

Collaborative Watershed Management in the Cuyahoga River Area of Concern

An Institutional Analysis

November 2020



Contact

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Abbreviations

ACOE	Army Corps of Engineers
AOC	Area of Concern
BUI	Beneficial Use Impairment
CCC	Cuyahoga River RAP Coordinating Committee
CRR	Cuyahoga River Restoration
CWA	Clean Water Act
ECCC	Environment & Climate Change Canada
GLLA	Great Lakes Legacy Act
GLRI	Great Lakes Restoration Initiative
GLWQA	Great Lakes Water Quality Agreement
IAD	Institutional Analysis and Development
IJC	International Joint Commission
NEORS	Northeast Ohio Regional Sewer District
NGO	Nongovernmental Organization
OEPA	Ohio Environmental Protection Agency
OLEC	Ohio Lake Erie Commission
OSG	Ohio Sea Grant
RAP	Remedial Action Plan
U.S. EPA	United States Environmental Protection Agency

1.0 Executive Summary

This report summarizes the findings of an applied research project conducted by the Ohio Sea Grant College Program (OSG) in the spring of 2020. The project examines collaborative environmental management in the Cuyahoga River Area of Concern (AOC), focusing on the biophysical nature of the river system, the reciprocal nature of local culture on river restoration activities, and institutional rules governing decision-making within the watershed. Twenty-three semi-structured interviews were conducted with members of the Cuyahoga AOC Advisory Committee and one alternate member (hereafter referred to as the “Advisory Committee”) to gather data on the decision-making processes and collaborative relationships that shape management actions in the watershed, and to solicit recommendations on how to achieve sustainable outcomes. The results should be helpful to identify and overcome common transaction costs associated with collaborative environmental management and inform the way the Advisory Committee shares information, coordinates activities, agrees on conservation strategies, and supports management actions approved by the Ohio Environmental Protection Agency (OEPA).

Restoration actions in the Cuyahoga River AOC are guided by the 1972 Great Lakes Water Quality Agreement (GLWQA). The GLWQA identifies the most polluted river systems throughout the Great Lakes, and local collaborative advisory committees identify which environmental stressors are most important in each watershed and recommend what management actions would have the greatest impact on river restoration. Given the connection between the professional expertise of Committee members and prioritization of projects that receive funding for implementation, it is helpful to better understand Advisory Committee members’ opinions on the biggest environmental threats in the Cuyahoga River AOC, most impactful restoration actions, most important environmental and social outcomes, and biggest influences on successful river restoration (see Table 1).

Biggest environmental threats	Stormwater	H ₂ O quality	Climate change	Wildlife	Marine debris
Most impactful restoration actions	Dam removal	Stormwater management	Habitat restoration	Wastewater treatment	Education & outreach
Most important environmental outcomes	Improved water quality	Ecosystem integrity	Better public access	Environmental awareness	Reduced contaminants
Most important social outcomes	Public access & recreation	Use of water trail & towpath	Education & awareness	Environmental ethic	Community development
Biggest influences on river restoration	Funding	State government	Community support	Stormwater projects	Federal government

Table 1: AOC priorities ranked by Advisory Committee members

Collaborative approaches to environmental management are often praised for increasing community participation, incorporating local knowledge, and producing more sustainable environmental and social outcomes than traditional methods. However, critics point out that when not properly supported, collaborative approaches can produce transaction costs that take time and money and lead to “lowest common denominator” decisions. For this reason, it is important to also understand the institutional performance of collaborative groups and develop strategies for overcoming such costs. Collaborative environmental management in the Cuyahoga River AOC has been productive, as evidenced by the completion of a strategic management action list that was approved by the OEPA. Despite the AOC’s success, Committee members suggest there remain opportunities to refine the group structure and

decision processes. Transaction costs to optimal institutional performance within the Advisory Committee stem from: (1) perceived inefficiencies in sharing information and coordinating activities; (2) asymmetrical levels of institutional knowledge among members regarding the Advisory Committee's history, mission, and goals; (3) questions about the accountability of voting processes; and (4) a desire to better incorporate underrepresented populations in AOC decision-making and explore new and innovative restoration strategies. According to Committee members, opportunities for reducing these transaction costs include:

- Improving efficiency by using the best available technology to organize meetings and AOC events, create and disseminate more detailed agendas, and incorporate live notetaking via a shared online platform (e.g., Google Docs). Following meetings, promptly creating and posting minutes and including notes from the Committee Chair highlighting important information and providing action items for Committee members.
- Reducing information asymmetries by assigning new members a mentor from the Advisory Committee and requiring them to attend an orientation by the facilitating organization on how the Committee and Subcommittees work, where information on management actions is stored, what the expectations are for Committee participation, where opportunities for participation exist, and differences in scope and oversight for the Advisory Committee and the facilitating organization.
- Assuring all Committee members have access to the same detailed information on BUIs and management action plans so everyone can contribute equally to strategic decision making. Developing a real-time dashboard of delisting progress for each Beneficial Use Impairment (BUI) including updated timelines for completion. Prioritizing management actions among all Committee members and tracking completed action plans once submitted.
- Improving accountability of the Advisory Committee by updating voting procedures to include opportunities for individuals to explain or justify their votes on management actions. Accountability could also be improved by instituting "blind voting" so that responses are not affected by path dependency. Inviting the full Advisory Committee to vote on the prioritization of projects identified on the management action list.
- Helping improve adaptability by seeking additional municipal funds to bolster the facilitating organization and enlisting diverse members from underrepresented communities located throughout the Cuyahoga River AOC to join the Advisory Committee. Inviting higher-level decision makers from each representative organization to participate in Advisory Committee governance.

2.0 Introduction and Background

2.1 Great Lakes Water Quality Agreement

The Great Lakes Water Quality Agreement (GLWQA) is a binational commitment between the governments of the United States and Canada and coordinated by the International Joint Commission (IJC) to "restore and protect the waters of the Great Lakes" (U.S. EPA, 2019). The GLWQA represents a general set of formal institutional rules that direct federal and state/provincial agencies, under the supervision of local collaborative advisory committees, to clean up the most polluted rivers draining into the Great Lakes. First signed in 1972, then amended in 1978, 1987, and 2012, the GLWQA has provisions to address harmful algal blooms, aquatic invasive species, impacts from climate change, discharges from vessels, and the focus of this project, cleanup efforts on the most polluted waterbodies associated with the Great Lakes. More specifically, Annex 1 of the GLWQA seeks to 'restore highly contaminated sites within the Great Lakes basin through the development and implementation of Remedial Action Plans (RAPs)' (U.S. EPA, 2019). These sites, designated Areas of Concern (AOCs), indicate human activities have caused serious damage to the environment, to the point that fish and other aquatic species are harmed and traditional uses of the water are impaired. AOCs are defined as:

“Geographic areas designated by Canada or the United States where significant impairment of beneficial uses has occurred as a result of human activities at the local level. Impairment of a beneficial use is a reduction in the chemical, physical, or biological integrity of the waters of the Great Lakes sufficient to cause any of 14 specific problems (beneficial use impairments, or BUIs) (GLWQA, Annex 1, 2012).”

A total of 43 AOCs have been identified in the United States (26) and Canada (12), with 5 binational AOCs. Efforts to clean up the AOCs represents a truly collaborative process, including a suite of stakeholders ranging from the United States Environmental Protection Agency (U.S. EPA) and Environment and Climate Change Canada (ECCC), to other federal and state environmental agencies, and many local governments, nongovernmental organizations (NGOs), businesses, and independent residents.

