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Adaptation Business Gains Momentum

Private sector follows public infrastructure managers and increases focus on climate risks and adaptation.

In our third edition on climate risk assessment and adaptation, CCBJ can report that this segment of the Climate Change Industry continues to gain strength and expand in scope. While public infrastructure managers—especially in water, wastewater and transportation—have been the most active in assessing and planning for climate change, mining, oil and gas, food and beverage, apparel and other consumer goods firms with far-flung supply chains are taking climate change risks more seriously.

As the *New York Times* reported in January 2014, **Coca-Cola** “has embraced the idea of climate change as an economically disruptive force.” Jeffrey Seabright, the company’s vice president for environment and water resources, told the *Times* that climate change impacts like “droughts, more unpredictable [weather and] 100-year floods every two years” have disrupted Coke’s supply chains for sugar and citrus. “When we look at our most essential ingredients, we see those events as threats.”

As the *Times* story mentioned, **Risky Business**, a major report on climate risks to the U.S. economy, is due out later this year. Led by Michael Bloomberg, former Treasury Secretary Hank Paulson and

investment advisor Tom Steyer, **Risky Business** will use downscaled global climate models in its ranking of probable risks for eight U.S. regions as well as industry types.

Longtime climate research and policy analyst James Neumann with **Industrial Economics** says he thinks the report will influence the private sector. “This project is led by a group of high-level private sector leaders, all of whom are also well-respected for their public sector experience. I think the message to their fellow CEOs likely will be along the lines of ‘I’m worried about the impacts of climate change on our business model, and you should be too.’”

Climate risk assessments and adaptation planning are looming larger for the oil and gas industry (see p. 6), whose members generally like to keep these activities under wraps lest they provoke more criticism for their contribution to climate change.

With the rising demand, climate risk and adaptation planning is growing in importance for professional service firms. Assurance firms have practices, led in CCBJ’s estimation by **PWC** and **Deloitte**. IT giant **CSC** markets the **ClimateEdge** climate risk management suite. There are specialized climate consultancies, such as **Acclimatise**, **Atmospheric and Environmental Research**, **Stratus** and **Climate Risk**.

For most environmental consulting and engineering (C&E) firms, climate risk

assessment and adaptation doesn’t stand alone as a separate business division but is incorporated into business lines, usually around water, wastewater, transportation and other infrastructure. **ICF International** probably has the largest practice among the C&E firms with about 25 full-time professionals working exclusively in climate risk and adaptation.

CCBJ lists the top 25 climate risk consulting firms for the North American market on page 4. Among the firms ranked are several profiled or quoted at length in this edition, each with a approach that is based on its prior expertise and positioning.

Dewberry addresses climate risks in the context of long-standing hazards mitigation practice. **Atkins**, **Golder** and **ERM** have significant climate risks practices with oil and gas companies. ICF partners with engineering firms on infrastructure-focused projects. **CH2M Hill**, **URS**, **TetraTech** and **Brown and Caldwell** work the adaptation problem in the context of infrastructure engagements—some of which don’t mention climate even though the relationship seems obvious.

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Tetra Tech Tackles All Facets of Water Security and Supply in Context of Climate Change

Consulting and engineering firm's modeling strengths come to the fore in global water projects.

Uncertainties are inherent when plotting impacts an altered climate on a complex ecosystem—a watershed, for example. “There’s not one scenario that fits all,” advised Leslie Shoemaker, senior vice president, corporate strategy, and a water resources engineer at Tetra Tech, a global consulting, engineering and technical services firm based in Pasadena. “We look at the weight of evidence [based] on a full suite of predictions.”

A case in point: the six scenarios Tetra Tech provided to the EPA in May 2013 for the agency’s analysis of how climate change could impact the already high levels of phosphorous pollutants entering the Lake Champlain watershed from its border with Vermont. Phosphorous, in the form of runoff from human activities including, in Vermont’s case, logging and agriculture, exacerbates the growth of algae, which in turn threatens water supplies and water infrastructure.

In its report to the EPA, Tetra Tech advised that the goal was not to “estimate a single, ‘most likely’ future trajectory for the watershed,” but rather to provide, from the multiple scenarios it prepared, a basis for determining what couldn’t be eliminated.” In other words, Tetra Tech was seeking to establish the pattern of the ecosystem to better understand what makes it tick—and what interrupts the rhythm.

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“We look at the interconnections,” said Shoemaker, “at the web of the ecosystem. That’s exciting for us. We’re helping develop the science—the analytic underpinnings—that can be incorporated into planning.” The Lake Champlain project, she added, is “a perfect fit for Tetra Tech. We’re helping to provide a bridge between pure science and applied science.”

Founded in 1966 to provide engineering services for waterway, harbor and coastal projects, today Tetra Tech, which reported \$645.8 million in revenue in the first quarter of fiscal 2014, has a staff of 14,000 and 330 locations worldwide. Water and climate modeling are among its strengths, noted Shoemaker. “Climate change and water, and how they affect various programs and clients, is a theme for us. And modeling is a strong part of our skill set.”

