



NYC-DEP ONE WATER RECOMMENDATIONS

THE EARTH INSTITUTE
COLUMBIA UNIVERSITY

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SIPA
School of International
and Public Affairs





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We are pleased to put forth this report, which continues the NYC DEP's commitment to advancing water-related equity and environmental justice. We would like to thank the IWM team, Alan Cohn, John Brock, Katlin Stath, as well as the Columbia faculty for their cooperation and guidance in this process. In addition, we are deeply grateful for the continuous support of our faculty advisor Nancy Degnan, without whom this work would not have been possible.

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Inge Wiersema, Vice President, National One Water Director at Carollo Engineers
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Respectfully,
The Columbia SIPA Graduate Workshop Group



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GLOSSARY

Affordability: A person's ability to afford (water) services compared to their income or the average income for their country or region.

CalEnviroScreen: A mapping tool that helps identify California communities that are most affected by many sources of pollution, and where people are often especially vulnerable to pollution's effects (OEHHA).

Case Study: A(n) (up)close or otherwise in-depth understanding of a single or small number of "cases," set in their real-world context. The closeness aims to produce an invaluable but complex understanding—an insightful appreciation of the "case"—hopefully resulting in new learning about real-world behavior (Yin, 2012).

CDC Social Vulnerability Index: A database that helps emergency response planners and public health officials identify, map, and plan support for communities that will most likely need support before, during, and after a public health emergency (CDC/ATSDR).

Data Dictionary: A set of information describing the contents, format, and structure of a database and the relationship between its elements.

Distributive Justice: The sharing of benefits and burdens between members of a society or community.

EPA EJScreen: An environmental justice mapping and screening tool that provides EPA with a nationally consistent dataset and approach for combining environmental and demographic indicators (US EPA).

Equity: Just and fair inclusion—a condition in which everyone has an opportunity to participate and prosper (US Water Alliance).

Equity and Affordability Screening Tool (EAST): A New York City specific community vulnerability and resilience mapping system created to support IWM's equity and affordability efforts.

Hidden Worker/Hidden Talent: Someone who is screened out of being considered for employment due to their categorization of "missing hours" (working one or more part-time jobs but willing and able to work full-time); "missing from work" (unemployed for a long time but seeking employment); or "missing from the workforce" (not working and not seeking employment but willing and able to work under the right circumstances). The term "hidden worker" is not intended to suggest in any way that workers are hiding and wish to or actively seek to remain excluded from consideration for employment (Harvard Business Review).

Manual for Partnerships: A guide written to assist the IWM in developing and conducting an equity and affordability driven stakeholder engagement process.

Screening Tool: A series of charts, diagrams or maps designed to interpret and present a specific set of data.

Socioeconomic: Relating to the combination of education, income and occupation of a certain person or group of people.

Social Vulnerability: The potential negative effects on communities caused by external stresses on human health. Such stresses include natural or human-caused disasters, or disease outbreaks.

Water Equity: When all communities have access to safe, clean, affordable drinking water and wastewater services; are resilient in the face of floods, drought, and other climate risks; have a role in decision-making processes related to water management in their communities; and share in the economic, social, and environmental benefits of water systems. (US Water Alliance)

Workforce Development: The improvement of employees' skills, knowledge and professional dispositions.

Workforce Development Strategy Report: A compilation of strategy recommendations for enhancing retention and recruitment of DEP employees under One Water NYC.



EXECUTIVE SUMMARY

The consulting partnership between the client, the Integrated Water Management (IWM) office of the New York City Department of Environmental Protection, and the consulting group, the Columbia SIPA graduate workshop, yielded the results of this report. IWM is spearheading an initiative called One Water NYC, and in early 2022, requested that the graduate consultant team engage in research to develop the Equity and Affordability and Workforce Development pillars of the One Water Framework. This report and the referenced external materials, the Equity and Affordability Screening Tool (EAST) Handbook, the Manual for Partnerships, and the Workforce Development Strategy Report, provide IWM with a comprehensive and actionable roadmap for addressing the focus areas Equity & Affordability and Workforce Development within One Water NYC.

The graduate consultant group is uniquely positioned to address the needs presented by IWM, with members' experiences in environmental justice advocacy, stakeholder engagement, product design, data analysis and management, quantitative environmental modeling, federal and local environmental policy, and infrastructure resilience.

Key issues identified in the preliminary stages of the project include:

1. The organization of equity and affordability data to identify vulnerable communities, particularly through social and environmental characteristics
2. Consistent and effective stakeholder engagement that cultivates equitable and sustainable community partnerships within identified communities.
3. Workforce development that will effectively support the goals of the plan.

The group recommends that IWM employ a community vulnerability screening tool to identify and prioritize vulnerable communities. Following community identification, IWM can prepare equitable engagement strategies to cultivate and maintain partnerships. We recommend that IWM develop, implement and assess an equitable engagement strategy that focuses on continuous improvement and support to communities and community stakeholders. Finally, the group recommends that the IWM cultivate a supportive and equity focused internal workforce infrastructure that can effectively support the focus areas of the One Water NYC Framework. The Equity and Affordability Screening Tool (EAST) Handbook, the Manual for Partnerships, and the Workforce Development Strategy Report, put forth actionable recommendations that address the identified key issues as well as guidance for implementation.

INTRODUCTION

One Water New York City

One Water is a sustainable, inclusive and integrated water resource management approach developed by the U.S. Water Alliance (U.S. Water Alliance, 2016). The One Water perspective emphasizes that all water has value and must be managed in a sustainable and holistic manner. The One Water management approach acknowledges the intersection of water resources and the complex systems and infrastructures needed to provide the public with clean and reliable water. By breaking down silos that separate these systems, water management through the One Water approach addresses a diverse range of goals such as improving community wellbeing, strengthening the local economy, and enhancing climate resilience. The client is currently developing a One Water framework to address challenges specific to New York City:

“One Water is a holistic approach to water management which emphasizes the perspective that all water has value, and the benefit of every drop should be maximized within the water system. Through One Water, our community could establish a collective, long-term vision for managing our water resources.” (NYC DEP, 2022)

Inequities such as racial discrimination, poverty, and access to education can impact the City’s ability to provide safe, reliable, and affordable drinking water to its residents. Communities of color in Harlem and the South Bronx manage more than 30% of the City’s waste and process up to 70% of the City’s sewage sludge (OWU, 2014). Neighborhoods within a half-mile of combined sewer overflow (CSO) sites are statistically proven to have unusually high percentages of poor and non-white residents (Breitzer, 2018). Aging infrastructure in older homes along Northern Manhattan, which is majority (>75%) non-white, also presents public health concerns for residents’ drinking water supply (HPD, 2018; WEACTION, n.d.). Additionally, vicious cycles of segregation and disinvestment result in historically redlined neighborhoods suffering a far higher risk of flooding in New York (Capps and Cannon, 2021). Although inequities may not have always been considered the responsibility of city and local government utilities, they have the power to help combat and counteract disparities. This can be achieved by the DEP through the intentional policy design and program implementation of One Water NYC .

