing for the 1%, listening too closely to the squeaky wheel, lack of enforcement for clear infractions. (Respondent: Over 15 years of experience internal to the program.)
	Certain & specific legislators blaming the DEQ for economic problems the State is experiencing, resulting in program cuts and encouraging lax enforcement of proven resource-protection laws, followed then by blaming the regulators for ultimate and eventual environmental degradation. Claiming that environmental protection interferes with job-creation is not just cowardly, it is proof of the Michigan legislature's dereliction of duty to effectively safeguard and promote Michigan's environmental health, & protect its citizenry (and resources) from ongoing & future contaminant impact. (Respondent: Over 15 years of experience internal to the program.)
	Politics. (Respondent: Over 15 years of experience internal to the program.)
	Term limited legislators that do not have nor take the time to really understand issues and build consensus with respect to ENR issues. Lobbyists who have more face time with legislators than the public who want to see DEQ/RRD as protectors of their interests when in reality what is left of Part 201 and 213 are results of what lobbyists and the regulated industry actually want in our programs - which is limited to no culpability. (Respondent: Two years or less working internal to the program.)
	Special interest and the legislators/governor. The current legislation is designed to benefit business and impede cleanup of the environment. A major concern is the amount of disinformation that is spewed and not questioned as it pertains to information the general public gets. (Respondent: Over 15 years of experience internal to the program.)
	How do politically, legally or financially motivated remedial decisions mesh with public expectations of environmental cleanup versus risk reduction? (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Legislators and the Chambers of Commerce pushing their preferences on the Department that do not promote good site cleanups and long-term sustainability of our resources. We are moving back to the scenario of doing what is good for business without considering how the decisions affect the environment. We are stepping backwards when this is not necessary. I see knee-jerk reactions where few are justified. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	The main factor is the government's focus on election cycles, and the political hay that can be made from a particular environmental project, rather than on long term program support. (Respondent: Between 5 to 10 years working internal to the program.)

Table 27 (cont'd)

Decision-makers and Influencers cont'd	Those external factions that have the ear of our elected officials. Many times those groups have money or political ties that can/often sway policy decisions in their favor. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	We are being driven by a select group of stakeholders focused on the economy & their own economic self-interests (& legislative representatives thereof), so we put all of our attention toward activities with economic benefits & do not truly acknowledge the future threat posed by allowing soil & groundwater contamination to remain, especially to the environment relative to people. As the laws are changed to reflect the preferences of stakeholders who are focused on economics, they seem to get more complicated & difficult to implement, taking staff away from the actual work that needs to be done. (Respondent: Between 10 and 15 years of experience internal to the program.)
	Politics (internal and external). (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Politics plays too major a role in ENR decisions. (Respondent: Over 15 years of experience internal to the program.)
	Including our stakeholders in our decision process more and more, so folks feel as good about the work DEQ does for them as they do with DNR. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	External support and more voices sought - try to reach out to communities impacted not just the corporate stakeholders. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Political and economic culture in which programs are developed/changed and implemented. (Respondent: Between 10 and 15 years of experience internal to the program.)
	I feel that regardless of how we are managed, most of the policies that affect our work are made by the legislature with undue weight given by the legislature to certain lobbying groups. This has been one of the main problems of term limits. (Respondent: Between 10 and 15 years of experience internal to the program.
	The factor that has the biggest impact is external political influence and from lobbyist/special interest groups representing the regulated community. (Respondent: Over 15 years of experience internal to the program.)
	Political pressure from special interest groups that do not take into account Michigan's unique geology and relationships with the Great Lakes. (Respondent: Over 15 years of experience internal to the program.)
	The legislature and governor are changing laws to help businesses, not the environment. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	External political pressures. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)

Table 27 (cont'd)

Organizational Culture and Structure	The organization first and ultimately needs to clearly identify exactly what it is trying to accomplish. It needs to develop a strategy to get that done. It needs to allocate its resources with those things DIRECTLY in mind. It needs to train and then TRUST staff. It needs to fend off the extraneous. It needs leaders with complete integrity. (Respondent: Two years or less working internal to the program.)
	Political pressures play a big role in how ENR issues get resolved. Sometimes we (DEQ) are our own worst enemy by not clearly providing a path forward for the regulated community. As a result they contact their representatives who then either try to "fix" the problem or intervene on their behalf. Providing streamlined cleanup policy/procedure and taking the time (customer service) to work with individuals who need to interact with the DEQ will help resolve this problem. (Respondent: Over 15 years of experience internal to the program.)
	Adequate staff time, program knowledge, legal guidance and managerial clarity with which to meet with stakeholders to develop an appropriate cleanup strategy and schedule. Is the public trust being violated? (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Metrics. The implementation of "sensible" metrics tools could enable management the ability to track the progress of each district office and individual staff. With this said, the type and difficulty of issues vary greatly from office to office (e.g. - SE MI office probably faces different challenges than the Kalamazoo office). Metrics need to account for the challenges presented within each district office; yet provide meaningful results for ALL staff. How would management recognize an office or individual staff person for high performance? Low performance? (Respondent: Over 15 years of experience internal to the program.)
	Understanding goals and providing a vision for outcomes. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Political leadership at the division level, not sufficient technical ability to lead the division. (Respondent: Over 15 years of experience internal to the program.)
	Making employees feel that they are making a difference (contributing) in the work they do in the DEQ and the environment and are recognized (a simple at-a-boy works). (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Workload distraction due to management of multiple high priority tasks and resources spread too thin. (Respondent: Over 15 years of experience internal to the program.)
	Keeping liable parties at the table talking often has an outcome of over-compromise....the consensus model. (Respondent: Between 10 and 15 years of experience internal to the program.)
	Understanding the ultimate outcome to provide good regulation and manage risks to the environment. (Respondent: Over 15 years of experience internal to the program.)
	Poor outcomes result when RRD needs to deal with a facility created as a result of permitted activities and the DEQ permitting divisions have not retained historical operating and compliance documentation due to short file retention schedules. Inadequately documented observations or actions on the part of DEQ staff. DEQ staff who believe that it's all a game. Little to non-existent policy and procedures for the many differing programs staff are supposed to implement. Management expecting staff to believe that direction is coming - but it never comes. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)

Table 27 (cont'd)

Organizational Culture and Structure cont'd	In order to effectively manage ENR, we need to develop a common understanding and consistent application of a site prioritization system based on risk posed to human health and environment. It has been frustrating over the years to witness the wide array of opinions among RRD staff on what constitutes an unacceptable risk. Contaminated sites vary tremendously on the overall risk they pose and this needs to be considered in the decision making process. We still have a tendency to treat all sites and situations the same. Staff and managers need regular training. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	The ability to negotiate. Too many go by the book and do not apply common sense; they take the most conservative interpretation of a law or rule. The one chosen will be the one that denies closure and results in additional work even if not a real issue. The old ideas held by some are difficult to overcome. Maybe in a generation of employees things will improve. In management there is a real fear that it is better to deny something rather than take a risk and approve it and possibly make a wrong decision. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Need training for regulated community. Owner/operators days. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Clear and concise statutory construction and implementation goals. (Respondent: Between 2 to 5 years working internal to the program.)
	The ability (and time) to see the big picture, communicate the problem, and implement solutions with authority. Once we see the big picture, appropriate goals can be set and achieved. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Factors include demographics, justice, and the power/authority to control available resources that impact the quality of our environment. (Respondent: Between 10 and 15 years of experience internal to the program.)
	Poor planning, staff inability to identify and secure quality data for decision making. Quality being defined as representative and reproducible data. Lack of consistent application of applicable law and rules. Poor training of staff, no accountability. Weak leadership by direct supervisors. (Respondent: Over 15 years of experience internal to the program.)
	[Led by funding comment: Funding, funding, funding.] We have been playing Twister for at least 5 years with the legislators, both entities jockeying for the best position aside from what may be a legitimate need for the environment. In an attempt to compromise, our management has let go of many long-standing truths staff here were led to believe were important. Regardless of the pretzel-twisting and giving away RRD has done, still, an external Champion to our cause has yet to be revealed. We've already given too much and have NOTHING to show for it. It's now embarrassing how emasculated this great agency has become. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Ethics. Honesty, humility and openness are lacking in the current political climate and DEQ does not have the courage, insight and leadership to challenge these most fundamental problems that we face. If we were honest and humble as a state, we could look at our problems and fix them. But political expediency and agendas and arrogance are leading us to poison our environment and our children, then our "leaders" trash and ignore those who stand up for the weak and innocent. Just look at the decision on criteria development. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)