2.2 Cuyahoga River

This study takes a close look at the Cuyahoga River AOC. Restoration efforts along the Cuyahoga River began to take off in earnest in the 1980s when the State of Ohio mandated the completion of a Remedial Action Plan (RAP) designed to restore all impaired beneficial uses for the river and its watershed. The OEPA designated the Cuyahoga AOC as the lower 46.5 miles of the river, its sub-watersheds, and 10 miles of adjacent Lake Erie coastline. A local advisory committee, originally called the Cuyahoga River RAP Coordinating Committee (CCC), represented a wide variety of stakeholders involved in the use and management of the watershed. By the end of the decade a nonprofit facilitating organization called Cuyahoga River Restoration (originally called the Cuyahoga River Community Planning Organization) was created to support the RAP’s activities (Goodman and Gigante, 2018). In 2020 the Cuyahoga County Soil and Water Conservation District took over responsibilities as the AOC’s facilitating organization.

The ultimate goal of the Cuyahoga RAP was to “restore the river and all impaired beneficial uses through the remediation of existing problems, and to protect the resource for future generations” (Goodman and Gigante, 2018, pg. 4). BUIs either restrict people’s ability to use the resource, negatively impact fish and other aquatic communities, or degrade water quality. Examples might include not being able to swim at certain beaches or healthy fish populations not surviving because the water is not clean enough. For the Cuyahoga River AOC, there were originally 10 BUIs that the RAP had targeted for restoration (see Table 2).

Restrictions on Fish Consumption	Beach Closings (recreational contact)
Degradation of Fish Populations	Public Access and Recreation Impairments
Fish Tumors or Other Deformities	Degradation of Aesthetics
Degradation of Benthos	Eutrophication or Undesirable Algae
Restrictions on Navigational Dredging	Loss of Fish Habitat

Table 2: Cuyahoga River AOC Beneficial Use Impairments (BUIs)

Development and implementation of the Cuyahoga RAP has unfolded in two distinct stages. Stage 1 finished in 1992 (updated in 1996) and focused on identification of use impairments and causes (Cuyahoga River Community Planning Organization, 2008). Stage 2 lasted until 2013 (updated in 2015) and identified operational actions and the organizations responsible for them (Cuyahoga River Restoration, 2015). Financial resources provided by the Great Lakes Restoration Initiative (GLRI) in 2010, along with the formation of the Cuyahoga River AOC Advisory Committee as well as technical and human resources from the OEPA, Cuyahoga River Restoration and the Cuyahoga County Soil and Water Conservation District aided the process greatly. According to the Executive Director of Cuyahoga River

Restoration, “This partnership has used a community-based planning model in enhancing legitimacy through direct stakeholder participation in decision-making, achieving community ownership of the work, and achieving progress through partnerships” (Goodman and Gigante, 2018, pg. 5).

3.0 Methods

In an effort to explore the complexities of watershed governance and all of the actors and actions involved in river restoration in the Cuyahoga AOC, this study will be guided by the Institutional Analysis and Development (IAD) framework (Kiser and Ostrom 1982). The IAD framework is employed to investigate how biophysical, cultural, and institutional factors affect the structure and decision-making processes of the Advisory Committee, transaction costs of collaboration, and subsequent social and cultural outputs. The framework can help reveal strengths and weaknesses of the collaborative management, as well as identify and inform policy makers and practitioners affecting the resource. Data for the project was collected by semi-structured interviews with members of the Advisory Committee, a thorough document analysis, and direct participant observation.

3.1 IAD Framework

The IAD framework developed by Kiser and Ostrom (1982) provides a means through which the complex decisions made by any particular institution can be broken down into components for analysis. The framework can then help researchers determine which specific factors influence decision-making behavior within the institution and the resulting outcomes (Kiser and Ostrom 1982). This is especially useful when examining Annex 1 of the GLWQA, since the bi-national policy represents a governance strategy buoyed by a variety of agencies at differing levels of government and local stakeholder participation is on a voluntary basis. Imperial (1999) argues that the IAD framework is particularly effective for ecosystem-based management systems because it not only addresses institutional rules, but biophysical and cultural influences as well. Therefore, it is an appropriate framework with which to analyze river restoration, since the AOC delisting process involves the restoration of particular environments and as stipulated in the GLWQA, requires the input of collaborative advisory committees that submit management action plans to state and provincial environmental agencies for approval. The IAD framework also examines the impact of human behavior on the institution and vice versa, which is particularly important when dealing with programs that are designed to influence resource use (Imperial 1999), such as access and recreation opportunities for local resource users.

Concepts and Variables

The IAD framework outlines three external factors that influence the decision-making process and outcomes of an institution (see Figure 1). The first is the biological and physical environment (Ostrom et al., 1994). This variable is particularly important when analyzing the AOC program since restoration decisions recommended by local advisory committees and approved by the U.S. EPA and ECCC target specific environmental criteria. The second factor is the community, which includes all the individuals who are involved in and impacted by the decisions made in the institution (Kiser and Ostrom, 1982). One significant aspect of the community variable of the GLWQA are local resource users, including recreationists, the shipping industry, manufacturers, and residents and retail businesses near the river. The cultural influence of these stakeholders on management actions can be measured using the IAD framework. The final factor is the institutional rules and behavioral norms that influence decision-making (Kiser and Ostrom, 1982). These rules include formal policy rules, such as legislation implementing the GLWQA, and informal rules, such as typical interactions among agency employees and resource users associated with AOC advisory committees (Kiser and Ostrom, 1982).

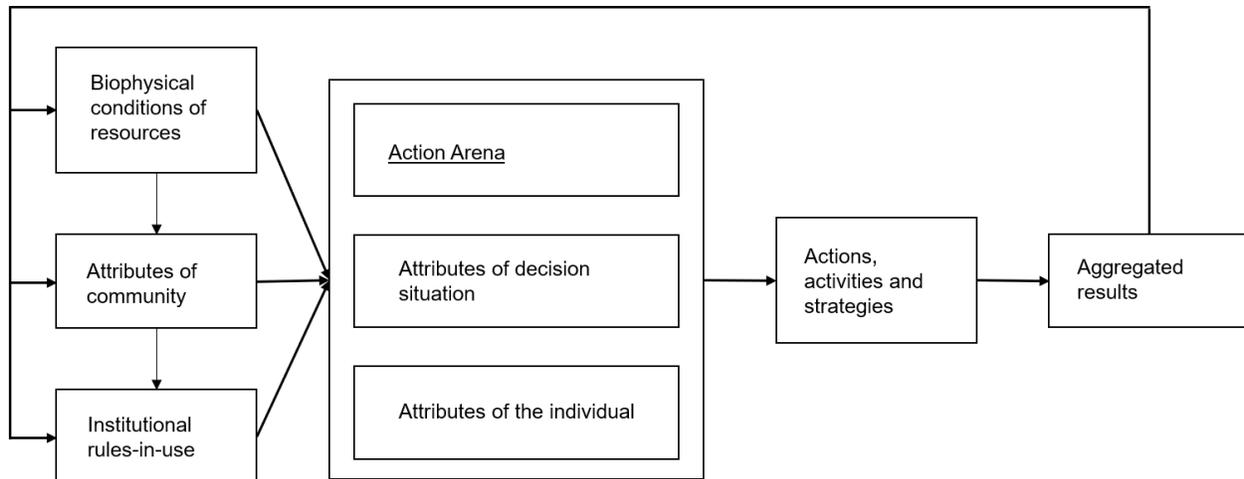


Figure 1: Institutional Analysis and Development (IAD) Framework. Adapted from *Rules, Games, and Common-Pool Resources*, by E. Ostrom, R. Gardner, & J. Walker, 1994, p. 37.