The current One Water NYC framework has 5 guiding principles and 6 focus areas for action.

Guiding Principles

- 1) Provide a Flexible, Strategic Framework that considers climate stressors, population changes, affordability and revenue stability, land use, and mandates, ensuring the resiliency of the urban water cycle.
- 2) Pinpoint Beneficial Modifications to existing projects using a watershed-based approach that models and pilots infrastructure, policy, and partnership interventions.
- 3) Address NYC's Current and Future Needs by balancing asset management, stormwater management, water demand, flood mitigation, and energy and greenhouse gas reduction.
- 4) Guide Investments and Policies that optimize cost and avoided cost, resource recovery, and social and environmental benefits, and reduce risk of failure, energy, and GHG footprint.
- 5) Inform Negotiations with Regulators by determining if and when mandated projects can be replaced or deferred by other cost-effective and beneficial alternatives.

Focus Areas



Figure 1. The six focus areas of the One Water NYC Framework

The One Water NYC provides an opportunity for IWM to continue to stand on the forefront of progressive environmental municipal policy. The six focus areas are designed to overlap to ensure the holistic nature of the Framework and address a diverse range of action. The implementation of One Water NYC will position IWM, and more broadly the DEP, to set an example for holistic and equitable resource management not only through the development of equitable practices and policies, but through the reinforcing of a competent and sustainable workforce that can adequately uphold them.

Client Asks and Guiding Questions

The consulting group was asked to focus on advancing the One Water NYC framework by actualizing the Equity and Affordability and Workforce Development focus areas. In preliminary meetings, IWM requested recommendations that addressed the intersectionality of these focus areas. The consulting group conceived the following guiding questions for each focus area based on IWM's requests, on one hand; and, on the other, toward the goal of producing versatile and effective recommendations that can be adapted according to current and future priorities of DEP leadership.

The access, probing, and utilization of data was central to the client's requests for this project. While IWM has internal data of its own, One Water NYC will require accessing, probing and utilizing critical data stored in both the DEP and other city and regional agencies' data repositories. By increasing the data capabilities of the DEP, our client believes that they will be better equipped to enact the focus areas of One Water NYC. Chief among their requests to the consultant group was the development of a NYC-specific social vulnerability tool, similar to that produced by the Center for Disease Control.

While understanding the importance of stakeholder and community outreach, our client shared that their efforts would benefit from developing a more specific stakeholder and community outreach strategy. IWM provided our team with a list of stakeholders obtained from a One Water webinar that was co-hosted by IWM and administrators of LA's One Water management system. IWM requested insight and recommendations for using this list as a starting point to more effectively engage with stakeholders through One Water NYC.

One Water NYC will need a strong and capable workforce to be implemented. One Water NYC presents an opportunity to recruit new talent, reinforce the benefits and ethos of public service, and enhance career satisfaction. Moreover, One Water NYC can be viewed as a catalyst for achieving greater equity and diversity within the workforce. The client shared that there is traction within the bureau for expanding upon green infrastructure jobs, and that they would like to see the initiatives expand for water conservation and water infrastructure, two other components of One Water NYC. While our group did not address these two other components, our recommendations to IWM on integrating goals of promoting staff engagement and commitment to a collective vision through One Water NYC can also be applied.

These requests resulted in the consulting group's development of the following Guiding Questions, organized to address each focus area:

Equity and Affordability:

1. Which communities are most vulnerable, and how can IWM reach them?
2. What can be learned from other cities that have implemented a One Water or similar framework and how can those lessons be tailored to NYC?
3. Who are the important internal and external stakeholders that need to be part of One Water NYC?

Workforce Development

1. What kind of human infrastructure is needed to execute the changes of One Water NYC?
2. How can the success of this workforce be measured?

The following sections will address the consulting group's recommendations for the development of the Equity and Affordability and Workforce Development focus areas through the introduction and summarization of the Equity and Affordability Screening Tool (EAST) Handbook, the Manual for Partnerships, and the Workforce Development Strategy Report.



Equity and Affordability

IWM recognizes that the incorporation of equity and affordability values, metrics, and implementation are crucial to the vision of One Water NYC. The preliminary One Water framework document lists “Incorporate environmental justice considerations”, “Maintain affordability for all communities” and “Increase community engagement and diversity” as goals for the Equity and Affordability focus areas. The consultant group believes that the One Water framework would benefit from the identification and detailed explanation of indicators that can be used to measure the success of these goals as well as goal oriented plans for related program implementation.

IWM shared that a comprehensive review of environmental justice indicators such as racial and socioeconomic demographics is both possible and desirable through the One Water NYC Framework. How to do so with this highest degree of effectiveness rests with establishing actionable goals and objectives for equity and affordability, accompanied by sets of indicators with which to measure these goals and objectives. The group’s recommendations, about goals and indicators are predicated on an approach that promotes the needs of underserved communities and prioritizes customer affordability.

1. Bureau of Business Information Technology, Office of the Agency Chief Engineer, Water Board, Bureau of Customer Services, Organizational Development & Human Resources.

Through conversations with the client and review of available One Water literature the group determined equity driven stakeholder identification, engagement and inclusion in decision making as critical processes for building Equity and Affordability under the One Water framework.

Stakeholder input is key to the development of the Equity and Affordability component of One Water NYC with ancillary benefits for all the other components of One Water (IWM, 2021).

For purposes of One Water, stakeholders are defined as: The internal DEP Bureaus and Offices, including IWM, as well as outside City agencies, regulators, influential external stakeholder groups, and the general public. IWM requested guidance pertaining to the cultivation and maintenance of all partnerships, but specifically for in-depth engagement in equitable partnerships for historically underrepresented and marginalized populations. Recommendations are centered around leveraging of socioeconomic and environmental data to facilitate the identification of vulnerable communities impacted by social and environmental injustice

The DEP Equity and Affordability Screening Tool and the Manual for Partnerships are two products developed in response to IWM’s articulated requests, and are meant to work in tandem to enhance the One Water NYC Equity and Affordability component.



Visualizing Equity and Affordability: The Equity and Affordability Screening Tool (EAST)

The Equity and Affordability Screening Tool (EAST) is a community vulnerability mapping system that is intended to support the IWM and the NYC DEP to authentically advance and achieve the goals of Equity and Affordability for all of New York City's citizens.