Table 27 (cont'd)

Organizational Culture and Structure cont'd	Other than pressures exerted by business and the legislature? Organization is deficient in technically competent staff (advanced degrees in specialty areas). There are too many generalists among rank and file (BS in soft sciences). Division and Project Managers come from generalist pool and don't understand technical issues but still make technical decisions regarding site remedial actions. Division (all levels) and Project Managers need management training. Too many sit in their cubes and don't interact (one on one, or in small groups) on a regular basis with project managers and staff. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	The legislature: stop changing the rules every two months, and stop using state employees as whipping boys/girls for re-election leverage. (A few of the) regulated community: nobody likes to be regulated, but we all have to accept some degree of regulation to function as a society. (Some of the) private consultants: read and learn the statutes/rules as they change daily just like we have to - stop expecting us to train your staff. (Respondent: Over 15 years of experience internal to the program.)
	Positive contact with the general public, field work resources, strong legislature to give us the right tools. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Stakeholder communication, trust and understanding, local empowerment within the DEQ, internal trust within the DEQ, public understanding of the DEQ's goals and actions. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
Program Costs and Funding	Funding, funding, funding. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	More than one factors/capacities/activities have very large impacts - lack of state funds for orphan sites (213 & 201), lack of funds for enough staff to handle current or future workloads, uncertain 201 program future with very little staff funding past 1 year from now, political pressure from legislature (business special interests) trumping good science-based or established legal management for ENR. (Respondent: Two years or less working internal to the program.)
	Overall cost of cleanup and how that affects business. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Financial. (Respondent: Over 15 years of experience internal to the program.)
	Economics will determine what can be done and what needs to be done, time constraints dictate methods. (Respondent: Over 15 years of experience internal to the program.)
Uncategorized Statements	ENR not a factor. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	It seems like politics trump science, and data. DEQ seems like a tree in the wind swaying in whatever direction the wind blows. Currently economic factors are valued more than anything else. Politicians seem governed by special interests rather than looking out for the public. Why would our children want to stay here, when we don't protect or value the environment when they could move to CO [Colorado] and ride their bikes from the city into the mountains? (Respondents: Between 5 to 10 years working internal to the program.)
	No comment. (Respondent: Two years or less working internal to the program.)

Question 3. *Of the activities you mentioned, please identify the one which has the biggest impact?*

Table 28. Internal Responses to Question 3

Stakeholders and Politicians	A lack of "true" understanding by elected officials that control agency/division budgets of what it is we do and what value our programs provide to the people and businesses of the state and to the environment. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	I would say they are equal in nature, but if I have to choose one, I would say including our stakeholders in our decision process. (Respondent: Over 15 years of experience internal to the program.)
	Politics determining what DEQ does instead of science and PHSWE [public health, safety, welfare and the environment]. (Respondent: Over 15 years of experience internal to the program.)
	Unwarranted political interest and interest from lobbyist/special interest groups representing the regulated community. This results in a lack of compliance and enforcement, and where compliance assistance is utilize some PRPs [potentially responsible parties] with bigger problems to deal with quickly figure out they can drag things out by performing small measures rather than doing what is really needed to address the true problem. (Respondent: Between 10 and 15 years of experience internal to the program.)
	Legislator/governor. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Term limited legislature. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Strong legislature to give us the right tools. Respondent: Two years or less working internal to the program.
	POLITICS. (Respondent: Over 15 years of experience internal to the program.)
	Politics. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Politics. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Political culture. (Respondent: Over 15 years of experience internal to the program.)
	The legislature. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Clearly stakeholders have recently had a significant influence on legislation directly administered by the DEQ. That legislation will impact the State's ENR management, even in unpredictable ways. For example the MS4 communities are now engaged in dealing with illicit discharges, which is positive and will have a big impact on industry (to the good I hope), so Stakeholder empowerment it is. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Squeaky wheel. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)

Table 28 (cont'd)

Program Costs and Funding	Funding - viability of this program to even exist into the future. (Respondent: Between 10 and 15 years of experience internal to the program.)
	Cost to business. (Respondent: Between 10 and 15 years of experience internal to the program.)
	Lack of commitment from Legislature to fund RRD 201 programs for the future and sufficient staff to effectively implement the 201 & 213 programs; this will negatively impact the State's environmental & natural resources and the perceived image of our State. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Focus on economics over environment, not seeking input from the public, which first requires that the public be informed, which could be done through use of social media, etc. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Source removal lack of funding; then on the hook for long-term funding. (Respondent: Between 10 and 15 years of experience internal to the program.)
	Economic. (Respondent: Over 15 years of experience internal to the program.)
Organizational Culture and Structure	Lack of public support or understanding of our programs will be our end. (Respondent: Over 15 years of experience internal to the program.)
	Effective education of not only legislators, but Michigan citizenry as a whole, re: every citizens' everyday impacts on Michigan's natural resources and environmental health. Consistently being criticized for attempting to enforce proven resource-protection statutes, & then being blamed when ultimate down-gradient impacts are realized, is literally driving away excellent/potential DEQ candidates. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	The amendment of our statutes that do not require the immediate cleanup of hazardous compounds in the subsurface, but rather, let those compounds be simply "restricted" in access. The contaminant mass as a whole is increasing statewide. (Respondent: Between 10 and 15 years of experience internal to the program.)
	Priorities need to be developed and incorporated into the decision making process. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Need all policy and procedures on website so there is no question what the most up to date policy is on any subject. MDOT needs to complete their permit for contamination remaining under their roads. (Respondent: Over 15 years of experience internal to the program.)
	The amendments to Part 213 and 201. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Changing our rules (201 and 213) and our policies (GSI issues). Very little needed to be changed, but instead of having discussions about potential issues and educating each other, the legislature and private stakeholders took over and dictated to the Dept. what was going to happen. This is not collaborative at all. Many staff indicated that while working on the CSI Team, they were blown off. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	I have two: 1) Properly characterizing a problem so that an informed decision can be made. 2) Having technically knowledgeable staff and managers who can look at a problem characterization and make technically sound decisions. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)

Table 28 (cont'd)

Organizational Culture and Structure (cont'd)	Clear and concise statutory construction and implementation goals. Recent amendment to Part 213 of the NREPA (May 1, 2012) specifically forbade DEQ from creating rules and obstructed the RRD's audit authority of one of its most critical reports the Initial Assessment Report. That draconian mandate clearly indicates the legislature's ideals relating to public health, safety, welfare and environment. (Respondent: Over 15 years of experience internal to the program.)
	Power & authority to control available resources that impact environmental quality. (Respondent: Over 15 years of experience internal to the program.)
	Understanding goals. (Respondent: Between 10 and 15 years of experience internal to the program.
	Understanding the environmental risks and how to evaluate these risks; making sure RRD and the stakeholder are communicating on these factors. (Respondent: Two years or less working internal to the program.)
	Workload distraction. (Respondent: Over 15 years of experience internal to the program.)
	Time and the skills to see the big picture. (Respondent: Between 5 to 10 years working internal to the program.)
	Little to non-existent policy and procedures for the many differing programs staff are expected to implement, including extralegal activities that have always been done but the process is unwritten, and the expectation that our actions will be consistent and predictable. (Respondent: Over 15 years of experience internal to the program.)
	Providing quality customer service. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Clear plan - faithful execution. (Respondent: Over 15 years of experience internal to the program.)
	Poor leadership of immediate supervisors. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Fear to say approved. (Respondent: Between 5 to 10 years working internal to the program.)
Uncategorized Statements	Pray. (Respondent: Over 15 years of experience internal to the program.)
	Moral. (Respondent: Over 15 years of experience internal to the program.)
	NA. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	No comment. (Respondent: Two years or less working internal to the program.)
	5.1 [Author's note – Question 5.1 in this survey was "What is your gender?"]. (Respondent: Over 15 years of experience internal to the program.)

