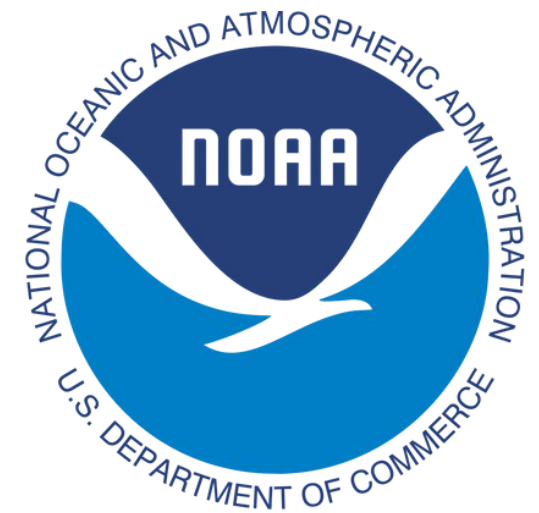




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BUILDING A CLIMATE-RESILIENT WORKFORCE: ADDRESSING EDUCATION AND TRAINING NEEDS FOR OHIO'S GREAT LAKES COMMUNITIES

Jason Cervenec, Traci Lepicki, and Lorryayne Miralha
Ohio ACTE Conference
July 21, 2026



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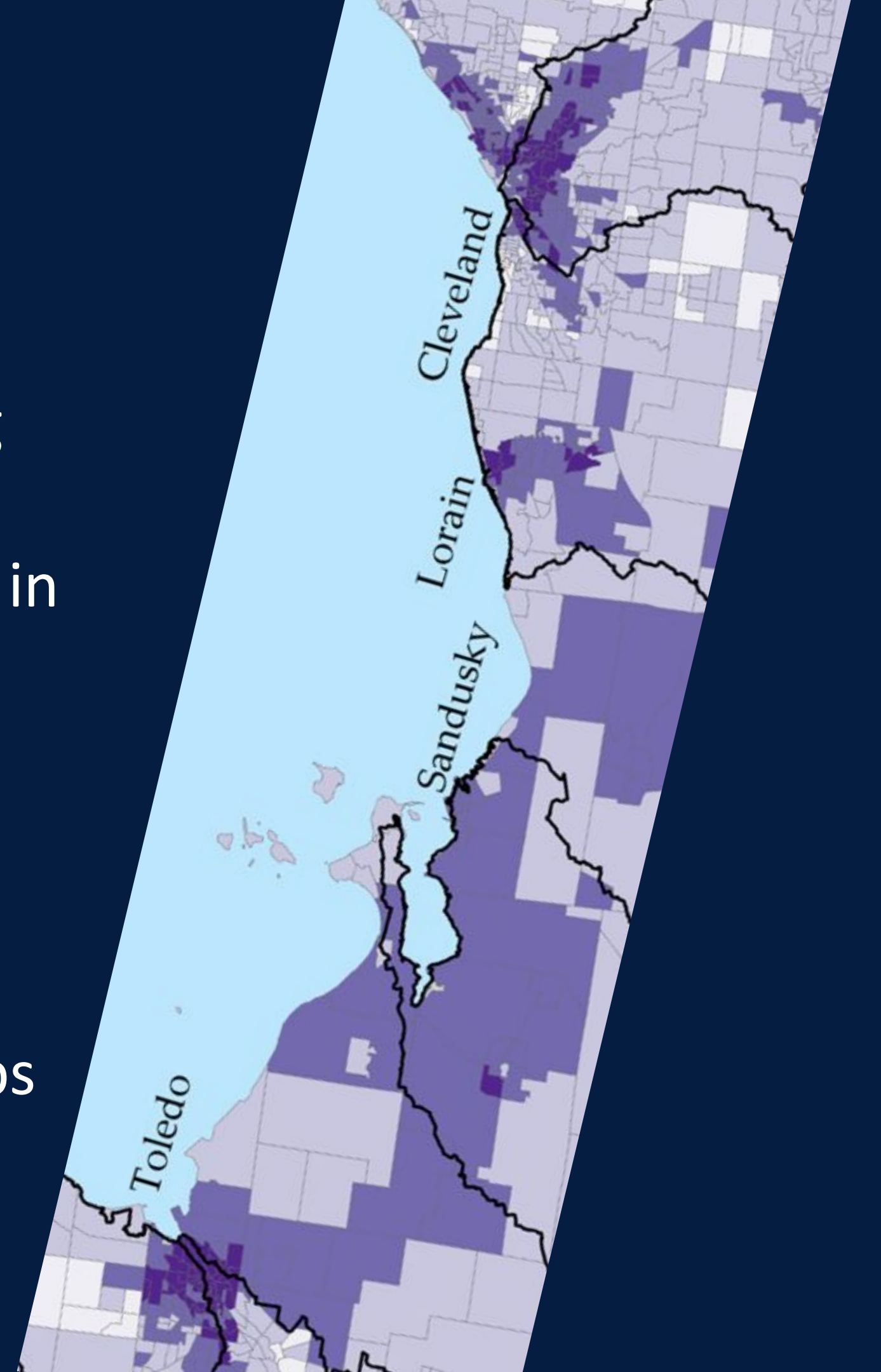
Project Overview