This tool can be used to meet the goals of One Water NYC's Equity and Affordability focus area - which aims to balance the needs of underserved communities while also prioritizing customer affordability of water resources (IWM, 2021). New York City's long standing challenges of inequities in drinking water quality, hazardous waste exposure, water body pollution exposure, vulnerability to natural disasters, and sewer infrastructure quality and management issues exacerbate environmental injustices for vulnerable New Yorkers (WE ACT, 2022; Environmental Justice Interagency Working Group, 2022). The urgency to understand and address environmental and health disparities is compounded by the reality of our changing climate, which can impact New Yorkers' resilience to adapt and respond to climate emergencies (Environmental Justice Interagency Working Group, 2022). Consequently, an equity and affordability screening tool will allow the IWM to pinpoint communities affected by socioeconomic and environmental injustices. As a corollary, IWM and the DEP can use the tool to demonstrate needs specifically for disadvantaged communities and access funding to specifically address and mitigate those needs, such as federal funding issued through the Justice40 Initiative.

Through an extensive literature search, a priori knowledge, and a correlation analysis, our team has recommended indicators of community and environmental characteristics for use in the EAST tool. The team selected a list of 18 recommended indicators based on existing EJ mapping tools and specific considerations for IWM-related functions. The tool incorporates both public data available from major U.S. databases, as well as data collected and maintained by the NYC government, including the DEP. The indicators are averaged together and converted into percentile rating by census tract to reflect relative percentile rankings, scored from 0 to 100, and are mapped for a more robust and visual understanding of which NYC communities face greater socio-economic and ecological risks.

Socio-Economic	Unemployment Rate
	Median Household Income
	Poverty Rate
	SNAP Benefit Enrollment
Demographic	Linguistic Isolation
	High School Nonattainment Rate
	People of Color
	Age above 65
	Age below 5
Community Access	Rate of Overdue Payments for DEP Services*
	Rate of Enrollment in the Home Water Assistance Program (HWAP)*
Environmental Risk	Drinking Water Quality*
	National Flood Insurance Program: Value of Flood Loss Claims*
	Number of CSO events*
	Proximity to Superfund Sites
	Sea Level Rise Projections*
	Wastewater Discharge
	Underground Storage Tanks (USTs)

* Currently, data are unavailable for these indicators. See Handbook for more detail.

Figure 2. Equity and Affordability Tool (EAST) Indicators.

We recommend that EAST be utilized to allow for a more precise decision-making strategy when addressing equity and affordability; and, to advance the capacity of the IWM and the DEP to meet the current and longer-term needs of the City's most vulnerable communities.

The tool's associated handbook contains detailed descriptions of the selected indicators, the tool and its usage, including:

- a rationale for each indicator included in the tool
- a calculation for an "EAST score" for single or aggregated indicators, and
- a list of recommendations for the tool's maintenance and usage

Figure 3 displays a visualization of NYC's five boroughs, the EAST score calculated across all accessible indicators (12 of the recommended 18). Remaining indicators were not included due to a lack of 1) access to DEP's data repository, or 2) necessary software to integrate into the map.. The darker areas are communities that have the highest EAST scores and are therefore the most vulnerable, suffering from disproportionate socio-economic, demographic, and environmental burdens. These communities are predominantly located in the Bronx, Brooklyn, and Queens. DEP should use these results to inform decision-making that adheres to the Equity and Affordability focus area of the One Water NYC.

Moreover, the EAST tool is a first step in a multistep process to address equity and affordability. As an example, when used in conjunction with the Manual for Partnerships, EAST can identify communities that are most in need of DEP's attention and, thereby, direct resources to develop concrete and effective solutions. The EAST tool directly tackles many of the unique challenges faced by NYC, including language variability, wealth disparity, and racial diversity(Fitzsimmons & Mays, 2021).

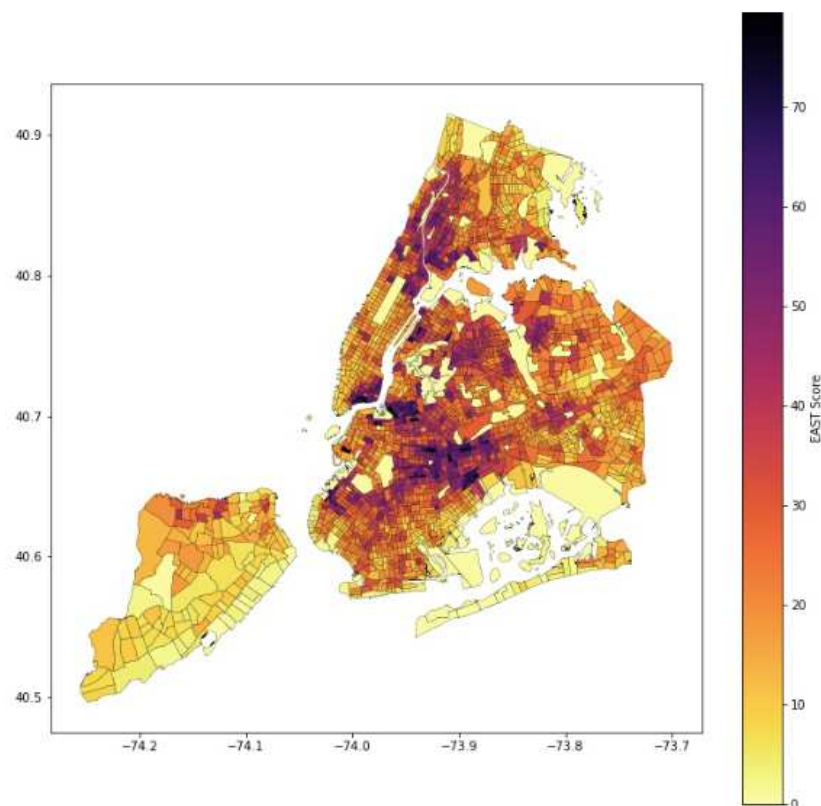


Figure 3. BETA version of the EAST Score mapped on the NYC Census Tracts. The EAST Score is calculated using 12 different socioeconomic, demographic and environmental indicators, with 6 additional indicators recommended in the next iteration of EAST. The score ranges from 0 to 100, with 100 being the highest vulnerability communities.

Case Study: Linguistic Isolation and EAST

The New York City metropolitan area contains speakers of over 600 languages and dialects, making it one of the most linguistically diverse cities in the world (Robins, 2019). While culturally valuable, this diversity poses additional challenges to both IWM's access to these communities and the communities' access to IWM. However, information from proposed EAST indicators, such as Linguistic Isolation, which describes households where all members have at least some difficulty speaking English, may help provide more accurate and better service, especially when communicating during times of emergency (OEHHA, 2015). Furthermore, the data are further subdivided into language groupings (e.g. Spanish, other Indo-European languages, Asian and Pacific Island languages, and other languages), making government outreach more achievable.

