TM-7: Michigan's Blue Economy

1.0 Executive Summary

A Blue Economy integrates water resources with jobs and development. Michigan's Blue Economy intends to grow businesses and jobs in water-enabled and water-related sectors by utilizing our abundant resources – water, academia, engineering and manufacturing workforces. In *Innovating for the Blue Economy: Water Research at the URC,* Anderson Economic Group, LLC defines water-enabled and related industries as key portions of the state's economy that produce, implement, or are significantly affected by water-related research and innovation. This includes water technology producers and service providers, as well as industries that are affected by changes in both the quality and quantity of available water and to regulations governing the quality of water runoff or effluent.

John Austin, Director, Michigan Economic Center at Prima Civitas, is studying Michigan's Blue Economy and writes: "Michigan has a unique opportunity to become a leader in this emerging 'Blue Economy,' using water in smart and sustainable ways, solving global water problems, and leveraging unique water assets for economic and community development."[i] Austin concludes that Michigan has a competitive advantage in water-enabled and water-related industries. For example, Michigan's share of employment in these industries is fourth in the nation.

However, Michigan's economy, as it has been historically, is still dependent upon the auto industry and manufacturing. At the recent peak of the recession, unemployment reached 14.2%.[1] Between 2000 and 2010, employment in the manufacturing sector lost 323,500 jobs; 24% of this loss occurred between 2008 and 2009.[2] Despite recent growth, we are still facing an unemployment rate of 7.5%.[3] Therefore, it is important to ask: how do we expand water-enabled and related sectors in Michigan to diversify our economy? Austin has defined a set of critical success factors for this task:

1. Leaders and stakeholders must take action to grow the Blue Economy.

2. Enable water technology product and service firms to operate and grow in Michigan. Water technology products include filters, cleaners, bio-digesters and infrastructure components. Water technology services include engineering, ecosystem services, infrastructure design, information systems, sensors, and financial services.[ii]

3. Communities must dedicate themselves to water place-making in order to achieve long-term economic benefits. Water place-making includes businesses and economic development driven by water restoration, water access, and amenity development.[iii]

4. Make growing the Blue Economy a regional priority.

DWSD is one of the nation's oldest and largest water and sewer utilities. It has a 1,079 square mile water service area including Detroit and 129 suburban communities, and a 947 square mile wastewater

[1] Bureau of Labor Statistics, Economy at a Glance: Michigan, August 2009.

[2] American Manufacturing, In Your State: Michigan. (americanmanufacturing.org/in-your-state-MI).

[3] Bureau of Labor Statistics, Economy at a Glance: Michigan, June 2014.

service area including Detroit and 76 suburban communities. The water system contains 3,840 miles of transmission and distribution mains and the sewer system contains more than 3,000 miles of sewer pipes. A significant regional force, DWSD can support and promote Austin's vision for Michigan's Blue Economy.

In 2009, Federal Judge John Feikens prompted DWSD to explore a Blue Economy vision. In March 2010, the Technical Advisory Committee (TAC), the partnership between DWSD and its suburban wholesale water customers, established a Blue Economy Committee to perform a market survey and publish findings. *Michigan's Blue Economy: Sustainable Resource and Business Development* was the result. This report found that the capacity and quality of our water and wastewater systems alone would not attract water intensive companies. Economic incentives, a focus on technology innovation, and support of economic development initiatives through outreach and branding would be required.[iv]

In the years since the 2010 report, DWSD has undergone significant restructuring, including a reconfigured Board of Water Commissioners and a new Director, Sue McCormick. Central to the "new" DWSD is an increased level of transparency between the utility and its customers. The utility is currently engaged in an aggressive optimization project, which is already yielding significant savings.

The Director believes DWSD can and should have a role in the Blue Economy. She sees DWSD as "an innovative primary partner", and DWSD has the potential to benefit from innovative technologies regarding infrastructure, water management, water quality, and new enterprises resulting from collaborative research. The following recommendations stem from this vision:

1. **Develop a 10-year Blue Economy Plan with Annual Goals**

   There are opportunities to expand the size of the water-dependent industry and commerce in the regional water service area. Food and beverage industry is a sector that is of particular interest. The Governor of Michigan has called for Regional Prosperity Plans which define integrated regional visions and plans to leverage, redevelop and create multi-jurisdictional, multi-faceted waterfront, and watershed community economic development.[v] Using its Customer Outreach process, DWSD can facilitate and/or sponsor the development of Blue Economy themed Regional Prosperity planning with its customers and other regional Blue Economy stakeholders.

2. **Continue to Support Water Stewardship Programs in Michigan**

   Water can be used as a development tool, but it is a limited resource. Sustainable and responsible use of water is increasingly important to commercial users. Continuing to support Water Stewardship Programs would allow DWSD to further demonstrate its commitment to protecting Michigan's water resources.

3. **Leverage DWSD's Organizational Optimization for the Blue Economy**

   DWSD is undergoing a best-in-class effort to optimize the organization's production and service delivery process. In order for water-enabled and water-related industries to operate successfully, sustainable infrastructure is essential. The same holds true for attracting and retaining new customers. This recommendation calls for DWSD to establish a Blue Economy Liaison within the Commercial Operations Group. This liaison would be able to work with other agencies, program

offices, and corporations to coordinate Blue Economy activities for its high volume customers. See **Figure 1-1**.

DWSD's 2010 Blue Economy report focused on ways to sell more water, responding to Judge Feikens' objective to attract water intensive businesses to the region to alleviate unemployment. The report defined a comprehensive strategy to accomplish Feikens' goal. Today, four years later, we believe that the future of Michigan's Blue Economy rests in research, sustainability, recreation and tourism, but not water intensive industries. While unemployment is still a major concern, especially in Detroit, there are important obstacles to attracting water intensive businesses to the region. Water is not seen as a critical expense factor in most businesses yet. As for the food and beverage industries, where water is a critical expense factor, the state's water rates legislation does not allow utilities to offer discounted water rates to attract business. Finally, this study concludes that a migration of businesses that are high volume water users from water stressed regions to the water rich Great Lakes will not occur in the foreseeable future.

