

**Revive H2O Final Report:
Michigan's Water Infrastructure Funding Gap**

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Table of Contents

Executive Summary	Page 3
Introduction	Page 4
Problem Statement	Page 5
Process	Page 5
Findings/Insights	Page 6
Next Steps	Page 8
Conclusion	Page 9
References	Page 10
Appendix	Page 11

Executive Summary

Michigan confronts a substantial \$5 billion funding gap in its water infrastructure, identified through interviews with the Southeast Michigan Council of Governments. Despite available grants and loans, funding remains insufficient, exacerbated by resident disengagement and a lack of pressure on local authorities. Inadequate communication threatens the state's water supply with leaks, main breaks, and toxin seepage. Research reveals a widening funding gap, contrary to initial estimates, and highlights a disconnect between residents and existing educational programs.

Initially focused on financial gaps, further study expanded to encompass public awareness and engagement issues. Data collection unveiled political support ambiguities and resident indifference. Recommendations emerged, advocating for a water affordability program and collaborative efforts. The affinity wall method organized findings, emphasizing the need for asset management and community involvement. Administrative and operational hurdles complicate infrastructure upgrades. Ongoing efforts by local governments and organizations are noted, emphasizing the need for innovative solutions to overcome community apathy.

Efforts to overcome public unawareness and enhance community engagement are visible through various ongoing programs. SEMCOG's "One Water" program is instrumental in communicating essential topics to local communities. Their engagement extends to workshops, educating elected officials on water-related matters. Despite these initiatives, a persistent challenge remains in resident engagement, with H2OMetrics' Co-Founder attributing the hurdle to community apathy. The reluctance to fund invisible water infrastructures further complicates the situation.

Effective communication between Michigan residents and relevant authorities emerges as crucial, particularly in the form of outreach. SEMCOG's proactive use of diverse social media platforms, including Facebook, Twitter, Instagram, LinkedIn, and TikTok, reflects a strategic approach to reach diverse audiences. Aligning with Michigan homeowners' preferences for personalized information delivery, SEMCOG's use of flyers, mailers, and social media posts stands out as a contemporary alternative to traditional town hall meetings.

Moving forward, plans to collect more data through town hall meetings, social media analysis, and stakeholder interviews are essential. The project aims to further explore legislative perspectives and gather resident insights for a comprehensive understanding. Following data collection, various solutions will be formulated and tested through focused studies, emphasizing the urgency of addressing communication gaps for the well-being of Michigan residents.

The project's findings emphasizes the critical need for effective communication between the Michigan government and residents to avert potential water infrastructure crises. The project's approach aims to bridge gaps in funding, awareness, and engagement, ensuring a sustainable and secure water future for the state.

Introduction

In the UMSI theme year of “water”, various topics like water resource, water conservation, sewage treatment, etc. have been discussed and investigated. Among those topics, water infrastructure is one of the most critical elements to ensure safe drinking water, casting considerable influence on the living quality of residents. Nevertheless, a great proportion of the infrastructures are in an aging condition, with only 32% water systems under 30 years old in the great lake region, breeding concerns about pipeline failure, lead standard, water leak and sanitation issues(2020). All of these indicate that there is an urgent need to upgrade the infrastructures with more advanced material as well as standards.

The major obstacle to upgrading infrastructure is the funding problem. Although there are other factors like administrative management division between public infrastructures and private infrastructures, or the impact of short-term water cut-off on the residents during the construction, the funding gap is the most obvious and severe one. According to EGLE, with the need for maintenance and upgrading, an annual funding gap of about 1 billion dollars is created in Michigan(2023). Despite the funding of “\$81.2 million in MI Clean Water grants” from EGLE (2023) and other grants released by the local governments, the current funding is struggling to meet the demands, creating a gap which is more than gigantic. Since it is virtually impossible to start a project without enough fundings, the funding gap is determined as the key issue for us to work on this semester.

Through background research, a lack of awareness and information about the infrastructure situation is found to pose an obstacle to the Michigan residences’ willingness to further support infrastructure improvement policies. According to the survey by Kasey M. Faust et al (2016), 18% of the respondents from 21 “shrinking medium or large cities” including Flint, Michigan showed no interest in infrastructure renewal decisions, and about 20% to 25% of them casted doubt on decisions made by their providers. It seems that more Michigan residents should be positively involved and informed in the interaction between providers and users to rebuild willingness and confidence towards infrastructure improvement. From the perspective of Michigan water providers, more intense contact with the government departments like EGLE is needed for efficient state resource allocation. As Cindy Wallis-Lage (2017) concluded from his survey, about 40% of the service providers do not have a clear and timely idea about political support, and providers are hindered from appropriate access to government funding, which could reduce the effectiveness of macroscopical policy adjustments for infrastructure renewal.

In our project, we started from the funding gap and dove into a more specific area of public awareness and education, developing considerable insights from secondary data collection as well as interviews. This essay will present our process of problem scoping, data collection, information analysis, final conclusion and reflections.