Recommendations for Use

Because cities have faced substantial challenges in utilizing screening tool insights, we have made the following recommendations for EAST to facilitate IWM's identification of One Water NYC projects and stakeholder engagement for various phases of the framework adoption.

Stakeholder and Community Outreach

A critical aspect of One Water NYC is stakeholder and community engagement. Current EAST outputs indicate that equitable and affordable projects under One Water should focus on neighborhoods in the Bronx, Queens, and Brooklyn. By referencing the EAST tool before initiating stakeholder engagement, IWM can help strategically direct DEP to prioritize its communication with various stakeholders listed in Manual for Partnerships. Additionally, IWM can begin outreach to regional stakeholders, such as state regulators, before project adoption and implementation. With limited time and resources, IWM and DEP can identify projects, target neighborhoods experiencing the most vulnerability, and engage relevant stakeholders for efficient and equitable project design and implementation.

EAST can enhance community outreach through informing IWM's decision to prioritize communities with water quality and affordability concerns. For example, if IWM is looking at projects for water utilities subsidies in the Bronx, it can use the EAST tool to identify neighborhoods in the borough that would benefit the most from subsidies programs. Then, IWM can reference the Manual for Partnerships to identify inter-borough organizations by their focus as well as specific location-based outreach efforts in the Bronx. Expected outcomes include greater community feedback, greater community trust, and community input into new indicators for future iterations of the EAST tool.

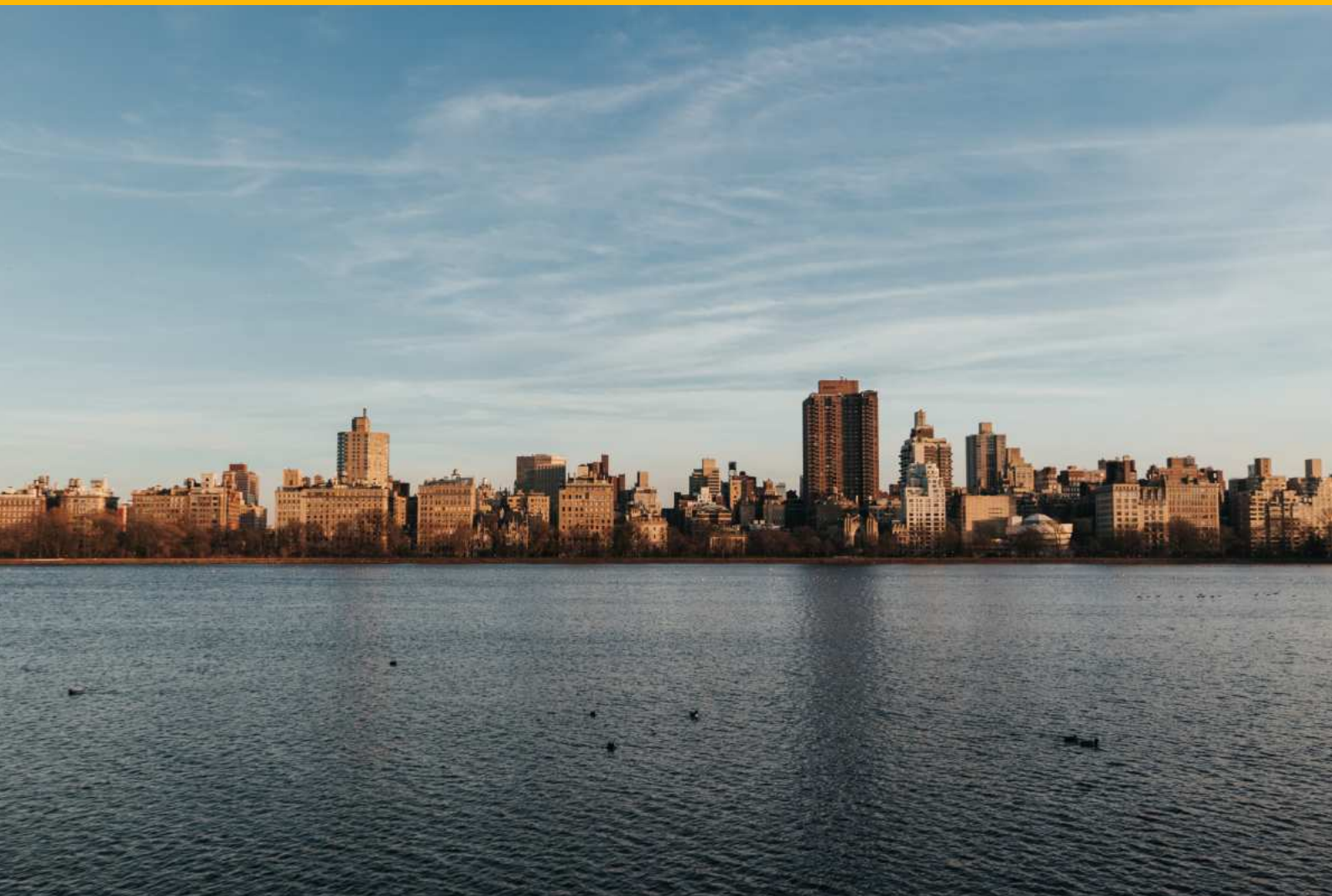


Inter-Agency Collaboration

While the EAST tool was created for the purposes of the IWM team and the DEP, the Tool can be enhanced by data collected through other agencies for functions that serve One Water NYC. Additionally, other agencies can provide important datasets for the indicators in the EAST tool. For example, the number of predicted and experienced CSOs are compiled by the New York State Department of Environmental Conservation (NYS DEC). By sharing the EAST tool with other agencies, IWM can access indicator data points more rapidly and efficiently, and other agencies can benefit from centralized data sets regarding indicators of interest for agency responsibilities. Moreover, other agencies can input data sets when they measure them or obtain them.

Cost-Assessment and Funding

Adopting a sustainable water framework requires efficient capital investments from state grants, City grants, and tax revenues. Capturing federal and state grants is an important first step when considering a project under the One Water New York City. In 2021, New York City received \$22 billion in federal grants, which is over 30% of federal grant funding (Haag & Rubinstein, 2021). Additionally, state funding is largely available under New York State policy. Federal and state funding opportunities are, therefore, a viable source of funding for new projects. The projects and accompanying funds ought to prioritize the vulnerable communities revealed through the application of EAST, as specific to equity and affordability.



Equitable, inclusive and comprehensive stakeholder engagement is central to the successful implementation of NYC's One Water Framework. The Manual for Partnerships provides guidelines for a standardized stakeholder outreach approach, including the process, partnership and planning needed to address the Equity and Affordability goals identified in One Water NYC. The Manual for Partnerships details recommendations, objectives, and actions for equitable stakeholder engagement as well as a list of stakeholders who can be directly engaged for benefit of immediate stakeholder input. The Manual for Partnerships is informed by extensive research into stakeholder engagement strategies applied in cities that have undertaken similar One Water programs such as Denver, Milwaukee, and Austin adaptive management planning, academic literature review, and public reports. The following objectives have been recommended to ensure that an equitable One Water stakeholder engagement process is developed with the intention of cultivating long-term and trust based relationships.