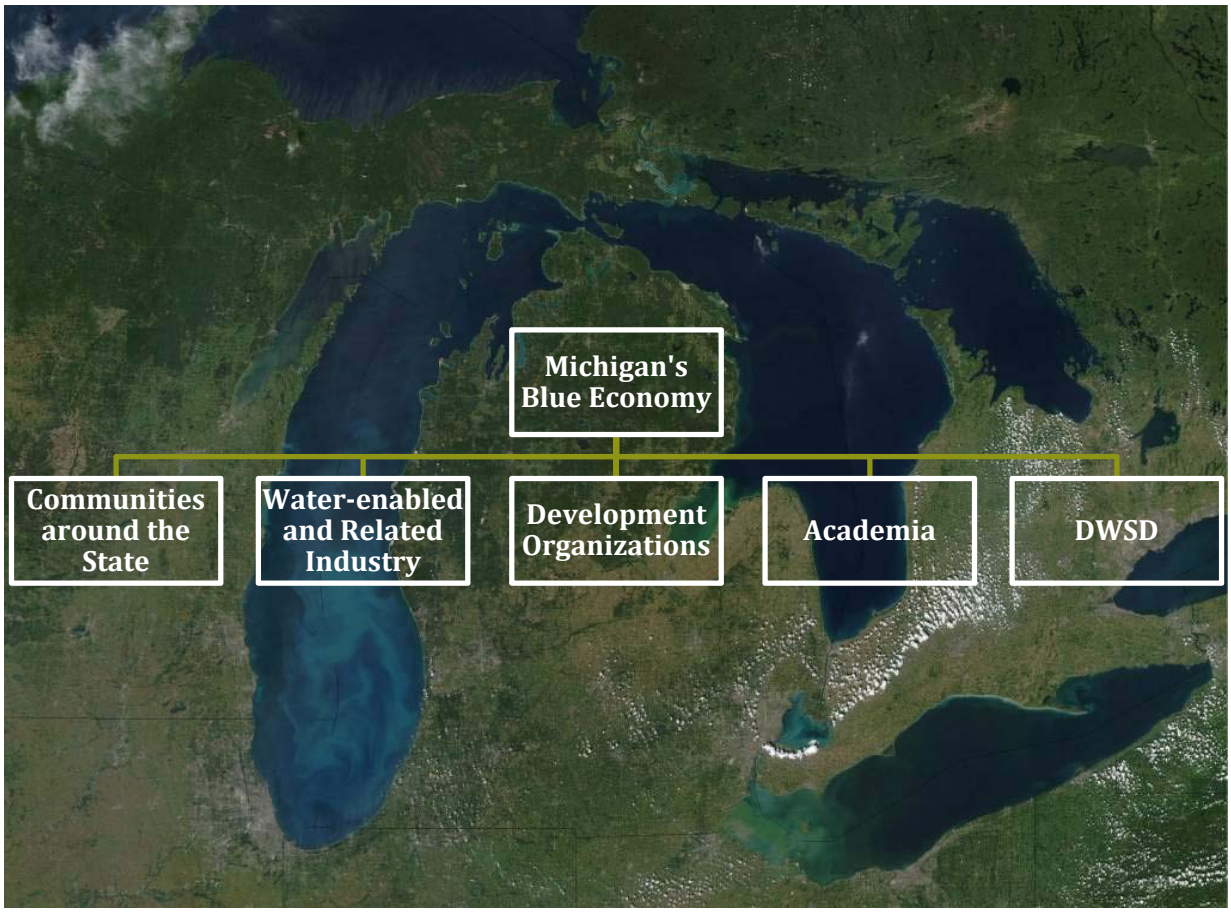

Figure 1-1: Leveraging DWSD's Organization to Facilitate Blue Economy Stakeholders

2.0 Introduction

With one-fifth of the world's freshwater supply at our doorstep, Michigan can be a leader in Blue Economy industry and research. The Great Lakes, along with Michigan's many rivers and inland lakes, have helped the state to prosper via shipping, agriculture, fishing, and production in the manufacturing sector. With over 3,000 miles of Great Lakes shoreline and more than 11,000 inland lakes, water remains central to everyday life in Michigan.

Michigan has a clear competitive advantage in water-enabled and water-related industries. This advantage can be economically beneficial to the residents of the state without abandoning our historic dedication to water stewardship. Detroit and Southeast Michigan also have ample real estate, world class research universities, and DWSD, which is one of the nation's largest water utilities. The combination of these assets presents Michigan with the opportunity to develop and promote a quality of life advantage found nowhere else. This report will lay out the ways in which DWSD can support Michigan's Blue Economy.

3.0 Water Challenges in the United States

The nation is facing a global water challenge characterized by rapid depletion of many of our freshwater sources. According to the UN, more than two thirds of the world's population will face water scarcity by 2025. Water scarcity has increasingly become a concern, and as a result, almost all regions are making efforts to promote sustainable water use. On a global scale, only 2.5% of the world's water is fresh, and approximately 21% of this freshwater is located in the Great Lakes.[vi] As a result of population growth, climate change, and increased use by agricultural and utility sectors, the world's freshwater supply is rapidly depleting. Agriculture is responsible for 70% of this usage and demand for food continues to grow with the population.

Climate change is affecting water availability and quality through increased evaporation, decreased recharge, increased demand, and recharge contamination. Coupled with low precipitation, in areas like the High Plains, groundwater recharge can take years, intensifying the effects of water scarcity. Water usage tends to increase with increases in temperature. Our nation's already stressed water supply will only continue to become more stressed. Water supplies in the South and West in particular, may face increased risk as population (and demand) grows, rainfall decreases and the length of droughts increase.

We can look to these indicators to predict a shift in population as well as industry from the West to the Great Lakes. While the likelihood of a large shift occurring now is low, developing and advancing framework for a Blue Economy would help prepare the region and the state for a future influx.

3.1 The Ogallala Aquifer: A Case Study

Many of our nation's regions rely on aquifers for their freshwater supply. For example, the Ogallala Aquifer constitutes 80% of the High Plains Aquifer in the central United States. Kansas, Texas, and Nebraska, the nation's top three grain producers, sit atop the majority of the Ogallala. The 347,000 km^2 aquifer[vii] is trapped between a calcified top layer (impervious to ground water recharge) and a layer of bedrock below. Annual precipitation is light and is outpaced by evapotranspiration rates. The natural recharge rate is so slow that depletion outpaces recharge. In Kansas, Nebraska, and Texas, the annual depletion rate is 100% to 140% above replacement."[viii]

Some farmers in Northwest Kansas are currently working on reducing depletion by 20% over a five year period. This initiative, coupled with other conservation techniques (i.e. all farmers agreeing to cut depletion by 20% immediately) could extend the peak year of extraction from 2040 to 2070.[ix] An extreme reduction in pumping of 80% would be required to achieve long term sustainability in Kansas, yet these drastic measures would not support the agricultural industries that are dependent upon the aquifer. Ongoing collaboration between Federal and State entities, as well as the High Plains states, is working toward conservation; yet, it is largely understood that even these efforts won't preserve the aquifer forever.