Goal

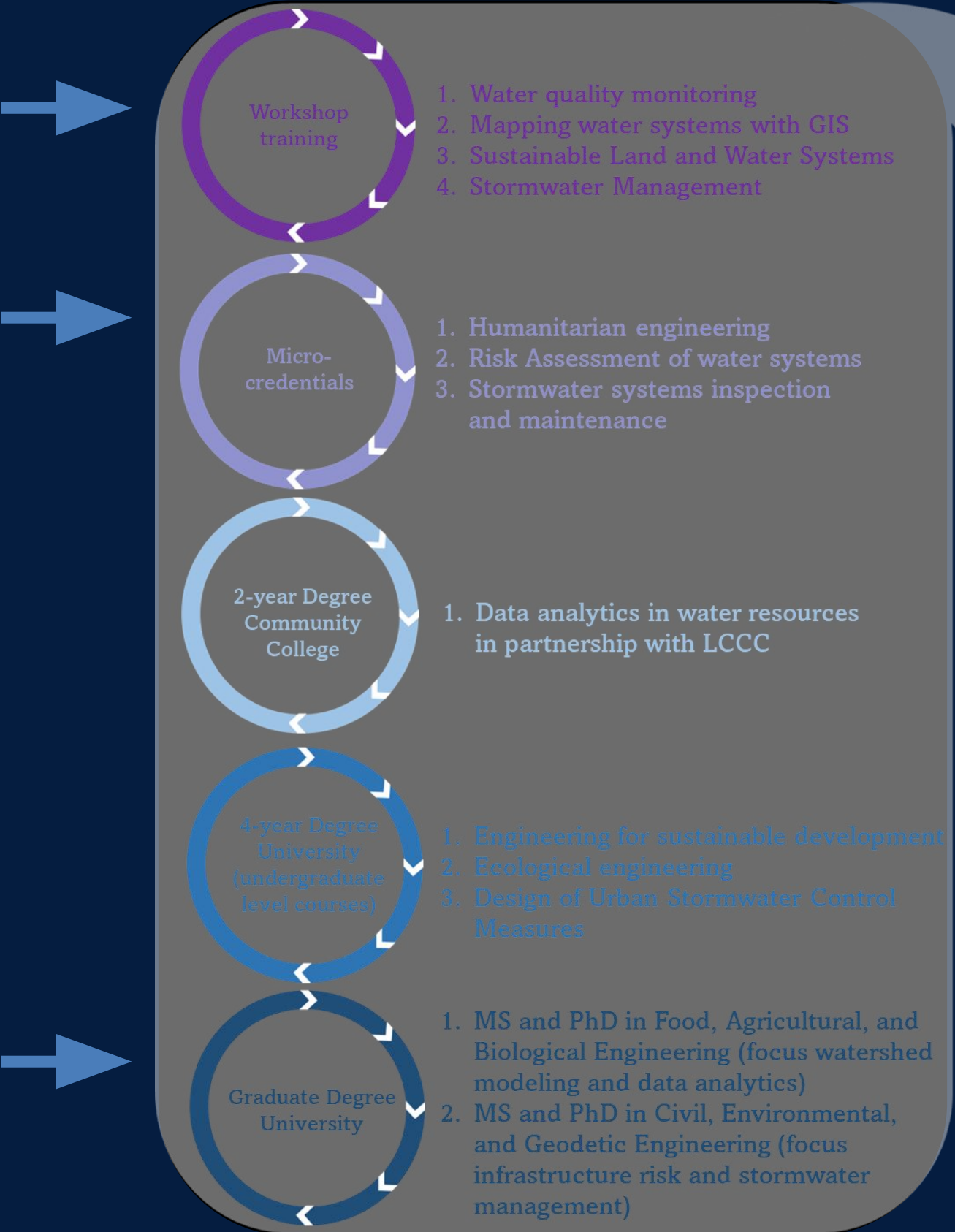
- Train at least 100 climate-ready workers, including technicians, scientists, and engineers, to fulfill the specialized workforce needs of the water industry in the Great Lakes by 2028

