Toward an equitable blue-green economy in Southeast Louisiana
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The Coastal Index in Brief: Toward an equitable blue-green economy in Southeast Louisiana
Executive Summary

At the federal level and in states and cities across the country, leaders are exploring how to connect job creation and equity goals with infrastructure improvement and climate change mitigation. These connections are especially relevant to Southeast Louisiana, where leaders have long understood the risks associated with coastal land loss and the need for adaptation and restoration. But Louisiana also has a very real opportunity to reduce social and economic inequality through massive coastal restoration, flood risk reduction, and climate mitigation projects.

This report examines the alignment of economic development, environmental adaptation, and equitable inclusion efforts in Southeast Louisiana. We focus on critical opportunities where environmental investments are being made: Mitigating flood risks and upgrading water infrastructure; protecting and restoring the coast; and reducing greenhouse gas emissions. Together, this “blue-green” economy offers the region a pathway to a more economically diverse and equitable future.

The impending changes to Southeast Louisiana’s economy and its relationship with energy and water present both opportunities and risks. This report illustrates those opportunities and risks, providing analysis for reflecting upon the path of the emergent blue-green economy, informed by interviews with 30 people who work locally on these issues. We highlight their insights on regional advantages, obstacles to greater workforce inclusion, and examples of equitable practices, among other topics. The interview data is supplemented with quantitative data on employment to assess skill demands and the current level of inclusion in blue-green economy. Below are some of the report’s main findings:

• The blue-green economy is holistic: It includes not just core design and construction jobs but also work across work sectors. Water management connects to broader regional issues like prioritizing racial equity, shifting away from extractive and emissions-intensive industries, diversifying the economy, and supporting communities through economic and environmental change.

• When reflecting on the sector’s evolution, stakeholders see positive change and stalled progress. They have observed improvements in framing, prioritization, policy, and planning, but point to gaps in thinking about project maintenance and local workers and businesses. Community engagement and community-driven processes, green infrastructure, holistic integration, and equity were key areas of uncertainty and differing perspectives on the trajectory over time.

• Many water and green jobs use skills already present in Southeast Louisiana’s workforce, such as mechanical and construction skills, while some of these jobs rely on enhanced skills and new approaches. Blue-green jobs vary widely in how much they require STEM knowledge, and just as the blue-green economy is holistic, so are the skillsets for the work.

• Equity is a priority for many stakeholders, though they define inequities and equitable outcomes in numerous ways. Concentrating
on the nuances of equity in the blue-green economy is a key area for future work.

- Access to the blue-green economy is uneven. For example, white and male workers are over-represented in water and green jobs, which is reflective of race and gender segregation in key occupations like engineering and construction. Our data suggest that interventions targeting the underlying mechanisms maintaining inequities should encourage changes to business-as-usual hiring and contracting practices, diversify pathways into water and green jobs, and equitably value the water and green knowledge of all residents.

The road to an equitable blue-green economy is not fully paved in Louisiana or anywhere else, but our findings point to two general pathways toward more equitable outcomes. The first pathway is greater diversity and inclusion in water and green industries. Design and construction firms, major infrastructure projects, and environmental agencies can drive opportunities to local workers and businesses. To succeed in project planning and implementation, diverse skills and knowledge from all corners of the region should be included and valued, especially communities of color and frontline communities who have been harmed during previous phases of regional change. The second pathway is to dissolve barriers between design and project expertise in blue-green industries and broader efforts across the region to address systemic inequities and support communities through periods of change, much of which occurs in nonprofits and community-based organizations. Equitable transition through the blue-green economy requires collective regional problem-solving. The practices and outcomes of that collective work can meet the high stakes in Louisiana and beyond.
Introduction

Recovery from Hurricane Ida finds our region again contemplating its future. Significant flood risk and very high poverty rates have long represented major weaknesses in Southeast Louisiana’s ability to be resilient. To inform decisionmaking around these vulnerabilities, The Data Center has repeatedly quantified and highlighted issues of sustainability and racial inequity in the region starting in 2010.¹

Last year, the COVID crisis laid bare Louisiana’s vulnerabilities with death rates and job loss rates among the highest in the nation.² Then the murders of George Floyd, Breonna Taylor, Ahmaud Arbery, and others catalyzed a new racial reckoning in the U.S. And an unprecedented number of named hurricanes and a record-breaking wildfire season brought climate change into much sharper focus.³

Leaders in Louisiana have long understood the regional risks associated with climate change. The state prioritized mitigating sea level rise and coastal land loss with the release of the first coastal master plan in 2007 and its ensuing updates. Then economic development leaders began understanding the job creation potential of restoring the coast and mitigating flood risk after the 2010 Deepwater Horizon oil spill and the 2016 floods led to an infusion of billions of dollars in funding.

But leaders have only recently begun to consider Louisiana’s very real opportunity to reduce inequity through massive coastal restoration, flood risk reduction, and climate mitigation projects.⁴ Louisiana has the potential to generate groundbreaking solutions to entrenched problems of inequity through its investments in flood and climate mitigation that could lead the way for the nation.

In 2021, links between jobs, infrastructure, climate, and equity are receiving renewed attention, at the federal level and in states and localities across the country. This report examines the alignment of economic development, environmental adaptation, and equitable inclusion efforts in Southeast Louisiana. We focus on critical opportunities where environmental investments are being made: Mitigating flood risks and upgrading water infrastructure; protecting and restoring the coast; and reducing greenhouse gas emissions.⁵ Together, this “blue-green” economy offers the region a pathway to a more economically diverse, equitable, and resilient future.

To assess the sector’s recent past and outlook for the future, we conducted 30 interviews with leaders and experts working broadly on water and coastal issues in Southeast Louisiana. By design, interview participants were recruited to reflect the breadth of regional expertise related to water and represent diverse viewpoints (see Appendix C). The interviews surfaced insights on regional advantages, obstacles to greater workforce inclusion, and examples of equitable practices, among other topics. We supplemented the information gained from these interviews with quantitative data on employment to assess the current level of inclusion in the blue-green economy, skills in the regional workforce, and the extent to which emerging industries can leverage these skills.

As the national economy emerges from the COVID-19 recession, it’s important to recognize that recessions and recoveries are periods of durable change for regional economies. For example, the “oil bust” of the 1980s accelerated
existing industry trends in the region (see Figure 1). In 1980, New Orleans’ major trade-related sectors — oil and gas, manufacturing, wholesale trade, and transportation — accounted for roughly one of every three jobs. By 2000, this share had fallen to one of every five. Meanwhile, services and retail — including tourism and white-collar professional industries — increased to over half of New Orleans metro employment during the oil bust. Similarly, in the Houma-Thibodaux metro, services and retail employment overtook production and trade by the end of the 1980s.

**Figure 1**
Share of employment in New Orleans MSA

![Chart showing employment trends in New Orleans MSA](image)

**Figure 2**
Share of employment in Houma-Thibodaux MSA

![Chart showing employment trends in Houma-Thibodaux MSA](image)

When COVID struck, the number of jobs in Louisiana fell by 14 percent between February and April 2020. In greater New Orleans, where the hospitality sector was hit especially hard, employment fell by 19 percent. While the recovery outlook after such an unprecedented shock remains uncertain, cycles of recovery in the wake of deep recessions historically have been periods of change. Employment levels eventually recover, but the mix of industries that make up regional economies change.

The impending changes to Southeast Louisiana’s economy and its relationship with energy and water present both opportunities and risks. This report aims to highlight pathways to a more inclusive, diversified, and resilient regional economy in the near and medium-term. The report begins with a description of the green and water economy and its pivotal role in Southeast Louisiana’s regional future. These sections summarize some of the high-level assessments from local stakeholders, as reflected in the interviews. The following sections drill down to two aspects of the green-blue economic development: first, understanding skills associated with jobs in the green-blue economy and, second, promoting equitable aims and outcomes through the blue-green economy.

Background: The promise and challenge of green and water jobs

Interest in green economic development grew nationwide in response to concerns about environmental pollution, workers’ wellbeing, and shrinking opportunities in manufacturing in the 1970s and 1980s. In Southeast Louisiana, enthusiasm for green economic development is currently associated with two broad, emerging sectors:

- Coastal and water management (“blue” or “water”) industries focus broadly on water infrastructure and flood mitigation, including investments related to coastal protection and restoration. Among the varied jobs involved with large water management projects, some of the largest in terms of employment are engineers who design infrastructure projects and building trades occupations that implement their construction. Other jobs in infrastructure, science and technology, and planning and community development could also be considered “water” jobs.

- “Green jobs” focus on restoring or enhancing environmental quality, such as reducing pollution and greenhouse gas emissions and conserving healthy ecosystems. These might include jobs such as solar panel installers, recycling workers and coordinators, environmental engineers, and landscape architects. Some green jobs may be generated indirectly as efforts to reduce greenhouse gas emissions, shift to renewable energy, and create sustainable infrastructure reverberate throughout the economy. These might include construction and building inspectors, commercial and industrial designers, and transportation managers.

To be clear, these categories of green and blue jobs are not mutually exclusive. For example, wetland restoration occupations, such as hydrologists, machine operators, planners, and geographic information systems technicians, are all categorized as both “blue” and “green.” Regardless of the category, these industries hold the potential for significant job creation and economic change, while addressing Louisiana’s environmental challenges. Major economic transitions in the past have typically created winners and losers, but a holistic, planned approach to economic development and environmental policy can counterbalance the uneven stresses of transition on disadvantaged people and places.

For some stakeholders, an equitable transition means that support for the future wellbeing of workers and communities tied to fossil fuel...
1 BACKGROUND: THE PROMISE AND CHALLENGE OF GREEN AND WATER JOBS

industries must be inextricable from energy and climate policy. For other stakeholders, an equitable transition requires a broader approach to systemic societal change.\textsuperscript{13,14} They argue that this transition must make high quality jobs accessible to low-income communities of color that have been historically excluded from economic opportunities and that tend to bear the steepest cost of environmental problems.\textsuperscript{15} Moreover, an equitable transition can extend beyond green jobs to include poverty alleviation, democratic participation in planning and decisionmaking, and fair distribution of the costs of climate change and the disruptive consequences of mitigation and adaptation.\textsuperscript{16} (See Appendix A for additional background.)

One-third of interview participants talked about their water management or coastal work explicitly in terms of equitable transition. Across all participants, perspectives were divided on the role of oil and gas industries in the future regional economy. Some imagine transitioning fully away from fossil fuel industries, while others see coastal restoration and water management ideally as a complement to maintaining existing industries, including oil and gas. Regardless, participants from across sectors agree that local communities should benefit and shape the transition process. The quotes below demonstrate perspectives from two interviewees on how an equitable transition means supporting both legacy industry workers and historically excluded workers as the regional economy changes.