Question 4. *Is there anything else you would like to add before submitting this survey?*

Table 29. Internal Responses to Question 4

ENR Outcomes	I think there are a great many people working in RRD that recognize that achieving improved ENR outcomes going forward absolutely must be done within the paradigm that includes balancing those outcomes with the socio-economic well-being of the state. I just hope that all the other stakeholders recognize the same is true of achieving improved socio-economic well-being with respect to ENR outcomes. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	I love my state and hate to see it ruined by politics and leave it in such a way that my generation cries like the Indian in the commercial over the pollution. I want a place for the younger generations to enjoy and truly live indoors as well as outdoors and not worry that they could become sick or die from cancer or other factors from exposure from the chemicals we leave behind. (Respondent: Over 15 years of experience internal to the program.)
	The government reinvention may not be about eliminating state employees but it is about he who pays gets the services. My preferred was mostly left blank; good governance is lost in politics and politics is lost in money. I have come to the point that I don't really care about the department management, I do what I can to improve the environment and hope it makes an improvement. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Clear regulations regarding environmental cleanup is being replaced with political expediency. "Risk-based" cleanups and other half-measures to address environmental damage will drive up the numbers used to calculate "metrics" and potentially satisfy politicians and those who pay for them (stakeholders); but the end-result is inadequate cleanups that may not be protective of future generations. (Respondent: Over 15 years of experience internal to the program.)
	Most changes have improved RRD's reviews on complex problems to manage risk to public health & environment, & preserve jobs effectively. Problems occur when some businesses with political clout & finances, want RRD/DEQ upper management to 'override' reviews to favor business's position. This often conflicts with our mission to protect public health & environment for all. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	External stakeholders have far outweighed science and the Department in changing environmental laws and in affecting policy at DEQ, to the detriment of our State. (Respondent: Over 15 years of experience internal to the program.)
	Significant improvements have been made in the last year, and I am hopefully for the future of the 213 program. (Respondent: Over 15 years of experience internal to the program.)
	Too many tree huggers within the department don't recognize economic realities. Many in the department are adverse to any level of risk. Problems are not looked at in a holistic manner. (Respondent: Over 15 years of experience internal to the program.)
	As much as I'm a fan of Civil Service and a pro Union person, I now know that my own motivation and success hinges upon empowerment along with clear and achievable goals. Improving the DEQ cannot be accomplished without providing staff with the goals and the rewards for achieving those. We need to value and respect Civil Servants internally (at least). (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)

Table 29 (cont'd)

Organization Culture and Structure	You can't make people in leadership humble or honest or informed if they don't want to be. I see absolute fools that have a huge amount of influence in our state over environmental and human health issues directing things, while the intelligent, hardworking honest people are marginalized. Our leaders talk a good game but seem to accomplish nothing progressive. (Respondent: Over 15 years of experience internal to the program.)
	I know my answers have been critical of the department. That criticism is related to how well we plan and execute. The PEOPLE in the organization are smart, hard-working, good folks. I don't think the leaders understand the importance or clear planning and faithful execution - or perhaps I don't understand the value of vague planning and constant deviation. I know they would say I don't understand. (Respondent: Over 15 years of experience internal to the program.)
	I am not in favor of making staff feel they should be empowered to make high stakes decisions on their own. Surveys such as this engender frustration when staff know they don't have that freedom and flexibility. Knowledge of mission and consistency in implementing that mission are NOT achieved by an organization that allows staff to act independently. Fostering this belief = dis-satisfaction. (Respondents: Between 10 and 15 years of experience internal to the program.)
	There is a defensive-minded culture that exists in this division. Staff feels they are being second guessed. That encourages a lack of open discussion between staff, specialist, and management. There is also the Lansing vs the District mentality that envelopes the division. Lansing doesn't fully understand conditions/difficulties in the trenches and District staffs don't see the big picture. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	I believe that DEQ RRD staff is staunchly dedicated to improving Michigan's environment while managing its business and economic development. I feel however that they are often caught between ultra-extreme business ideals and statutory requirements which create moral dilemmas. The feeling that any decision made will be the wrong one is a strong motivator not to make any decision. (Respondent: Over 15 years of experience internal to the program.)
	Over my long career and working for 7 other organizations, this is the most dysfunctional place I have worked. (Respondent: Between 5 to 10 years working internal to the program.
	Should government put more emphasis on the protection of ENR or the wants and desires of business? (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	It is unfortunately clear that outside stakeholders are guiding policy, rather than sound science. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	The governor and legislators generally do not appreciate the importance of the work that we do or the value in protecting the environment from the legacies of our past. Our management answers to them and they are focused on their economic priorities. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Managing risks may not be as effective, often costs more in the long-term, and the public perception is that we aren't doing our job. (Respondent: Between 10 and 15 years of experience internal to the program.)

Table 29 (cont'd)

Organization Culture and Structure (cont'd)	Some of the State's sites with the highest environmental risk should be managed with less consideration for economic impacts and interests from politics/lobbyist/special interest groups representing the regulated community. The environment and impact on the community and citizens living in those communities should be the priority in the decision making on these sites, which isn't always the case. (Respondent: Between 10 and 15 years of experience internal to the program.)
	Unless & until the fresh water-spoiled populace & legislators of this State are educated enough to appreciate & protect Michigan's fresh water, including empowering DEQ to actually do their job w/o interference from un-educated, agenda-driven lawmakers, nothing will change, except more-rapid & increasingly-obvious impacts to those water resources. Then, it'll be time once again to blame the DEQ! (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	It is believed that Efficient Managers are those that do their work through others; therefore, the prime focus of managers should be to train and empower those through whom they (managers) do their work. (Respondent: Over 15 years of experience internal to the program.)
	RRD has implemented significant positive action to accelerate decision making through empowerment of field personnel and delegation of decision making to field personnel that work directly with stakeholders. Relentless positive action. Well done! (Respondent: Over 15 years of experience internal to the program.)
Uncategorized Statements	Thanks for doing this! It was pretty long (but I think that was necessary) and so it probably won't be completed by a bunch of people. I didn't really care for the "Neutral" category -- because in a lot of cases we are progressing (a "Sometimes" category would have been preferred). Overall, I think DEQ/RRD management is progressing well in most aspects of this survey. Your 0% to 100% seems off. (Respondent: Over 15 years of experience internal to the program.)
	Several questions should have had the options for Neutral, or Do Not Know, because many of us staff are not involved in a number of these decisions. For example, questions 3.3, 3.4 [structured participatory decision management] and 4.1 [outcomes] are in this category. A few questions I left blank because I had no idea of how to answer the questions. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	While taking the survey my perspective kept changing between my specific role and job experiences (what it is like from my specific vantage point), and a general big picture view of the Division as a whole (my perceptions of how RRD operates). (Respondent: Between 10 and 15 years of experience internal to the program.
	I missed your definition of the term "wicked" you used throughout this survey. Also, Q3.1, please define [magnitude of problem's…] "relative impact". Do you mean environmental, economic, human health, or political? (Respondent: Over 15 years of experience internal to the program.)

Table 29 (cont'd)

Uncategorized Statements (c0nt'd)	I am really having a hard time understanding the use of the word "wicked" to describe ENR issues. Please see my comments in Q 5.9 [first open ended question]. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	The survey would have been more productive if it had been written in plain English. Don't assume everyone knows what the "mumbo jumbo" of your selected field of study is or that they attended enough management meetings to be fluent in that upper hierarchy's lingo. "Governance capacity"! I couldn't find one person in this office who knew what that meant. (Respondent: Over 15 years of experience internal to the program.)
	No. (Respondent: Over 15 years of experience internal to the program.)
	No. (Respondent: Over 15 years of experience internal to the program.)
	No. (Respondent: Between 2 to 5 years working internal to the program.)
	No. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	No comment. (Respondent: Two years or less working internal to the program.)
	No. (Respondent: Two years or less working internal to the program.)
	No. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)
	Thanks. (Respondent: Over 15 years of experience internal to the program; member of CSI or TAPs.)