Timeline – Program and Recruitment

- Design Phase: CETE, ESD, microcredentials, and recruitment
- Implementation Phase: Hands-on training and jobs



Program we are building



Water Quality Management



Sensor Technology



Wetland Delineation



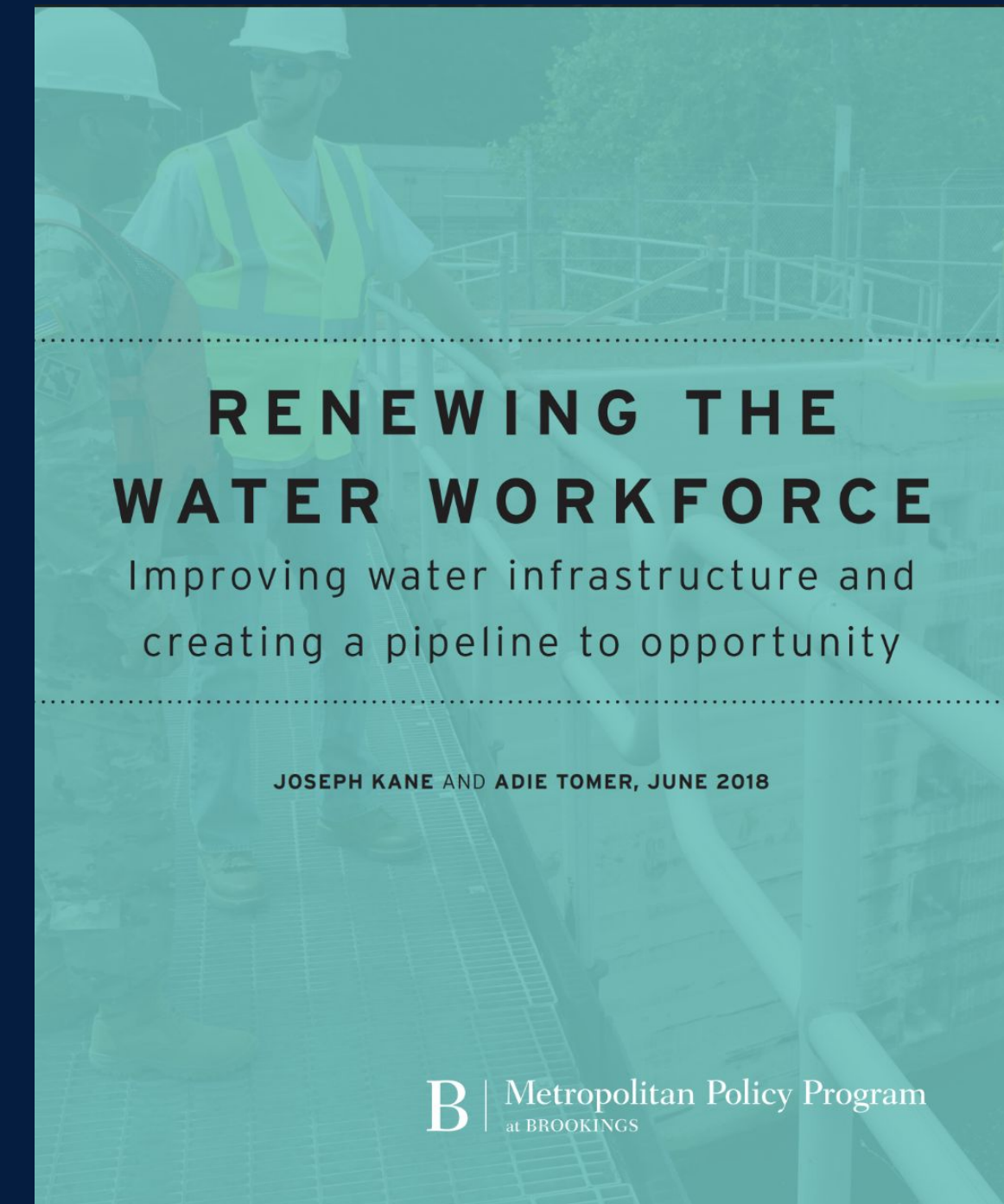
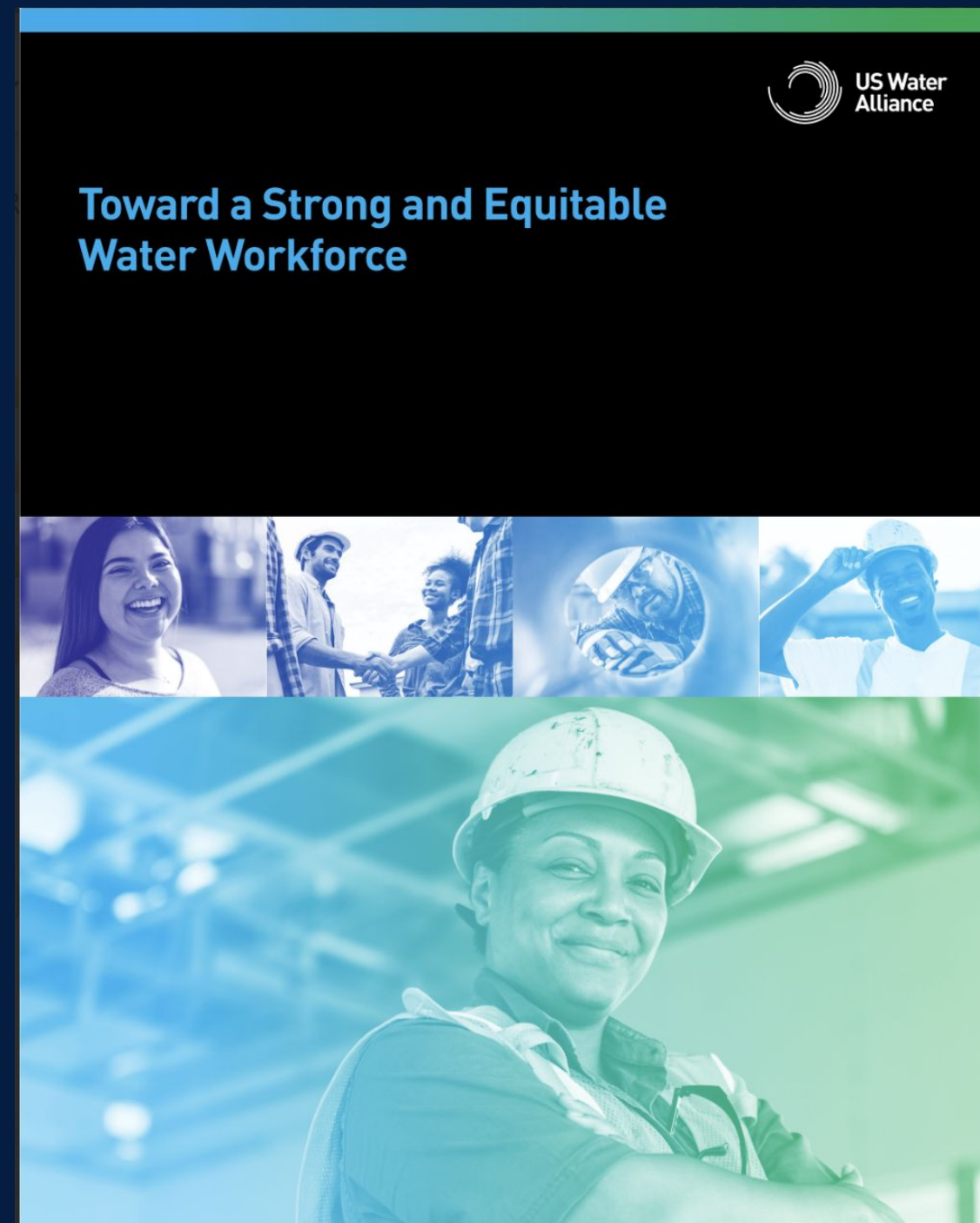
Stormwater Control Measures

And More!