“Being on the ground, I don’t see the [offshore] industry coming back the way it was before. I don’t think it’ll ever be in the heyday of what it was and what it meant to Louisiana. So, I think there’s got to be a movement and a shift for people, so that there’s something for them...I think there [needs to be] fair wages for work. And a lot of the local folks were passed up for offshore jobs...we have to invest in our own and getting them trained up to be able to move into those areas. But I think we’ve got to move into more industry as well.” (public)

“I certainly want a just transition. I don’t want this to happen so fast that there’s so many people unemployed. If we switch to renewables tomorrow, everybody would be out of a job. My dad would be out of a job. My brother would be out a job. But I do want a slow transition. I do want to provide opportunities to people...What happens when you take tribal members who are first-generation high school students and offer them a job where they can provide for their families? Of course, they’re going to take it. And then you tell them that what they’re doing is damaging the ecosystem. So now more important to me is providing people opportunity to lift themselves out.” (nonprofit)
Equitable regional futures and the blue-green economy

As the regional economy changes, identifying new opportunities and bringing leaders together around a shared vision is essential for setting priorities, aligning efforts, and setting a new direction. In this section, we outline Louisiana’s recent history around energy and water management. We then examine the interviewees’ ideas about how to make the investments in water management more impactful, examine differences in opinion about what water management includes, and examine their visions for the future of Southeast Louisiana where we find important synergies. We conclude with their perspectives on the region’s advantages and progress to date.

2.1 Louisiana’s past, present, and future bring together energy, coastal management, and water infrastructure

For years, Louisiana has been working on climate adaptation in the form of coastal protection and restoration. Land loss, subsidence, and sea-level rise — and thus, coastal protection and restoration activities — have long been key priorities for state leadership. The Coastal Protection and Restoration Authority (CPRA) was established in 2005 after Hurricanes Katrina and Rita to bring hurricane protection, conservation, and coastal restoration planning and implementation together under one roof. The Coastal Master Plan, which guides protection and restoration projects, has been updated every five to six years, approved by the state legislature and supported by governors regardless of political party affiliation since the 2000s. As a 50-year plan backed by billions of dollars, the Coastal Master Plan remains exemplary in scale and scope.

Compensation from the 2010 Deepwater Horizon oil spill provided an influx of funding over 15 years to carry out coastal projects. Nevertheless, the most recent Coastal Master Plan (2017) outlines a $50 billion budget for the set of projects required to stem coastal land loss over time, but $18 billion in total funding has been identified thus far through federal and environmental remediating sources. For local governments in Louisiana are also prioritizing blue-green infrastructure. (See Appendix B for a glossary of key blue-green infrastructure terms.) For example, the City of New Orleans has begun to take initial steps to incorporate water management into infrastructure and zoning policies. In 2018 and 2019, the city council implemented a permeable pavement
requirement for all new commercial parking spaces, and a new stormwater code for types of private development and redevelopment in the Comprehensive Zoning Ordinance. New Orleans has sought and secured funding for water management and green infrastructure projects, most notably through a $141 million HUD National Disaster Resilience Competition grant for the Gentilly Resilience District. In 2020, JP Morgan Chase committed to investing $5 million in New Orleans for blue-green infrastructure, and related workforce and business development and opportunities. As these local projects accumulate, they can provide testing grounds for sustainable infrastructure and water management solutions with potential for wider adoption in the region and beyond.19

In August 2020, Louisiana Governor, John Bel Edwards, set the target of achieving net-zero greenhouse gas emissions20 statewide by 2050 and charged a Climate Initiatives Task Force with making recommendations for strategies and actions (the Task Force submitted its report to the governor in February, 202221). Louisiana joins 23 other states and the District of Columbia (at the time of writing) that have adopted emission reduction targets through executive order or legislation.23 To date, Louisiana is the only state in the South designing and innovating its own routes to net-zero emissions through the adoption of an emissions target24 — and the first in the Gulf South to join the U.S. Climate Alliance, a coalition of states developing climate policies aiming to achieve the goals set in the Paris Agreement.25 In 2021, the U.S. also announced the target of net-zero emissions nationwide by 2050, setting the stage for collaboration across federal and state levels. Green jobs, clean energy, and climate resilient infrastructure are federal policy priorities.26 Whether legislative action will follow these priorities remains to be seen, but additional federal support could make its way to bolster Louisiana’s already evolving work in these areas. Because of its emissions inventory, Louisiana’s pathways to reducing emissions will chart new ground. The state’s carbon emissions from fossil fuel combustion were third highest in the nation in 2018, exceeded only by Texas and California.27 The majority of Louisiana’s emissions come from industrial sources. These fossil fuel refining and chemical manufacturing industries make up a much larger share of carbon emissions than in other states.28 In fact, 20 industrial facilities account for the majority of Louisiana’s emissions.29 Transportation and electric power generation produce roughly two-thirds of national emissions but around one-third of emissions in Louisiana (see Figure 3).


Louisiana’s electricity generation relies on natural gas at a greater rate (71 percent) than the nation as a whole (39 percent).30 Nationwide, electricity comes from a plurality of sources. Renewable energy sources fuel 20 percent of electricity generation nationally and 4 percent in Louisiana.31 Louisiana lags behind other states in installed capacity for wind, now the nation’s top renewable, but interest is growing in the state’s capacity for offshore wind generation.32 The state may also be well positioned to link the Coastal Master
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Plan with climate mitigation by incorporating greenhouse gas storage as a measurable outcome of wetland conservation and restoration.34

2.2 Visions for a more equitable, more integrated blue-green economy

The blue-green economy is expected to see billions of dollars in public and private infrastructure investment. This investment can generate demand for good-paying jobs, accessible to workers with various skill backgrounds. At the same time, many stakeholders share concerns about whether the region will manage to effectively make the needed investments in environmental adaptation, to maximize spillover benefits for local workers and businesses, and to realize equitable returns as previous periods of economic transition have not. How can these investments ignite a transformative, inclusive impact on the regional economy?

In order to identify possible future directions, we asked 30 leaders and experts working broadly on water and coastal issues in Southeast Louisiana to: 1) define what activities are part of water management, 2) describe ideal outcomes of their work on water specifically, and 3) discuss their visions for a better future in Southeast Louisiana.

Interviewees typically described the emerging blue-green economy as encompassing the public sector, planning, policy, design and engineering firms, nonprofits and community groups, construction, scientific expertise, project and infrastructure maintenance, and materials transport. They raised two ways for current investments in blue-green industries to be more transformative:

- Integrate larger climate issues with water management and plan for a comprehensive “blue-green” economy.
- Incorporate initiatives to help local communities and economies to adapt, including ensuring local residents have access to jobs and a prominent voice in decisionmaking.

Correspondingly, they drew links between climate change, energy, infrastructure, water management, and equitable outcomes. Just under half of interviewees brought up renewable energy, energy efficiency, and reducing emissions as they described their visions for their own work on water and for the future diversified economy of Southeast Louisiana. Relatedly, most interview participants saw at least one of the following areas as integral to the blue-green economy and water management:

- climate-related migration or relocation
- adapting in place or nonstructural adaptation
- housing
- financial and insurance management
- engaging productively with the oil, gas, and chemical industries on transition
- navigating general processes of coastal and regional economic change.

In other words, they see understanding and managing community change as just as critical to their work and to the region’s future as major infrastructure and environmental issues. One public stakeholder from a frontline parish succinctly summarized, “There’s going to be somewhat of


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... an economy built around this sort of palliative care. How do you get these communities through this transition? A stakeholder from a private firm agreed, “I think there’s a whole industry in climate change planning that has to do with helping people find ways to fund this transition process.”

Most participants connected water management to all types of public infrastructure. They envision that, going forward, traditional water, housing, and transportation infrastructure will intersect with water management and climate mitigation. For some, water management and climate resilience serve to protect the region’s critical economic infrastructure like roads, rails, and ports. Others view blue-green infrastructure as a “cohesive whole,” including finding ways to leverage funds to serve community and environmental needs through infrastructure and to avoid duplication and waste. These visions of the blue-green economy align with intentions at the state and federal level to link infrastructure investment with climate mitigation and adaptation. The proposed federal infrastructure bill currently being considered by Congress (at the time of this writing) includes funding for climate disaster resilience, energy and water systems, electric vehicle charging stations, and other measures related to climate change.35

Yet, to build this equitable and inclusive vision, the regional blue-green economy must figure out how to incorporate differences in perspective about scope (e.g., urban/coastal contexts) and priorities (e.g., environmental/social outcomes). In regard to scope, around half of the interview participants see coastal and urban water issues as one connected system of natural processes, planning, design, and infrastructure. The other half perceive urban flooding and stormwater management as a separate problem, and a separate field, from coastal restoration and surge protection.

In regard to priorities, one interviewee noted the need for coastal restoration and water management to have equitable social impacts and described the funding as a chance to “transform the economy and who benefits from it.” Another expressed their motivations more narrowly in terms of coastal restoration, “to make sure the money doesn’t get squandered on non-coastal restoration related projects and that the projects that are picked are science-based.” Others struck a middle ground: “Do you really want to get the project done right, or do you want to generate this economy? I think there’s a little give and take there that needs to be thought through.” Overall, when prompted to describe ideal outcomes of their specific water work, all participants included environmental considerations like climate and flood mitigation, biodiversity, and land-water conservation. However, half described social goals like affordable housing, equitable job access, and democratic participation in planning for risk reduction.

To be sure, priorities can differ across urban and coastal settings, partly due to differences in sources of funding. Coastal management more often receives federal and state funding that has emphasized flood protection and ecosystem restoration, while funding for urban projects may come from federal agencies with a history of tying investment to social equity. For example, the Gentilly Resilience District is funded by the Department of Housing and Urban Development.

These differences do not have to be the barriers they may seem to be. For example, the urban and coastal contexts might be able to inform each other toward equitable outcomes. Stakeholders specifically highlighted the potential for urban water projects to generate lessons on equity, opportunity, and inclusion that could inform future iterations of coastal projects. One common concern raised across the interviews was the need...
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for more work on regional-level governance, organization, leadership, and messaging. The Louisiana Watershed Initiative, launched in 2018, reflects recent efforts by the state to approach water management and flood mitigation at the regional level.

When prompted to discuss their visions for a better future in Southeast Louisiana, interviewees shared a more expansive and overlapping set of visions that span environmental and social dimensions (Table 1). Interviewees’ visions for the region’s future are shaped by their work experiences in the blue-green economy and how the sector is emerging. They also bring these visions to their work, influencing the sector’s future directions. These visions point to messaging that can be effective in bringing groups together, even if their perspectives differ on scope and priorities.

<table>
<thead>
<tr>
<th>TABLE 1 VISIONS FOR A BETTER FUTURE IN SOUTHEAST LOUISIANA BEHIND WATER MANAGEMENT WORK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ideal visions for Southeast Louisiana’s future that were shared by at least five interviewees, listed in order of descending prevalence. Some interviewees are highly motivated by one or two of these visions. Others spoke about nearly all of them.</td>
</tr>
<tr>
<td><strong>Green economic transition.</strong> A shift from extractive industries to renewable energy, ecotourism, coastal restoration, or other blue-green industries.</td>
</tr>
<tr>
<td><strong>Equity.</strong> A more equitable future, often described in terms of flood risk, access to the blue-green economy, wellbeing and quality of life, funding, and infrastructure.</td>
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<tr>
<td><strong>Healthier ecosystems.</strong> A desire to see improved environmental quality and to stem losses of land and ecosystems.</td>
</tr>
<tr>
<td><strong>Communities adapt successfully.</strong> A region where people can continue living safely in places they want to be, despite changes.</td>
</tr>
<tr>
<td><strong>Economic diversification.</strong> A more diverse economy with implications for new job creation, business attraction, and people to stay rooted in their communities. This also includes the adaptability of work and businesses to ongoing challenges of managing water and climate change.</td>
</tr>
</tbody>
</table>
Reduced flooding. A future where people can live and work in the region without worrying as much about flooding as they do today.