External Practitioner Responses

Question 1. *Effective governance is defined as being "participatory, consensus oriented, accountable, transparent, responsive, effective and efficient, equitable, inclusive; follows law and is responsive to the present and future needs of society (United Nations, 2011; United Nations Development Program, 1997). What one question or issue did you feel was missing from this survey that would help identify the means to improve environmental and natural resource outcomes?*

Table 30. External Responses to Question 1

ENR Outcomes	Do staff and management understand the implication for how their decisions are viewed and used and ultimately affect the outcome of activities. (Respondent: Less than 15 years of experience external to the program.)
	I think sometimes MDEQ is too conservative in their decision making and using protection of future EMR outcomes as their rationale for being overly conservative. It would be curious to understand how the Department's ENR goals are viewed - are they too protective, just right, or too loose? (Respondent: Over 15 years of experience external to the program.)
	Whether the stakeholders are being required to invest too many resources to minimize very speculative future risk? (Respondent: Over 15 years of experience external to the program; member of CSI or TAPs.)
Organizational Culture and Leadership	Once change is determined in DEQ leadership, it is left to everyone in the Districts to come up with their own interpretation. The question regarding De-Centralization should be reworked as most successful programs across the country are centralized and focused. (Respondent: Over 15 years of experience external to the program; member of CSI or TAPs.)
	Questions that examine the role of the legislature in determining policy as opposed to trained staff. (Respondent: Over 15 years of experience external to the program.)
	Something around stakeholder expectations - - often they are too biased and expect the DEQ to bend too much. Somehow stakeholders need to check their accountability and role in process. It's hard to expect the department to be fully transparent and collaborative if the other participants are not. (Respondent: Over 15 years of experience external to the program; member of CSI or TAPs.)
	Leadership and trust in leadership. Understanding the need for prioritized allocation of resources that achieves the greatest reduction in public risk /exposure to environmental contaminants. (Respondent: Less than 15 years of experience external to the program.)

Table 30 (cont'd)

Organizational Culture and Leadership cont'd	Variances between districts/staff and which one/ones are most effective in communication, cooperation, responsiveness to stakeholder concerns. (Respondent: Less than 15 years of experience external to the program.)
	Is staff aligned and do they fulfill their roles consistent with department management's goals, objectives, instructions and initiatives. (Respondent: Over 15 years of experience external to the program; member of CSI or TAPs.)
	Despite the Freedom of Information Act, much of the data that the DEQ RRD gathers or is given to review is not as readily available to the general public in this state as it is in other states I have worked in. In these other states an entire historic set of file information regarding a particular site is often easily found and available online, regardless of computer file size. (Respondent: Less than 15 years of experience external to the program.)
	Does staff embrace theories of liability and remediation approaches in conflict with state law? (Respondent: Over 15 years of experience external to the program; member of CSI or TAPs.)
	Are the appropriate concerns of stakeholders being addressed in an appropriate and timely manner by the DEQ? (Respondent: Over 15 years of experience external to the program; member of CSI or TAPs.)
Uncategorized Statements	Survey focus is on current and preferred view. There has been a significant change in the RRD culture in dealing with external stakeholders. RRD is more proactive in dealing with issues and reaching consensus quickly. RRD is willing look at how to solve problems when historically it was more about finding ways to say NO. Survey should have included some questions about past behavior. (Respondent: Over 15 years of experience external to the program; member of CSI or TAPs.)
	I wish that some questions asked if we had seen a recent improvement. Otherwise I was forced to consider a longer history of contact with MDEQ. (Respondent: Over 15 years of experience external to the program; member of CSI or TAPs.)
	Financial resources (un-)available. (Respondent: Less than 15 years of experience external to the program.)
	For question 5.7, I would have asked if survey participants thought that the amount of resources were adequate but not focused or deployed optimally. I would have clicked that circle! (Respondent: Over 15 years of experience external to the program; member of CSI or TAPs.)
	Comprehensive survey. No additional questions come to mind. (Respondent: Over 15 years of experience external to the program.)
	(1) Environmental Justice & Citizen Participation approach. Redevelopment of brownfields may help or could create environmental injustice? (2) Green Building approach, the 21st century cities may be sustainable in two senses: as desirable place to live & as communities that use fewer non-renewable resources. (Respondent: Over 15 years of experience external to the program.)
	None. (Respondent: Over 15 years of experience external to the program; member of CSI or TAPs.)
	None. (Respondent: Less than 15 years of experience external to the program.)
	None. (Respondent: Less than 15 years of experience external to the program.)
	NA. (Respondent: Less than 15 years of experience external to the program.)

Question 2. *What types of factors, capacities or activities have the biggest impact on effective ENR management and improved outcomes? Your responses can include external and internal pressures or influences that are outside the scope of this survey.*

Table 31. External Responses to Question 2

ENR Outcomes	Failure to base decisions on sound science and the reluctance to stand on sound science to defend decisions and to explain it to interested community stakeholders. This is NOT an across the board problem, but we can improve on this. There are some RRD staff who cling to very unrealistic risk evaluations and appear to fail to understand that devoting too many resources to chase a very small risk can translate into very real negative consequences for people (such as higher infant mortality and other problems when there are job losses and economic stress). (Respondent: Over 15 years of experience external to the program; member of CSI or TAPs.)
	I think the thing that impacts ENR outcomes the most is the compliance and responsibility shown by individual property owners and businesses to meet their obligations. DEQ's role includes both enforcement (stick) and incentive (carrot) approaches to help parties meet these goals. The Department is starting to understand that even incremental improvements that can be undertaken by responsible parties is a good thing. It is not always necessary or practical to expect full cleanup or compliance. When necessary, the DEQ needs to not be afraid of enforcement where no PRP activity is ongoing. (Respondent: Over 15 years of experience external to the program.)
Organizational Culture and Structure	Early discussions with the regulated community. Would prefer if MDEQ was known to be open to early discussions. (Respondent: Over 15 years of experience external to the program; member of CSI or TAPs.)
	Recognizing the power of integrating diverse perspectives and recognizing the broader impact of decisions to the citizens of Michigan. (Respondent: Less than 15 years of experience external to the program.)
	It may be changing, but my feeling is that with respect to decision making, the potential risk aversion (i.e., making the wrong decision) is so strong it often gets in the way of creative solutions. (Respondent: Over 15 years of experience external to the program; member of CSI or TAPs.)
	District and enforcement level staff DO NOT implement the management themes and priorities articulated by senior DEQ management. Instead, they do their best to implement their own prerogatives and they can only be altered by engagement with senior level staff. (Respondent: Over 15 years of experience external to the program; member of CSI or TAPs.)
	Staff levels greatly affect their ability to timely and efficiently handle work, in addition to being able to obtain and maintain effective knowledge and practices that are beneficial to desired outcomes. Resources availability (funding, technology, and training) is also key for staff to have the support and tools needed. (Respondent: Less than 15 years of experience external to the program.)
	Staff with the appropriate knowledge were and are kept from participating in program changes. (Respondent: Less than 15 years of experience external to the program.)

Table 31 (cont'd)

Organizational Culture and Structure cont'd	Bureaucratic paralysis eliminates decision-making. (Respondent: Less than 15 years of experience external to the program.)
	I felt like we developed some clear paths to move projects in Michigan forward during the CSI, and look forward to seeing how change has improved. However, I have not seen a clear push to move Part 213 sites forward as a whole as I have in other states when sweeping changes are enacted. MDEQ seem to have their own unique belief structure within the districts which significantly retards the efforts of Lansing and the desire to move projects forward. Once decisions are made, there is a lot of questioning that lingers among the Districts for years. (Respondent: Over 15 years of experience external to the program; member of CSI or TAPs.)
	Individual staff members independently deciding what is "best" regardless of departmental philosophy, mandate, and sometimes even law and regulation. (Respondent: Over 15 years of experience external to the program; member of CSI or TAPs.)
	Being able to efficiently close a site and put it to productive reuse. Private money often is spent for many years with no end in sight while the property sits fallow and there is no return on the investment. This is a significant drain on resources that might be better used in different areas. Economic redevelopment must take into account reasonable risk and being too conservative does not help the process. (Respondent: Over 15 years of experience external to the program; member of CSI or TAPs.)
	DED staff often does not have the proper training, education and experience to make the scientific policy decisions being made by the DEQ. Decisions are being made on important issues, such as vapor intrusion, without a clear understanding by the regulated community of the efficacy of the information being used as a basis for the decisions nor an ability to solve problems that are being created by the decisions (e.g., lack of appropriate exit ramps). (Respondent: Over 15 years of experience external to the program; member of CSI or TAPs.)
	Prompt and professional responses to requests or document submission from State staff. Improved use of technology for things like FOIA requests, availability of online documents, etc. Willingness of State staff to address questions/concerns in a timely and competent manner. (Respondent: Less than 15 years of experience external to the program.)
	True risk-based approach to problem solving and application of best practices and professional judgment. Former program was more or less regulated to the lowest common denominator and Industry and their consultants can't be trusted. There are some bad apples out there, but they are the exception not the norm. Separately, the RRD needs additional resources (labor and technology) to solve problems more effectively. Factors include: Availability of Appropriate Resources, Risk-based approach, Collaborative approach, good science approach. (Respondent: Over 15 years of experience external to the program; member of CSI or TAPs.)
	Clean-up should be risk-based. The structure of the cleanup program does not reward RRD staff for making risk-based decisions so there is either more time/resources/sampling that would be needed or worse yet, paralysis. (Respondent: Over 15 years of experience external to the program; member of CSI or TAPs.)