Problem Statement

The state of Michigan has about a 5 billion dollar funding gap in its water infrastructure, according to our interview with representatives from Southeast Michigan Council of Governments. This funding gap is aided by many grants and loans, however, this is still not enough. The residents of Michigan are not engaging with provided information or resources to understand the aging water infrastructure problem. This causes a lack of pressure on local governments, such as Governor Gretchen Whitmer and Michigan Legislature, to approve more funding opportunities. When funding is approved there is a lag in the process to execute projects. The inadequate communication between the Michigan residents and local governments is dangerous. The scarcity of funding can cause small leaks or even water main breaks. It also affects the ability to update and maintain the water system which can cause chemicals and toxins to leach into the water supply.

Originally, we had sources saying there was only a 1 billion dollar funding gap. Through interviews and more data collection this number increased from 1 billion to 5 billion. Lastly, through our data collection process our original understanding of the problem was incorrect. There are programs in place that educate Michigan residents about these water infrastructure problems, the issue is that residents don't connect with information.

Process

Our research adopted many approaches. Initially, online data searches suggested a significant funding gap, prompting an exploration of potential financial solutions. However, as our investigation deepened, it became apparent that the challenges extended beyond mere fiscal deficits. Through a series of interviews with Michigan government officials, a pivotal realization emerged: the essence of the dilemma was not solely financial but also rooted in public awareness and engagement.

We did some data collection from reports, articles and recorded video interviews. The report proved instrumental, uncovering that approximately 40% of service providers encountered ambiguity regarding political support, while most residents displayed indifference towards the decisions affecting infrastructure renewal. This finding steered our research towards the aspect of community engagement and outreach.

Four interviews played a pivotal role in our data collection process. Two SME video interviews were conducted with the Co-Founder of H2OMetrics, and the Water Commissioner of Washtenaw County. We also interviewed the Environmental Planner and Communications Manager at SEMCOG (Southeast Michigan Council of Governments). These interviews reinforced our understanding of the problem, underscoring the necessity of public education to foster a sense of shared responsibility for water resources, and the strategic coordination of infrastructure projects.

A salient insight arose from our engagement with the residents themselves. The fourth interview, featuring a Michigan homeowner’s preference for personalized information delivery—such as flyers, mailers, or social media posts—over traditional town hall meetings illuminated the need for varied and relatable communication strategies.

Integrating the insights from our interviews and secondary data analysis, we employed the affinity wall method to distill our findings into structured themes. This visual and collaborative approach facilitated the clustering of ideas, allowing our research team to step back and observe the patterns that emerged from the mosaic of data. Firstly, the affinity wall highlighted the pressing need for robust asset management, underscored by a strong sentiment for community involvement. Our data indicated a public that was not only under informed but also under engaged with the state of their water infrastructure. It reveals that when residents are involved in the discourse, their investment in the outcomes grows. Secondly, the current condition of Michigan's water infrastructure presented itself as a glaring concern. The aging systems, strained by both use and time, were struggling to meet contemporary demands and were vulnerable to escalating threats from natural disasters, particularly in the stormwater sector. Lastly, our method exposed the varied challenges across different administrative strata. The affinity wall brought to light the administrative and operational hurdles, from supply chain disruptions to staffing shortages that further complicated the execution of necessary upgrades and maintenance.

Findings/Insights

Lack of Resident Engagement as an important cause of the Michigan’s water infrastructure funding gap

The local government and organizations recognize the importance of community outreach. In the SME video interview, the Water Commissioner emphasized that “people need to understand the criticality, priorities, and conditions of their water infrastructure to make improvements”. SEMCOG also pointed out the significant need for public education to explain water infrastructure systems, privately-owned water infrastructure maintenance, and the role of local funding in infrastructure investments.

There are current trends to overcome public unawareness and enhance community engagement in water infrastructure issues. Various community outreach programs are ongoing. For example, the “One Water” public education program by SEMCOG plays a crucial role in communicating important topics to local communities, while they also engage in workshops and educational programs to bring elected officials up to speed on water-related topics.

Despite ongoing community outreach programs, a persistent challenge is the lack of resident engagement. The Co-Founder of H2OMetrics pointed out “the biggest challenge with community outreach is apathy”. One Water Commissioner noted that “people are not willing to fund public infrastructures, especially for the invisible water infrastructures”.

Effective communication strategies between the Michigan residents and relevant authorities are crucial, especially regarding the form of outreach. SEMCOG introduced their active uses of various social media platforms, including Facebook, Twitter, Instagram, LinkedIn, and TikTok. This corresponds to the Michigan homeowner's preference for personalized information delivery—such as flyers, mailers, or social media posts—over traditional town hall meetings.

Data Collection and Technologies as Potential Solutions

The research indicates that the adoption of new technologies has the potential to significantly benefit water infrastructure systems by providing more efficient observation and management methods. Current technologies, while affordable and in place, are recognized to have the capacity for enhancement, particularly in their ability to collect and analyze data. However, there is a noted resistance to the adoption of new technologies, primarily due to concerns about the risks of catastrophic damage in case of failure. We find these approaches during researching: rigorous testing and experimentation of new technologies before widespread implementation, and a focus on identifying and filling the gaps where technology can aid in data acquisition. Enhanced data collection is crucial, as it underpins all aspects of Infrastructure Management, from daily operations to long-term strategic planning.