2.3 Reflections on regional advantages

Adapting to environmental change means different things for different places. Regions vary in their climate challenges, available resources, industry composition, and cultures, for example.36 These conditions may shape a region’s specific set of challenges and opportunities. Many interviewees agreed upon elements of Louisiana’s coastal and water industry that they view as supportive of success in the long run (Table 2). Their responses give a snapshot of regional advantages and suggest building blocks for the continued development of the sector.

<table>
<thead>
<tr>
<th>TABLE 2</th>
<th>REGIONAL ADVANTAGES IN COASTAL RESTORATION AND WATER MANAGEMENT AS PERCEIVED BY STAKEHOLDERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ordered from most common (nearly half of interviewees) to least common (two or more).</td>
<td></td>
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<tr>
<td>Frontline advantage timing and experience, the urgency of the problems</td>
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<tr>
<td>Knowledge for local and transferrable use, generated through learning from mistakes and challenges</td>
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<tr>
<td>Strong, established body of science and modeling, and scientific expertise in and about the region</td>
<td></td>
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<tr>
<td>Commitment to place among those working on water and coastal issues in Louisiana</td>
<td></td>
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<tr>
<td>Coastal protection and restoration in progress on a large scale</td>
<td></td>
</tr>
<tr>
<td>Evidence that “things are happening,” or in other words, science and practice are blending</td>
<td></td>
</tr>
<tr>
<td>Visible work on equity, and individuals are “forward-thinking” even if systems constrain</td>
<td></td>
</tr>
<tr>
<td>Work on planning with communities is in progress</td>
<td></td>
</tr>
<tr>
<td>Funding advantages: the DWH settlement and post-disaster funds, local governments getting grants</td>
<td></td>
</tr>
<tr>
<td>A less partisan issue in Louisiana than elsewhere, and holds more reliable support</td>
<td></td>
</tr>
<tr>
<td>The natural environment: delta and river systems, diversity of ecosystems with restoration possibility</td>
<td></td>
</tr>
<tr>
<td>Economic relevance of the “working coast” demonstrates how coastal issues impact people</td>
<td></td>
</tr>
</tbody>
</table>
Longstanding pride in the use and productivity of the region’s natural resources

Opportunity to work with industry on transition and build transferrable knowledge from the process

Though the interviewees spoke openly about many advantages, a handful also struggled with the topic. Two said that the region has no advantages for the blue-green economy, while an additional two acknowledged advantages but added — in contrast to frontline timing — that the region is disadvantaged by starting water and green work late in comparison to other places.

The region’s water and green sectors are a space for collective knowledge and problem-solving around pursuing equitable outcomes. How to put goals of equitable transition into practice remains uncertain — across Louisiana, in national policy, and globally. Similarly, the pathways for water infrastructure and green jobs to become an inclusive engine for regional economic growth are not yet fully drawn. In addition to figuring out how to best build up homegrown green and water businesses, interviewees from across nonprofit, private, and public sectors see the potential for local projects to generate generalizable lessons on integrating equity into water and green work:

We have these scientists, these big architects who are coming here...But the opportunity where we can lead is, how do we make sure that [water and green investments] are sustainable and equitable?...So that it lasts and actually transforms how we live our lives, improves our lives here on the ground, through the jobs for our residents, especially low-income and communities of color. I think that’s important for any city globally...that’s what we can show here...Because if the same people benefit, we didn’t win. (nonprofit)

How do we expect people to respect [trees and water] when they haven’t been respected? It’s all tied together. The part [of green industry] I think we could do and teach other cities is how to use it for serious workforce development and wealth building for people who are poor. (private)

The way that we’re anticipating risk over a longer time horizon, how we take that information and apply it to a planning process that engages the public, a multi-disciplinary effort to really thinking through a societal evolution as a result of what we know about risk. I think that is transferrable...[for example] how do we think about site selection for affordable rental housing [in the context of environmental risk]? There’s a perception that there’s less money in that type of niche expertise. There’s just not a lot of focus placed on it. (public)
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This valuable learning has already begun. Many interviewees mentioned that the lens on systemic inequities they now bring to their blue-green jobs has been sharpened, influenced, and ignited by experiences working on and living with water in Southeast Louisiana.

2.4 Assessments of progress to date

When asked about how water management in Louisiana has changed over time, the interview participants’ most common observation was that water is becoming more of a regional priority. The general population and key actors in the public, civic, and private sectors better understand water management, coastal protection and restoration, and climate change — and their importance for Southeast Louisiana. At the same time, the interviewees have not yet seen water management prioritized to match the need across levels of governance. Several added that work remains to improve public understanding of water management and green infrastructure.

The interview participants also expressed concerns that water management practices, projects, and programs have remained in model or study phases for too long given the urgency. This gap was noted more often by people of color. A handful of interviewees also recognized pilot projects as positive steps. For them, initial models raise up examples from the region, provide a way to collect data over time on processes in local context, and materialize something for people to “grit their teeth on” with limited initial funding. Still others lamented that the region could struggle to demonstrate leadership on water and climate adaptation without the visibility of implemented projects and support from the community as they see infrastructure working to reduce flooding at scale.
### TABLE 3
**IMPROVEMENTS AND GAPS IN REGIONAL WATER AND GREEN SECTORS OVER TIME**

<table>
<thead>
<tr>
<th>Improvements</th>
<th>Both Positive Change and Stalled (most common category)</th>
<th>Gaps</th>
</tr>
</thead>
<tbody>
<tr>
<td>• No longer framing water management as only a modeling or technical problem.</td>
<td>• <strong>Prioritization.</strong> Water is more present in policy and public understanding, but still not an urgent and comprehensive priority.</td>
<td>• Respect for and investment in project maintenance and maintenance workers.</td>
</tr>
<tr>
<td>• Planning processes and knowledge about planning have improved over time.</td>
<td>• <strong>Community engagement.</strong> Some say more widespread and better incorporated in projects, others say still weak or even weakening.</td>
<td>• Water and green workforce and businesses in the region still not well understood; Are they are getting work from these projects and investments?</td>
</tr>
<tr>
<td>• Water policy and regulation changes in the City of New Orleans.</td>
<td>• <strong>Green infrastructure shift.</strong> More visible and more investment, but much GI still in pilot phases.</td>
<td>• Tying water management to needed infrastructure improvements and repairs.</td>
</tr>
<tr>
<td></td>
<td>• <strong>Integration.</strong> Some saw improved coordination across state agencies and sectors, and models and projects are also more integrated. Others still observed water management approaches as siloed and redundant.</td>
<td>• K-12 and university education in areas relevant to water, coastal, and climate issues.</td>
</tr>
<tr>
<td></td>
<td>• <strong>Equity.</strong> More discussion about equity and more inclusive practices, but racism and exclusion still a problem in these sectors.</td>
<td>• Integrating culture and cultural impacts of environmental change into water management.</td>
</tr>
</tbody>
</table>

Interviewees observed that the region’s water management and coastal planning processes have already iterated to better reflect the complexities of adaptation since the 2000s. For several interview participants, LASAFE, the successive versions of the Coastal Master Plan, and the Louisiana Watershed Initiative, while by no means perfect, reflect progressive learning in adaptation planning and productive dialog among residents and experts.38
Community engagement was the most frequently mentioned gap in regional water management. At the same time, a subset of those who identified this gap, as well as other interviewees, noted positive (if not yet optimal) movement on community engagement. Another subset warned that they have seen engagement and organizing weaken over the recent past. Interviewees have observed more emphasis and action toward diversity and inclusion within water management since they began working in the field. However, this observation of change was not necessarily widespread — it was, for example, not raised by anyone working primarily in urban water contexts, and a similar portion of interviewees highlighted persistent inequities.

For now, concerns about squandering this window of opportunity are prominent among stakeholders. Half of the interviewees explicitly said they worry constantly about whether the funds coming to Louisiana for the broad purpose of adapting to environmental risk — coastal protection and restoration, green and water infrastructure, flood protection, and climate mitigation — will be leveraged toward optimal ends, regardless of how their viewpoints differ on exactly what those ends should be. Interviewees from across the public, nonprofit, and private sectors expressed this sentiment:

_Hundreds of millions of dollars for science and coastal restoration is a lot of money. And so you’ve got to think about like, how am I going to get the results into the hands of the people who really need them? (public)_

_The problem isn’t so much that we’re not spending money. We’re spending tons of money. Part of the problem is that none of that money goes to building up capacity so everything is contracted out to consultants...It just doesn’t aggregate. There’s no coherence, I think, unless there’s a community-driven push to say, we demand a coherent strategy. (nonprofit)_

_A lot of the time with these projects, especially when, you know, a lot of huge dollars come in the mix...You have a lot of different parties come in from different regions, everywhere, because their only goal is to reap the benefits of the dollar. Whereas I think if those dollars could benefit the community and those stakeholders in the community, I think you have a win-win in that situation. (private)_

An interviewee who was working in a state agency summed up the stakes of the moment for Louisiana by saying, “There’s a lot of work to be done. It’s an immense privilege that Louisiana has this opportunity. A lot of other states don’t have this opportunity.”
The question of workforce skills

Historically, periods of technological, environmental, and policy change have altered the demand for skills in the job market. In some cases, entirely new categories of jobs are created while others are effectively destroyed. More commonly, demand for some existing tasks increases while demand for others decreases, and, thus, the set of tasks associated with existing jobs changes. The prospects for a regional economy to adapt to change — and to do so in an equitable fashion — hinges on the skills of its workforce, as well as the willingness to change inequitable hiring and subcontracting practices.

The interview participants often described concerns about skills and expertise in the region. The concerns they raised are tied to perceptions about whether other regions have more established blue-green industries, whether major investment programs rely on out-of-state companies and workers to the detriment of Southeast Louisiana’s homegrown economy, and whether existing infrastructure skills are transferable to new blue-green approaches. Their concerns and observations yielded these gaps in knowledge:

- Does Southeast Louisiana already have a workforce with the knowledge and skills to fill jobs in blue-green industries?
- Can local workers and businesses already involved in legacy industries and traditional gray infrastructure transition relatively easily to emerging green and water opportunities?
- What new education, training, and on-the-job experiences in green, water, or natural approaches are needed to better position the local workforce?

How can the region’s workers and businesses more easily access hiring and contracting opportunities?

Previous analysis on green jobs nationally\(^{40,41,42}\) and in other regions\(^{43}\) echoes similar concerns about the workforce and skill transferability. The idea of a “skills gap” or “skills mismatch” is a common, but limited, explanation for inequitable outcomes in the labor market. In theory, when skills present in the workforce do not match demand, this results in less hiring by local businesses, fewer good jobs, and less access to job opportunities.

Our findings below suggests that the skill demands for water and green jobs are diverse and that many of the relevant skills are already abundant in the regional workforce. The issue, then, is as much about skill transferability, job quality, and job access as it is about skill gaps. To be clear, STEM education, water and coastal literacy programs, and targeted training and credential programs all have important roles to play.\(^{44}\) But alone, they are unlikely to be sufficient to optimally convert spending on green-blue infrastructure into inclusive opportunities for local workers and businesses.
3 THE QUESTION OF WORKFORCE SKILLS

3.1 The blue-green economy includes a mix of existing, “greening,” and possibly new jobs

The blue-green economy is an emerging source of demand for jobs, but the jobs themselves are not necessarily entirely new. Changing demand can affect the numbers of jobs in certain occupations, as well as the characteristics of certain occupations — their specific mix of tasks and skills. New skills may be required to work in clean energy, coastal restoration, or water management. These dynamics should translate into increased demand in existing jobs, some with enhanced skills, as well as some entirely new kinds of jobs. For example, the green economy could alter demand for specific skills in the following ways:

- **Existing skills with increased demand.** A traditional skillset (e.g., building and construction) might see increased demand (e.g., installing residential solar panels). While the number of openings in certain occupations may change, their specific tasks and skills might remain largely unchanged.