These factors are then examined in the context of the action arena: all individuals who interact to make decisions that affect the outcomes of the institution (Ostrom, 2011). For Great Lakes AOCs, the action arena includes advisory committees, local residents, state and local officials who implement and enforce the program, consultants and NGOs that assist in implementation, and policy makers who dictate the overarching rules. Decisions are made in the action arena, affected by the external variables, then generate outcomes (Kiser and Ostrom, 1982). The IAD framework can be used both to predict potential outcomes and evaluate measurable outcomes (Ostrom, 1999). Since the framework isolates the external variables and the connections between variables and outcomes, both the outcomes themselves and the processes that lead there can be evaluated (Ostrom, 1999). Thus, the framework can be used to identify strengths and weaknesses of the program and advisory committees, solutions for recurring problems, and methods to increase efficiency (Ostrom, 1999).

3.2 Data Collection

Data collection for this study included semi-structured interviews with key informants, a review of research articles and government documents on the structure and implementation of the GLWQA and Cuyahoga RAP, and participant observation at quarterly meetings of the Advisory Committee from 2017-2020, binational AOC conferences in 2017 and 2019, and other professional events geared toward restoring the Cuyahoga River. Key informants are people with firsthand knowledge of the events being studied who provide factual information about the organization from an insider perspective. In this study, key informants are those most closely involved with collaborative watershed management in the Cuyahoga River AOC: members of the Advisory Committee. Twenty-three members out of 25 individuals on the Committee (including one alternate) were interviewed.

The Committee members that agreed to be interviewed make up a diverse membership profile, primarily representing government agencies and regional government-backed collaborative entities (10), environmental consulting firms (5), nongovernmental organizations (5), members of the public (3), and academia (2). The amount of time individuals have served on the Committee also varies greatly, ranging from about two months to “from the beginning,” sometime around 1987. The distribution is somewhat bimodal, with six people having served for 10 years or more, while six people have only served for two years or less.

Interviews were conducted between January 28, 2020 and April 20, 2020, and lasted between 30 minutes and 90 minutes each, with follow-up emails and phone calls as needed to corroborate information. Interview questions prompted respondents about the institutional network of rules and community

attributes in place in the Cuyahoga River watershed, as well as environmental systems in question, patterns of interaction among key decision makers, and decision situations within the Advisory Committee that impact AOC restoration outcomes.

Primary and secondary sources from documents pertaining to the Cuyahoga River AOC included the U.S. EPA and OEPA reports on the GLWQA and beneficial use impairments, Cuyahoga River RAPs, completed watershed action plans, data concerning organization and watershed characteristics, including information about group history, goals, objectives, activities, financial resources, and partner organizations.

4.0 Results

4.1 Biophysical

The GLWQA was drafted in direct response to severe disturbances to the integrity of a valuable and unique biophysical system. In its own words, the goal of the GLWQA is to “restore and maintain the chemical, physical, and biological integrity of the Waters of the Great Lakes (GLWQA, 2012).” In order to achieve this goal, the governments of the United States and Canada have established nine general objectives based on environmental quality. According to the GLWQA (2012), the waters of the Great Lakes should:

1. *Be a source of safe, high-quality drinking water;*
2. *Allow for swimming and other recreational use, unrestricted by environmental quality concerns;*
3. *Allow for human consumption of fish and wildlife unrestricted by concerns due to harmful pollutants;*
4. *Be free from pollutants in quantities or concentrations that could be harmful to human health, wildlife or organisms, through direct exposure or indirect exposure through the food chain;*
5. *Support healthy wetlands and other habitats to sustain resilient populations of native species;*
6. *Be free from nutrients that directly or indirectly enter the water as a result of human activity, in amounts that promote growth of algae and cyanobacteria that interfere with aquatic ecosystem health, or human use of the ecosystem;*
7. *Be free from the introduction and spread of aquatic invasive species and terrestrial invasive species that adversely impact the quality of the Waters of the Great Lakes;*
8. *Be free from the harmful impacts of contaminated groundwater; and,*
9. *Be free from other substances, materials or conditions that may negatively impact the chemical, physical or biological integrity of the Waters of the Great Lakes.*

While the GLWQA establishes goals for the waters of the Great Lakes, individual members of the 43 local Advisory Committees that recommend management action plans to state and provincial environmental agencies come to the collaborative planning table with their own biases and expertise. To explore the differences in expertise among stakeholders in the Cuyahoga River AOC, members of the Advisory Committee were asked to share their professional goals related to watershed management along the Cuyahoga River. In many cases, Committee members’ goals mirror those established by the GLWQA, albeit from a broader perspective. The number one goal stated by Committee members is simply “river

restoration,” followed closely by improvements in water quality. In contrast to the GLWQA, Committee members also value social goals, such as public environmental education and community development.

Given the time and resources that go into large scale restoration efforts, it is important to understand how Committee members measure success and determine if their goals for restoration are being met. Most respondents in this study indicate that they measure success according to BUI removal, EPA approval of the Committee’s management action plans, and water quality and wildlife habitat improvements. These responses represent a relatively straightforward, biologically grounded, and empirically based approach. Committee members also suggest other, more difficult to quantify measures, such as community engagement, number of people who use the river for recreation, and community and economic development purposes.

While the broad objective of the GLWQA is to improve environmental quality, local advisory committees have the latitude to decide which environmental objectives are most important in each watershed. These objectives are thus subject to local land use and community development interests. When asked what the most pressing environmental issues are in the Cuyahoga watershed, the top response by Committee members overwhelmingly is stormwater management, including contributors to, and results of, stormwater such as impervious surfaces and combined sewer overflows (see Figure 2). Officials at the Northeast Ohio Regional Sewer District (NEORS) in Cleveland must agree, as the agency recently committed to a 3-billion-dollar effort dubbed Project Clean Lake that seeks to store combined sewer overflows in a series of underground tunnels and keep sewage from polluting Lake Erie. Committee members also feel that water quality issues such as nutrient loading and high bacteria levels are important, and to a lesser extent, sediment issues associated with erosion, dredging, and legacy sediment in the river bottom. Other important issues mentioned by the Committee include climate change, alterations to wildlife habitat and subsequent impacts on wildlife populations, plastic marine debris, public access, and outdated dams.

For a watershed to be considered an AOC, significant impairment of beneficial uses must have occurred as a result of human activities (U.S. EPA, 2019). RAPs for each AOC are based on environmental factors, as are restoration actions. RAPs for each impaired water body “identify beneficial use impairments and causes; include criteria for restoring beneficial uses (established in consultation with the local community); identify remedial measures to be taken and entities responsible for implementing these measures; summarize the remedial measures taken and the status of beneficial uses; and describe surveillance and monitoring processes” (Binational, 2019). Progress on RAPs is reported biannually to the Great Lakes Executive Committee and chronicled in a Progress Report of the Parties every three years.