Furthermore, the research underscores the importance of effective communication strategies in engaging communities with water infrastructure issues. It is essential to employ a variety of methods tailored to different segments of the community to ensure a broad and inclusive reach. SEMCOG exemplifies this approach through its collaboration with diverse stakeholders to gather and synthesize data, subsequently producing informative reports and maps that support transparent and informed decision-making.

Reflection

Bias might be introduced during the process of studying the relationship between public awareness, education, and the lack of water infrastructure funding. As contextual inquiry is a complex endeavor that requires careful and logical deduction throughout the information search process, these biases can significantly impact the conclusions drawn from the study and may influence the perceived relationships between these key variables. In our research, we have figured out and been working on mainly two biases: temporal bias and attribution bias.

Temporal bias refers to the distortion or limitations in research outcomes caused by the timing of data collection or analysis. In the case of our study, to obtain a more scientific and authoritative source of information, we have done considerable literature reviews on the platform of google scholar. However, since the topic of water infrastructure is more practical than theoretical, the source of articles is limited. The two relevant articles we selected as literature evidence are all before 2020, which means that the change of policies and infrastructure

conditions in recent years might not be included if we just use these sources. Fortunately, we noticed the problem and tried to obtain information from more updated sources like websites, annual reports, and interviews, compensating for the blank while developing a more synchronous concept of how public education changed over years.

Attribution bias means the tendency to unconsciously omit some possible attributions when deducing reasons to a fact. In our case, attribution bias happened when we were deducing the lack of public education resources about water infrastructure from the lack of public awareness. Logically speaking, when information is not well communicated, there might be problems with both the sender and acceptors. Nevertheless, since it is common to blame issues on the organizations who are in charge of relevant areas, we hardly considered the public's low engagement in education about water systems during our research. After our interview with SEMCOG, we finally decided to adjust our target for a more objective and scientific approach of analysis.

Next Steps

Through our data collection process our problem shifted from a lack of public education to a lack of resident engagement and this is what is going to influence our next steps. The first step we need to take is to collect more data relevant to our new problem and then test different solutions.

We would like to observe a town hall meeting that specifically has water infrastructure on the agenda. We would also like to gather examples of social media posts that are being used as a tool to distribute information on water infrastructure. While doing this we would also like to collect interaction data on these posts. These steps would allow us to gain more insight on the content being distributed to residents but also how much interaction from residents is happening during this topic. This data would help inform us of the efficacy of different routes of communication and information distribution.

We would also like to take a look at the stakeholders of our project, the Michigan Government and Michigan Residents. As of right now we have conducted two interviews, one on each side of stakeholders, this is not enough. We would like to do at least one more interview on each side. This will allow us to have more than one perspective but also highlight potential overlaps in data. Ideally, we would interview someone who works directly with the legislature related to water infrastructure and another Michigan resident. The resident should not use a private well as this is not maintained by the government or affected by funding decisions.

Lastly, after this new data collection we would like to take the information gleaned to formulate different solutions to this problem. After finalizing different solutions we would like to do a focus study to test the effectiveness of the different communication strategies before recommending any final solutions.

This project should be continued because it directly deals with the livelihood of Michigan

residents. The ineffective communication between the Michigan government and its residents can cause massive issues the further it continues. We need to find a solution to this problem.

Conclusion

In conclusion, our project on water infrastructure highlights crucial areas for community related improvements. The SME video interview emphasized the need for public understanding of the essential aspects of water infrastructure to drive improvements. SEMCOG further emphasized the necessity for public education to explain water infrastructure systems, private maintenance responsibilities, and the role of local funding.

While efforts are underway through various community outreach programs, a persistent challenge lies in overcoming resident apathy. The Co-Founder of H2OMetrics identified this as a major obstacle, emphasizing the reluctance of people to fund public infrastructures, particularly those that are not visible, such as water infrastructure.

There is evident potential for improving water infrastructure management through the adoption of new technologies. While current technologies are in place, our project findings suggest room for efficiency, data collection, and analysis enhancements. Overcoming resistance to these innovations necessitates rigorous testing and a focus on addressing gaps where technology can enhance data acquisition. Effective communication strategies, exemplified by SEMCOG, are crucial for engaging diverse communities in technological advancements.

Acknowledging literature limitations, particularly reliance on pre-2020 articles, we recognize the dynamic nature of policies and infrastructure conditions. Incorporating information from updated sources compensates for potential gaps, offering a more synchronized understanding of public education evolution. Our admission of attribution bias underscores our commitment to objectivity, as seen in our recognition of oversight regarding public engagement in education about water systems after the SEMCOG interview. This reflects our dedication to a scientific and unbiased approach to analysis.

Our next steps involve collecting more relevant data, observing town hall meetings with water infrastructure on the agenda, and analyzing social media posts and interaction data. Additionally, we aim to conduct more stakeholder interviews on both the Michigan government and residents to gather diverse perspectives.

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Appendix

† ReviveH2O Data Collection