The Ogallala Aquifer is just one case of a rapidly diminishing water supply. We are seeing water scarcity in some of the nation's top agricultural regions, especially in California. With California facing one of the most severe droughts on record, Governor Brown declared a drought State of Emergency in January 2014, and directed state officials to take all necessary actions to prepare for water shortages.[x] The 2010 Blue Economy Report suggested that an influx of residents and businesses could occur as a result of water depletion in the West. Increasing scarcity has thus far failed to cause an exodus from water-stressed to water-rich areas like Michigan, but in the future this may change.

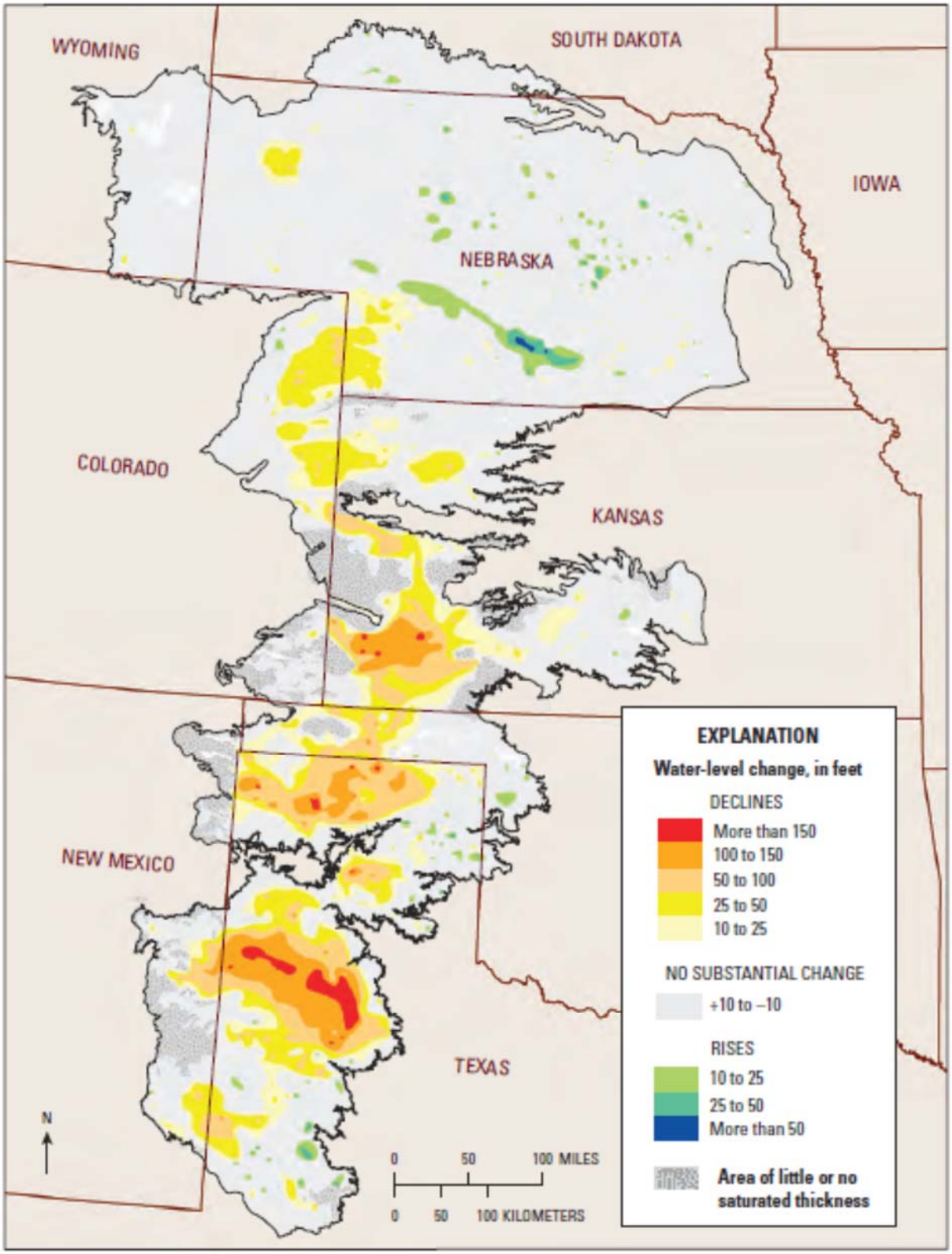

Figure 3-1: Map of the Ogallala Aquifer (Source: USGS Circular 1323)

4.0 Blue Economy Initiatives in Michigan

Michigan thought leaders have been exploring a Blue Economy for several years. The reasons are obvious, as noted below. This section summarizes the most visible initiatives to date.

- Michigan has freshwater access unrivaled outside of the Great Lakes Region, which provides an abundant supply of water and contributes to an expansive transportation network.
- World-class academic institutions are located in Michigan. Southeast Michigan is anchored by the University Research Corridor (URC), consisting of Michigan State University, the University of Michigan, and Wayne State University.
- Michigan has a national competitive advantage in water-enabled and water-related sectors.
- Water scarcity in the West creates the long range potential for the Blue Economy in Michigan.
- Real estate suitable for commercial and residential occupancy is readily available in Southeast Michigan.

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4.1 Green Jobs for Blue Waters

In 2009, the Governor office announced the *Green Jobs for Blue Waters* program, to be managed by the Michigan Economic Development Corporation (MEDC). The goal of this statewide initiative was to establish Michigan as a leader in the water technology sector. This initiative resulted from former Governor Jennifer Granholm's trip to Israel in 2008. The Governor wanted to foster partnerships surrounding water technology with Israel, a world leader in the field. Michigan is a prime location to research, test, and implement new water technologies and innovations. Key efforts included:

- An MOU between Michigan and Israel for the development of joint water technology projects, with matching funds from Israel.
- Identifying and coordinating Blue Economy stakeholders on a state and national level.

- Development of a comprehensive water sector database that identifies Michigan water resources and Michigan companies involved in the water sector.