Bracing for More Extremes

The Lake Champlain project is one example of the growth Tetra Tech is seeing in climate-related projects. Rhode Island is another. A coastal state, Rhode Island’s weather vulnerability was underscored in 2010 and 2012 when severe storms damaged water utility infrastructure and threatened to pollute the water supply with overflow—a vulnerability stemming from Rhode Island’s reliance on a single reservoir to supply its drinking water.

For the state’s Office of Drinking Water Quality, Tetra Tech assessed climate risks from five hazards—hurricanes, drought, sea level rise and both coastal and riverine flooding—across three time periods (2022, 2052 and 2084).

Specific to “hardening facilities,” said Shoemaker, Tetra Tech’s assessments are being used by water utility managers there to develop adaptation strategies. “They’re planning rather than reacting after the fact,” she said. “Rhode Island is looking to be ahead of the game.”

Tetra Tech's growing list of climate-related projects includes continued work in the Philippines, no stranger to the fury of nature and still recovering from Typhoon Haiyan, which devastated the city of Tacloban in November 2013 with its record-breaking winds and 25-foot storm surge.

"We've been working in the Philippines for a long time," said Shoemaker. "Along coastal regions, the work is related to coral reefs." But Tetra Tech is also focused on strengthening "fundamental infrastructure," she noted, "and building in resilience to infrastructure investments."

Working with the U.S. Army Corps of Engineers and the Millennium Challenge Corporation, a U.S. foreign aid agency, Tetra Tech evaluated the conditions of bridges, water systems and vertical structures in the Philippines, as well as hundreds of kilometers of coastal roads and mountain passes.

"You've got to have roads in a disaster, and if they're designed well, they can withstand big events," said Shoemaker. Road development, whether related to climate change or not, already considers storm management, she added. "We're looking to build resilient roads that can withstand a 500-year storm."

Considering Both Green and Dry Cities

Tetra Tech is an active participant in the EPA's Green Infrastructure program, which hopes to encourage innovations in managing city stormwater by redirecting potential overflow via "green" buffers, such as green spaces, bioretention, and permeable pavement. In January 2014, Tetra Tech was among the winners of the Washington, D.C., Green Infrastructure Challenge for its Lamont Park project that will include dedicated bicycle lanes with pervious pavement and converting a roadside tree box into a runoff-capturing bioretention tree and native grass planter.

Tetra Tech worked with the Los Angeles Department of Water and Power on an assessment of potential threats climate change could have on the city's crucial 340-mile long aqueduct. Using both modeling and analytical approaches, Tetra Tech identified potential adaptation measures that included additional ground-water/surface water storage, conservation and new water supplies.

"We're helping to provide a bridge between pure science and applied science."

And it recently completed an analysis of how climate change and other impacts, including population growth, might affect water supplies across the United States into 2050. Integrating water withdrawal projections and future estimates of renewable water supply, the analysis—performed for the Natural Resources Defense Council—also identified what regions of the country are most susceptible to climate change. California was among the states identified as being at threat, but the study found that the Great Plains and Southwest are "at extreme risk."

Of all the work it has done to date, there is one project that Shoemaker is most enthusiastic about—a USAID program in East Africa that she believes will be a linchpin in the advancement of climate change science.

Evolution of Climate Science

Called PREPARED, the USAID project is looking at how changes in climate will affect its targeted ecosystem—Lake Victoria—but also at how knowledge of those impacts can be deepened and, importantly, applied to sustaining ecosystem biodiversity, water resources, and livelihoods within the East African region.

It is a capacity-building effort that, as a Shoemaker noted, looks at the larger picture, and one that companies like Tetra

Tech can learn from to assess and devise solutions for preparing communities—and infrastructure—against a host of climate risks and ecosystem degradations.

The keystones of the USAID project, she said, include building "academic strength" through strengthening the capacity of local institutions to develop and apply more sophisticated monitoring and decision support tools; connecting biodiversity conservation and water resources management with changes in climate; and melding "the fundamentals of resilience" as a means to strengthen and improve the region's critical water supply.

"We tend to talk about only flood control or resilient buildings when considering climate change," said Shoemaker, "but we're beginning to understand the impacts [of] what we weren't expecting"—how climate impacts on hydrology, for example, also affect water quality, the ecosystem connections that Tetra Tech has already begun to see and explore further in its modeling.

"Anticipating the unexpected requires an understanding of the incredibly diverse ecosystems we have worldwide," said Shoemaker. "Tetra Tech is proud of the fact that we have 330 offices around the world," not only from a business standpoint but in terms of the learning curve that this broad range of locally derived expertise has provided to Tetra Tech scientists and engineers and for its clients.

Models today are beginning to show that elements within separate systems "all touch in varying degrees," a concentric circle of connectedness, said Shoemaker, that when studied closer will advance climate science.

While still nascent disciplines, climate change assessments and modeling are evolving rapidly, added Shoemaker. "We're becoming more aware of the second-tier impacts, the interconnections," she said, adding that the PREPARED project will provide even greater insight into the "ripple effects" of a climate in flux. ☼