Table 31 (cont'd)

Organizational Culture and Structure cont'd	Collaborative decision making / responsible adaptability/flexibility in decision-making / decentralized decision-making/staff empowerment / responsiveness / accountability. (Respondent: Over 15 years of experience external to the program.)
	Disconnect with the Attorney General Office - MDEQ attorney is rarely fully capable of representing state interests when compared to attorneys representing industry. MDEQ is very passive, understaffed, and unable to make important data available to locals that could support the agency mission. Locals could greatly assist in site monitoring and aiding in cleanup with Brownfields if data were available. (Respondent: Over 15 years of experience external to the program.)
	Training/getting up to date with changes in technology so that staff are on the same page, so that district to district, or PM to PM results/responses are similar. (Respondent: Less than 15 years of experience external to the program.)
	Time management. (Respondent: Less than 15 years of experience external to the program.)
	The difference of opinions encountered throughout the organization. Different MDEQ-RRD PMs require different things, contrary to current promulgated law. (Respondent: Less than 15 years of experience external to the program.)
Uncategorized Statements	Money!! Available funds not only affect how many projects can be undertaken they affect how quickly, effectively and thoroughly the work can be completed. Whether it is more DEQ field or technical staff or grants or loans available to private or public stakeholders for cleanup/remediation/assessment it's very much about the $$$. (Respondent: Less than 15 years of experience external to the program.)
	Not Applicable. (Respondent: Less than 15 years of experience external to the program.)

Question 3. *Of the activities you mentioned, please identify the one which has the biggest impact?*

Table 32. External Responses to Question 3

ENR Outcomes	The broad impact of decisions to actual quality of life. (Respondent: Less than 15 years of experience external to the program.)
	The ability to get to the end of the closure process. (Respondent: Over 15 years of experience external to the program; member of CSI or TAPs.)
Organization Culture and Structure	Lack of central leadership and accountability to produce results. Defining the results. (Respondent: Over 15 years of experience external to the program; member of CSI or TAPs.)
	Staff behavior. (Respondent: Over 15 years of experience external to the program; member of CSI or TAPs.)
	Staff seem to be wary of their leadership given the changes that have been made to the laws; the process is driven by politics and stakeholder interests, not clean-ups. (Respondent: Less than 15 years of experience external to the program.)
	Early in the process meeting with the Company representatives. (Respondent: Over 15 years of experience external to the program; member of CSI or TAPs.)
	Weak data disclosure requirements for responsible parties. (Respondent: Over 15 years of experience external to the program.)
	Use of technology, availability of online documents. (Respondent: Less than 15 years of experience external to the program.)
	Collaboration. (Respondent: Over 15 years of experience external to the program.)
	No reward for staff for making risk-based decisions. This is a tough one since new knowledge can appear after a decision is made but that is not a reason not to make decisions! (Respondent: Over 15 years of experience external to the program; member of CSI or TAPs.)
	Vapor intrusion pathway decisions are not being made with expert oversight or peer review. (Respondent: Over 15 years of experience external to the program; member of CSI or TAPs.)
	Time management. (Respondent: Less than 15 years of experience external to the program.)
Uncategorized Statements	Resource availability. (Respondent: Less than 15 years of experience external to the program.)
	Listed above. (Respondent: Over 15 years of experience external to the program; member of CSI or TAPs.)
	$$$. (Respondent: Less than 15 years of experience external to the program.)
	Not Applicable. (Respondent: Less than 15 years of experience external to the program.)
	NA. (Respondent: Less than 15 years of experience external to the program.)

Question 4. *Is there anything else you would like to add before submitting this survey?*

Table 33. External Responses to Question 4

ENR Outcomes	There has been a significant improvement in tone and openness to exploring options. This promotes early discussions, which means faster resolutions and better outcomes. This also results in higher levels of compliance. (Respondent: Over 15 years of experience external to the program; member of CSI or TAPs.)
	Need to recognize that we need to "compete" together, not against one another to win - win back the stature of Michigan. Thank you for the opportunity to serve. (Respondent: Less than 15 years of experience external to the program.)
	I have been working in Michigan for more than 25 years. There is some great talent in the RRD and the current approach of "unleashing the talent" and empowering staff is a huge shift in the right direction. Working collectively with internal and external stakeholders to find balanced solutions that protect ENR is the right solution to long term trust and the best outcomes for all stakeholders. (Respondent: Over 15 years of experience external to the program; member of CSI or TAPs.)
Organization Culture and Structure	I have observed very significant improvements in RRD in terms of moving the cleanup program toward using sound science and becoming more realistic about risks posed by environmental conditions. There is a slow but perceptible movement towards recognizing factors beyond "cookbook" programmatic factors and looking more at the big picture, but we need to improve on that. (Respondent: Over 15 years of experience external to the program; member of CSI or TAPs.)
	Appreciate current efforts to be responsive, timely and inclusive in improving DEQ. (Respondent: Less than 15 years of experience external to the program.)
	The CSI process was an extremely welcome approach, particularly as it undertook significant outreach within and outside of the DEQ and allowed for a frank exchange of perspectives. This process should be repeated. Allowing staff to seek innovative approaches to site closure would be very helpful. Staff has been much more willing to meet and discuss site options in recent years; more collegial. (Respondent: Over 15 years of experience external to the program; member of CSI or TAPs.)
	The reinvention effort has been a positive experience that holds promise. The key is to continue to inform and involve stakeholders continuously throughout the implementation phase and to recalibrate the effort regularly, rather than to "go internal" and lose sight of the concerns and recommendations of the stakeholders. A small miscue can materially alter the outcome; this must be avoided. (Respondent: Over 15 years of experience external to the program; member of CSI or TAPs.)
	I believe that DEQ management are working very hard to change a culture of zero risk tolerance within DEQ staff. (Respondent: Over 15 years of experience external to the program; member of CSI or TAPs.)
	As an external consultant, we have had some very positive experiences working with the DEQ, with them as part of the project team. This includes regular updates and "keeping the MDEQ PM" in the loop. This makes it easier for MDEQ to review material (nothings a surprise) and discussions are more productive. (Respondent: Less than 15 years of experience external to the program.)