Top environmental issues

- 1) Stormwater
- 2) Water quality
- 3) Climate change
- 4) Wildlife
- 5) Plastic debris

Most impactful restoration actions

- 1) Dam removal
- 2) Stormwater management
- 3) Ecological habitat restoration
- 4) Wastewater treatment
- 5) Education and outreach

Important environmental outcomes

- 1) Improved water quality
- 2) Improved ecosystem integrity
- 3) Better public access
- 4) Environmental awareness
- 5) Reduced contaminants

Biggest influence on restoration

- 1) EPA
- 2) NEORS
- 3) AOCAC
- 4) ACOE
- 5) OLEC

Figure 2: Environmental threats and restoration outcomes

The Advisory Committee worked with key stakeholders to identify and prioritize restoration opportunities for the Cuyahoga RAP, which has been pivotal in helping the EPA to initiate restoration actions. While the EPA ultimately decides what conservation practices will be used, the environment dictates which practices are most effective, and the Advisory Committee recommends actions to implement. For example, particular soil types along riverbanks are more suitable for vegetative buffers, and certain areas may be better for building wetlands. Factors that influence types of restoration also include soil erosion potential, landscape properties, size of the river channel, type of substrate, presence of toxins, existence of dams, and species diversity.

Given the role of the Advisory Committee in prioritizing management actions in the RAP, Committee members' opinions about the effectiveness of different management strategies is of critical importance. For this project, Committee members were asked what types of watershed restoration and conservation programs are, or would be, most impactful in the Cuyahoga AOC (see Figure 2). The removal of several dams along the river is absolutely seen as the most impactful. This process has already started with demolition beginning on the Brecksville Diversion Dam and Pinery Feeder Dam in the Cuyahoga Valley National Park. A larger dam along the Cuyahoga Falls Gorge is targeted for removal next. Committee members also highlight the importance of stormwater management efforts spearheaded by the NEORSD, ecological habitat restoration, community-based stormwater management and reduction of impervious surfaces at the sub-watershed level, as well as wastewater treatment, education and outreach, and sediment capture.

Annex 1 of the GLWQA is designed to work in conjunction with federal, state, and local stakeholders in both the United States and Canada. Local advisory committees who create the management action plans for each AOC also consider state laws and conservation requirements. In fact, the GLWQA holds the promise of assisting municipalities in improving economic conditions and fulfilling state regulatory requirements for land and stormwater management. For example, in Cleveland, Ohio, recently-enacted management actions have resulted in greater public access to the Cuyahoga River, improved aesthetics, and less restrictive guidance on fish consumption. In theory, riverbank landowners will be able to gather higher rental payments on their properties due to the environmental improvements and diversified use of the resource. The combination of International Joint Commission (IJC) guidance with federal, state, and local government initiatives is exemplified by the GLWQA. Through the AOCs, states can collaborate with local stakeholders to implement restoration plans that focus on issues of national and regional environmental importance. The success of these plans thus reflects issues most important to local stakeholders.

Not only does the biophysical environment affect the decisions and actions of the government agencies implementing the program and means by which successful restoration is measured, but the strategies for restoration employed by local stakeholders as well. For example, new technologies allow environmental consultants to test innovative ways to create fish habitat along bulkheads found in channelized sections of impaired rivers or plant toxin-resistant native vegetation to restore wildlife habitat. These cases show how the structure of the program is well suited to its purpose of restoring ecosystem integrity to the watersheds, and in turn, is heavily influenced by local environmental conditions.

Given the connection between the goals and expertise of Committee members and the influence of local environmental stressors and baseline conditions, this study aimed to find out what environmental outcomes are most important to Committee members (see Figure 2). The most important environmental outcomes cited by the group include (in order of importance): improved water quality, improved ecosystem integrity, better public access and environmental awareness, and reduced contaminants in the river. This in part is determined by the biophysical scale of restoration activities. When asked who has the biggest influence on restoration activities, Committee members cited the EPA (federal and state) first, followed by the NEORSD, AOC Advisory Committee, Army Corps Of Engineers (ACOE), Ohio Lake Erie Commission (OLEC), Cleveland Metroparks, and existing environmental policy frameworks established by the GLWQA and Clean Water Act (CWA). Thus, members of the Advisory Committee are focused on

improving the aquatic and terrestrial habitat of the watershed, and they feel large government agencies who often fund, as well as provide technical and human resources toward restoration, are the most vital contributors to river restoration.

4.2 Social

Ecological restoration within the AOCs can have a significant impact on resource users, local municipalities, and landowners and businesses with riverfront property. How a community uses the river and riparian land can also have a major impact on restoration plans, and whether there is public support or resistance to management actions. If, for example, a municipal landowner chooses to participate in a restoration project, it may reduce the amount of land available for development. Also, stringent stormwater management policies and model building codes in riparian areas can be restrictive on real estate developers and businesses. On the other hand, restoration actions can improve public accessibility and recreation opportunities on the river, increase property values, and improve economic and community development efforts in the watershed.

Members of the Advisory Committee are aware of the connection between the Cuyahoga River and the people who live in its watershed and are especially enthusiastic about the social benefits associated with restoring the AOC. When asked about the importance of social outcomes associated with the AOC program, Committee members indicate that improvements in public access and recreation along the river are the most important, including increased visibility and usage of the Cuyahoga River Water Trail and Ohio and Erie Canal Towpath Trail (see Figure 3). Committee members are also excited about increases in public education and awareness and how they can help build an environmental ethic among watershed residents, as well as community and economic development, public health, and improved aesthetics.

Most important social outcomes of watershed management

- 1) Improvement in public access and recreation
- 2) Increased usage of the Cuyahoga River Water Trail and Ohio and Erie Canal Towpath
- 3) Increases in public education and awareness
- 4) Building an environmental ethic among watershed residents
- 5) Community and economic development

Figure 3: Most important social outcomes of watershed management

National public opinion and politics also influence implementation of Annex 1 of the GLWQA. Changes to the AOC program in 2012 reflected the desires of the public and of policy makers to expedite cleanup of BUIs along identified river systems. The public viewed the GLWQA as a beneficial program which provides better water quality and habitat enhancement, which are both popular, relatively non-controversial environmental issues. Government agencies, nongovernmental organizations and municipalities have also voiced support for the program, although they sometimes criticize the GLWQA for its complexity and long-time horizon for restoration.

Restoration of the Cuyahoga AOC is seen by Committee members as being impacted both positively and negatively by local public opinion and politics. Almost half of the Committee members interviewed for this study feel that local residents either don't care about the river, are not connected to the resource, or have a perception that the river is not clean. Alternatively, several members feel that northeast Ohioans do have pride in the river, generally support restoration efforts, and take ownership of the resource. A concern, however, is that communities located within the Cuyahoga watershed do not all enjoy the same level of economic development, leading some locals to prioritize public services over river restoration.

Others fear that the historical lack of public access negatively impacts current perceptions of recreation on the river.

Municipal preferences about land use and community development also influence the way in which AOCs are managed and restored. County and state governments can have a similar impact. If there are certain environmental projects that are favored by a community, those projects can be targeted through the RAPs and seek the assistance of NGOs and state agencies. The officials who implement the program are also a part of the community, as they decide which restoration measures to implement. Officials are highly motivated to provide resource managers with the maximum possible benefits and put in place effective restoration measures. They seek to improve environmental attributes of the state, while also improving local ecosystem integrity. The program thus provides landowners with the economic and technical opportunity to participate in restoration and contribute to the wellbeing of their state and county. In Cleveland, Ohio, Lake Erie is a major component of the local culture and so AOC restoration practices have been targeted toward improving water quality in the Cuyahoga River and the lake, improving the health and habitat of native aquatic species, and enhancing the nearshore segment of the Cuyahoga River and adjacent coastline.