- **Green enhanced skills.** Workers in traditional occupations (e.g., engineering) might need to acquire new skills specific to green projects to keep up with changing demand (e.g., design for green infrastructure).

- **New or emerging skills.** Emerging green occupations might involve entirely new, or new combinations, of tasks and skills. These new types of occupations and the skills they will require are less well understood so far, and their prevalence may vary across regional labor markets. Examples of emerging jobs include climate change analyst, instrument operator for emissions measurements, environmental restoration planner, brownfield redevelopment site manager, and carbon sequestration system installer.

- In many cases, increased demand for green jobs is expected to lean heavily on traditional skillsets closely related to a significant portion of the existing regional workforce. In fact, previous research suggests that very few green jobs are entirely new. Instead, most resemble existing jobs, sometimes with new tasks that require upgraded skills. These enhanced green skills might pertain, for example, to low-carbon materials and construction or to the integration of plants, soils, and green technologies into design.

We applied “green occupations” identified by the U.S. Department of Labor to employment data on Southeast Louisiana (see Figure 4). Jobs with existing skills and increased demand from green economy activities (without any significant altering of the work or requirements) comprised over 8 percent of total employment in 2019. Green jobs with enhanced skills (for which the essential elements of the occupation remain the same) made up 7 percent of employment in the region in 2019. In short, the emerging green economy is more likely to require incremental shifts in knowledge or qualifications rather than a complete retraining of the regional workforce. Nonetheless, as opportunities expand for some workers and contract for others, economic change often has had uneven effects on workers with different skill, education, and experience backgrounds.
3 THE QUESTION OF WORKFORCE SKILLS

Figure 4
Percent of workers in “green” occupations, 2019

Source: The Data Center analysis of data from EMSI and O*net. Note that “new and emerging” green occupations are not well-captured in local data and therefore excluded from these charts.

3.2 Skills for water and green jobs are transferrable

A detailed comparison of the average importance of specific skill areas in both green and water jobs illustrates the expertise needed for these emerging jobs and the potential transferability of acquired skills. To analyze how skills valued in the regional blue-green economy compare with skills valued in the regional economy overall, we summarize data on skills using the following sub-categories of water and green jobs (Appendix D describes the data source and the analysis):

- **Water management and coastal (or “blue”) jobs**: the group of jobs that encompasses the heavy construction, design, engineering, and specialized services most closely related to procurement activities for coastal projects and urban water infrastructure.61 In some of the analysis, these jobs are further divided into: “water management production and project implementation” occupations and “water management planning, design, and services” occupations — for the most part, “blue collar” versus “white collar” jobs, though these distinctions are not always clear cut.

- **Green jobs**: the broad set of emerging occupations that will experience increased demand or new skill requirements due to climate change mitigation or enhancing environmental quality.62 The green occupations definition we use comes from the U.S. Department of Labor, so the set of occupations are not directly tailored to the composition of Louisiana’s green economy.63 In some of the analysis, these jobs are further divided into “green enhanced skills” and “green increased demand” — capturing whether the green jobs are expected to require new skills or not.
### 3 THE QUESTION OF WORKFORCE SKILLS

**Figure 5**

Average skills scores by occupational category

<table>
<thead>
<tr>
<th>Skills Category</th>
<th>All jobs</th>
<th>Green jobs</th>
<th>Production and implementation</th>
<th>Planning, design, and services</th>
</tr>
</thead>
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<td>3.35</td>
<td>3.31</td>
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<td>Speaking</td>
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<td>3.34</td>
<td>3.27</td>
<td>3.78</td>
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<td>Critical Thinking</td>
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<td>3.31</td>
<td>3.17</td>
<td>3.64</td>
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<td>Reading Comprehension</td>
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<tr>
<td>Social Perceptiveness</td>
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<tr>
<td>Monitoring</td>
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<td>3.2</td>
<td>3.05</td>
<td>3.34</td>
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<tr>
<td>Coordination</td>
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<td>3.17</td>
<td>3.14</td>
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<td>Service Orientation</td>
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<td>Judgment and Decision Making</td>
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<td>3.06</td>
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<td>Writing</td>
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<td>Active Learning</td>
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<tr>
<td>Complex Problem Solving</td>
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<td>2.89</td>
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<td>2.44</td>
<td>2.96</td>
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<tr>
<td>Instructing</td>
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<td>2.58</td>
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<td>2.86</td>
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<td>Negotiation</td>
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<td>1.57</td>
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<td>Equipment Maintenance</td>
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<td>Installation</td>
<td>1.18</td>
<td>1.56</td>
<td>1.48</td>
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</tbody>
</table>

**Source:** The Data Center analysis of data from EMSI and O’net.
### Figure 6
**Average knowledge scores by occupational category**

<table>
<thead>
<tr>
<th>Field</th>
<th>All jobs</th>
<th>Green jobs</th>
<th>Production and implementation</th>
<th>Planning, design, and services</th>
<th>Water management</th>
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</thead>
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</table>

Source: The Data Center analysis of data from EMSI and O’net.
3 THE QUESTION OF WORKFORCE SKILLS

Figures 5 and 6 summarize skills and knowledge requirements across green and water jobs. Above-average scores (purple) indicate skills and knowledge requirements more important for green and water jobs than for the average for all occupations in the region. Both green jobs and water jobs in production and project implementation place above-average value on technical skills like operation monitoring and control, troubleshooting, and equipment selection, installation, maintenance, and repair. With respect to knowledge levels, these skills correspond with especially high scores in mechanical and building and construction knowledge. In contrast, water jobs in planning, design, and services fields, which include many science and engineering jobs that require a four-year degree, involve a broader set of skills at levels higher than in the regional economy overall, including more basic, social, and problem-solving skills. Taken together, the region’s existing green and water jobs cover a spectrum of skills that are accessible to workers with a range of skill backgrounds, create opportunities for skill transfer, and provide exposure to a range of different types of careers in related professional settings.

As demand changes, transferable skills facilitate the regional economy’s capacity to adapt at many levels. Rather than following a narrow career pathway, workers can stack skillsets through experience and credentials and transition accordingly as job opportunities change. In times of transition and uncertainty, skills transferability helps to manage risk and to prevent “lock in” — for workers, businesses, and the regional economy.

The mix of skills and knowledge involved with green and water jobs indicates significant diversity and overlap. On average, mechanical skills are more important for green jobs and project implementation water jobs than they are in the economy overall, while analytical skills are more valued for green jobs and planning, design, and services water jobs. Engineering, design, and technology knowledge are more valued overall in the blue-green economy, but wide variation exists across blue-green jobs on the importance of these knowledge areas. In many types of water and green jobs, business and management or building and construction knowledge are equally or more valued than STEM knowledge. (See Appendix E for box plot visualizations of the variability of these data.)

While the data make a compelling case for skills and knowledge overlaps within the blue-green economy, interview participants disagreed about the ease with which workers from legacy industries and gray infrastructure can transfer into blue-green industries. For example, two who work in coastal areas described ample green transition opportunities for local workers, given the region’s history with oil and gas employment.

An electrician working on an oil rig is still doing electricity, whether he’s 64 working on an oil rig or if he’s doing electrical work on a wind turbine. We have engineers that could do restoration, or they could design an LNG [Liquified Natural Gas] facility. A dredge operator might be a captain on a dredge boat, or he might be a captain on a supply vessel to an oil platform. A welder might weld a dredge pipe, or he might build ships. (public)
The Question of Workforce Skills

Because the oil industry has been so prevalent in this area...we have people with a skillset that could transfer to renewable energy, I think, fairly easily. There are machine shops. There are people who know how to install very large pipes. I think that a pipe that moves oil is not so much different than a pipe that moves sediment. Our people can build [turbines]. We know how to weld and cut out metal pieces and put it all together. (nonprofit)

Yet, two with experience on green infrastructure and stormwater management projects suggested that green approaches still need to be cultivated in local design and construction industries, highlighting the distinct expertise required for traditional projects and still emerging blue-green projects.

There’s been a lot of talk with the bond money, the settlement, FEMA dollars, etcetera. I think there are contractors in the City of New Orleans that are capable of the work. To say they’re expert contractors in doing [green] work? I would say [green work] is fairly new to make that call. There may be contractors that advocate, like, we are experts at this, or we do this. But in the industry, all of this is fairly new — a lot of the projects, designs, or products that’s being put out there or just being constructed. I would say we haven’t had enough time to even see the benefits or conditions that derive from those new designs or products. (private)

[People can’t be] pretending they know what they talk about with green infrastructure. This is a specialized field, even down to the plants that you’re planting...you can’t put something there and say that it’s a native plant, when there’s a whole organization of people nationally and locally who know, who can tell you this is not a native plant. (nonprofit)

In summary, perspectives from inside the sector differed on whether local workers and firms currently have sufficient green and water expertise to carry out ongoing and proposed projects. But overall, interviewees expressed their need to know more about who potential local workers might be, what backgrounds they might have, and whether the spending to date on coastal and green infrastructure projects has increased the size of the workforce or scale of relevant training programs. Taking a step back, some interviewees questioned whether specific regional green infrastructure innovations, such as permeable pavement, create any new jobs at all. As with other forms of innovation, greener and more sustainable approaches to production, construction, and environmental management have complex effects on jobs at the firm and regional levels. Green technologies can immediately have labor-saving consequences or, alternatively, require additional
workers. Over time, the increase in demand for new green products and services can eventually generate more employment at firms, but the regional level impacts depend upon how labor-intensive those green products and services are.65

Many of the interview participants emphasized that the complex processes of decarbonizing the economy, reducing flood risk, conserving land, and easing community transition rely upon (and build) a broad set of knowledge, especially when incorporating equity goals into these processes. One participant with a neighborhood-level, workforce development perspective remarked, “When we start to think about our young folks and the career opportunities that [water] presents, there is room for everyone. There is a role for everyone to partake in our climate.” Focusing narrowly on quantitative employment data or design, engineering, and construction businesses can downplay some of the skills that water leaders deem important. Skills important to the blue-green economy highlighted by the interviewees fall into four broad categories: baseline soft skills, social and cultural practice skills, applied skills for science and technology, and experiential water and green skills.66

**TABLE 4**

| SKILLS IDENTIFIED AS IMPORTANT FOR GREEN AND WATER WORK BY INTERVIEWEES |
|---|---|
| **Baseline soft skills** | Communication, collaboration, writing, listening |
| **Social and cultural practice skills** | Language interpretation (mentioned: Spanish, Vietnamese, Khmer, Cajun French), mental health services and social work, management of housing and finance, job services, community engagement and organizing, law, planning, arts, environmental history and philosophy, documentation of ecological and cultural change, experience in anti-racism work. |
| **Applied skills for science, engineering and technology** | Decisionmaking, measurement, spatial, hands-on problem solving at project sites, building, business, marketing, management, grant writing procedures (especially federal grants), and work experience in holistic approaches to water. |
| **Experiential water and green skills** | Outdoor inclined or experienced, green thumb, farming, boating, traditional and local ecological knowledge, including knowledge of native plants. |

This complexity underscores that the skills question is best addressed by building a broad base of career pathways, stackable skills, and varied entry points into job opportunities.
3 THE QUESTION OF WORKFORCE SKILLS

3.3 Green and water jobs rely on a range of formal education levels and skills learned on the job

The jobs in Southeast Louisiana’s blue-green economy today rely on workers across all levels of educational attainment. Compared with the entire regional workforce, green occupations are more likely to be accessible with a high school diploma and less likely to require an advanced degree, suggesting ample opportunities for workers with less formal education (see Figure 7). Many of the green jobs that will see increased demand but little change in skill requirements are those employing workers without college degrees. The types of green jobs using new enhanced skills will more often require postsecondary training or a college degree. Most water jobs in the production and implementation of water projects will require only a high school education. While water jobs in design, engineering, scientific research, and planning fields are more likely to require a Bachelor’s degree or an Associate’s degree.