Recommended Objectives from the Manual for Partnerships

1. Establish a combination of short and long-term partnerships within the New York City government that inform planning for climate stressors, population changes, affordability and revenue stability, workforce development, land use, and mandates in the next year.
2. Begin outreach to external stakeholder networks, recording and reviewing stakeholder objectives and concerns in one to two years.
3. Identify and implement methods of transparency, communication, and accountability for setting, reviewing, and achieving external stakeholder goals in the next one to two years.
4. Develop outreach channels within New York City and New York State that balance digital and in-person communication, workshops, and events that are equitable for all stakeholders in the next one to two years.
5. Create an engagement platform that facilitates consistent communication with established external and potential stakeholders throughout changes in One Water programmatic strategies and DEP staffing in the next two to three years.

The consulting group suggests that IWM create a timeline that prioritizes efficient and genuine response to stakeholder needs. Below is a proposed timeline for the implementation of the recommendations included in the Manual for Partnerships:

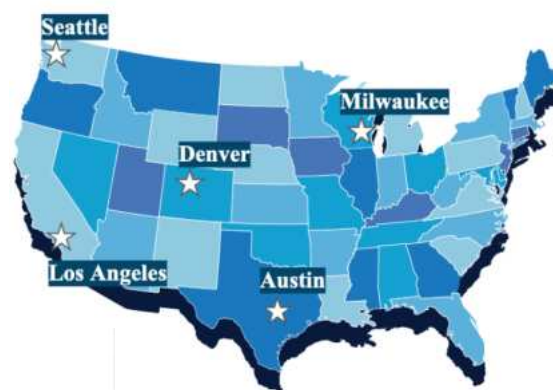
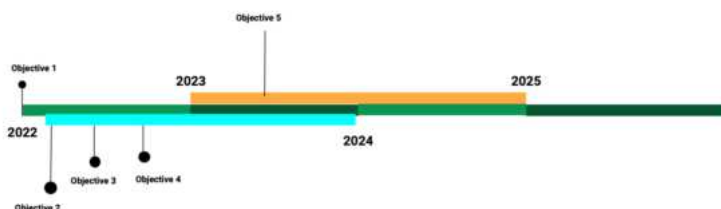


Figure 4. Map of cities included in the Manual for Partnerships case studies.

The final section of the Manual for Partnerships consists of case studies from our interviews with various One Water and integrated water management experts across the country including Austin, Denver, Milwaukee, L.A., and Seattle. The case studies distill barriers and successes experienced by each city which can, in turn, be used to inform the One Water NYC stakeholder outreach approach.

Case Study: Los Angeles

Contact: Azya Jackson, Environmental Engineer,
City of Los Angeles Wastewater Engineering Services Division



Key Findings

- Stakeholder engagement strategies were initiated far in advance of project identification and adoption
- Stakeholder groups were involved in different stages of the engagement phases including the development of visions, goals, and the engagement plan
- Stakeholder groups were strategically engaged, based on their ability to best further the objectives of each phase
- Stakeholder engagement was a critical place to learn from failure, understanding how and why previous projects did not succeed in the broader LA community

Measuring Success

- L.A. developed two types of metrics
 - Equity
 - L.A. collected data on the neighborhoods that stakeholder groups came from, populations and demographics that stakeholder groups represented, and communities and neighborhoods that were left out of stakeholder representation
 - After compiling these lists and evaluating for missing representation, LA refocused outreach to include the communities and people previously overlooked. They also translated fact sheets into Spanish in order to reach and engage with these audiences.
 - Stakeholder Engagement Satisfaction
 - L.A. wrote and administered periodic surveys that asked stakeholders about their satisfaction with processes; and, stakeholders' levels of interest in projects, overall.
 - After analyzing surveys, the team asked all stakeholder groups to submit a final project proposal at a city workshop meeting. Team managers synthesized project proposals in a final package and ranked the projects. Benefits were twofold: First, the process improved how team managers and stakeholders narrowed priorities; and, second, the process supported a rendering of consensus for projects.

Recommendations

- Involve stakeholder groups in goal-setting so that their priorities are integrated early on in project, program, or policy development.
- Set up systems for consistent feedback: Regular meetings, frequent surveys, and space for both positive assessment and critique.
- Create task forces to shape engagement strategies and provide scope and balance to project development and implementation
- Welcome and facilitate stakeholder disagreement and consensus in order to get a more complete picture of inter-community needs

Recommendations for Use

Development of One Water NYC

The Manual for Partnerships can be referenced to further existing plans to create an internal One Water Steering Committee. Further, Governmental, regulatory, and community stakeholders will play key roles in determining the reach and impact of One Water NYC and IWM is dedicated to including them in the development of the framework. The Manual for Partnerships includes recommendations for effective committee members, methods for outreach, and a timeline for implementation. Further, the Manual for Partnerships includes methods for continued engagement and stakeholder relationship management.

Equitable Project Implementation

The Manual for Partnerships presents actionable recommendations for project development, project implementation, and project management that prioritize stakeholder perspectives. Recommendations detail equity driven methodologies for survey analysis, focus group management, and stakeholder knowledge engagement and collection. Additionally, the Manual suggests a focused integration with EAST. In this way, successes and failures measured in EAST outputs, chiefly through reductions in community and environmental vulnerability in a given neighborhood or region, can inform future strategies the IWM, and by extension, the DEP adopt both in its stakeholder engagement processes and project design and implementation.

Accountability

The Manual for Partnerships can be used to guide the IWM team to help catalyze the broader DEP organization in engaging community members with intention and accountability. The Manual for Partnerships contains recommendations for methods of accountability in information sharing, fostering citizen action, facilitating discussion and debate, and effective government response.

The Manual for Partnerships serves as a blueprint for the successful incorporation of stakeholders into the planning and implementation of One Water NYC. Alongside the EAST Handbook and the Workforce Development Strategy Report, the Manual for Partnerships provides a holistic framework for stakeholder involvement, the steps necessary to realize effective partnerships, and methods for measuring the impact and success of the One Water NYC stakeholder engagement process.

Workforce Development

One Water NYC can serve as a catalyst for positively influencing workforce development throughout the DEP. The One Water NYC framework provides many opportunities within the DEP to advance employee's professional growth, development and involvement in co-developing a shared vision of water management in New York City. By thoughtfully working across bureaus in the planning, and implementation phases of the One Water framework, IWM has the opportunity to galvanize a broader workforce development movement. The benefits of such a movement will be felt far beyond IWM and One Water NYC.