Given the interplay among local and state actors, and the relative importance of prioritizing certain management actions over others, local social networks and connections within a community can have tremendous value and enhance collaborative governance arrangements. For these governance relationships to perform efficiently and effectively, a certain level of trust among stakeholders is necessary for program implementation. Members of the Advisory Committee revealed that trust appears to be important throughout the entire program. The federal government trusts that implementers will use funds appropriately. The OEPA and OLEC trust that the Advisory Committee's management plans are viable. Committee members trust leadership to put the Advisory Committee in a position to succeed. Finally, the public trusts the Committee's expertise to restore the river. One Committee member summed up the role of trust by saying, "...trust is especially important when [the] feds give millions of dollars and trust local implementers to follow through on restoration projects. They trusted us that this is a reasonable management list. Within our group, we trust each other to represent the AOC professionally, and use our jobs to extend the messaging."

4.3 Institutional

The GLWQA was passed in 1972 and placed under the discretion of the IJC as an outgrowth of the Boundary Waters Act of 1909. The basic structure and purposes of the AOC program (Annex 1 of the GLWQA) are set through this bill. The statute mandates that AOCs are to be administered by the U.S. EPA/ECCC and implemented by state/provincial environmental agencies in the United States and Canada. Operational activities of the program are carried out through federal, state, and local stakeholders, led by local AOC advisory committees. In the United States, state EPA offices approve the RAPs and determine how to proceed with management actions. Local advisory committees work with state agencies to draw up lists of management actions to be approved by U.S. EPA. The GLWQA also allows for the consultation of other agencies as necessary, such as state natural resource agencies and the U.S. Fish and Wildlife Service. Additionally, it sets many of the definitions that govern the AOCs, including specific biophysical characteristics, enforcement and implementation mechanisms, and economic terms.

While the GLWQA identifies the international and federal partners required to oversee the AOC program, and stipulates certain collective choice processes such as the formation of local advisory groups, much of the management decisions are coordinated by local and state actors that are unique to each AOC. For this study, Committee members were asked to identify the major decision makers in the Cuyahoga AOC (see Figure 4). The clear frontrunner according to members of the Advisory Committee is the NEORS, given their role in regional stormwater management and implementation of Project Clean Lake. Next is the EPA (federal and state offices received equal votes), followed by Cleveland Metroparks, and collaborative efforts among communities and the Committee, including the Executive Committee (includes

Chairperson and Vice Chairperson of the AOC, plus the Chairs of the three subcommittees: Governance, Strategic Implementation and Planning, and Public Outreach and Education). Several other options were noted, such as the Cuyahoga County Planning Commission, the City of Akron, Cuyahoga River Restoration (former AOC facilitating organization), and Cuyahoga Valley National Park. Furthermore, like all AOCs, the Cuyahoga River has its own set of influential decision makers. When asked who or what has the biggest effect on the structure and decision-making processes of the Advisory Committee, the Great Lakes National Program Office of the EPA and the OEPA are most often cited, followed by the GLWQA itself, the AOC Committee Chair and Executive Committee, OLEC, and the NEORS.

While the GLWQA is a binational agreement between the United States and Canada, the statute is broad enough to allow many of the specifics of the AOC program to be regulated internally by the U.S. EPA and ECCC. Therefore, there are nearly constant minor policy changes to the regulations of AOCs. In general, the GLWQA tends to correlate well with state priorities. Federal and state EPA officials consistently work with state agricultural, fish and wildlife, forestry, stormwater management, planning, and parks and recreation agencies to ensure that the restoration methods recommended by local advisory committees are beneficial to the state's environmental priorities. Often, officials with state agencies are the most knowledgeable about how local ecosystems function. This knowledge can be invaluable to implementing the program in a cost-effective and environmentally beneficial manner that champions restoration actions that are environmentally sustainable.

While state priorities help keep internal decision-making in AOCs focused, sometimes external factors can impact an Advisory Committee's ability to achieve their goals. According to Committee members, the number one factor outside of state policy intervention that affects restoration success in the Cuyahoga AOC is seen as funding, followed by the effectiveness of the OEPA Coordinator, local community actions,

Biggest impact among external factors

- 1) Funding
- 2) Effectiveness of state government
- 3) Local community support
- 4) Large-scale stormwater projects
- 5) Effectiveness of federal government

Most imposing issue networks in AOC

- 1) Economic development
- 2) Transportation
- 3) Stormwater management
- 4) Public access/recreation
- 5) Public health

Most important financial resources

- 1) GLRI
- 2) OEPA
- 3) NEORS
- 4) GLLA
- 5) City of Akron

large-scale projects such as the NEORS tunnels, the U.S. President, media, climate change, and finally, business community input (see Figure 4). These external factors can affect policy guidance for collaborative institutions such as AOCs through the support of informal advocacy coalitions that coalesce around issues related to, but not directly analogous with, improving water quality. Interest groups, governmental agencies, NGOs, and individuals will loosely unite as an advocacy coalition to promote a common cause or agenda in a way that influences government policy. For the Cuyahoga AOC, the most important issues other than watershed management identified by Committee members that garner support from varying advocacy coalitions and thus influence policy include (in order of impact): economic development, transportation, stormwater management, public access/recreation, public health, industry, green infrastructure, climate change, spirituality, and agriculture.

The GLWQA relies heavily on interagency cooperation. Officials at the state and local level, usually state employees or members of local municipalities, state extension programs, or other government agencies and nongovernmental organizations, explain restoration measures to businesses and landowners, helping them to understand and fulfill AOC restoration requirements. One of the major goals of the local advisory committees is to give landowners and municipal governments the maximum economic and community development benefit

Figure 4: Institutional variables impacting AOC restoration

in accordance with the physical qualities of the impacted rivers, state regulations, and preferences of the state and U.S. EPA. AOCs provide a means through which the landowner can restore land in fulfillment of binational, national, state, and local regulations, while still receiving financial and technical resources to help defray the cost of implementing the necessary restoration measures.

The importance of financial, technical, and human resources cannot be overstated in relation to restoration efforts in the Cuyahoga AOC. In terms of funding, several sources were identified by the Committee members as critical to restoration success (see Figure 4). Great Lakes Restoration Initiative (GLRI) funds lead the way, followed by money from the OEPA, NEORS, Great Lakes Legacy Act (GLLA), City of Akron, and several others with mentions such as the ACOE, Cleveland Foundation, and local communities. Technical resources are thought of as being provided first by the NEORS, as well as the OEPA, environmental consultants, and Cleveland Metroparks, among others. Human resources are seen as predominantly offered by AOC Advisory Committee members, Cuyahoga River Restoration and Cuyahoga County Soil and Water Conservation District, local residents, and regional watershed groups.

5.0 Transaction costs

Transaction costs refer to the hidden drawbacks associated with the collaborative process and can be incurred due to the way individual actors or organizations share information, coordinate meetings and other activities, and participate in the decision-making process of strategic planning. While collaborative approaches like the formation of AOC Advisory Committees under the GLWQA have been lauded for network building, increasing private-public partnerships, and producing more sustainable environmental and social outcomes than traditional command and control methods (Wondolleck & Yafee, 2000), some detractors suggest that collaboration can take excess time and money, and can lead to a weakened democratic process that results in lowest common denominator decisions (Sabatier et al., 2005). For this reason, it is important to investigate the institutional performance of collaborative groups at a given point in time, including the impact of undesired transaction costs associated with the collaborative process, and strategies for overcoming such costs.