Previous national reports on green and water jobs have found that these jobs are more likely to require on-the-job training and applied learning than jobs in the economy as a whole. For a substantial portion of green jobs, on-the-job training provides a way for workers to gain green enhanced skills, building on the education and skillsets they already have.

In Southeast Louisiana, green jobs that require enhanced skills, as well as production and implementation water jobs, are more likely to include longer term on-the-job training (see Figure 8). Interview participants in the design and engineering fields stressed the importance of

Figure 7
Typical entry-level education of “green-blue” jobs by category
Southeast Louisiana, 2019

Source: The Data Center analysis of data from EMSI.
3 THE QUESTION OF WORKFORCE SKILLS

Figure 8
Typical on-the-job training of “green-blue” jobs by category
Southeast Louisiana, 2019

Source: The Data Center analysis of data from EMSI.

learning on the job, especially given that blue-green approaches are currently emerging through practice and not yet codified or necessarily learned through their formal education. Most planning, design, and services water jobs do not include on-the-job training.

3.4 Blue-green job quality and systemic economic trends

Green jobs have long been championed as “good jobs,” but we are still learning about job quality in blue-green industries.70 While many factors contribute to job quality, fair pay is an important one. In nationwide analyses, pay equity is promising in clean energy and water jobs. Wages are higher than in the economy overall, including for workers with less formal education and on the lower end of the income distribution.71,72 Likewise, water management occupations in Southeast Louisiana are more likely to be middle earning than the rest of the economy.

TABLE 5
DISTRIBUTION OF TYPICAL OCCUPATIONAL HOURLY WAGES BY OCCUPATION GROUP, SOUTHEAST LOUISIANA

<table>
<thead>
<tr>
<th>Percentile</th>
<th>10</th>
<th>25</th>
<th>50</th>
<th>75</th>
<th>90</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td></td>
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<td>25</td>
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<td>90</td>
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</tbody>
</table>
3 THE QUESTION OF WORKFORCE SKILLS

<table>
<thead>
<tr>
<th>Industry</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
</tr>
</thead>
<tbody>
<tr>
<td>All industries</td>
<td>$9.50</td>
<td>$11.68</td>
<td>$18.02</td>
<td>$25.73</td>
<td>$33.86</td>
</tr>
<tr>
<td>Water: Production and project implementation</td>
<td>$13.00</td>
<td>$15.99</td>
<td>$21.52</td>
<td>$26.80</td>
<td>$29.32</td>
</tr>
<tr>
<td>Water: Planning, design, and services</td>
<td>$14.88</td>
<td>$20.92</td>
<td>$28.50</td>
<td>$40.27</td>
<td>$47.35</td>
</tr>
<tr>
<td>Green: Increased demand</td>
<td>$12.97</td>
<td>$12.97</td>
<td>$18.39</td>
<td>$29.66</td>
<td>$35.99</td>
</tr>
<tr>
<td>Green: Enhanced skills</td>
<td>$15.98</td>
<td>$18.37</td>
<td>$23.80</td>
<td>$46.29</td>
<td>$47.36</td>
</tr>
</tbody>
</table>

Source: The Data Center analysis of data from EMSI.

However, perspectives from inside the sector on the quality of green and water jobs diverge. Some interview participants imagine green and water jobs as “better” jobs — safer and healthier, more secure and stable, higher paying, and more conducive to career pathways for lower income and historically marginalized residents — than the regional economy currently provides. Others are more reserved in their enthusiasm for the transformative potential of blue-green jobs. Their skepticism is underpinned by their own perceptions, or their observations of perceptions in the community, that green and water jobs are largely outdoor-oriented, based in physical labor, unskilled, and undervalued. Others are dissuaded by the lack of visible racial diversity across green and water jobs today, especially in engineering, planning, and design. Interviewees also noted that some traditional public water utilities and legacy industries have historically provided secure and quality jobs, leading them to wonder whether new and lesser-known blue-green jobs will provide the same. They suggested continuing to monitor job quality standards in growing green and water industries.

Without attention to job quality, the professional and blue-collar divide within these industries could reproduce inequities. Blue-collar jobs are central to the blue-green economy, in Louisiana and elsewhere. However, construction and maintenance workers can face hazardous working conditions, the insecurities of project-based work, and low pay with few benefits. Green and water jobs are not exempt from these conditions. The influx of funding into the construction of water management and coastal restoration projects introduces a wedge to raise industry-wide employment standards.

Furthermore, as with any efforts to build a more inclusive and resilient regional economy, achieving an equitable blue-green economy requires countering broader economic trends — such as the growth in low paying and precarious jobs — and longstanding systems of economic exclusion. Water and green jobs are not silver bullets for systemic inequities, but they provide momentum to attack deeper issues. The remaining portion of this report elaborates on mutually reinforcing efforts to address systemic inequities inside blue-green economy institutions and in the regional economy overall. This includes expanding the scope of the blue-green economy to encompass the work of equity and justice.
Toward an equitable blue-green economy

Even if the blue-green economy delivers on fair wages, inclusion across education levels, and enhancing valuable knowledge, its promise falls short without addressing racial and gender inequity. Ensuring that everyone can contribute their skills and knowledge to climate mitigation and adaptation work — through formal employment and/or democratic participation in transition planning — is key to building a stronger and more inclusive economy and region. In addition, the effective design, construction, and maintenance of critical projects — and their long-term performance in protecting the region and mitigating climate change—requires broad participation and access to key decisionmaking processes, especially by groups that have historically been underserved or marginalized during previous phases of regional change. Beyond realizing better returns from the blue-green economy’s growth potential, greater diversity and inclusion is a practical necessity for ensuring the region’s ability to mitigate and adapt to climate change and flooding. The stakes could not be higher.

4.1 Equity is an upfront concern for many water leaders, and a work in progress

Many water stakeholders are concerned with systemic inequities. Two-thirds of interview participants addressed how equity is related to their work before being prompted to do so. When asked to describe their ideal visions for Southeast Louisiana’s future if water and green work succeeds, equitable outcomes were the second most common component of those visions (See Table 1).

However, the effective meaning of equity varies across individuals and the contexts of their work. The 30 interviewees shared 59 interpretations overall of how equity is related to water management. These interpretations varied in their focus on different groups of people, different aspects of coastal and water management projects, day-to-day work interactions, and broader systemic issues. At the same time, five interviewees volunteered that they are still in the process of learning and thinking more about how equity connects with their water and green work.

In addition to working through how to address justice, diversity, equity, and inclusion, who should be the focus of these efforts is another question. Interviewees brought up each of the following groups listed below in discussions of equity, and many overlap:

- “Community and local folks”
- People of color, and Black and Indigenous folks in particular
Incarcerated and formerly incarcerated people

People with lower levels of formal education

Women

Low-income urban residents

Low- and middle-income coastal residents

The Black middle class

Speakers of non-English languages

Renters and houseless population

Environmental justice or frontline communities, specifically those that have experienced disproportionate environmental harms in the past and/or that now face the greatest burdens in adapting to the risks of land loss and sea-level rise

Communities expected to be most negatively impacted by new coastal restoration projects in coming decades (e.g., fishing)

Communities with the largest economic transition burden, often those who have depended on oil and gas jobs

Communities outside the levees

Given that the interviewees work in both urban and coastal settings, equity also shifted between a focus on lower-income and majority-Black urban neighborhoods and lower-income coastal communities outside the levees. Notably, Asian and Latinx communities were mentioned rarely, if at all.

For example, Indigenous people were often the point of reference when interviewees talked about coastal relocation, adaptation, historical harms, and frontline impacts of sea-level rise and coastal restoration. Meanwhile, most interviewees discussing diversity and inclusion in water and green industries focused on Black workers, except for two interviewees who noted that tribal communities also have not had equitable job access. Black men were the point of reference for workforce development efforts in water and green industries, but discussions of equitable planning and decisionmaking frequently pointed to the role of Black women as community leaders and organizers. These patterns underscore the continuing need for reflection in efforts toward equity. There is a subtle risk that blind spots in inclusion efforts can work to reproduce inequities — such as recreating the uneven division of risks and responsibilities — even if those efforts are well-intentioned and sensitive to the needs of specific groups.

4.2 Processes behind systemic inequities in blue-green industries

Behind high-level assessments of mixed progress on equity, the interviews also shed light on three processes that perpetuate systemic inequities in blue-green industries. These processes are “business as usual” practices in industries, agencies, and private firms; labor market segregation; and devaluing of knowledge of women, people of color, and workers of different educational backgrounds.

First, “business as usual” practices around partnering, contracting, and hiring can reproduce exclusion. In assembling bids on projects, subcontracting agreements are shaped by narrow social networks. When seeking new partnerships, businesses gravitate toward businesses that have similar characteristics and that operate in similar networks. When hiring new staff, employers often gravitate toward candidates with backgrounds
4 TOWARD AN EQUITABLE BLUE-GREEN ECONOMY

and educations that correspond with existing employees. Even when unintentional, these routine business decisions can reproduce existing barriers. Both interviewees below described regional contracting and partnering practices in water and green industries, and how those practices can intersect with systemic racism to exclude workers and businesses of color.

“\textit{The constraints that we come up against are the usual constraints. People don’t see people of color in this space. And most people that are doing this thing, they have their handpicked people to do it. They aren’t open to bringing somebody else in, of color or not. And I think that we have to be open-minded to partnerships. We’re concerned that the pie is so small that if I partner with you, you’re going to get my piece of the pie. [Working together] will open up a lot of doors for us to really start getting more people involved, for us to lead in green infrastructure. It seems like it’s competition, but really there’s enough water issues in our city that we wouldn’t have nearly enough folks to deal with them.}” (nonprofit)

“\textit{Definitely in this industry, it’s hard to find talent. But in this region, I find that sometimes people find it a burden when they even hear ‘diversity and inclusion.’ When there’s an excuse to say, ‘oh, yeah, we’re trying to do that, but we’re just unsuccessful’ or we don’t have this, or we don’t have that. I kind of turn an eye at that. It’s a natural tendency for everyone to want to work with people that they know or that they trust. Working with other people is not as comfortable, because they think different and they don’t do things how we work. But that doesn’t necessarily mean that it’s a wrong way of doing it. As soon as someone we don’t know or someone that’s a little different makes one mistake...we all make mistakes...it’s, ‘See? That’s why they’re not talented,’ because they did this or that and it wasn’t the way that we want it done. Once again, it’s that excuse we can use to say that talent isn’t there.}” (private)

Second, existing occupational segregation in water and green jobs can be self-reinforcing. For example, social and family connections can shape relationships and, in turn, access to job openings and career pathways. Groups with narrower points of entry have less access to on-the-job experience and specialized training for skills valued by the water and green jobs, further constricting pipelines into stable careers, leadership positions, and entrepreneurship.