Table 33 (cont'd)

Organization Culture and Structure cont'd	If you truly want change you must remove some mid to senior level enforcement and program staff. They may say that they believe in implementing the governor's and director's objectives but they do their best to prevent progressive change to the organization by implementing their own policies and prerogatives rather than those set forth by senior management. You must change this culture. (Respondent: Over 15 years of experience external to the program; member of CSI or TAPs.)
	Part213 sites, MDEQ (Lansing) should put together a checklist tool based on the current regs; require all RPs to evaluate their sites to see why their site should remain ACTIVE. Many sites pose no risk, and have been ready for closure for years. If sites meet the criteria, they should be administratively closed. This has been done in TX and CA with amazing success. This will allow MI to focus on problems. (Respondent: Over 15 years of experience external to the program; member of CSI or TAPs.)
	The Grand Rapids district office has the best system for providing requested documents. It is prompt, very cost effective and staff has always been polite and professional. There is also some specific staff across the State who do outstanding work with addressing concerns, providing feedback and working collaboratively with stakeholders, consultants, property owners, etc. (Respondent: Less than 15 years of experience external to the program.)
	Much is said about being more responsive to businesses or individuals to improve the economic status but often the data are lacking when it comes to monitoring or follow up. Individual projects can be held more accountable and transparent the same as the DEQ staff. (Respondent: Less than 15 years of experience external to the program.)
Uncategorized Statements	The majority of our work with the DEQ is FOIAs; the process seems to be improving, however, procedures can often change for no reason. For example, we will show up to make copies of files and are told we can take the copies with us until the invoice has been paid and then those copies will be mailed. When in the past it never worked this way and we weren't informed of the changes until we showed. (Respondent: Less than 15 years of experience external to the program.)
	The correct methods used to obtain copies of records (FOIA Requests) are outdated, slow and impractical. I would urge you to consider updating the system and bring Michigan up to par with other states. One example to look at is the Oculus system available through Florida's DEP, where interested parties can download available files without delay. (Respondent: Between 5 to 10 years of experience external to the program.)
	Aligning brownfield redevelopment standards as EPA's, RBCA/HUD's and the State of Michigan. (Respondent: Over 15 years of experience external to the program.)
	NA. (Respondent: Less than 15 years of experience external to the program.)
	NA. (Respondent: Less than 15 years of experience external to the program.)
	No. (Respondent: Over 15 years of experience external to the program.)
	Nothing more. Well done. I'm interested in the results and whether it fosters continued change for the better. (Respondent: Over 15 years of experience external to the program.)

BIBLIOGRAPHY

BIBLIOGRAPHY

Allan, Catherine, and Allan Curtis. (2003). Regional Scale Adaptive Management: Lessons From the North East Salinity Strategy (NESS). *Australian Journal of Environmental Management* 10: 76-84. Print.

Arvai, Joseph, Gavin Bridge, Nives Dolsak, Robert Franzese, Tomas Koontz, April Luginbuhl, Paul Robbins, Kenneth Richards, Katrina Smith Korfmacher, Brent Sohngen, James Tansey, and Alexander Thompson. (2006). Adaptive Management of the Global Climate Problem: Bridging the Gap Between Climate Research and Climate Policy. *Springer Climatic Change* 78: 217–225. Web.

Arvai, Joseph L., Victoria E.A. Campbell, Anne Baird, and Louie Rivers.(2004). "Teaching Students to Make Better Decisions About the Environment: Lessons From the Decision Sciences Bulletin of the British Ecological Society 41:48-56." *The Journal of Environmental Education* 36.1: 33-44. Web. Dec. 2011.

Arvai, Joseph L., Tim McDaniels, and Robin Gregory. (2002). Exploring a Structured Decision Approach as a Means of Fostering Participatory Space Policy Making at NASA. *Www.elsevier.com/locate/spacepol*. Dec. 2011. Web.

Babbie, Earl R. (1989). Chapter 15 Indexes, Scales, and Typologies. *The Practice of Social Research*. Belmont, CA: Wadsworth Pub. Print.

Batie, Sandra S. (2008). Wicked Problems and Applied Economics. *American Journal of Agricultural Economics* 5: 1176-191. Print.

Bertels, Stephanie Petra. (2006). *Understanding Domain-Based Interorganizational Collaboration: Governance, Process and Capacity*. Diss. The University of Calgary. Ann Arbor: ProQuest Dissertations and Theses (PQDT). Print.

Bingham, Lisa B., Tina Nabatchi, and Rosemary O'Leary. (2005). The New Governance: Practices and Processes for Stakeholder and Citizen Participation in the Work of Government. *Public Administration Review* 65.5: 547-58. Print.

Bradshaw, Gary L., Langley, Patrick W., & Simon, Herbert A. (1983). Studying Scientific Discovery by Computer Simulation. *Science*, 222(4627), 971-975. Doi:http://dx.doi.org/10.1126/science.222.4627.971. Web.

Brown, Valerie A. John A. Harris, and Jacqueline Y. Russell. (2010).*Tackling Wicked Problems: Through the Transdisciplinary Imagination*. London: Earthscan. Print.

Brundtland, Gro Harlem. (1987). *Eighth Proceeding on the World Commission on Environment and Development*, Japan, Tokyo. Web.

Bunnell, Fred L., and Glenn B. Dunsworth. (2004). Making Adaptive Management for Biodiversity Work - The Example of Weyerhaeuser in Coastal British Columbia. *The Forestry Chronicle* 80.1: 37-43. Print.

CERES. (2010). The 21st Century Corporation: The CERES Roadmap for Sustainability. *Creative Commons.* 10 Nov. 2011. Web. <http://www.ceres.org/resources/reports/ceres-roadmap-to-sustainability-2010>.

Chandler, Alfred D. (1977). *The Visible Hand: The Managerial Revolution in American Business*. Cambridge, MA: Belknap. Print.

Cohen, Wesley M., and David A. Levinthal. (1990). Absorptive Capacity: A New Perspective on Learning and Innovation. *Administrative Science Quarterly*, 35(1), 128-152. Http://ezproxy.msu.edu/login?url=http://search.proquest.com/docview/63064325?accountid=12598. Web.

Cohen, Wesley M., and David A. Levinthal. (1989). Innovation and Learning: The Two Faces of R&D. *The Economic Journal*, 99, 569–596. Print.

Corraliza, J. A.., and J. Berenguer. "Environmental Values, Beliefs, and Actions: A Situational Approach." *Environment and Behavior* 32.6 (2000): 832-48. Web.

Criscuolo, Paola, and Rajneesh Narula. (2008). A Novel Approach to National Technological Accumulation and Absorptive Capacity: Aggregating Cohen and Levinthal. *The European Journal of Development Research* 20.1: 56. 8 Dec. 2012. Web.

Davidson, Debra J., and Scott Frickel. (2004). Understanding Environmental Governance: A Critical Review. *Organization and Environment,* 17.4: 471-92. Sage Publications, Inc. 17 Oct. 2011. Web.

Dewulf, Art, Greet Francois, Claudia Pahl-Worstl, and Tharsi Taillieu. (2007). A Framing Approach to Cross-disciplinary Research Collaboration: Experiences from a Large-scale Research Project on Adaptive Water Management. *Ecology and Society, 12(2):14. Http://www.ecology and Society.org/vol12/iss2/art14/.* Web.

Dryzek, John S., and Hayley Stevenson. (2011). Global Democracy and Earth Sytems Governance. *Ecological Economics,* 70.11: 1865-874. Print.

Dunlap, R., K. Van Liere, A. Mertig, and R. Jones. "New Trends in Measuring Environmental Attitudes: Measuring Endorsements of the New Ecological Paradigm: A Revised NEP Scale." *Journal of Social Issues* 56.3 (2000): 425-42. Print.

Dunphy, Dexter C., Andrew Griffiths, and Suzanne Benn. (2007). *Organizational Change for Corporate Sustainability: A Guide for Leaders and Change Agents of the Future*. London: Routledge. Print.

Eagles, Paul F.J. Windekind C. Buteau-Duitschaevera, Jasveen Rattana, Mark E. Havitza, Troy D. Glovera, Francesc Romagosab & Bonnie McCutcheona Pages 269-287. "Non-government Organization Members' Perceptions of Governance:

A Comparison between Ontario and British Columbia Provincial Parks Management Models." Leisure/Loisir Volume 36, Issue 3-4, 2012 (n.d.): Print.

Ebbin, Syma. A. (2003). Swimming Upstream: Institutional Dimensions of Asymmetrical Problems in Two Salmon Management Regimes. *Marine Policy* 27.5: 441-8. ASFA: *Aquatic Sciences and Fisheries Abstracts*. 12 Oct. 2012. Web.

Eccles, Robert G., and Ioannis Ioannou, and George Serafeim. (2011). The Impact of the Corporate Culture of Sustainability on Corporate Behavior and Performance. *Harvard Business School Working Paper* 12.035. Print.

Elkington, John. (1997). *Cannibals with Forks: The Triple Bottom Line of 21st Century Business*. Gabbriola Island: New Society. Print.