4.2 H2Opportunities

In 2011, the Oakland County Water Resources Commissioner used his office to establish H2Opportunities to promote Michigan as a development ground for water purification, conservation, and utilization technologies – all in demand around the world. H2Opportunities has no staff and pays no salaries but goes after state, federal and foundation grants that become capital to attract companies such as Israel-based Miya – developer of the leak-detention system – to Michigan. H2Opportunities has brought three other companies to Michigan. One is testing a process to extract electricity from wastewater. Another is developing modular water treatment equipment that would be useful, for example, in residential areas where septic capacity has been exhausted. A demonstration system is being installed at a sprawling year-round camp near Evart in the northern Lower Peninsula. Yet another company is amplifying for water treatment the medical technology that's used to inject oxygen into blood without causing dangerous bubbles.[xi]

4.3 Macomb County Blue Economy Strategy

Macomb County has traditionally been a national leader in water-related business and is known for its nearly 32 miles of Lake St. Clair coastline and the Clinton River, with its many tributaries. Under the direction of Macomb County's Executive Mark Hackel, a new initiative is underway to celebrate the many aspects that are known as Macomb's Blue Economy. With over 50 active marinas, a world-class recreational boating and fishing industry, and numerous public and private access points providing many other ways to enjoy the water, Macomb County has a large Blue Economy opportunity. The Macomb County Department of Planning & Economic Development is developing land and water planning programs and projects to create sustainable outcomes that will be experienced for generations to come.[xii]

4.4 University Research Corridor

The University of Michigan, Michigan State University and Wayne State University form the University Research Corridor (URC). The URC vision is "to unite and lead, playing a key role in creating a vibrant Michigan economy that leverages the intellectual capital of its three public research universities, to work proactively to attract the knowledge economy businesses that can find the research activity that feeds new enterprise, educates the workforce and plants the seeds for the new industries of tomorrow."

The URC is a major contributor to Michigan's Blue Economy. The achievements and goals of the URC are detailed in *Innovating for the Blue Economy: Water Research at the URC*, a report written by Anderson Economic Group. The report, presented at the Detroit Regional Chamber's 2014 Mackinac Policy Conference, revealed that the URC received approximately $300 million in awards for water related research and outreach between the years of 2009 and 2013. Annually, 3,400+ graduates emerge from the URC, and specialize in water-related industries and related areas of focus including Great Lakes restoration, water monitoring and filtering technologies, agriculture related research, policy research related to solving for water related issues, and climate and weather research on topics concerning water quantity and quality.

4.5 Governor Snyder's Water Strategy

Michigan's Water Strategy resulted from Governor Snyder's request to create a vision for managing water quality and quantity in the future. The *Preliminary Framework for Michigan's Water Strategy* was published in 2013 by the Office of the Great Lakes and the Michigan Department of Environmental Quality. This water strategy aims to steer water-related policy in all forms for the next 30 years toward sustainable, beneficial use.

The Office of the Great Lakes also commissioned a white paper entitled *Water, Michigan, and the Growing "Blue Economy."* Written by John Austin[4], Director of the Michigan Economic Center (MEC) at Prima Civitas, the study defines the Blue Economy, how water has been important to our economy, and how it will be significant in the future. The report also outlines the opportunities and challenges facing Michigan in its effort to fuel economic growth with water. According to Austin, Michigan can be a leader in water research, education, conservation, clean-up, management, and new water-technology enterprise, alongside making our lakes and rivers the centerpiece of community economic development.

Austin, the MEC, and Grand Valley State University's Annis Water Resources Institute, are now working on a new report. The report primarily focuses on three areas: water research, large volume water users, and water technology products and services. Contributors to the report have identified Blue Economy initiatives as well as furthering Anderson's industry research. The report will lay the foundation for organizing and promoting the Blue Economy Initiative in communities across Michigan.

According to Mary Sue Coleman, former President of the University of Michigan:

> *The URC is making important contributions to interdisciplinary research, including work being done in the United States and Canada through the Council of Great Lakes Governors, the Great Lakes Restoration Initiative, and the International Joint Commission.*

4.6 DWSD's Blue Economy Thought Leadership

The concept of a DWSD Blue Economy strategy originated initially in 2009 in the chambers of the Honorable Judge John Feikens, who fostered a dialogue with regional stakeholders to explore the possibilities of the Blue Economy. One of the key outcomes was a request for DWSD to take a leadership role. DWSD contracted a local consulting firm to produce: *A Proposal for a Blue Economy.* As Michigan's automotive economy contracted, water usage in the Southeastern Michigan declined almost 20%. This proposal focused on attracting water intensive businesses to grow water usage in the DWSD system.

In March 2010, the TAC, the DWSD-suburban water customer partnership that has spent several years building a collaborative relationship between the region's major supplier of water and its customers, chartered a Blue Economy Committee to conduct a market survey. The committee developed a scope of work that would survey regional businesses that might have an interest in building a Blue Economy and multi-national companies that used high volumes of water in their production processes.

Regional interviews focused on current Michigan business conditions, corporate decisions on locating new plants and the current perception of DWSD water and wastewater quality, cost and service. These

[4] John Austin is the architect of the 'Blue Economy' in Michigan. In his 2007 study *Healthy Waters, Strong Economy,* Austin makes the argument that utilizing the Great Lakes resources, both physical and intellectual, for economic growth is a viable strategy for Michigan.

interviews provided a fundamental understanding of corporate priorities and how water fits into those decisions in different market sectors as well as the importance of water innovation. Three major points emerged:

- DWSD water and wastewater system infrastructure alone is insufficient to attract new plants and facilities to increase system usage and regional employment.
- DWSD water and wastewater system infrastructure can be an economic development tool.
- Southeast Michigan can brand itself as a sustainable water innovation hub with academic, business, government and regional economic development collaboration.

The interviews also revealed a broad range of interest in the Blue Economy concept. The following are consistent themes and representative comments from these companies:

- Southeast Michigan water, wastewater and energy infrastructure is a competitive advantage, but corporate awareness outside of Michigan is limited.
- Sustainable water development branding could be important to "Green Companies."
- Companies recognize the need for water, wastewater and stormwater innovation, and are especially important to most of the interview set, especially those companies which consider themselves "High Tech".
- Michigan's environmental academic prowess, regulatory openness and world-class infrastructure support the Blue Economy concept.

5.0 Blue Economy Initiatives outside of Michigan

5.1 Ontario: Blue Economy Initiative

Royal Bank of Canada (RBC), the Walter and Duncan Gordon Foundation, and the Canadian Water Network (CWN) founded Ontario's Blue Economy Initiative (BEI) in 2011. Ontario's guiding values for the BEI are: sustainability, transparency, efficiency, stewardship, and leadership. The BEI has established four focus areas:

1. The value of water to Canada's economy
2. Global water opportunities
3. The value of water in agriculture/good production
4. Innovative smart water and wastewater infrastructure – "city of the near future"[xiii]

The BEI performs research as well as projects surrounding these focus areas. To date, the BEI has completed five publications regarding Ontario's Blue Economy process. The reports are available at: http://www.blue-economy.ca.