Figure 9 depicts the workforce demographics of green and water occupations in Southeast Louisiana, with the demographics of all occupations included for comparison. The farther a colored dot is from the tick mark indicating “All occupations” the more that specific occupational category reflects gender or racial segregation. Currently, Southeast Louisiana’s blue-green industries are somewhat diverse. For example, Hispanic workers comprise a near equitable share in green industries and production and
4  TOWARD AN EQUITABLE BLUE-GREEN ECONOMY

implementation water industries. Women (particularly White women) are just under 50 percent of workers in water planning, design, and services industries, and Asian workers are also represented in these industries. Yet, the blue-green economy as a whole remains disproportionately White and male. Black workers are underrepresented broadly, and women are underrepresented in production and implementation water jobs and green jobs.

Figure 9
Workforce demographics by occupational category
Southeast Louisiana, 2019

Third, systematic bias can emerge against types of relevant expertise, especially knowledge that is less formal or harder to quantify. Even with the right experience and credentials for blue-green jobs, people of color, women, and people who do not have prestigious degrees sometimes encounter challenges to their expertise in professional settings.

The participant below spoke to the sector’s undervaluing of community knowledge, the knowledge of workers of color, and of workers with a high school education.

“We have such a merit-based approach to dealing with folks that, somebody that had graduated from high school, a person with a degree or a doctorate is not going to treat them with the same intellectual respect. We see this all the time…It’s racism as well […] And I don’t think that we think community members are smart enough. And that’s a real shame.” (private)
Interview participants from workforce development observed that many skilled trainees can’t get their foot in the door at water management and green companies. If employers adopted more intentionally inclusive hiring practices, more local residents and underrepresented groups would be working in the sector, which in turn would fortify a diverse and skilled regional labor pool for this work.

Extending access to jobs and simply getting projects into people’s hands cultivate experience and reputation in creating water and green solutions, building visibility for workers — especially workers of color. As in the economy overall, education and skills training are important foundations but insufficient alone to actively counter systemic inequities in access to the blue-green economy.

4.3 Overcoming systemic inequities in blue-green industries

Interviewees provided multiple examples of how hiring practices — and other practices well beyond hiring — can increase equity in these emerging industries (Table 6). They also identified current well-intentioned practices that serve to reinforce inequities (Table 7). The tables below are not meant to be exhaustive lists or to prescribe best practices, but they highlight a range of practices and reflections on systemic inequities that are on the minds of interview participants.

### TABLE 6 EXAMPLES OF EQUITABLE PRACTICES WITHIN BLUE-GREEN INDUSTRIES FROM INTERVIEWS

<table>
<thead>
<tr>
<th>Practice</th>
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<tbody>
<tr>
<td>Share information about blue-green hiring and training openings with organizations led by people of color.</td>
</tr>
<tr>
<td>Push back against “how things are done” in engineering and design fields, to ask if there is a reason for certain practices, or why something new is not possible to do.</td>
</tr>
<tr>
<td>Support local professional organizations for historically underrepresented groups in blue-green industries, which can provide spaces to talk about grants and projects in the pipeline, sexism and racism in the industry, opportunities to collaborate, and create a sense of not being alone.</td>
</tr>
<tr>
<td>Implement paid on-the-job training programs that incorporate important social and cultural practice skills, applied STEM skills, and experiential skills (see Table 4).</td>
</tr>
<tr>
<td>Hold colleagues accountable for taking equity seriously and devoting more time to the tasks.</td>
</tr>
<tr>
<td>Build mentor-protégé relationships into contracts and create local chains of these relationships so firms can be mentors and mentees.</td>
</tr>
</tbody>
</table>
4 TOWARD AN EQUITABLE BLUE-GREEN ECONOMY

Shape firm cultures to promote a sense of ownership over work for all, learning from mistakes, respect, and accountability to the community.

Employ maintenance workers for water and green infrastructure and include maintenance in project planning, which can lead to accessible job opportunities and ensure that new infrastructure remains in safe and working order across communities, especially communities that have experienced inequities and harms with public infrastructure.

TABLE 7
EXAMPLES FROM INTERVIEWS OF GOOD INTENTIONS REINFORCING INEQUITIES IN BLUE-GREEN INDUSTRIES

The disadvantaged business enterprise (DBE) or small business designation can be broad, including a large pool of firms and capping at a high revenue. Many firm leaders suggested investigation into how DBE certifications and requirements can be retooled to promote its objectives more effectively.

When funding comes through an agency that does not move payments quickly, the need to shoulder the upfront costs can disproportionately harm small local firms and DBEs, even when they gain access to procurement opportunities.

In water and coastal spaces, White male scientists, often those with degrees in traditionally respected fields and carrying out leading research and practices, are more likely than affected groups to garner legitimate attention when discussing equity and inclusion issues.

4.4 Dissolving barriers within the blue-green economy

Climate mitigation, water management, and coastal restoration are critical to Southeast Louisiana’s economic and environmental future. Equitable access to the industries that directly design and implement climate, water, and coastal projects offers one pathway to a more inclusive blue-green economy. Another pathway lies in more tightly aligning those water and green jobs with the broader work of supporting and empowering marginalized communities. Ultimately, for the region to adapt, the work of grassroots and nonprofit organizations focused on equity, and of public and private sector groups focused on managing community change, has to be supported and acknowledged through environmental funding and decisionmaking. In addition, this human-centered work needs to be approached with the same rigor and expertise as studies of projected land loss. And greater transparency is needed around which populations are receiving the greatest benefits from critical infrastructure projects.
TOWARD AN EQUITABLE BLUE-GREEN ECONOMY

While water and climate equity is a burgeoning focus for nonprofits and philanthropy in Southeast Louisiana, the region historically has had a small environmental nonprofit sector with less philanthropic support than other regions. The region’s civic sector has extensive knowledge and experience working toward racial equity. This work could be bolstered if the state, the green and water sectors, and philanthropy were to recognize its importance to the region’s resilience going forward.

Dissolving barriers between blue-green industries and social equity work to create an inclusive blue-green economy could allow more people to see a role for themselves, and a potential livelihood, in this field. If this human angle were given greater attention and visibility, more residents and, especially, youth with passions for social and environmental justice could match their interests with rewarding careers within blue-green industries. However, like the core blue-green industries, the civic, planning, and nonprofit parts of the blue-green economy also risk benefitting the businesses, organizations, and residents with the greatest existing advantages and connections. Attention to equitable funding, opportunities, and outcomes is not a given, simply because more public agencies, private businesses, and nonprofits are tackling water and climate equity.

The interview data suggest that buy-in exists within the sector for making the blue-green economy more inclusive of these types of work. Half of the interviewees defined equity and inclusion, at least in part, as diversifying the types of work and expertise valued in water management beyond the design and construction industries, and/or stated a more inclusive definition of the sector as a future direction they would like to see. For example, an environmental scientist working in coastal management proposed that the evolution of coastal restoration will be in forging connections with other parts of the economy and maximizing project value for residents and businesses outside of design and implementation.

Recognizing that this is a significant investment already on the table with hopes and plans for an even more significant investment for our economy is certainly something we need to continue to do. I think we could build on that by more purposefully linking the other sectors of the coastal economy to restoration efforts. We’re building $100 million plus projects with big heavy equipment that certainly support jobs for the people who operate that equipment and the people who designed the projects. But it also provides benefits to commercial fishers, recreational fishers, charter boats, birdwatchers, tour guides. Now we know the projects are coming. We know the funding is there. We can pivot a little to being more critical about the nuance of the project value outside the construction economy.

Another participant who works on infrastructure design and engagement around water and climate expands the scope even further to include the broader set of civic actions that comprise equitable blue-green transition.
Civic engagement and the civic processes that I think would be necessary are the ones that we’re least likely to invest in because they don’t return economic benefits. To invest in peoples’ capacity to engage science and planning and economics, and to invest in democratic processes for hashing out our hardest problems. Those are exactly the things we need to do to address racial inequality. Those are exactly what we need to do to address climate change.

Lastly, the interviews drew links to other types of work that are insufficiently considered not just in blue-green industries but in the economy overall. Some interviewees identified mental health services as a component of equitable climate adaptation. Also, some illustrated a role for documenting changes happening on the ground as water management, climate mitigation, and coastal restoration projects — and the crises they seek to address — unfold. Documenting unfolding economic, cultural, and environmental changes, and the choices they force about what to leave or save, is work that could generate some sense of control for Southeast Louisiana residents who live with great uncertainty and upheaval. Participants also saw intentionality in documenting adaptation and lessons learned as a way to build transferrable knowledge for equitable transition. Tables 8 and 9 summarize other suggestions, as well as concerns, that came out of the interviews.

### TABLE 8
**EXAMPLES FROM INTERVIEWS OF WAYS TO MAKE THE BLUE-GREEN ECONOMY MORE INCLUSIVE**

<table>
<thead>
<tr>
<th>Suggestion</th>
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<tbody>
<tr>
<td>Bring groups of community-based organizations and organizations working for equitable outcomes into coalition for water and climate planning processes.</td>
</tr>
<tr>
<td>Workforce at core institutions spend more time and resources on community engagement.</td>
</tr>
<tr>
<td>Treat community engagement as a paid blue-green economy job, included in grants and RFPs.</td>
</tr>
<tr>
<td>Hire water and green workers representative of and based in communities where projects are located.</td>
</tr>
<tr>
<td>Consider work to address systemic racism, economic inequities, historical processes surrounding land and development, and exclusion from democratic processes part of blue-green industries.</td>
</tr>
<tr>
<td>Build water and climate literacy among residents and help experts use language and concepts that stem from community knowledge and make sense to residents.</td>
</tr>
<tr>
<td>Include ancillary services around blue-green infrastructure projects in the initiatives for local and equitable contracting.</td>
</tr>
</tbody>
</table>
### TABLE 9
EXAMPLES FROM INTERVIEWS OF HOW INCLUSION CAN UNINTENTIONALLY WORK AGAINST EQUITABLE OUTCOMES IN THE BLUE-GREEN ECONOMY

<table>
<thead>
<tr>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue-green infrastructure projects can exacerbate existing tensions between residents and state agencies or institutions, or among residents.</td>
</tr>
<tr>
<td>Perception that climate change work already faces challenges and that bringing systemic racism into that messaging might jeopardize water and green initiatives.</td>
</tr>
<tr>
<td>Required community engagement or diversity and inclusion with grants can tokenize individuals and groups in some circumstances.</td>
</tr>
<tr>
<td>Funding for planning and community aspects of water and green projects can go to better connected organizations and individuals, over local residents and communities of color.</td>
</tr>
<tr>
<td>Bringing equity advocates together with core agencies and firms could weaken equity and community goals, practices, and outcomes.</td>
</tr>
</tbody>
</table>
Conclusion

Water and green jobs hold potential as a source of inclusive employment growth. Meeting this potential requires activating a wide array of expertise in the regional workforce. However, persistent inequities in access to economic opportunity and decisionmaking act as obstacles to participation in these emerging industries. Some of these dynamics may be unique to the green-blue economy; most are not. However, what is unique are the stakes. Without more inclusive approaches, the region will stunt its capacity for adapting to environmental change and will struggle to optimize the transformative impact of billions of dollars in infrastructure spending.