European Environmental Agency (EEA). (2010) *The European Environment - State and Outlook 2010: Assessment of Global Megatrends*. Copenhagen: European Environmental Agency. Print.

Failing, Lee, Graham Horn, and Paul Higgins. (2004). Using Expert Judgment and Stakeholder Values to Evaluate Adaptive Management Options. *Ecology and Society. http://www.ecologyand Society/iss1/art13* 13th ser. 9.1. Web.

Fink, Jonathan. (2012). *Harvesting the Hype: Building Pan-University Sustainability Initiatives*. Sustainability Studies Seminar Series. Erickson Kiva, East Lansing. 23 Mar. 2012. Lecture.

Field, Andy P. Discovering Statistics Using SPSS: (and Sex and Drugs and Rock 'n' Roll). Los Angeles [i.e. Thousand Oaks, CA: SAGE Publications, 2009. Print.

Fisher, Roger, William Ury, and Bruce Patton. (1991). *Getting to Yes: Negotiating Agreement without Giving In*. New York, NY: Penguin. Print.

Folke, Carl, J., Stephen R. Carpenter, Brian Walker, Marten Scheffer, Terry Chapin, and Johan Rockström. (2010). Ecology and Society: Resilience Thinking: Integrating Resilience, Adaptability and Transformability. *Ecology and Society* 20th Ser. 15.4. <http://www.ecologyandsociety.org/vol15/iss4/art20/>. 30 July 2012. Web.

Goldsmith, Stephen, and Donald F. Kettl. (2009). Unlocking the Power of Networks: Keys to High-performance Government. *Ash Institute for Democratic Governance and Innovation*. Cambridege, MA. Print.

Graham, John, Bruce Amos, and Tim Plumptre. Principles for Good Governance in the 21st Century. Publication. Vol. 15. Ottawa: Institute On Governance, 2003. Print.

Gregory, Robin., Dan Ohlson, and Joseph L. Arvai. (2006). Deconstructing Adaptive Management: Criteria for Applications to Environmental Management. *Ecological Applications* 16.6: 2411-1425. Print.

Griffith, Rod. (2002). *How Shall We Live? The Sustainable Agenda and Institutional Change in Local Governance in Australia.* Diss., University of Western Sydney, Sydney. Print.

Hart, Stuart L., Mark B. Milstein, and Joseph Caggiano. (2003). Creating Sustainable Value. *The Academy of Management Executive* 17.2: 56-69. Print.

Hart, Stuart, L., and Glen Dowell. (2011). A Natural-Resource-Based View of the Firm: Fifteen Years After. *Journal of Management* 37.5: 1464-79. Web.

Hendriks, Carolyn M. (2010). Inclusive Governance for Sustainability in *Tackling Wicked Problems: Through the Transdisciplinary Imagination*. Valerie A. Brown, et al.,. London: EARTHSCAN,151-60. Print.

Holliday, Scot. (2011). *A Case Study of How DuPont Reduced Its Environmental Footprint: The Role of Organizational Change in Sustainability*. Diss. The George Washington University, 2010. Ann Arbor: ProQuest Dissertations and Theses (PQDT).Print.

Jennings, Daniel F., and Samuel L. Seaman. "High and Low Levels of Organizational Adaptation: An Empirical Analysis of Strategy, Structure, and Performance." Strategic Management Journal 15.6 (1994): 459-75. Web. 5 June 2012. <http://www.jstor.org/stable/2486761>.

John, Richard R. (1997). Elaborations, Revisions, Dissents: Alfred D. Chandler, Jr.'s, The Visible Hand after Twenty Years. *The Business History Review* 71.2: 151-200. Print.

Jurin, R. R., Roush, D., & Danter, D. (2010). Communicating across cultures, PP.189-203 Chapter 12 in R.R. Jurin, D. Rousch, & D. Danter. (Eds.) Environmental communication: Skills and principles for natural resource managers, scientists, and engineers. London: Springer Science + Business Media.

Karim, Samina., and Will Mitchell. (2000). Path-dependent and Path-breaking Change: Reconfiguring Business Resources following Acquisitions in the US Medical Sector, 1978-1995. Strategic Management Journal, 21: 1061-1081. Web.

Keeney, Ralph L. (2002). Common Mistakes in Making Value Trade-offs. *Operations Research* 50.6: 935-45. Print.

Kellon, Delanie S. (2011). *Resource Management in a Developing Country Context: Improving Decisions by Confronting Difficult Tradeoffs in Costa Rica*. Diss. Michigan State University, 2011. Ann Arbor: ProQuest Dissertations and Theses (PQDT). Print.

Kettle, Donald F. (2002) *Environmental Governance: A Report on the Next Generation of Environmental Policy*. Washington, D.C.: Brookings Institution. Print.

Kjær, Anne Mette. (2010). *Governance*. Malden, MA: Polity. Print.

Kotler, Philip. "Chapter 3." *Marketing for Non-profit Organizations.* New Jersey: N.J. Prentice-Hall, 1982. 75-111. Print.

Kotter, John P. (1995). Leading Change - Why Transformation Efforts Fail. *Harvard Business Review* 73: 59-67. Print.

Kuhn, Thomas S. (1996). *The Structure of Scientific Revolutions.* Chicago, Univ. of Chicago, IL. Print.

Leach, William D. and Paul A. Sabatier. (2005). To Trust an Adversary: Integrating Rational and Psychological Models of Collaborative Policymaking. *The American Political Science Review, Vol. 99, No. 4: 491-503 Published By: American Political Science Association*. Http://www.jstor.org/stable/30038960]. Web.

Lindblom, Charles. (1959). The Science of Muddling Through. *Public Administration Review* 19.2: 79-88. Print.

Lipsky, Michael. 2010. *Street-level Bureaucracy: Dilemmas of the Individual in Public Services*. New York: Russell Sage Foundation. Print.

Lubchenco, Jane. (1998). Entering the Century of the Environment: A New Social Contract for Science. *Www.sciencemag.org*. Science Vol. 279, 23. Web.

Matso, Kallie E., Molly O'Donovan Dix, Benjamin Chicoski, Debra L. Hernandez, and Jerry R. Schubel. (2008). Establishing a Minimum Standard for Collaborative Research in Federal Environmental Agencies. *Integrated Environmental Assessment and Management* 4.3: 362-68. Web.

Mehan, Tracy (2011) in Norris, Patricia E., and Jan Urban-Lurain (eds). *Critical Conversations about Environmental and Natural Resource Governance*. Rep. East Lansing: Michigan State University, 2011. Print.

Menon, Ajay, and Anil Menon. "Enviropreneurial Marketing Strategy: Emergence of Corporate Environmentalism." Journal of Marketing 61 (n.d.): 51-67. Web. Jan. 1997.

Metzenbaum, Shelley. (2002). Measurement That Matters: Cleaning up the Charles River in Kettle, Donald F., *Environmental Governance: A Report on the Next Generation of Environmental Policy*. Washington, D.C.: Brookings Institution. Print.

Metzenbaum, Shelley H. (2006). Performance Accountability: The Five Building Blocks and Six Essential Practices. Rep. Washington, D.C.: IBM Center for The Business of Government. Print.

Michigan Department of Environmental Quality. (2013). Mission Statement. www.michigan.gov/deq. Web.

Michigan Department of Environmental Quality and Michigan State University Extension (MDEQ and MSUE) (2012). *Michigan's Collaborative Stakeholder Initiative,*

Reinventing the State's Cleanup and Redevelopment Program Final Report and Recommendations. Lansing: MDEQ. Print.

Michigan Office of Regulatory Reinvention. (2011). *Recommendations of the Environmental Advisory Rules Committee to the Office of Regulatory Reinvention*. State of Michigan; Lansing. Print.

Michigan Sea Grant and Graham Environmental Sustainability Institute (MSG and GESI)(2009). *Tackling Wicked Problems Through Integrated Assessment.* [MICHU-09-506] University of Michigan, Ann Arbor, MI. : Www.miseagrant.umich.edu/downloads/research/tackling-wickedproblems.pdf. 13 July 2012. Web.

Middendorf, Gerard, and Lawrence Busch. (1997). Inquiry for the Public Good: Democratic Participation in Agricultural Research. *Agriculture and Human Values* 14: 45-57. Print.