Canada is one of the United States' largest trading partners and is the number one importer of Michigan exports, accounting for 44% or $12.2 billion worth of exports in 2013. Michigan and Canada trade

upwards of $204 million in goods and services each day.[xiv] Efforts by the Michigan Economic Development Corporation (MEDC) to solidify this trade partnership include establishing a Canada trade office partnered with the Council of Great Lakes Governors. There is an opportunity for collaboration between Michigan and Ontario, sharing best practices and innovative technologies in the water enabled and water related industries, further enabled by the proximity between Detroit and Windsor.

5.2 Milwaukee: Global Compact City

In 2009, The United Nations designated Milwaukee as a Global Compact City; a designation for select cities that "showcase progress on issues that involve human rights, environmentalism, health or labor standards." Milwaukee is one of two cities in the world that focuses on water. Jamshedpur, India is the other, specifically dedicated to industrial sewage treatment projects. There are 13 member cities in the Global Compact Cities Program. This designation gives Milwaukee global recognition as an international hub of water technology. [xv]

In 2009, The Milwaukee Water Council was established by a group of business and government leaders, and academia in the Milwaukee area. It is a non-profit organization dedicated to the promotion and advancement of water technology and innovation, research, economic development and entrepreneurship. The Water Council advances water technology and innovation through Business, Research, Entrepreneurship, and Wisconsin (BREW). BREW is an accelerator program for freshwater startups that provides capital, networking, and training for entrepreneurs.

Each year the Water Council hosts a global Water Summit, a gathering of industry, water sector and government leaders and professionals (See Appendix A). The Water Summit is not only a networking and information sharing opportunity, but an opportunity to push water issues, challenges, and achievements to the forefront. The theme of the 2014 Water Summit was *Thriving in the Global Water Economy.* The speakers and breakout sessions at the Water Summit highlighted the fact that freshwater challenges cannot be addressed in isolation. Three main topic areas emerged from the Water Summit:

- Interconnectedness and holistic relationships between the water sector, private sector, public sector, government, and academia are essential for a successful Blue Economy strategy.
- A culture of acceptance with regard to change and innovation must be instilled in the water sector.
- Water scarcity is a crisis affecting our nation, not just developing nations. We must learn from our crises, addressing both the risks and opportunities involved.

The Summit impressed upon attendees that they must be willing to change. While water scarcity does not appear to be a pressing issue for our region now, it may be in the future. As Kim Marotta, Director of Sustainability at MillerCoors said: "Water is about 80% investment in human capital, but 20% is cultural." Change does not happen overnight, nor does it happen alone. Precedent shows that collaboration interaction between various actors and groups fuel the innovation required to build a Blue Economy.

6.0 Blue Economy Food and Beverage Regional Market Analysis

The state of Michigan employs 718,704 people in water related industries,[xvi] accounting for 21.3% of total employment in the state. Over 80 industries and subsectors of these industries make up the water-

enabled and water-related jobs in Michigan. (DWSD designates companies in these sectors as Significant Industrial Users.) This section explores an economic development strategy targeting these users to augment demand for DWSD water service.

Water is a primary ingredient in food and beverage industry products. Most beverage manufacturers use municipal sources for water. Soft drinks are comprised of 90-99% water, and soft drink production requires strict quality standards.[xvii] In addition to the drink itself, the bottles, labels and packaging consume water during the production process. For North American companies, it takes 1.39 liters to make 1 liter of water. That's less than the global average of a liter of soda, which requires 2.02 liters of water.[xviii] With such a large water footprint, soft drink producers need abundant and high quality water readily available.

In order to analyze this opportunity, we compared Michigan's food and beverage manufacturing data to similar data from two categories – Water Rich and Water Stressed states. The Water Rich category includes Ohio, Illinois, Indiana and Wisconsin. The Water Stressed category includes the High Plains and California. The High Plains has a significant market share of the food manufacturing industry and is largely supplied by the Ogallala Aquifer. A looming concern for this industry is aquifer depletion (as noted previously). Studying market data in the Water Stressed category provides some insight into how much market share may be available to Michigan if water scarcity turns into a true crisis.

6.1 Water Stressed Category – High Plains[5] and California

As shown in **Tables 6-1 and 6-2**, Michigan is not a leader in employment or establishments in either industry, but does have a sizeable presence in both sectors. California clearly has the largest market share of food and beverage production, packaging and bottling. Yet freshwater supplies in California have been in peril for years. While per capita daily water use within the state has been declining over the last two and a half decades[xix], population growth, persistent drought, and poor water management are stressing on limited freshwater resources.

Table 6-1: 2012 Food Manufacturing Industry – Michigan, High Plains and California

State	Michigan	Kansas	Nebraska	Texas	California
No. of establishments	780	282	293	1,666	3,421
No. of paid employees	29,443	28,101	34,712	89,341	152,205
Annual Payroll ($1,000)	1,259,285	1,037,688	1,307,847	3,073,518	6,395,047

Data Source: U.S. Census Bureau, County Business Patterns, 2012
Note: number of paid employees calculated for pay period including March 12

Table 6-2: 2012 Beverage Manufacturing Industry (aggregated)[6] – Michigan, High Plains and California

State	Michigan	Kansas	Nebraska	Texas	California
No. of establishments	131	25	25	255	1,381
No. of paid employees	3,810	546	373	8,474	36,921
Annual Payroll ($1,000)	169,230	23,369	12,660	447,710	2,088,953

Data Source: U.S. Census Bureau, County Business Patterns, 2012
Note: number of paid employees calculated for pay period including March 12

[5] Of the High Plains States, the top three producers are Kansas, Nebraska, and Texas.

[6] See list of references for breakdown of soft drink and bottled water manufacturing.

6.2 Water Rich Category– Great Lakes States

Results are similar when comparing Michigan to neighboring Great Lakes states. Michigan does not display a dominant presence in either the food manufacturing or beverage industries. Despite this fact, the two industries account for more than 33,000 jobs in Michigan alone. For this reason, economic strategies should remain focused on maintaining the prosperity of these industries.