Transaction costs in collaborative environmental management can be high for several reasons. Often, transaction costs increase when everybody involved in the collaborative does not have the same knowledge or access to information (Imperial, 1999). For the Advisory Committee, this can manifest itself in terms of historical knowledge of management actions in the Cuyahoga River watershed, understanding of the power structures among decision-makers that affects change within the AOC, and familiarity with Annex 1 of the GLWQA and the role of Advisory Committee members. In short, there is a lot to learn for new members of the Advisory Committee. Trust is also a factor. If individuals do not trust each other or their leadership, it can be more difficult to create and implement operating procedures for a collaborative group (Kauneckis & Imperial, 2007). Fortunately for the Cuyahoga AOC, this does not seem to be a problem, and in fact, high trust among Committee members is believed to be a strength rather than a downfall. Lastly, transaction costs tend to rise as institutions become more complex (Levi, 1990). The more people share in decision-making, the more opportunity exists for disagreement and bargaining, something that is not perceived as a problem given the relatively small size, collegial interactions, and shared goals of Committee members. At 25 members, and composed entirely of northeast Ohio residents who either volunteer their time or have the support of their employers to donate in-kind time to AOC efforts, social capital is high among Committee members.

5.1 Sharing Information

Transaction costs associated with sharing information occur when people are forced to spend time finding and sorting through different materials in order to make informed decisions (Imperial, 1999). The Advisory Committee can incur these costs when recommending management action plans to the OEPA, when guidance on specific restoration actions is shared among members of the Strategic Implementation Planning (SIP) committee, or even when planning documents and other organizational materials are

discussed among Committee members and within the Subcommittees. In the Cuyahoga AOC, Committee members acknowledge that with so many watershed planning studies and subsequent management action plans submitted to the OEPA and OLEC, sharing information is an imperative, and often taxing, part of collaboration among involved stakeholders. Internally, sharing information among Committee members is generally seen as much improved in recent years under the current leadership. Despite the recent gains, however, there are several areas where Committee members highlighted possible inefficiencies, as well as potential areas for improvement.

The most commonly-noted transaction cost associated with sharing information among Committee members is added time commitments – in terms of reviewing, organizing, and disseminating information (see Table 3). For new Committee members, this can create further work in an effort to get up to speed and understand all of the Committee procedures and tasks necessary for participation in the collaborative process, as well as where all essential information is stored. Time is also seen as a cost in terms of travel for quarterly meetings, with some members driving more than an hour each way to attend. Even the way meetings are scheduled and organized was brought up by some members who feel there are untapped opportunities to increase efficiency.

Transaction costs of sharing information	Recommendations to improve information sharing
Reviewing, organizing, and disseminating information	Build real-time BUI dashboard
New members learning where information is located	Onboarding for new members, mentor program
Organizing quarterly meetings and other events	Bolster agendas, live notetaking, efficient data storage
Scheduling/attending AOC events, voting practices	Best use of technology, update voting procedures

Table 3: Transaction costs of sharing information

Committee members suggest several options to improve the way information is shared, especially in terms of using technology to be more efficient (see Table 3). One innovative idea seeks to create an internal evaluation tool that reports the progress of specific projects within each BUI – similar to a real-time dashboard for BUI removals. The Cuyahoga AOC website hosts some of this data, but Committee members indicate that it has traditionally been difficult to understand and not always updated (recent improvements made by the CSWCD have addressed this cost). In fact, not all Committee members are aware the delisting status of BUIs could be found on the website. Upgrading, updating, and simplifying how this information is accessed would save time when trying to identify and understand the status of different BUIs, and help improve Committee members' ability to educate the public, or "brand" AOC actions to external stakeholders. Another suggestion is to employ live notetaking during meetings (e.g., a Google Doc) instead of the way such information is currently stored as Word documents uploaded to a Box folder sometime after meetings. Several respondents further suggest introducing all new Committee members to the data storage approach via a short onboarding exercise conducted by the facilitating organization that expressly identifies where information is stored, catalogued, and updated. Some Committee members also lament the way voting by email occurs. Concerns were raised about the lack of conversation or due diligence that takes place during the votes. Suggestions to address this included "blind voting," justification for each positive or negative vote, or providing an opportunity for members to more thoroughly voice their opinions and debate options. Committee members also suggest the way meetings are scheduled can be more efficient. Many believe a better use of technology, like an Outlook or Google calendar invite, instead of multiple email reminders, would be easier and less time consuming.

5.2 Coordinating Activities

Coordination costs take place when trying to plan for group projects and events, such as committee meetings, the development of planning and outreach materials, or educational activities (Ostrom, Schroeder, & Wynne, 1993). In the Cuyahoga AOC, this occurs during the organizing and negotiation of different management action plans and watershed programs. This can include high level strategic planning among the different sub-committees, or more general efforts to coordinate full Committee meetings or organize AOC events such as the International AOC Conference and public BUI removal announcements. Ideological differences or personal conflicts among actors can contribute to these costs, as can guidance from different Committee members' employers regarding their role on the Committee, available time commitment, and end goal for Committee membership. While all members of the Advisory Committee have their own specific beliefs and motivations for participating, everyone must interact with others in order to plan and recommend restoration programs to the EPA, as stipulated in the GLWQA.

When asked about transaction costs associated with how the Committee coordinates activities, members felt it was similar to sharing information – it takes time, whether organizing management plans or AOC events, and can be confusing for new members less familiar with the way the Committee operates (see Table 4). Some felt that coordinating activities can be contentious at times, especially in terms of identifying specific projects and making recommendations on how and where to distribute funding. Many indicate that some actions are more difficult to coordinate than others, such as reducing impervious surfaces throughout communities in the AOC. On the other hand, the transition to the OLEC as an oversight agency was mentioned as a positive development in terms of coordination and reducing delays. One recommendation to improve the way we coordinate activities is to seek additional municipal funds to better support the facilitating organization. This would provide more human hours to follow up on individual Committee member suggestions and allow the facilitating organization to serve as a public outreach arm of the AOC, advocating for resource allocation and project development. Another suggestion to improve coordination is to send out minutes and notes from each Committee meeting as soon as possible (within 1-2 days), including anything the Chair or members of the Executive Committee would like to highlight. This could also be an opportunity to assign specific action items for individual Committee members to complete prior to subsequent meetings, thus making the coordination of future activities more efficient.

Transaction costs of coordinating activities	Recommendations to improve coordination
Negotiating management action plans and organizing watershed protection programs	Support facilitating organization, diversify members
Confusing operations for new members	Onboarding for new members, mentor program
Free riding	Chair highlights most important developments in minutes and assigns specific action items to members
Path dependency	OEPA/OLEC gives presentation on history, goals, mission, and responsibilities of Advisory Committee

Table 4: Transaction costs of coordinating activities

Negotiating the terms of specific projects may or may not involve substantial coordination costs, depending on the type of project and project lead. Two types of transaction costs that are often mentioned when coordinating specific projects are “free riding” and “path dependency” (see Table 4). The free rider problem occurs when a community shares the burden of excess work because one or more actors are not contributing their fair share of effort towards a common goal. In the Cuyahoga AOC, some Committee members suggest that, due to differing levels of historical knowledge and alignments with host organization missions, a few individuals often lead specific projects and “do all the work” while others

involuntarily end up acting as free riders. It is important to note that many of the respondents who spoke of this relationship are eager to contribute more toward collaborative efforts but are not sure how. Thus, the free rider problem is not due to an unwillingness to participate, but rather a lack of opportunity or understanding about how or when to contribute.