Preliminary Information to Guide the Project

Report assembled by state government ~10 years prior indicated unfilled demand in career sector

Anecdotal reports of shortage of applicants to fill current positions and "silver tsunami" of employees eligible to retire



Defining the "Water Resources" Career Sector

- Some members of the project team envisioned the water resources sector focused on employees in water and wastewater treatment plants as well as installation of infrastructure, such as building facilities and laying pipe.
- Other members of the project team envisioned water resources sector focused on site assessments, wetlands restoration, and installation of green infrastructure.
- The team adopted an inclusive definition, with the former being established careers that still needed employees and the later being emerging careers seeing continued growth.

Employer Needs Assessment Survey

Goal

- Gather information to better understand local workforce needs
- Identify training needs associated with those workforce needs
- Assist with identifying opportunities for occupational analysis and input for supporting curriculum development

Survey Results

Current and Projected Workforce Need

- Environmental Manager, Environmental Sampling and Analysis Scientist, and Environmental Sampling and Analysis Technician

Identified Skill Gaps

- Basic knowledge in watershed issues
- Basic taxonomy
- Data analysis programs such as R
- General computer classes
- Identification of macroinvertebrates and fish species
- Interpreting topographic maps and construction plans
- Wetland identification/delineation
- More hands-on experiences



DACUM Functional Analysis Workshops

- Data Collection and Analysis
- Erosion and Sediment Control

DACUM Results:

Data Collection and Analysis

DACUM Research Chart for Data Collection and Analysis Function										March 10 & 11, 2025	
DUTIES		TASKS									
A. Perform Project Planning	A.1 Determine project objectives (e.g., goals, hypothesis, outcomes)	A.2 Obtain management approval	A.3 Assemble project coordination team	A.4 Coordinate with project partners and stakeholders	A.5 Obtain project funding (e.g., grant funds, budget, milestones)	A.6 Review historical data (e.g., reports, as-built, video footage)	A.7 Obtain work permits/property permissions	A.8 Determine project methodologies (e.g., sampling, assessment, testing)	A.9 Identify data collection sites		
	A.10 Establish data collection schedule	A.11 Create data management plans (e.g., study plan, retrieval, storage)	A.12 Create QA/QC plan	A.13 Develop data analysis plan	A.14 Create project assets (e.g., templates, forms)	A.15 Determine project resource requirements (e.g., tools, tech, staff)	A.16 Identify project-specific training and development needs	A.17 Delegate project tasks	A.18 Develop project evaluation plan (e.g., deliverables, model confirmation, timeline)		
	A.19 Determine safety										
	B.2 Maintain spare part and supply inventory	B.3 Test technical equipment (e.g., instruments, meters, motors)	B.4 Troubleshoot technical equipment	B.5 Repair malfunctioning tools and equipment	B.6 Perform equipment preventative maintenance (e.g., clean, batteries, fuses)	B.7 Maintain equipment records	B.8 Assemble technical equipment	B.9 Update equipment firmware and software			
	C.2 Confirm field work permissions	C.3 Determine site access locations	C.4 Gather field work supplies and equipment (e.g., bottles, paperwork, preservatives)	C.5 Verify equipment calibration	C.6 Provide field work information to public	C.7 Gather site information from public	C.8 Install monitoring equipment	C.9 Collect in situ measurements			
	C.11 Conduct environmental field assessment (e.g., biological, habitat, plant/animal)	C.12 Collect field samples	C.13 Coordinate sample processing with lab (e.g., chain of custody, schedule, hold times)	C.14 Restore work area to original condition	C.15 Verify industrial self-monitoring reports	C.16 Report nuisance conditions	C.17 Document field data (e.g., scan, transcribe, upload)				
	D.2 Subdivide field samples	D.3 Store field samples	D.4 Prepare sample per intended analysis	D.5 Prepare test reagents and standards	D.6 Analyze biological samples (e.g., identify, quantify, specify)	D.7 Conduct chemical analysis (e.g., instrumental, wet chemistry)	D.8 Verify quality control checks (e.g., standards, blanks)	D.9 Maintain lab environment (e.g., temperature, humidity, cleanliness)			
	D.11 Re-analyze anomalous results	D.12 Ship samples for commercial analysis	D.13 Input data into secure information management system								
	E.2 Create data optimization resources (e.g., scripts/macros, programs, templates)	E.3 Prepare data for analysis (e.g., clean, sort, filter)	E.4 Perform data exploration (e.g., compute summary statistics, initial visual representation, data gaps)	E.5 Conduct statistical analysis (e.g., test hypothesis, identify trends and relationships)	E.6 Develop predictive models (e.g., test, validate, calibrate)	E.7 Perform data interpretation (e.g., standards, models, targets)	E.8 Perform data visualization (e.g., figures, tables, maps)	E.9 Create draft report			
	E.11 Obtain stakeholder feedback (e.g., peer review, public comment)	E.12 Address stakeholder feedback	E.13 Finalize project report								