Our findings point to two general pathways to more equitable outcomes. The first is greater diversity and inclusion within water and green industries. Design and construction firms, major infrastructure projects, and environmental agencies can drive opportunities to local workers and businesses, especially since more inclusive participation enriches the region’s communities of color and frontline communities that face the greatest risks and uncertainties. Better representation of the regional workforce and population across the spectrum of water and green occupations will also translate to more effective project planning and implementation. These goals can be furthered with targeted interventions in the workforce pipeline that go beyond skills training. Interventions should encourage changes to business-as-usual hiring and contracting practices, increase initial access to blue-green opportunities, and equitably value the water and green knowledge of all residents. There may also be opportunities to tweak regulations to require and track diversity, equity, and inclusion in procurement and within firms and agencies charged with managing major infrastructure projects.

The second pathway is to dissolve barriers between blue-green industries and the broader work of addressing systemic inequities and supporting communities through periods of change. Nonprofit and community-based organizations have important roles to play. They can drive community concerns into key decisions about mitigation, adaptation, and infrastructure. Tighter integration of equity goals need not come at the expense of progress on the scientific and technological aspects of water management. Each will make the other stronger.

Our interviews reflect the breadth of the blue-green economy and the interconnected, nuanced approaches these professionals bring to their work. However, the pressures of managing complex projects and barriers between different professional and organizational domains can hinder the kind of productive diversity that facilitates innovation and collective problem-solving. Funding and resources for community work, workforce and business development, and the full range of other levers to promote
equitable outcomes should be included in coastal, climate, and infrastructure policy at all levels. Equitable transition is part of the work blue-green industries are tasked with, and the civic sector is part of investing in blue-green transition and infrastructure.

Decisionmakers in government, private industry, and the civic sector have increasingly embraced the blue-green economy as integral to the environmental and economic future of Southeast Louisiana. Professionals grounded in the everyday work of coastal and water management bring this perspective to how they approach their work. An equitable transition demands the same rigor as the science of coastal change and the implementation of major infrastructure investments. Connecting climate change mitigation and equity with coastal protection and restoration will set up Louisianans to lead and benefit from the decades of work ahead.
Appendix A: Elements of equitable or “just transition”

<table>
<thead>
<tr>
<th>The following are elements of “just transition” recognized in the literature(^{87,88,89}) that were also perceived by interview participants to be at least partially already reflected in Southeast Louisiana’s blue-green economy, whether in idea, planning, or implemented stages.(^90)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long-term planning processes on coastal, water, and climate issues</td>
</tr>
<tr>
<td>Community engagement, participation, and leadership</td>
</tr>
<tr>
<td>Building niche “green” networks and organizations among workers and industries</td>
</tr>
<tr>
<td>Local jobs and economic diversification</td>
</tr>
<tr>
<td>Concerns about job quality</td>
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<tr>
<td>Addressing gender and racial inequities in green sectors</td>
</tr>
<tr>
<td>Investing in and including roles for “green” segments of education and research institutions</td>
</tr>
<tr>
<td>Workforce training and job transitioning services</td>
</tr>
<tr>
<td>Embedding equity in environmental planning, legislative, and regulatory processes</td>
</tr>
<tr>
<td>Focusing on legacy industry workers and historically and presently un(der)employed groups</td>
</tr>
<tr>
<td>State and/or private funds to spur innovative approaches</td>
</tr>
<tr>
<td>Remediation of contaminated or polluting sites</td>
</tr>
<tr>
<td>Rectifying harm by energy and infrastructure activity</td>
</tr>
<tr>
<td>Ecosystem restoration</td>
</tr>
</tbody>
</table>
Appendix B: Key blue-green infrastructure terms and definitions

Coastal protection: Reducing flooding risk from hurricanes and storm surge through nonstructural and structural measures. These projects include levees, floodgates, pumping stations, floodproofing of commercial structures, home elevation, and land acquisition, among others.

Coastal restoration: Rebuilding or maintaining land lost to coastal erosion and sea-level rise and restoring a resilient coastal landscape. These projects include barrier island restoration, marsh creation, and sediment diversions, among others.

Stormwater management: Impervious surfaces like pavements and roofs do not allow rainfall to soak naturally, leading water to run quickly into storm drains, sewer systems, and drainage ditches. The downstream problems include flooding, erosion, harm to habitats, water system overflow, infrastructure damage, and water contamination. Stormwater management refers to any work that addresses or alleviates these problems, reduces runoff, or improves water retention and quality.

Gray infrastructure are types of stormwater or flood management systems that rely on structures made from steel and concrete materials to detain and move water. These could include pipelines, impermeable pavements, dams, dikes, and storm drains. Gray infrastructure may also refer to traditional infrastructure like roads, bridges, sewer and water treatment systems, and parking lots.

Green infrastructure are types of stormwater management systems that mimic nature using vegetation, soils, and natural processes to manage water, restore hydrological processes, reduce pollution to waterways, and may even contribute to reducing subsidence. Green infrastructure might slow runoff by capturing and storing rainwater where it lands, or letting it filter through plants and soils and recharge groundwater. Green roofs, trees, parks, rain barrels or gardens, and permeable pavement are some examples of green infrastructure. In places with more development, green infrastructure can reduce some pressure on sewage, drainage, and pump systems, increasing stormwater capacity during rainfall and storm events.

The term blue-green infrastructure can refer to green infrastructure that is designed to manage water, among other co-benefits.

Water management broadly can vary in interpretations, especially across place. In Louisiana, the definition hinges on managing the region’s foregrounded problems of flooding and storm surge. Elsewhere, water management may focus primarily on drinking water, water quality, groundwater, drought, aquifer protection, and water conservation.
Appendix C: Qualitative data and methods

Sociology of the future framework

The qualitative research methodology, including the interview instrument, was informed by a sociology of the future framework. The interview questions asked participants to share their points of view about and visions for the future of Southeast Louisiana through a set of structured open-ended questions (The interview questions can be made available upon request, contact Dr. Amy Teller (asteller@umn.edu)). Within this framework, as people make decisions, take actions, and observe and diagnose problems in the present, their current activities are informed by their visions for the future of the places where they live and work. At the same time, their present experiences and actions also shape what kind of future they imagine for the region.91,92,93 The research design employs this interplay across the future, past, and present to collect new data about water management, coastal restoration, and climate mitigation work in Southeast Louisiana. Two specific topics that emerged through The Data Center’s previous research and stakeholder interest as integral to growth in water management in Louisiana are social inclusion or equity and the role of expertise. This research was also designed to collect data that complements and expands upon our understanding of those two topics.

In this context, ideas about future risks underlie both the interviewees’ work and their own lives in the region, making the explicit inclusion of the future in research design a source of fruitful data, and a way to connect what can seem like a narrow economic sector to broader sentiments relatable for residents who care about the region’s future.94,95 Furthermore, bringing the future into the dialog elicits data on commonalities and points of tension in a diverse sector, and provides a tool for those who work in the sector to “go visiting” to the visions and motivations behind others’ work.96

Sampling design

The interview sample included people who work in water management, broadly defined, in the Super Region geography (from The Data Center’s Coastal Index). Interview participants work within and across Southeastern Louisiana coastal parishes, the New Orleans metro region, and Baton Rouge. The sampling process began through ethnographic observation of public water-related events and attendees during Fall 2019 and Winter 2020, as well as meetings held by The Water Collaborative, The Data Center and collaborators, and The Gulf Research Program. From that initial list of possible participants, the author began contacting people for interviews. Through each interview, the author built a larger snowball sample by asking each participant to name others who work in the sector.

The sample was primarily designed to capture the breadth of water management in Southeast Louisiana. However, the sampling design was not motivated by random selection, but by the following intentions important to the research design: 1. Expansion beyond the most visible regional actors in this sector; 2. Even representation across those who work in private, public, and nonprofit/civic/community institutions (especially to complement the previous research focused on the engineering and construction work of private firms); 3. Inclusion of folks who work on water in more environmentally-oriented and economic- or community-oriented spaces; 4. Oversampling of people of color and women to be sure a sufficient sample size of underrepresented perspectives would populate the data (given the equity lens of this research); and 5. Geographic inclusion across coastal and urban areas.
These key intentions were borne out in the interview sample (See Figure above). However, some patterns that reflect the reality of the regional water sector also emerged, such as the underrepresentation of people of color working on water in the public and private sectors. The sample also picks up the oft-mentioned trend of people moving to the region from outside Louisiana to do this work. Without intentionally bringing that characteristic into the sampling design, exactly half of the interview participants turned out to be originally from Southeast Louisiana. The nonprofit sector interviewees represent organizations with an environmental focus; a neighborhood, community, social, or economic focus; or organizations that span those areas — including on topics of workforce and business development, education, conservation, research, advocacy, and organizing. The public sector interviewees include Louisiana-based individuals working at federal environmental agencies, tribal governments, state agencies, and parish-level government offices in coastal parishes. Among the private sector interviewees, some lead or work at local design, engineering, planning, and construction firms, and others are based at the New Orleans location of larger regional and international firms.

The bolstered snowball sample reached 100 individuals, of which 30 were interviewed to comprise the final sample. The author reached out to 40 people, and 10 of them did not respond or were not available to schedule an interview. The first 12 interviews were conducted in-person before the COVID-19 pandemic during February and March 2020, and the remaining 18 were conducted remotely over Zoom during August and September 2020. The 18 interviews that were conducted later in 2020, were conducted after...
the 2020 racial justice protests and the disparate impacts of COVID-19 brought heightened urgency to longstanding problems of racial inequity. Nonetheless, results from the interviews later in 2020 did not indicate greater interest in equity issues, than the interviews that took place early in 2020.

The interview questions remained consistent across these two time periods and mediums, and no discernible differences emerged in the data between the groups. In most cases, only one person from an institution, organization, or agency was included in the sample. There were a couple of exceptions where two participants from one organization were interviewed separately, only when one of them also represented another organization that appeared in the sample. In two cases, multiple people from an organization contributed to an interview if they were present with a primary participant, but otherwise, interviews were conducted one-on-one.

### Approach to interviews and analysis

The interview questions built across multiple scopes, including the individual’s work and background, the role of their organization, institution, or agency in the water sector, their observations of the regional water management sector, and their observations of the region itself, including visions for its future. The approach to interviewing was to create a comfortable and purposeful conversation for the interviewees, a space to think out-loud about water, the environment, and equity, to clarify their thoughts, and reflect on their work and motivations. Such conversations elicit rich data, data in which the interview participants speak and represent themselves, their work, and their points of view on their own terms without strong distortion or critique. Given that all the interviewees come to their work with a genuine desire to make the region better, the interviews were grounded in a “reparative approach” that sought to respect the interview participants and to collect and present data that expands possibilities and thinking on complex issues like inequity and climate change.