Table 6-3: 2012 Food Manufacturing Industry – Great Lakes States

State	Michigan	Indiana	Illinois	Ohio	Wisconsin
No. of establishments	780	478	1,162	910	955
No. of paid employees	29,443	33,291	70,925	52,187	62,002
Annual Payroll ($1,000)	1,259,285	1,397,914	3,222,596	2,187,497	2,651,312

Data Source: U.S. Census Bureau, County Business Patterns, 2012
Note: number of paid employees calculated for pay period including March 12

Table 6-4: 2012 Beverage Manufacturing Industry (aggregated)[7] – Great Lakes States

State	Michigan	Indiana	Illinois	Ohio	Wisconsin
No. of establishments	131	77	114	117	100
No. of paid employees	3,810	2,408	3,447	4,496	3,019
Annual Payroll ($1,000)	169,230	89,252	164,600	219,845	144,150

Data Source: U.S. Census Bureau, County Business Patterns, 2012
Note: number of paid employees calculated for pay period including March 12

6.3 Breaking out the Beverage Industry

By charting the percent of total employment of the beverage manufacturing industry by state, we gain a clearer picture of the impact the sector has on each state's economy. The percentage of total employment occupied by the beverage manufacturing industry in California is more than two times the second highest state (Wisconsin). This may create opportunity for Michigan and other Water Rich Regions to capitalize upon beverage manufacturing businesses that are forced to leave California for a water rich state.

[7] See list of references for breakdown of soft drink and bottled water manufacturing.

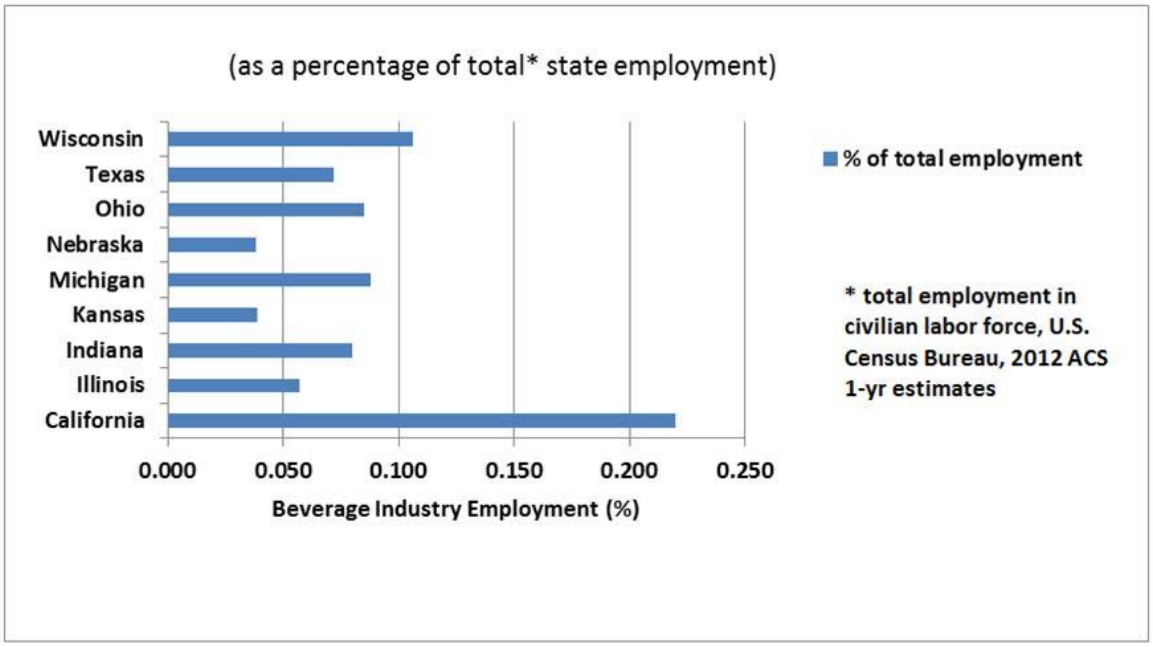


Figure 6-1: Beverage Manufacturing Industry Employment for FY2012 (Source: U.S. Census Bureau, 2012 ACS 1-yr estimates, 2012 County Business Patterns)

6.4 U.S. Food & Beverage Manufacturing Sector Performance

Contributors to DWSD's 2010 Blue Economy Report were asked whether or not they felt markets were saturated with respect to food and beverage industries. According to Jay Richardson, "We certainly are not saturated and the fact is that the opportunity is global for water and technology processes." But as shown in Chart 2, the growth shown in both sectors following 2008 is miniscule and represents post-recession recovery. Thus, improvements in performance beginning in 2009 should not be viewed as enough growth to suggest that Michigan should aggressively pursue food and beverage manufacturers.

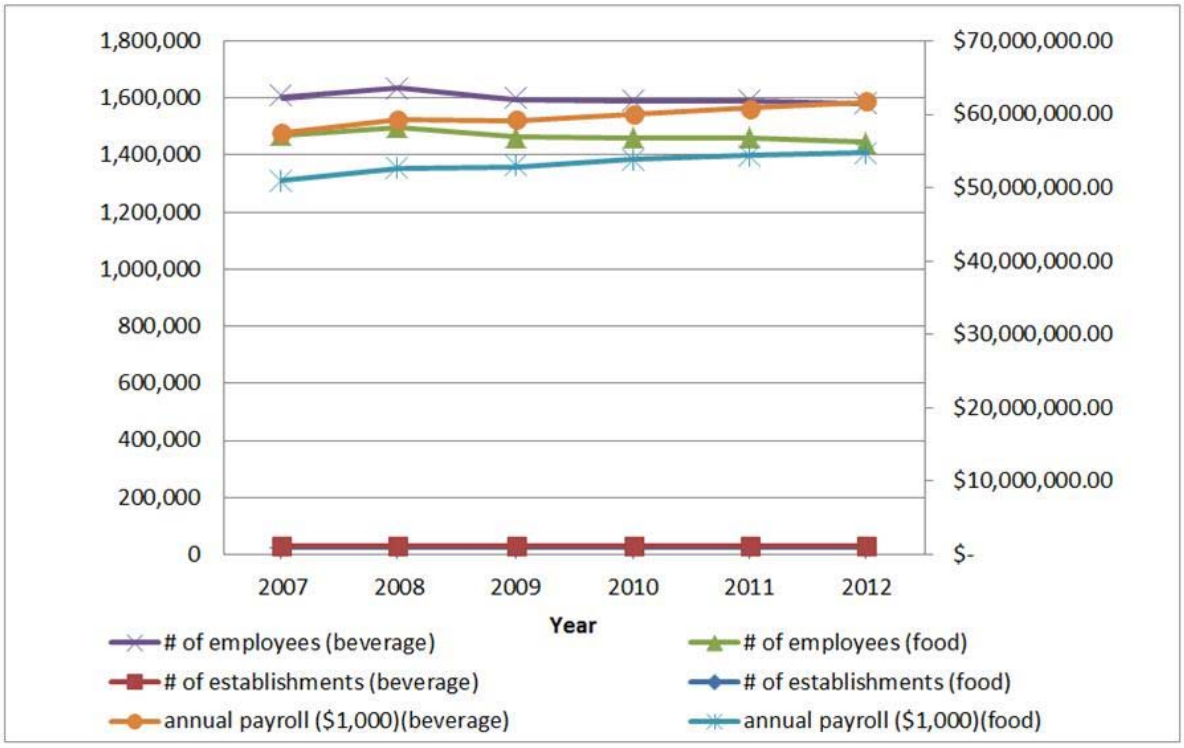


Figure 6-2: U.S. Food and Beverage Manufacturing Sector Performance 2007-2012 (Source: U.S. Census Bureau, American Fact Finder, County Business Patterns, 2007-2012)