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Address stakeholder feedback
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DACUM Results: Erosion and Sediment Control



DACUM Research Chart for Erosion and Sediment Control Function

Produced for



DACUM Panel

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Cherish Vance

DACUM Facilitators - OSU

Kate Fergus
Tricia Hughes-Fitzgerald

7 duties & 127 tasks

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CENTER ON EDUCATION AND
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DACUM International Training Center
Columbus, Ohio

June 16 & 17, 2026

Additional DACUM Analysis

Charts Developed in Collaboration with Ohio EPA

- Class I Wastewater Collection System Operator
- Class II Wastewater Treatment Operator
- Wastewater Treatment Operator Class III
- Class IV Wastewater Treatment Plant Operator
- Class I Water Operator
- Class IV Water Supply Operator
- Collection System 2 Operator
- Environmental Specialist II-CDO
- Water Chemistry Data Collector

Content Standards Alignment

- Department of Labor Competency Model Clearinghouse
 - Reviewed the Water and Wastewater Competency Model
- Ohio's Career Field Technical Content Standards
 - Reviewed Construction Technologies
 - Mapped at strand level to six course outlines
 - Competency mapping in process
 - Reviewed Agricultural and Environmental Systems
 - Mapped at competency level to nine course outlines

Agricultural and Environmental Systems Career Field

Environmental Science for Agricultural & Natural Resources

Subject Code: 010720

Outcome & Competency Descriptions

Course Description
Students will study relationships on the farm and how they respond to change. They will examine fundamental concepts of environmental control. Students will interpret data and gather responses to current environmental issues.

- Competencies**
- 1.1.1. *Identify the components of a wastewater treatment system.
 - 1.1.2. *Identify the components of a wastewater treatment system.
 - 1.1.3. *Develop a plan for wastewater collection and treatment.
 - 1.1.4. *Describe the processes of wastewater treatment (e.g., mixing, coagulation, flocculation, disinfection, treatment system, effluent disposal, solids management).
 - 1.1.5. Develop a plan for wastewater collection and treatment.
 - 1.1.6. Explain the importance of wastewater collection and treatment.
 - 1.1.7. *Apply the principles of wastewater collection and treatment.
 - 1.1.8. Identify the components of a wastewater treatment system.
 - 1.1.9. Give and receive feedback on wastewater collection and treatment.
 - 1.1.10. Adapt plans for wastewater collection and treatment.
 - 1.1.11. Recognize the importance of wastewater collection and treatment.
 - 1.1.12. Identify the components of a wastewater treatment system.

1 | Environmental Science for Agricultural & Natural Resources

Manage reproduction practices in animal populations across habitats to achieve the desired outcomes and specific goals.

- Competencies**
- 2.6.1. Identify factors that lead to reproductive readiness.
 - 2.6.2. Compare and select superior traits.
 - 2.6.3. Compare and select superior traits.
 - 2.6.4. Identify normal and abnormal management practices.
 - 2.6.5. Understand the rationale for breeding (e.g., sex-sorting, natural and selected breeding systems).
 - 2.6.6. Understand the rationale for embryo transfer, natural mating, and artificial insemination.
 - 2.6.7. Describe requirements for gestation within different environments.
 - 2.6.8. Describe ethical and responsible practices (e.g., spaying, neutering, containment, culling, euthanasia).

Strand 3
Learners will use modern biotechnology to improve animal health and productivity.