Each interview was audio recorded with participant consent, transcribed, de-identified, and thematically analyzed with the support of qualitative analysis software (NVivo). The coding followed an inductive process, through which a set of codes were generated from the data. The data was then tagged with these codes during a second pass through, with iterative adjustment to the codes, as needed. All qualitative responses to structured prompts were coded into one or more thematic categories. The qualitative data presented in the report draw directly from the complete results of this coding process, while the author selected direct interview quotes coded to the theme at hand for illustration. The quantitative analyses in this report, carried out after interview data collection, were informed in part by the qualitative analysis.
Appendix D: Quantitative data and methods

Defining green and water jobs

Employment data uses a standard system for categorizing the industries of businesses and the occupations of workers. This system works well for some industries, like hospitals, manufacturing facilities, and restaurants. Broader categories like green jobs and water management are harder to measure because they cut across standard categories. Here, water management is defined as a group of industries first used by The Data Center in 2015 and refined in subsequent publications. Green jobs are occupations identified by the U.S. Department of Labor. See below for details. Neither grouping is definitive or all-encompassing of jobs that might be considered green or water-related. Both count jobs that they should not. Despite their limitations, both approaches are based on rigorous attempts to deal with a common problem with examining emerging and inter-related parts of the economy. Many other reports on water and green jobs use different definitions for equally valid reasons. Indeed, some of Southeast Louisiana’s most important legacy industries like tourism and oil and gas present the same challenges for analysis.

- Water management and coastal (or “blue”) jobs: This is a set of industries based on national definitions provided by the U.S. Cluster Mapping Project and refined over the course of previous Coastal Index reports by The Data Center into a “core and supporting” set of water management industries. Basically, these industries encompass the “core” heavy construction, engineering, and specialized services most closely related to procurement activities of major agencies like the CPRA and USACE, as well as other “supporting” industries with a heavy footprint in the supply chain. Many of the analyses below use estimates of the occupational employment within these industries as a basis for comparing the jobs employed by these industries. See the 2019 report Changing Coast, Evolving Coastal Economy for detailed definitions.

- Green jobs: The analysis uses descriptive data on detailed characteristics of occupations from O*net, a resource provided by the U.S. Department of Labor Employment and Training Administration. O*net identifies a set of new and emerging green occupations, some of which are not well measured in other sources of data on employment and wages, as well as a broader set of occupations that will experience increased demand or increased skill requirements due to the green transition. Unlike the coastal and water management definition, this definition for green jobs is not based on occupational employment within a given industry.

To examine the characteristics of jobs, totals are based on detailed EMSI estimates for 5-digit occupational employment in Southeast Louisiana. In addition to employment totals, EMSI provides estimates for race, gender, and Hispanic ethnicity; typical on-the-job training needed to attain competency in the occupation; and typical education required at an entry level. Each of these estimates is based on federal sources.

To examine skills and knowledge characteristics of jobs, we combined the EMSI occupational employment estimates with detailed information from O*net. O*net derives detailed job characteristics from national surveys of workers.
in every occupation, which are intended to describe the “anatomy” of an occupation. For both skills and knowledge, O*net provides the importance of each category on a range from one (not important) to five (extremely important). As defined, each of the green and water job categories combines many occupations, so we compare these categories by taking the average skill and knowledge importance scores of their component occupations, weighted by the total Southeast Louisiana employment in each component occupation.

Appendix E presents additional summaries based on further simplified estimates. There, skills are based on a Pew Research Center analysis of emerging jobs and the green economy.98 These skill categories are similar to, but slightly simpler than, the categories provided by O*net. O*net knowledge categories were also simplified by the study team.

The table “Distribution of typical occupational hourly wages by percentile, Southeast Louisiana” is based on median wages within each detailed occupation, as provided by EMSI. Weighted quantiles of these “typical,” i.e., median, wages are then calculated for each occupation grouping: All detailed occupations across all industries in the entire economy, as well all detailed occupations assigned to each of the four sub-categories of green and water jobs, respectively. The quantiles are weighted by total employment in each occupation in Southeast Louisiana; EMSI provides estimates of local data and wages. It is not possible with available EMSI data to calculate true wage quantiles for each grouping directly, so we instead report the variability of typical wages within each grouping.
Appendix E: Distributions of skill and knowledge importance in blue-green industries

Green and water jobs involve a wide range of skills and knowledge. The figures below provide summary estimates of different types of occupational skills and knowledge associated with green and water jobs in Southeast Louisiana. These figures illustrate the median and interquartile range (25th and 75th percentiles) of occupational skill and knowledge scores within each category. The averages are not weighted by employment, so they merely illustrate the total variation in skill and knowledge scores involved in each occupational group, as defined. These are derived from detailed 5-digit occupations, but occupations with less than 50 workers in Southeast Louisiana are excluded from the analysis. Comparable measures for all occupations are shown as a benchmark for comparison (Appendix D describes the data source and the analysis). Water jobs are further divided into production and project implementation occupations and planning, design, and services occupations. The mix of skills and knowledge involved with green and water jobs indicates significant diversity and overlap.

Variation in occupational skill importance
Variation in occupational knowledge importance

Math, science, and social science

Engineering, technology, and design

Business and management

Building and construction

Knowledge importance score (category average)

- Water management: Production and project implementation
- Water management: Planning, design, and services
- Green
- All
Endnotes


4 Mitigation refers to actions that reduce greenhouse gas emissions and the associated consequences of climate change. Adaptation refers to actions that better prepare people and places to continue living and operating as climate change impacts such as sea-level rise occur.

5 Greenhouse gas is the overarching category for all types of gases that contribute to climate change by trapping heat after being emitted into the atmosphere. Carbon dioxide (CO2) emissions are the most prevalent. Methane (CH4) and nitrous oxide (N2O) emissions are additional types.


15 McCauley and Heffron, 2018


18 https://coastal.la.gov/learn-more/ (CPRA)

19 Hess, 2012

20 Net-zero greenhouse gas emissions, sometimes also called carbon neutrality, refers to a balance point where the amount of carbon and other greenhouse gases being emitted are not higher than the amount of greenhouse gases being sequestered from the atmosphere and stored through ecological and/or industrial processes.


The commitment to reduce global net greenhouse gas emissions at least 50 percent below 2005 levels by 2030 and reach net-zero emissions no later than 2050 was set in the Paris Agreement, with aims of keeping the global temperature increase from climate change below 1.5 degrees Celsius. Link to Paris Agreement: https://unfccc.int/sites/default/files/english_paris_agreement.pdf


From the EPA's state CO2 emissions from fossil fuel combustion released in 2020 for up through 2018. https://www.epa.gov/statelocalenergy/state-co2-emissions-fossil-fuel-combustion


In 2020, renewable power’s portion of fuel nationwide (including wind, solar, hydroelectric, geothermal and biomass) converged with coal power’s portion for the first time, at 20 percent each.


River deltas and wetlands are important carbon regulators with potential to store carbon and other greenhouse gases. Louisiana is home to a large portion of the nations' wetlands and the majority of wetland loss. Stemming this loss through conserving and restoring wetlands or building new wetlands—as described in the Louisiana’s Coastal Master Plan—may also have a role to play in climate mitigation. Restoration projects can have conservation, land-building, and climate mitigating purposes. The potential for restored wetlands to store carbon and reduce net greenhouse gas emissions is an ongoing area of research in Louisiana and globally. Connecting wetland restoration and carbon mitigation, through blue carbon markets or programs, for example, will require the science to measure and estimate the net-storage of greenhouse gases in Louisiana’s wetlands over time.

a. https://thewaterinstitute.org/projects/blue-carbon


Kohler et al., 2019
Kohler et al., 2019

This pattern is consistent regardless of interviewees’ organizational positions, professional backgrounds, or identities.


Kane, Joseph W., and Adie Tomer. "Renewing the water workforce: Improving water infrastructure and creating a pipeline to opportunity." Brookings (June 2018). https://www.brookings.edu/research/water-workforce/


Zabin et al., 2020


Muro et al., 2019


Hess, 2012

Pollin, 2015


Kohler et al., 2019


Pollin, 2015


For example, an analysis of job creation through climate mitigation programs in California found that two-thirds of green jobs were in traditional building and construction occupations, while only 2% were in new specialized occupations (Zabin et al. 2020)

Bowen et al., 2018


Pollin, 2015

Many of the analyses below use estimates of the occupational employment within these industries as a basis for comparing the jobs employed by these industries.

Hess, 2012

Unlike the coastal and water management definition, this definition for green jobs is not based on occupational employment within a given industry.

In this quote, "he" pronouns were used to describe a hypothetical worker transitioning from types of oil and gas employment to green employment. This reflects the risks for reproducing existing patterns and entrenching gender inequities within segments of green industry.


While the relevance of these skills may vary across workplaces and sectors within the blue-green economy, interview participants from across firms, public agencies, and nonprofit and community groups spoke to all four categories.

Kane and Tomer, 2018

Muro et al., 2019

Bowen et al., 2018

Hess, 2012

Muro et al., 2019

Kane and Tomer, 2018

82 To be sure, this interview data can only address how leaders in water management and coastal restoration are thinking about equity. Additional research is needed to understand whether the work they and others carry out and the industries they work in are effectively moving toward equitable practices and outcomes.

83 Nearly every participant of color drew a connection between equity and water management during the interview before being prompted on the topic, compared with about half of white interviewees. All interviewees working only in urban contexts did so, as well. While these patterns are not necessarily representative, they did emerge in the data. Otherwise, the centrality of equity did not vary substantially by any other characteristics of the interviewees, such as their sector of work.

84 A March 2021 report prepared for members of the House Committee of Science, Space & Technology illustrates that the federal STEM workforce nationwide is disproportionately White and male. Women are underrepresented especially as engineers and in the STEM workforce at environmental agencies including the U.S. Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA). Black workers are not just underrepresented in STEM at these agencies, but their representation declined or remained stagnant over recent years. Source: https://science.house.gov/imo/media/doc/2021-3%20EMBARGOED%20Scientific%20Brain%20Drain%20Majority%20STAFF%20REPORT%20w%20cover%20page.pdf
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Dr. Amy Teller was a Research Associate at The Data Center and a Gulf Research Program of the National Academies of Sciences (NASEM) Fellow hosted at The Data Center. She is an expert in environmental sociology with a strong interest in research that is useful to community members and rooted in place. With a decade of research experience in qualitative and quantitative methods, and in the social and natural sciences, her work finds ways to bridge and integrate across these areas. She has published peer-reviewed journal articles on a range of environment and society topics—including climate change and inequality; eco-civic imagination and engagement at local and regional levels; and inclusion in environmental fields. Prior to working with The Data Center, she earned a PhD in Sociology and an MS in Ecology from Brown University. Currently, she holds a research appointment at the University of Minnesota and The Land Institute.

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ABOUT THE COASTAL INDEX

Many states have significant coastal vulnerability, yet none of them are tackling this threat head-on at the scale Louisiana is. The billions of dollars slated for coastal protection and restoration will create thousands of jobs in the short term, but the most promising economic opportunity associated with the Coastal Master Plan and related investments is the possibility of leveraging current investments to develop a specialized “water management” industry cluster that is self-sustaining. The Coastal Index quantifies some of the public and private investment already at work in Southeast Louisiana’s water management industry. It then measures economic, social, and political factors that have been shown to affect the formations of clusters in the U.S. — revealing strengths and weaknesses in the state’s ability to create a vibrant industry cluster. To find updates to The Coastal Index and companion publications, visit www.datacenterresearch.org/topic/coastal/.

ABOUT THE DATA CENTER

The Data Center is the most trusted resource for data about greater New Orleans and Southeast Louisiana. Since 1997, The Data Center has been an objective partner in bringing reliable, thoroughly researched data to conversations about building a more prosperous, inclusive, and sustainable region. The Data Center became the local authority for tracking post-Katrina recovery with The New Orleans Index, developed in partnership with the Brookings Institution, and has continued to be a leading neutral and independent voice on the issues that are most pressing to greater New Orleans and Southeast Louisiana.

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