The One Water NYC goals for Workforce Development are as follows:

- Grow and retain highly qualified and diverse staff to drive integrated and collaborative solutions to:
 - Improve employee retention
 - Increase diversity
 - Enhance professional development and institutional knowledge transfer (IWM, 2021)

IWM expressed the need for workforce development improvements to support the One Water framework and that the onset of One Water implementation provides a unique opportunity to catalyze these changes. IWM is passionate about the recruitment of more diverse staff and believe it is crucial to the sustainability of their workforce. Additionally, IWM shared that enhancing workforce culture internally is imperative to supporting and retaining incoming employees.

Supporting One Water NYC: The Workforce Development Strategy Report

The Workforce Development Strategy Report, hereafter referred to as Strategy Report, presents recommendations to bolster IWM's efforts to enhance workforce development through the One Water NYC framework. The framework places an emphasis on a collective, long-term vision for management that requires a parallel emphasis on developing a highly skilled, diverse, and passionate staff to drive innovative solutions under the goals of One Water NYC. Additionally, the framework celebrates interdepartmental collaboration across all DEP agencies in order to expand employee engagement in the planning and implementation process.

In the development of meaningful and actionable recommendations for our client, the consulting group focused on developing IWM's capacity for retention and recruitment by:

1. Leveraging One Water NYC to catalyze workforce engagement and;
2. Increasing morale throughout the DEP and driving long-term, agency-wide cohesion and collaboration in pursuit of necessary institutional knowledge for advancing One Water NYC.

The following sections detail recommendations for workforce development strategies focused on improving retention and recruitment under the One Water NYC framework.



Retention

One Water NYC, offers a unique opportunity to increase agency-wide morale and retention at the DEP. Two main avenues for improving and maintaining morale are: 1) Actively promoting employee growth and development, and 2) Encouraging employee involvement. These goals can be achieved through support from mentors and supervisors, flexibility in applying employee skills, and trust with managing responsibility. Improvements in employee engagement are achieved through active participation in creating standards and setting clear goals, as well as ensuring role congruity and continuity. Cultivating employee growth, development, and involvement in a large and complex organization can be a challenge. The following sections outline a recommended strategy to develop these employee attributes and support retention.

Recommended Retention Strategies from the Workforce Development Strategy Report

Host Visioning Workshops:

Visioning Workshops or brainstorming sessions have the potential to be a critical step in ensuring the successful implementation of One Water NYC and also assist in boosting DEP morale. While led by IWM staff, the group recommends that DEP personnel from the five bureaus of the agency along with the Chief Administrator and the Chief Financial Officer participate in visioning workshops. By thoughtfully bringing together agency-wide knowledge and expertise, these workshops will develop enthusiasm for One Water NYC, and project implementation will gain momentum from the onset. In turn, cross collaboration presents the opportunity to encourage employee growth, development and involvement. During the initial brainstorming sessions, the IWM team can demonstrate their commitment to listening to all voices, making participants feel respected and heard, and encouraging continued involvement.

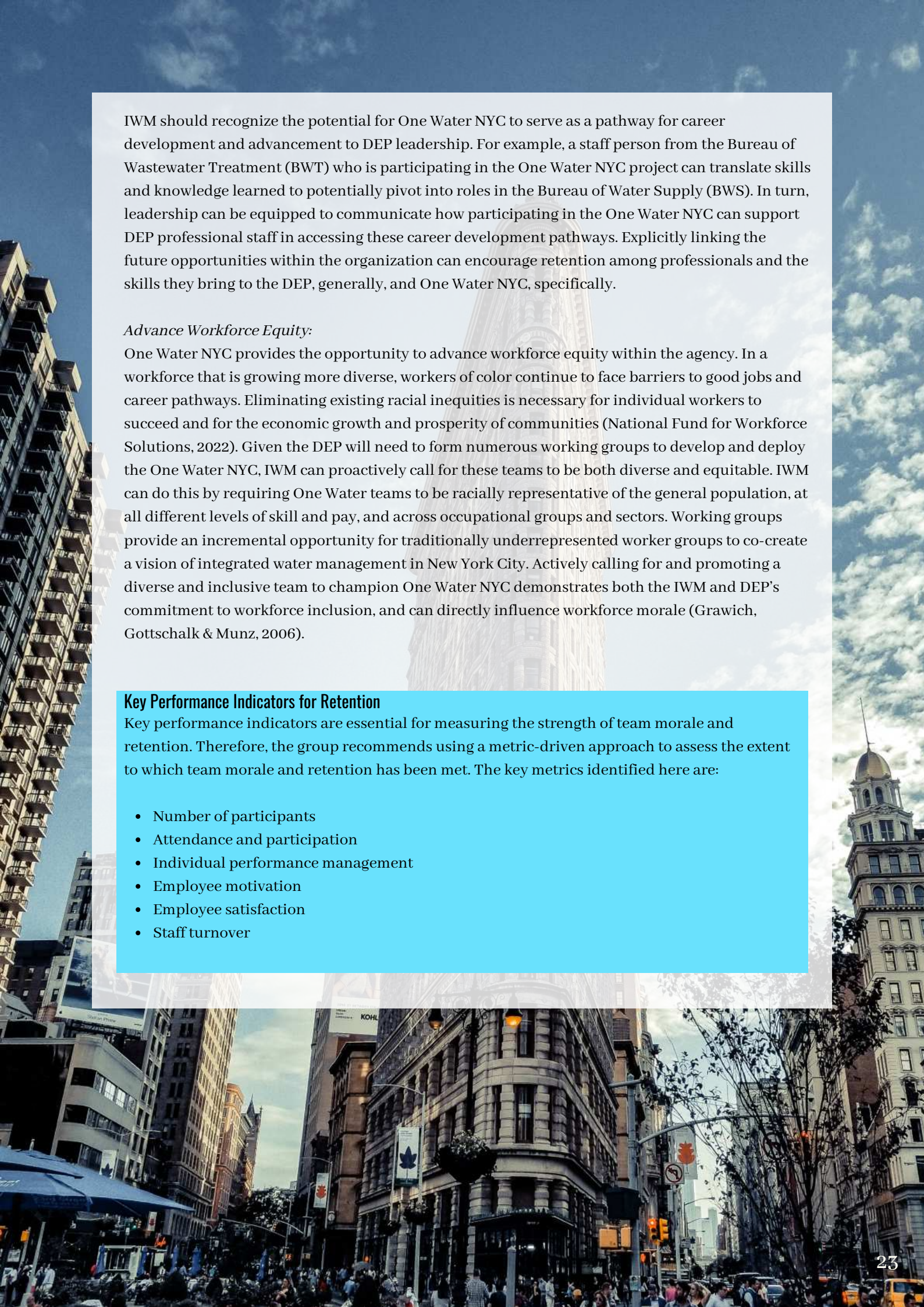
Visioning Workshops will provide the “space” for brainstorming, while also creating a unique opportunity for employees to become more intimately involved with their own work and that of One Water NYC. To assist the IWM team in planning these workshops, we developed a series of questions to guide the workshops, which can be found in Appendix A of the Strategy Report.