6.5 Examples of Current Blue Economy Opportunities

VernDale Products Inc. is an example of an expanding Detroit based food processing company. VernDale produces roller-dried whole milk, a primary ingredient in high quality chocolate. Prompted by European customers, the family owned business is building a $20 million 82,000 square foot plant in Detroit to accompany their current plant which is also located in the city. VernDale Products is the only roller-dried milk producer in the nation, and the majority of the milk used in their production process is Michigan made. Some foreign chocolate producers are expanding their U.S. operations, creating new opportunities for VernDale Products.

Distilleries and breweries are also growing in the region. Thumb Knuckle LLC and Two James Spirits are two new operations opening distilleries and tasting rooms in previously vacant warehouses. Two James Spirits, located in Corktown, is the first licensed distillery in Detroit since prohibition, and opened its doors in 2013. Thumb Knuckle Distillery LLC, located in Hazel Park, expects to open its doors in October of 2014 in a 12,000 square foot space in an abandoned lumber yard.

6.6 Conclusion: Food/Beverage Market Not Driver for Blue Economy

The aforementioned examples illustrate the challenge of pursuing a food and beverage section expansion strategy in Michigan. Both companies will probably not become significant purchasers of DWSD water. The following analysis of DWSD's significant industrial users provides further insight.

Today, DWSD's significant industrial users' total average daily flow is 2.2 MGD. This equates to 0.4% of the average daily 2013 water production of 546 MGD. Twenty three companies are responsible for the 2.2 MGD demand. In order to reach a nominal goal of 25 MGD by 2035, DWSD would have to increase

sales of water to high volume users by 22.8 MGD. There are four food and beverage companies today in the DWSD service area that use 187,000 to 395,000 gallons per day of water. The region would have to attract approximately 80 more companies of this size to achieve the 25 MGD goal. This unlikely scenario translates to bringing four new companies per year to Southeast Michigan for the next 20 years.

7.0 Recommended Blue Economy Strategies for DWSD

Growing populations and long-term unsustainability of water demand in the Western U.S. are leading indicators that the Blue Economy could bring more economic development to Southeast Michigan. Michigan stands at the frontier of supplying water-enabled and water-related industries. Yet, even with abundant high quality water, we cannot rely on Western water scarcity for economic growth. It may take decades for an economic shift from water stressed regions to water rich regions like Michigan. DWSD's capacity and Michigan's fresh water supply cannot be disputed, yet these are not the only factors in a business relocation decision, even for a high volume water user. Transportation costs, tax incentives, development requirements, labor costs, and cost of water/sewer services, are key factors in relocation or expansion decisions. Therefore, following recommendations focus on a holistic effort to grow Southeast Michigan's Blue Economy.

1. Water Research Collaboration

The emerging Water Master Plan calls for repurposing one or more of DWSD's five water treatment plants. Utilizing a portion of water treatment plant as a Research Center presents a unique opportunity to realize several of the critical success factors of Michigan's Blue Economy. For example, the Michigan Economic Center and Annis Water Resources Institute vision calls for concentrated collaborations to develop and commercialize key water solutions. DWSD can provide the physical capital for these collaborations in the form of a Water Research Center.

The dedication of a portion of a plant as a Research Center would be a catalyst for facilitating collaboration between academia, and the public and private sectors. Responsible water use in economic development through advances in innovation and water technology could go from conceptual to practical. Creating an innovation and technology hub where universities and colleges of all calibers can come together with private industry will facilitate knowledge spillovers, advances in water research and innovation, and training water resource experts, all while increasing coordination among current water research programs. Austin's report recommends creating a "Pure Michigan Water Technology Accelerator[xx]," similar to The Water Council's Global Water Center accelerator program. A Water Research Center has the potential to be a springboard for this proposal.

This cornerstone suggestion has a precedent. Professor Kevin Fitzsimmons, with the University of Arizona College and Agriculture and Life Sciences, has submitted a proposal to Pima County, Arizona to repurpose a decommissioned wastewater treatment plant as a research center. Currently the county has earmarked $32 million to demolish the wastewater plant. If the proposal is approved, the facility would be used for aquaculture and water use research. This plan was inspired by Aquila International, a Versailles aquaculture company, which raises fish in decommissioned wastewater tanks and lagoons.

Kentucky State University has had success in establishing sustainable aquaculture operations at a decommissioned wastewater treatment plant. This reuse is purported to create jobs, eliminate

demolition costs that would be incurred by municipalities, and generate revenue for the communities these reclaimed water facilities (RWF) are located in. Furthermore, building the new facilities adjacent to the reclaimed facilities allows reclaimed water to be used in aquaculture operations.

2. Develop a 10-year Blue Economy Plan with Annual Goals

The notion of a Michigan Blue Economy has been gaining traction in recent years, sparking action from various institutions and prominent governmental figures.

- University Research Corridor –The URC specializes in water innovation and technology. More than 3,400 students graduate from the URC institutions each year prepared to work in water enabled and water related industries.
- Macomb County – The "Macomb County Blue Economy Strategic Development Plan," released in 2012, set forth five detailed recommendations, tailored toward tourism and recreational improvements and developments. Three core principles guided the process: environmental stewardship, economic development, and quality of life.
- Great Lakes Region Initiatives – The Council of Great Lakes Governors, Council of Great Lakes Industries, Great Lakes Restoration Initiative and the Great Lakes Commission are all working to coordinate the Great Lakes states and provinces to facilitate environmental stewardship, protection, and economic development surrounding precious freshwater resources.
- Michigan Economic Center at Prima Civitas – John Austin and Grand Valley State University's Annis Water Resources Institute are advancing the work of Michigan's Water Strategy and local Blue Economy Initiatives to encourage participation across the state.

DWSD can promote collaboration amongst these various initiatives by supporting and encouraging the development of "Regional Prosperity Plans'[8] called for by Governor Snyder.