Another common transaction cost associated with coordinating activities is path dependency. This indicates that what has occurred in the past will continue in the present and future due to a resistance to change. For the Cuyahoga AOC, there is a notion that certain ways of doing things are ingrained in the group, which may not leave room for new ideas or innovative approaches to problem solving. This most likely plays a role in the involuntary free riding that some Committee members mentioned. A recommendation to address both free riding and path dependency among the group deals with operational rules set forth by the GLWQA, guidance from the U.S. and OEPA regarding the mission of the Advisory Committee, and detailed description of the actual job responsibilities and potential to support Committee functions as individual committee members. To coordinate activities more effectively, many Committee members expressed that it would be helpful for the OLEC and/or OEPA to attend an Advisory Committee meeting and conduct a brief presentation that explains the specific responsibilities of the Advisory Committee and how members can contribute.

5.3 Agreeing on Conservation Strategies

Strategic costs associated with agreeing on conservation actions accrue when different stakeholders in a collaborative group attempt to benefit individually or bring benefits to their home organization at the expense of others (Imperial, 1999). In environmental management groups such as scientific advisory committees, this could manifest itself in terms of “turf protecting,” when one person tries to sway management actions to benefit their firm or community, or in terms of “rent seeking,” when an individual attempts to inflate the importance of a specific project or management project to favor specific benefits for themselves, their firm, or their community. In the Cuyahoga AOC, Committee member responses indicate that overall strategic costs are minimal, and that neither turf protecting nor rent seeking are a problem.

According to members of the Advisory Committee, the group generally agrees on conservation strategies and congenially comes to consensus on management action plans. While some members admit that there is at least in part motivation to contribute to the Committee for professional networking and advancement, all members agree that participation is genuine, and the collaborative process is both professional and transparent (see Table 5). Given the criteria for management actions, agreeing on conservation strategies is a group process based on science. While it may “appear messy” and “take time,” there is a degree of order. All members vote, which substantiates group decision-making. As with coordinating activities, agreeing on conservation strategies is more contentious for some BUIs than others. In the end, good leadership and policy guidance from the GLWQA and OLEC are seen as key to successfully reducing transaction costs in this area.

Transaction costs associated with strategy	Recommendations to improve strategy
Takes time, appears messy	Build real-time, detailed BUI dashboard
More contentious for some BUIs than others	Full Committee votes to prioritize actions
Lack of openness to addressing new ideas	Delegate more responsibility to subcommittees
Concern that all projects are already mapped out	All Committee members must have same information to contribute to strategic decision-making

Table 5: Transaction costs of agreeing on conservation strategies

One concern among some Committee members comes back to path dependency – some issues have been the focus of the Committee for a long time and new approaches to address these issues, or ideas for new projects beyond what is already being addressed, may not always be welcome (see Table 5). Some members addressed this by saying that “projects are already mapped out” or “the RAP is set and there is not much opportunity to contribute additional information or expertise.” Several Committee members suggest this could be minimized by prioritizing management actions. The subcommittees are seen as helpful in this regard, and further viewed as a means to reduce additional time sinks during full committee meetings. One person mentioned that the SIP Committee has done some of this, but the full committee should vote to prioritize the management list, or at least decide on top three and bottom three projects. Another suggestion asked for more real-time updates on individual projects, so that everyone has the same information and can be equal contributors to strategic decision-making. As mentioned above, a real-time dashboard of BUI project progress would help in this area.

6.0 Institutional Performance

The job of AOC Advisory Committees is to collaborate on a series of recommendations to the local, state or provincial environmental management agency for restoration actions in a particular AOC and surrounding watershed. Through the advent of collaborative advisory committees established in accordance with the GLWQA, a larger group of stakeholders are brought into the decision-making process than traditional models that rely on individual practitioners. In theory, this creates an opportunity for more local voices to be heard and a wider array of local expertise to lend their perspective to management planning. Unfortunately, as we have seen in the cases of sharing information, coordinating activities, and agreeing on conservation actions, collaboration is not a panacea. Given the concern over the role collaboration should play in environmental management, it is important to better understand the collaborative process within groups and to measure institutional performance overall by investigating if a collaborative body operates efficiently, equitably, accountably, and adaptably (Imperial 1999).

6.1 Efficiency

Efficiency is based on the ability of an institution to achieve its goals while wasting as few of its resources as possible (Ostrom, 2011). While no institution is 100% efficient, high-performing arrangements find a way to minimize transaction costs and maximize available resources. When asked if the Advisory Committee is efficient, members expressed a wide range of opinions – from “very efficient” to “not efficient at all.” Most responses suggest some combination of the two. Those who feel the group runs efficiently generally attribute it to the leadership of the Committee Chair and OEPA and OLEC, along with consistent funding through the GLLA and GLRI. For those that feel the Advisory Committee could operate more efficiently, a couple of common themes emerge: 1) coordination of meetings and events could be improved; and 2) everyone needs to be equally aware of the Committee’s core mission, goals, and how each member can contribute to decision-making.

The first concern with efficiency deals with coordinating meetings and developing/implementing action plans for the existing BUIs. Committee members generally feel that meetings would be more efficient if Committee members came prepared with actionable items, rather than spending time updating everyone on the progress of management actions. Regarding the planning and implementation of management actions, members further believe the current approach is efficient for some and not for others. For example, dam removal is efficient because it is easier to assess the benefits and identify which organizations should take the lead role. Other projects, like riparian restoration, are inefficient because there are many stakeholders, funding opportunities are disparate, and identifying the best stakeholders to include is complicated.

The second inefficiency mentioned by the Committee deals with information asymmetries. With a bimodal distribution of time served on the Committee and wide disparity of institutional history, it appears that not all Committee members are on the same page regarding overall goals and vision. Many respondents

lament their lack of understanding of the Committee's core mission, as well as ways they could contribute. Other questions were raised with regards to the status quo, and a perceived reluctance to adopt new and innovative ideas now that the management action list has been approved by the OEPA. As with transaction costs associated with sharing information, coordinating activities, and agreeing on conservation strategies, some of these issues could be addressed by making sure Committee members possess a strong understanding of the structure and function of the AOC. As mentioned in the previous section, Committee members recommend an onboarding exercise for new members that covers processes, tasks, and responsibilities, and how and where all information is stored, as well as a short presentation by the OLEC or OEPA on the history of the Cuyahoga AOC, goals of Annex 1 of the GLWQA, and specific responsibilities of Committee Members at this point in the restoration process.

6.2 Equitability

Equitability refers to how resources are allocated and which items take precedence within a collaborative group (Imperial, 1999). Evidence suggest that people are more likely to want to contribute to a collaborative group if they think that benefits of participating are related to the amount of their efforts (Ostrom, 2011). For the Cuyahoga AOC, most members feel the group is equitable, yet some voices get lost in the discussion. A few Committee members noted that organizations that provide funding and in-kind services have a larger impact on restoration actions, despite what individual Committee members might prioritize. For example, one Committee member pointed out that "USACOE has financial resources and OEPA has regulatory power, therefore they are the loudest voices." Others expressed concerns that new members do not fully, or equally, participate because they do not always have the history or institutional knowledge to affect change. This is despite the Committee Chair offering to hold one-on-one discussions with all new members at the time of their appointment to review operating procedures and answer any questions about the AOC. Also, some members' personalities may not lend themselves to speaking out during meetings. In this case, the smaller and more focused subcommittees are lauded as a means to achieve greater equitability. One suggestion to further improve equitability focuses on building more detail in upfront agendas prior to meetings. Sending more direction on preparing for meetings is seen to improve participation. One member suggested that new members can be assigned a mentor to help explain the history of management actions and how it relates to current decision-making. A related suggestion builds on prior calls for the facilitating organization to hold an onboarding for new members on how the committee and subcommittees work, including how action plans for individual BUIs are developed and implemented. The same person said, "We need training! This limits the effectiveness of new people coming on board, so more responsibility falls to folks who have been on the Committee longer. If you want to use the Committee to its fullest, orientation is needed to onboard new members."