Establish recurring meetings and follow up meetings:

IWM should establish recurring general meetings with relevant DEP staff to demonstrate how their ideas are being incorporated into the One Water NYC. Through recurring meetings, leadership and staff can gain insight on how their involvement in visioning workshops contributes to implementation of the One Water NYC. Follow-up meetings, on the other hand, are intended to actively engage staff in using their expertise to problem solve specific areas of implementation. These meetings may also result in mechanisms for implementation—such as steering committees – to ensure that the goals of One Water NYC are being reached. Staff will benefit from increased involvement in planning and the ability to actively share their skillset, which should lead to improvements in morale and internal workforce development.

Catalyze Career Advancement:

Actively engaging DEP staff through visioning workshops can catalyze career advancement in the DEP. Through these intra-departmental interactions, staff will gain insights into agency-wide functions, while also acquiring a deeper understanding of how their skills and knowledge contribute to core functions and overall mission of the agency. Through One Water NYC, IWM can catalyze opportunities for internal career advancement, reinforcing the idea, and reality, that the NYC DEP is a place for professional growth and enhanced satisfaction.



IWM should recognize the potential for One Water NYC to serve as a pathway for career development and advancement to DEP leadership. For example, a staff person from the Bureau of Wastewater Treatment (BWT) who is participating in the One Water NYC project can translate skills and knowledge learned to potentially pivot into roles in the Bureau of Water Supply (BWS). In turn, leadership can be equipped to communicate how participating in the One Water NYC can support DEP professional staff in accessing these career development pathways. Explicitly linking the future opportunities within the organization can encourage retention among professionals and the skills they bring to the DEP, generally, and One Water NYC, specifically.

Advance Workforce Equity:

One Water NYC provides the opportunity to advance workforce equity within the agency. In a workforce that is growing more diverse, workers of color continue to face barriers to good jobs and career pathways. Eliminating existing racial inequities is necessary for individual workers to succeed and for the economic growth and prosperity of communities (National Fund for Workforce Solutions, 2022). Given the DEP will need to form numerous working groups to develop and deploy the One Water NYC, IWM can proactively call for these teams to be both diverse and equitable. IWM can do this by requiring One Water teams to be racially representative of the general population, at all different levels of skill and pay, and across occupational groups and sectors. Working groups provide an incremental opportunity for traditionally underrepresented worker groups to co-create a vision of integrated water management in New York City. Actively calling for and promoting a diverse and inclusive team to champion One Water NYC demonstrates both the IWM and DEP's commitment to workforce inclusion, and can directly influence workforce morale (Grawich, Gottschalk & Munz, 2006).

Key Performance Indicators for Retention

Key performance indicators are essential for measuring the strength of team morale and retention. Therefore, the group recommends using a metric-driven approach to assess the extent to which team morale and retention has been met. The key metrics identified here are:

- Number of participants
- Attendance and participation
- Individual performance management
- Employee motivation
- Employee satisfaction
- Staff turnover

Recruitment

Particularly in the public sector, hiring new talent is often stymied by protracted hiring processes and lower financial incentives. Solutions such as highlighting the ethos of public service, or communicating the importance of mission are just two ways to address these challenges. These recommendations are just a brief description of the many recruitment strategies that the team tailored specifically to the needs of IWM.

Recommended Recruitment Strategies from the Workforce Development Strategy Report

Work with Academic Partners:

Working with local organizations can provide a unique channel to advertise jobs and target candidates with specific skills sets. Focusing on local colleges and universities, IWM can increase the probability of recruiting NYC residents. Additionally, looking at colleges beyond high-ranking institutions can reduce competition for hires from the private sector, while still gaining talent with equal skill sets. Furthermore, IWM could work with these institutions to develop apprenticeship programs that provide training in specific skills. Modern apprenticeships extend beyond hourly and unionized workers and have shown success in training salaried positions, such as software engineering (Carson, 2018).

Identify Hidden Talent:

Hidden workers or hidden talent are workers who are unemployed or under-employed, both in terms of hours and position. One study found that companies that actively search for hidden talent in their hiring process led to a return on investment of 36% (Fuller, 2021). Identifying and targeting hidden workers can be a powerful way for IWM to find skilled candidates who are excited and ready to work. Additionally, this talent pool is often more diverse than traditional candidates which provides the additional benefit of incorporating equity into the hiring process and the workforce.

Hire for Equity:

One of the key elements of One Water NYC is to consider how to reach out to groups who are traditionally underrepresented in the workforce and ensure that the interview process is fair and unbiased. Therefore, increasing the diversity of applicants will ensure that greater diversity persists through the rest of the hiring process (Friesen & McLeod, 2021).

It's important to recognize individuals who are traditionally passed over for specific roles. For example, women tend not to apply to programming jobs if recruiting events only showcase male software engineers (Mackenzie, 2019). Additionally, subtle cues in job descriptions, such as specifying pronouns, can bias what types of candidates see the position as interesting and apply (Fatourou, 2022).

One of the best ways to control for hiring bias is through a blind hiring process, whereby factors, such as age, race, gender, education, and years of experience are removed from the evaluation process (Newbery, 2018). One organization was able to increase diversity in new hires by 45% by implementing a blind hiring process (CBI, 2019). The NYC Mayor's Office of Climate and Resiliency also employs this practice, giving IWM a local example to emulate in their hiring practices.

Key Performance Indicators for Recruitment

Key performance indicators are vital to measure the success of the recruitment process. Metrics should be broken down by demographic areas (race, sex, etc.) to further evaluate the success of equitable hiring strategies. Care should be taken when handling demographic data, so the blind interview process is not compromised.

The key metrics identified here are:

- Channel Attribution
- Cost of Recruitment
- Funnel Metrics for Attrition
- Demographic data for Equitable Hiring
- Rate of Positions Filled
- 6 Month Job Performance

CONCLUSION

The One Water NYC Framework, and more specifically the focus areas of Equity and Affordability and Workforce Development, can provide IWM with a range of innovative opportunities for internal and external capacity building. While there are extensive lists of recommendations found in the EAST handbook, Manual for Partnerships, and Workforce Development Strategy Report, the team has provided these four recommendations for immediate action:

1. As soon as possible, IWM should share these deliverables with DEP leadership to advance the implementation of One Water NYC. By delivering these products with a sense of urgency will highlight the importance of this plan and demonstrate how the plan can lead to meaningful and long-lasting improvements to NYC's water delivery system.
2. IWM should establish a Task Force to conduct a beta test of EAST through a pilot project. This action will give immediate analytical power to the decisions made within IWM. Additionally, a pilot study will validate the Tool's accuracy and ground truthing. This study should be designed and enacted within the next 8 to 12 months.
3. IWM should consider the immediate formation of an Internal Steering Committee to enact the action steps detailed in the Manual for Partnerships. This Committee will establish a multi-year timeline with goals for community and stakeholder outreach.
4. IWM should conduct a highly focused pilot study to address the critical issues of recruitment, retention and morale within the agency. The pilot study should quantify its success using the provided KPIs in the Workforce Development Strategy Report. This study should be designed and enacted within the next 8 to 12 months.