Miller, Alan. (1999). Environmental Problem Solving: Psychosocial Barriers to Adaptive Change. *Springer Series on Environmental Management*. Springer-Verlag, New York. Web.

Mol, Arthur P.J., David Sonnenfield, and Burt Spargaren. (2011). The Ecological Modernisation Reader: Environmental Reform in Theory and Practice. International Sociology 26.5: 685-9. *International Bibliography of the Social Sciences (IBSS).* 6 Aug. 2012. Web.

Morris, William, comp. (2001). *The American Heritage College Dictionary.* Boston: Houghton Mifflin. Print.

National Research Council. (1996). *Understanding Risk: Informing Decisions in a Democratic Society*. Washington, DC: National Academy Press. Print.

Norris, Patricia E., and Jan Urban-Lurain. (2011). *Critical Conversations about Environmental and Natural Resource Governance*. Rep. East Lansing: Michigan State University. Print.

Ostrom, Elinor. (1999). An Assessment of the Institutional Analysis and Development Framework Institutional Rational Choice: Theories of the Policy Process*. Westview Press*: 35-71. Print.

Parissi, Cesidio. (2010) Truth, Knowledge and Data: A Study of Truth-Building in Organizational Change in *Tackling Wicked Problems through the Transdisciplinary Imagination*. Valerie A. Brown, John A. Harris, and Jacqueline Y. Russell. London: Earthscan. 204-13. Print.

Patterson, Michelle. (2006). *Towards Ecosystem-based Management in Canada's Northeast Pacific Ocean: Research Support for and Emerging Collaborative Science Initiative [MS Thesis].* Victoria (BC): Environment and Management Program, Royal Roads University. Rep. Print.

Pielke, Roger A. (2007). *The Honest Broker: Making Sense of Science in Policy and Politics*. Cambridge: Cambridge UP. Print.

PricewaterhouseCoopers LLP. (2012) *Employee Engagement Survey. State of Michigan, Environmental Quality.* Rep. <www.pwc.com/saratoga>. Web.

Putnam, Robert D. (2000). *Bowling Alone: The Collapse and Revival of American Community*. New York: Simon & Schuster. Print.

Renn, Ortwin and Webler, Thomas and Rakel, Horst and Dienel, Peter and Johnson, Branden. (1993). "Public Participation in Decision Making: A Three-Step Procedure." Policy Sciences 26.3: 189-214. JSTOR. 14 May 2012. Web. Policy Sciences 26.3 (1993): 189-214. JSTOR. Web. 14 May 2012. <http://www.jstor.org/stable/4532287>.

Renn, Ortwin. (2012). Inclusive Governance: Public Participation in Risk Decision Making. *Michigan State University Environmental Science and Policy Program Distinguished Lecture Series*. Michigan State University, 23 Feb. 2012. <http://www.espp.msu.edu/news/seminars/ortwin_renn.pdf>. 16 Oct. 2012. Web.

Rhodes, Rod A. W. (1999) 'Forward' (xviii), in Gerry Stoker (ed.),. *The New Management of British Local Level Governance*. Basingstoke: Palgrave MacMillan. Print.

Rittel, Horst W., and Melvin M. Webber. (1973). Dilemnas in a General Theory of Planning. *Policy Sciences* 4: 155-69. *JSTOR*. 6 June 2012. Web.

Roberts, Karlene H., Suzanne K. Stout, and Jennifer J. Halpern. (1994). Decision Dynamics in Two High Reliability Military Organizations. *Management Science* 40.5: 614-24. Web.

Schultz II, Clifford J., and Morris B. Holbrook. (1999). Marketing and the Tragedy of the Commons: A Synthesis, Commentary, and Analysis for Action. *Journal of Public Policy and Marketing* 18.2: 218-29. Print.

Schwandt, David R., and Michael J. Marquardt. (2000). *Organizational Learning: From World-class Theories to Global Best Practices*. Boca Raton: St. Lucie Press. Print.

Schwartz, Barry. *The Paradox of Choice: Why More Is Less*. New York: HarperCollins, 2005. Print.

Selin, Steve, Chad Pierskalka, David Smaldone and Karen Robinson. (2007). Social Learning and Building Trust through a Participatory Design for Natural Resource Planning. *Journal of Forestry.* Society of American Foresters JF-07-21.

Senecah, Susan L. (2004). The Trinity of Voice: The Role of Practical Theory in Planning and Evaluating the Effectiveness of Environmental Participatory Processes. Chapter 1 in S.P. Depoe, J.W. Delicath and M.F.A. Elsenbeer (eds.) (1992), *Communication and Public Participation in Environmental Decision*

Making. Albany: State University of New York Press. Sewell, W.H., Jr. (2000). A Theory of Structure: Duality, Agency and Transformation. *American Journal of Sociology* 98(1):1-29. Stanfield, R.B. (ed.). 2000. The Art of Focused Conversation. Gabriola Island, British Columbia, Canada: New Society Publishers, in *Environmental Decision Making*. Albany: State University of New York Press.

Sharma, Sanjay, Maark Starik and Bryan Husted. (2007). *Organizations and the Sustainability Mosaic.* Northampton: Edward Elgar. Print.

Shriberg, Michael P. (2002). *Sustainability in U.S. Higher Education: Organizational Factors Influencing Campus Performance and Environmental Leadership*. Diss. University of Michigan, 2002. Ann Arbor: ProQuest Dissertations and Theses (PQDT). Print.

Simpson, Thomas W., and Sarah Weammert. (2007). The Chesapeake Bay Experience: Learning about Adaptive Management the Hard Way. *Managing Agricultural Landscapes for Environmental Quality: Strengthening the Science Base.* Ankeny, IA: Soil and Water Conservation Society. Print.

State of Michigan. (2011). DEQ - Department of Environmental Quality. *SOM - State of Michigan*. Web. 17 Mar. 2011. Http://www.michigan.gov/deq. Web.

Stern, Paul C. (2000). Theory of Environmentally Significant Behavior. *Journal of Social Issues* 56.Number 3: 407-24. Print.

Tedlow, Richard S. "Introduction, Chapter 1." New and Improved: The Story of Mass Marketing in America. New York: Basic, 1990. N. pag. Print.

Thomas-Larner, Jennifer, ed. (2007). *A Practical Guide to Collaborative Governance*. Publication. Portland: Policy Consensus Initiative. Print.

Thompson, Paul. (2007). Agricultural Sustainability:What It Is and What It Is Not. *International Journal of Agricultural Sustainability* 5.1: 5-16. Print.

Tversky, Amos, and Daniel Kahneman. (1981) "The Framing of Decisions and the Psychology of Choice." *Science* 211. (4481): 453-58. Print.

Tversky, Amos, and Daniel Kahneman. (1992). Advances in Prospect Theory: Cumulative Representation of Uncertainty. *Journal of Risk and Uncertainty* 5.4: 297-323. Print.

United Nations. (1997). Governance for Sustainable Human Development. *United Nations Development Program.* 18 Feb. 2013. Web. http://mirror.undp.org/magnet/policy>

United Nations. (2011). What Is Good Governance. *United Nations Economic and Social Commission for Asia and the Pacific*. United Nations. <http://www.unescap.org>. 11 Oct. 2011. Web.

Vogt, Eric E., Juanita Brown, and David Isaacs. (2003). The Art of Powerful Questions. *Whole Systems Associates.* Print.

Walker, Brian H., and David Salt. (2006). *Resilience Thinking: Sustaining Ecosystems and People in a Changing World*. Washington, DC: Island. Print.

Weidner, Helmut. (2002). Capacity Building for Ecological Modernization: Lessons from Cross-national Research. *American Behavioral Scientist*, 45(9), 1340-1368. Web.

Williams, Peter G. (2009). *Institutionalizing Sustainability in Community Colleges: The Role of the College President*. Diss. Oregon State University, 2009. Ann Arbor: ProQuest Dissertations and Theses (PQDT). Print.

Winter, Sidney G. (2000). The Satisficing Principle in Capability Learning. *Strategic Management Journal,* 21: 981-996. Web.

Wüstenhagen, Rolf. (2008). *Sustainable Innovation and Entrepreneurship*. Cheltenham, UK: Edward Elgar. Print.