- Competencies**
- 3.1.1. *Design a research plan, including hypotheses, objectives, variables, methods of study, and data analysis.
 - 3.1.2. *Examine sources for credible information.
 - 3.1.3. *Apply sampling methods and procedures for systematic data collection.
 - 3.1.4. *Explain the importance of accurate data collection.
 - 3.1.5. *Document results of the experiment, including purpose, experimental design, data, and conclusions.
 - 3.1.6. *Create, interpret, and use graphs.
 - 3.1.7. *Compute measures of central tendency and dispersion.
 - 3.1.8. *Define the concepts of probability and statistics.
 - 3.1.9. *Use t-test and p-value to determine statistical significance.
 - 3.1.10. *Describe the relationship between experimental results and statistical analysis.
 - 3.1.11. *Draw conclusions based on experimental results and statistical analysis.
 - 3.1.12. *Prepare and present findings.
 - 3.1.13. *Evaluate experimental results.
 - 3.1.14. *Describe how biotechnology is used in agriculture.

10 | Environmental Science for Agricultural & Natural Resources

Outcome 6.6. Wastewater Operations

Monitor the wastewater collection and treatment methods for a specific site.

- Competencies**
- 6.6.1. *Identify the components of a wastewater treatment system.
 - 6.6.2. *Collect wastewater samples using industry approved standard operating procedures.
 - 6.6.3. *Identify, analyze, and reconcile the components of wastewater samples using industry-approved standard operating procedures.
 - 6.6.4. Identify normal and abnormal conditions in wastewater collection and treatment systems.
 - 6.6.5. *Describe the processes of wastewater treatment (e.g., mixing, coagulation, flocculation, disinfection, treatment system, effluent disposal, solids management).
 - 6.6.6. Identify and describe methods for cross-connection and backflow prevention.
 - 6.6.7. Locate, identify, and inventory wastewater assets.

Outcome 6.7. Solid Waste and Renewable Resource Management

Control and process solid waste using current and alternative technologies.

- Competencies**
- 6.7.1. Collect, analyze, and treat solid waste materials (e.g., livestock mortalities, manure, garbage, food waste).
 - 6.7.2. *Distinguish the risks associated with solid waste accumulation, utilization, and disposal.
 - 6.7.3. *Determine an acceptable site for solid waste disposal.
 - 6.7.4. *Compare the processes of aerobic and anaerobic waste decomposition.
 - 6.7.5. Describe and monitor solid waste disposal procedures and management practices (e.g., recycling, burial, bio-digester).
 - 6.7.6. *Describe and monitor solid waste disposal procedures and management practices (e.g., composting, incineration, recycling, burial, bio-digester).
 - 6.7.7. *Explain the control processes and potential uses for solid waste byproducts (e.g., leachate, ash, landfill gas, biosolids, methane, manure).
 - 6.7.8. Describe standard operating procedures and identify design requirements for specific purposes (e.g., landfill, lagoon, leachate treatment).
 - 6.7.9. Evaluate site closure methods and post-closure monitoring.
 - 6.7.10. Determine type and volume of solid waste generated by an operation or facility.

Outcome 6.8. Contaminants and Pollution Control

Assess an affected area, determine the source and type of contaminant, and respond.

- Competencies**
- 6.8.1. *Collect, record, and analyze environmental samples and interpret the results.
 - 6.8.2. *Determine the types, sources, and impact of natural, human-made contaminants, and high-risk contaminants.
 - 6.8.3. *Monitor, analyze, and quantify levels of contaminants from point and non-point sources.
 - 6.8.4. Monitor noise and light pollution and recommend abatement measures.
 - 6.8.5. *Describe the environmental impact from both industrial and nonindustrial processes.
 - 6.8.6. Identify, comply with, and implement best management practices for contaminant control, remediation, and prevention (e.g., biological, sanitation, buffer strips).
 - 6.8.7. *Identify, describe, and recommend remediation strategies for the release of contaminant to soil, surface water, or groundwater.
 - 6.8.8. Monitor and conduct remediation activities.

29 | Environmental Science for Agricultural & Natural Resources | 2026



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Questions and Feedback

1. How does our work align with demand you are seeing from employers? Interests you are seeing from students?
2. Does the process seem well-aligned with assessing demand/future demand and aligning the skill set?
3. Any feedback, guidance, recommendations?
4. Are you interested in collaborating with the team if there are opportunities? If so, please add your name, school, and e-mail address to our contact list.

Climate-Ready Workforce Project Website

<https://go.osu.edu/crw>

- Needs assessment report
- DACUM charts
- Links to trainings and project partners



Thank you!



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