In order to meet the specific needs of IWM, the team has delivered a comprehensive, interdependent package for the effective adoption and enactment of One Water NYC. From the analytical power of the EAST tool, to the actionable and meaningful recommendations of stakeholder and workforce development and through the implementation of One Water NYC, IWM and the greater DEP will undoubtedly lead to a sustainable and equitable water delivery system for generations of New York residents.

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MEET THE TEAM



Sarah Chin (She/her), Manager

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Raleigh has a PhD in ecology, where he gained expertise in data collection, statistical analysis, and project management. As deputy manager, Raleigh worked with the manager, faculty advisor, and graduate consultants to coordinate a strategy for the production of this report. He frequently interacted directly with employees at the DEP and was responsible for disseminating the client's needs to the team of graduate consultants. He was also integral in constructing and editing the submitted report.



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Cassidy Childs (She/her)

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Cassidy is a passionate advocate and analyst for environmental justice and climate resilience. Throughout the semester she interned at the White House Council on Environmental Quality, working on the Environmental Justice team and Justice40. She is the Data Team Lead, working to develop an Equity and Affordability Screening Tool (EAST) for the NYC DEP. Cassidy has previous experience working with equity indicators and data, building a data dashboard for the UN Sustainable Development Goals in DC with the UN Association. Cassidy hopes to bring insight into equity and social impact for future DEP projects.

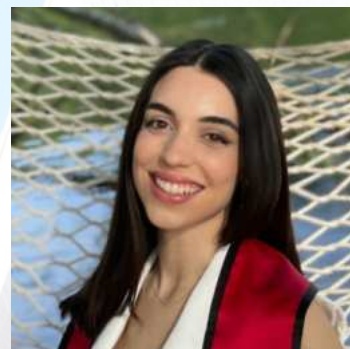
Gianna is an aspiring policy analyst who is thrilled to utilize her knowledge of water management and environmental justice for this capstone project. Before Columbia, she studied Environmental Analysis & Policy at Boston University, where she gained experience in quantitative environmental modeling and GIS. At Columbia, she fostered skills in leadership, communications, and project development. Throughout the semester, she worked with the White House Council on Environmental Quality's Environmental Justice team on the CEJST screening tool. Gianna was integral in the development of the EAST screening tool, and editing the final report.



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Nikki has B.A. in Political Science and Government, with a minor in sustainability from San Diego State University. There she gained expertise in policy analysis, research, and environmental justice. As a member of the data analytics team, she conducted research, defined metrics, and co-wrote the technical handbook for the Equity and Affordability Screening Tool (EAST). As a member of the literature review team, she conducted research and literature reviews, helping put together the annotated bibliography. Nikki's prior experience in policy research and analysis contributed to the literature review and the formulation of the metrics used in EAST.



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Karen has a Bachelor's in Environment and Sustainability with a concentration in policy and governance from Cornell University. She worked on both the stakeholder and data teams of the One Water Workshop group. She researched indicators for the EAST handbook and provided recommendations for the DEP's strategic use of the screening tool. She also conducted stakeholder interviews, applied adaptive management frameworks to the DEP's stakeholder engagement goals, and made recommendations for DEP stakeholder engagement strategy moving forward. Her experience in environmental ethics and environmental management are key contributors to both her roles on teams of this project.

Chelsea has a B.S. in Environmental Science and is passionate about the intersection of equity and climate action. She has extensive experience in community development, stakeholder engagement and analysis of equitable climate planning. Throughout this project, she has used her background to analyze the best practices in community engagement, conduct expert interviews, and guide the formation of the Manual for Partnerships. She hopes her experiences of working in vulnerable communities and developing community partnerships will lead towards long-lasting and meaningful relationships between communities and government.



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Johnluca is a native New Yorker and is excited to bolster the city's water-system resiliency. He attended Haverford College outside of Philadelphia where he majored in political science and environmental studies. He immediately transitioned to the MPA-ESP program after graduation in May and has been absolutely loving it. He worked largely in the stakeholder outreach section of the report. Outside of the program, Johnluca works with Gotham360 Energy Consulting helping their clients meet the building efficiency standards of Local Law 97 in NYC. After graduation from SIPA, he will begin as an analyst in the New York City Office of Management and Budget in the Parks Capital Unit.



Nick Venezia (He/him)

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Nick's interest in environmental issues began when he lived through Hurricane Sandy, which spurred a fascination with resiliency and the many issues cities face during natural disasters. While studying Public Affairs at CUNY Baruch College, he interned at the environmental advocacy nonprofit Food & Water Action, and later worked for the ranking member of the Environmental Conservation Committee in the New York State Senate. Currently, he works as a Lab Assistant at the Lamont-Doherty Earth Observatory, and was selected as a PMF Finalist. Nick led the project's Literature Review team and was a member of the Stakeholder outreach team.



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Deanna is excited to take her experience and knowledge of water systems and infrastructure resiliency beyond businesses and towards the public sector. Prior to Columbia, she studied International Relations at the University of St Andrew in Scotland. There she worked with former Chief Scientific Advisor to the UK Government to change the face of voluntary carbon offsetting across the country. She is experienced in stakeholder outreach, strategy creation, and innovative thinking. Deanna contributed to the project's literature and policy review process and was instrumental in the development of the Workforce Development Strategy Report.



Kate Champion (She/her)

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Kate has a BA in management and a minor in statistics and has worked in Silicon Valley as a product manager. She was able to utilize her experience in building data products and acting as project manager during this project. As the first lead of the data team she helped organize and guide the team during the initial phases of the project. She then helped develop the core ideas that lead to formation of the workforce development team and formulated recommendations around recruitment. She brought her editing skills to the table by providing feedback and support to the whole team.



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Blake holds a BSBA in Finance from the University of Pittsburgh and is a certified Project Management Professional. He has experience in a variety of roles including corporate finance, business development, and product management. As a member of the Stakeholder and Workforce Development workstream, he conducted stakeholder analysis, informational interviews, and developed organizational strategies for improving workforce morale. Blake hopes to continue exploring his interests in community-based climate initiatives and urban sustainability.



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