Politics also appear to play a role in Committee equitability. Members have noted an "interesting dynamic" because everyone has their own reason to be there and nobody wants to offend anyone, despite welcoming all opinions. One person suggested asking all members what they hope to accomplish as a member of the Committee. This already occurs as part of the written application individuals submit when applying to the Committee. There is also an update every other year when Committee members reapply for subsequent two-year terms, thus offering the opportunity to reevaluate individual goals and targets. Possibly offering the option to update application goals on a yearly basis would be welcome by some Committee members. Others have pointed out that some member organizations are more aligned with the restoration goals of the AOC than others, such as the NEORS, thus they *should* be leaders among the group. One member suggests that during meetings they should "go around the room and get everybody's take [on issues], instead of just asking for opinions. If directly asked a question, people would talk." Although this would improve participation and the sharing of ideas, it would dramatically increase the Committee's time commitment. One common concern is that there are people missing from the conversation, and that more representatives from underrepresented neighborhoods in the AOC should be invited to the table. Overall, Committee members indicate that meetings are run thoughtfully, and everybody has an equal opportunity to contribute, even if some opinions get lost in the crowd.

6.3 Accountability

Accountability deals with internal systems for self-monitoring behavior and imposing penalties or sanctions for misconduct, and thus appears to be more difficult to measure than other metrics. Committee members roundly praised the committee leadership for keeping the group on track and accountable to guidelines established by the EPA via the GLWQA for creating a viable list of management actions. However, different variables impact accountability as individual members. Furthermore, differing levels of experience working within the AOC process allows some members to contribute more to decision-making processes than others. From a Committee perspective, accountability is tied to federal policy. The OEPA and U.S. EPA continue to work hard to recruit funding for restoration projects along the Cuyahoga, thus indicating that the group is accountable to established congressional intent.

On the operational level of specific BUIs, some actions are seen as accountable due to CWA and GLWQA precedent and guidance, while others are less so. The job of the Advisory Committee is to frame and understand issues in the AOC and provide recommendations on restoration actions. Given the mix of stakeholders who impact river restoration, guidance from the oversight agency has helped with accountability. For instance, the GLWQA is still governed by binational and federal government agencies, yet financial resources are not offered to the Committee for oversight or accountability practices. In the words of one member, “dollars are spent on environmental health because it impacts economic and personal health.” There is also the question among some Committee members about the need for accountability. Given the role of an advisory committee that makes recommendations, rather than allocates funds, do Committee members need to be accountable? What are the consequences if BUIs are not delisted? Committee members raised additional questions about how the facilitating organization and the Advisory Committee’s responsibilities differ, including exactly who is holding both groups accountable. Again, the OLEC and/or OEPA could include this in a short presentation for the Advisory Committee.

Overall, Committee members overwhelmingly feel like the Cuyahoga AOC Advisory Committee is self-accountable given that the group’s goals are being met in a timely manner and that Committee members are accountable to the Chairperson. The Committee is also viewed as accountable to guidance from the GLWQA, as well as the OEPA and OLEC, and most importantly, the general public. One suggestion to improve accountability is to invite higher-level decision-makers from each representative organization to participate. Another common refrain suggests that “we need clearer expectations of what responsibilities are for each member. Everyone needs to be better plugged into the work of the committee.”

6.4 Adaptability

Adaptability within collaborative institutions is closely tied to sustainability, and the ability to change with social, political, economic, and environmental circumstances (Ostrom, 2011). Similar to the biophysical nature of a river system, in order to be resilient, a collaborative group must have the ability to change over time and bounce back from deviations from the equilibrium. Annex 1 of the GLWQA has guided actions in AOC advisory committees since 1987, and individual Advisory Committees must constantly change in order to meet emerging challenges associated with river restoration. By and large, Committee members praise the group’s adaptability. The diversity of organizations/agencies that make up the group is seen as lending to its flexibility. Also, changes in group membership over time due to the 2-year term limits, and with guidance from the OEPA and OLEC, has shown flexibility. A general shift has been lauded, from conducting studies of BUIs to creating management action lists, to the actual implementation of restoration actions. One area where Committee members perceive a lack of adaptability is after the submission of management action plans. Once the Advisory Committee’s recommendations are sent to the OEPA, there is a concern that there are no opportunities to provide continuous feedback.

Approximately six years ago the framework for the Committee changed, lending itself to greater adaptability. In fact, the AOC has transformed during this time. There have been several changes in

leadership at the OEPA and OLEC. This has altered the group's approach and focus, as well as prioritizations within the project list. The Committee is able to pivot and look to different funding sources for project needs. There are more resources available now than in the past, and as the AOC inches closer to the proposed delisting date established by the EPA, the federal government provides more incentives and emphasis on completing restoration actions.

7.0 Project Conclusions

Collaborative Watershed Management in the Cuyahoga River Area of Concern: An Institutional Analysis was conducted by Ohio Sea Grant as a participatory action project in conjunction with the Cuyahoga River AOC Advisory Committee. The project seeks to better understand the collaborative decision-making processes of the group in relation to the development and implementation of management action plans in the Cuyahoga AOC, as defined by the GLWQA. While this project focuses on the Cuyahoga River AOC, lessons learned should be transferrable to other AOCs throughout the Great Lakes.

The main questions focusing this project deal with the collective processes of sharing information, coordinating activities, and agreeing on conservation actions. To address these processes, members of the Advisory Committee were asked a series of questions that sought to identify opportunities to improve the Committee's efficiency, equity, adaptability and accountability. Results suggest that transaction costs associated with the collaborative process stem from: (1) perceived inefficiencies in sharing information and coordinating activities; (2) asymmetrical levels of institutional knowledge among members regarding the Advisory Committee's mission and goals; (3) questions about the accountability of voting processes; and (4) Committee members' desires to better incorporate underrepresented populations in the AOC and explore new and innovative restoration strategies. Recommendations from Advisory Committee members to overcome these costs include employing best available technology to organize events and disseminate information; supporting new members with an orientation and/or mentor that explains how the Committee and Subcommittees work; assuring equal access to detailed information on BUIs and management action plans with a BUI dashboard; updating voting procedures and prioritization of management actions; and incorporating underrepresented local communities and high-level decision makers from municipalities, government agencies, and NGOs located within the Cuyahoga AOC.

In closing, the individuals and organizations associated with the Advisory Committee deserve a great deal of credit for developing and implementing the watershed management plan in the Cuyahoga AOC. It is also important to note that Committee members interviewed for the project roundly praised the accomplishments of the Committee and incredible progress made toward delisting the Cuyahoga AOC. Much of the success was attributable to those who have guided the program through the years, from the leaders of the original RAP to the current Committee leadership and representatives from the OEPA and OLEC. While some of the language in the report is corrective in nature, the overall feedback from Committee members was overwhelmingly positive, especially in terms of the group's ability to complete their core mission to develop strategic priorities for removing BUIs and delisting the AOC, and to advise the OEPA on measures to implement such strategies.

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