The plan can start with analysis of the existing 23 large food and beverage companies currently buying DWSD water. These companies collectively use 2.2 million gallons of water daily and employ approximately 2,900 people. A goal can be established for increasing water use by food and beverage companies and other water-dependent industry. DWSD's industrial water sales have fallen from 44 MGD to 23 MGD in the last 15 years. A goal restores much of the 44 MGD industrial water over a 10 to 20-year period would be ambitious. In addition to high quality and abundant water supply, the regional water service area has a strong transportation network and available land. Growing water scarcity in other parts of the country could drive growth for Blue Economy business in Michigan.

DWSD has considerable expertise in creating and facilitating regional collaboration. In 2003, DWSD initiated a partnership process with their Suburban Wholesale Water Customers in conjunction with the development of the Water Master Plan Update.

A Technical Advisory Committee (TAC) was established, with six co-chairs, five from the suburbs and one from DWSD. The TAC meets quarterly and conducts its business according to by-laws, which were developed jointly by DWSD and the customers and approved in 2008. A significant accomplishment includes jointly developing a new 30-year master water contract, which has been signed by 75 suburban communities.

(Note: The Water Council and the city of Milwaukee also provide a good baseline for collaborative action. Milwaukee has had success in establishing a unified water hub, bringing together private business, academic institutions and the water sector.)

3. Continue to Support Water Stewardship Programs in Michigan

Michigan has 3,288 miles of Great Lakes shoreline, and nearly 21% of the world's freshwater can be found in the Great lakes. Yet, the world is facing a water crisis, with more than 2/3 of the world's population expected to face water scarcity by 2025. Using our resources wisely and promoting sustainability will help carry our region into the future. Blue Economy stewardship will help move Michigan into an economically and resource vibrant future. Water can be used as a development tool, but we can use water smartly, improving water quality and availability as well. A Blue Economy that fits with an environmentally conscious vision of our state as well as water stewardship would be ideal. Key water stewardship initiatives include the Michigan Water Stewardship Program (MWSP) and the Michigan Clean Water Corps (MiCorps).

4. Leverage DWSD's Organizational Optimization for the Blue Economy

DWSD is undergoing a best-in-class effort to optimize the organization's production and service delivery processes. Helping high volume water users with water efficiency and reducing their costs is central to Austin's vision for growing Michigan's Blue Economy.

Creating an educational interface for DWSD customers, particularly commercial users, on sharing best practices surrounding use and treatment will aid these customers in becoming more cost effective, more sustainable, and better stewards of water. Additional, recommendations for working with customers include:

- Establishing a Blue Economy Liaison within the Commercial Operations Group to work with and address concerns of Significant Industrial Users.
- Demonstrate the benefits to customers, the environment, and the economy that result from investing in sustainable infrastructure, and maintaining these assets into the future.
- Track indicators of employment growth and water sales in industrial/commercial sectors during the 5-year reviews of the Water Master Plan.

Appendix A: Water Summit 2014 Summary Report

Alyson Bove, Project Innovations Graduate Intern attended The Water Council's Water Summit 2014 in Milwaukee, Wisconsin on June 18 and 19. Carl Johnson of CDM Smith, the DWSD Water Master Plan Update Project Manager directed Bove to attend the Water Summit in order to make contact with several actors in Milwaukee's water sector.

In reference to the Blue Economy, Milwaukee presents a parallel case to Michigan. Strategically located on the shores of Lake Michigan, the abundance of freshwater surrounding Milwaukee has provided considerable economic advantages. The city was founded on wet industries such as breweries and tanneries; but most of those industries have left the city, leaving its water utility with excess capacity. Milwaukee did not establish itself as a global water hub overnight. It took years of commitment and collaboration to create change and development. In developing its Blue Economy, Milwaukee relied on private sector leadership. This commitment from private industry accelerated the development of Milwaukee's global water hub, as well as the Global Water Center.

Keynotes and Speakers:

- Dean Amhaus, President & CEO, The Water Council
- Rich Meeusen, President, CEO, & Chairman, Badger Meter, Inc. and Co-Chair, The Water Council
- Glen Daigger, President, International Water Association and Senior Vice President & Chief Technology Officer, CH2M HILL
- Dr. Lawrence Spinelli, Director of Outreach & Public Affairs, Overseas Private Investment Corporation (OPIC)
- Lisa Downes, Director of Freshwater Stewardship, North America, The Nature Conservancy/Alliance for Water Stewardship
- Brigadier General Daniel R. Ammerman, Commander, 353rd Civil Affairs Command
- Paul Jones, Executive Chairman, A.O. Smith Corporation and Co-Chair, The Water Council
- Paul Reiter, Strategic Counsel to the International Water Association and President, ReiterIWS
- David EJ Garman, Dean, School of Freshwater Sciences, UW-Milwaukee and Past-President & Former Chairman, International Water Association
- Elizabeth Thelen, Director of Entrepreneurship & Talent and Director of The BREW – The Water Council
- Lee Swindall, Vice President, Business and Industry Development, Wisconsin Economic Development Corporation
- Governor of Wisconsin, Scott Walker

Workshops Attended:

1. *A Water Utility CEO's Guide for Business Growth Through Maximizing ROI:* Presenter: Tim Waldron, Chairman, International Water Association Water Loss Specialists Group & Former CEO, Wide Bay Water Corporation

   Tim Waldron, in keeping with the theme of innovating for change, declared that the water industry is very traditional. Key comments included: *to change things is not always easy … we need to look at the problems differently and accept change . . . motivation to change must be given by leaders . . . the job of a water utility CEO is to inspire and give vision . . . we are constantly dealing with complexity, and as a whole stand to benefit from addressing these complexities in new ways.*

2. *Investing in The Water Council's Future: Building a Bright Blue Future for Innovation Exchange:* Presenters: Dean Amhaus, President & CEO; The Water Council, David EJ Garman, Dean, School of Freshwater Sciences, UW-Milwaukee; Douglas Schaedler, President & CEO, inno360 Inc.; Michael J Turillo Jr, Co-Founder & Chairman, inno360 Inc. and Co-Founder, Innovation Exchange, LLC.

   The goal of this panel discussion was to promote the Innovation Exchange, a collaborative platform for research and knowledge sharing. The Exchange allows existing talents in Milwaukee to connect with each other and also with talents around the world, attacking barriers erected by intellectual property concerns in both the private sector as well as academia. The platform creates a 'non-threatening atmosphere' and a 'collaborative environment' for discovery.

3. *NO WATER, NO BEER!* Presenter: Kim Marotta, Director of Sustainability, MillerCoors

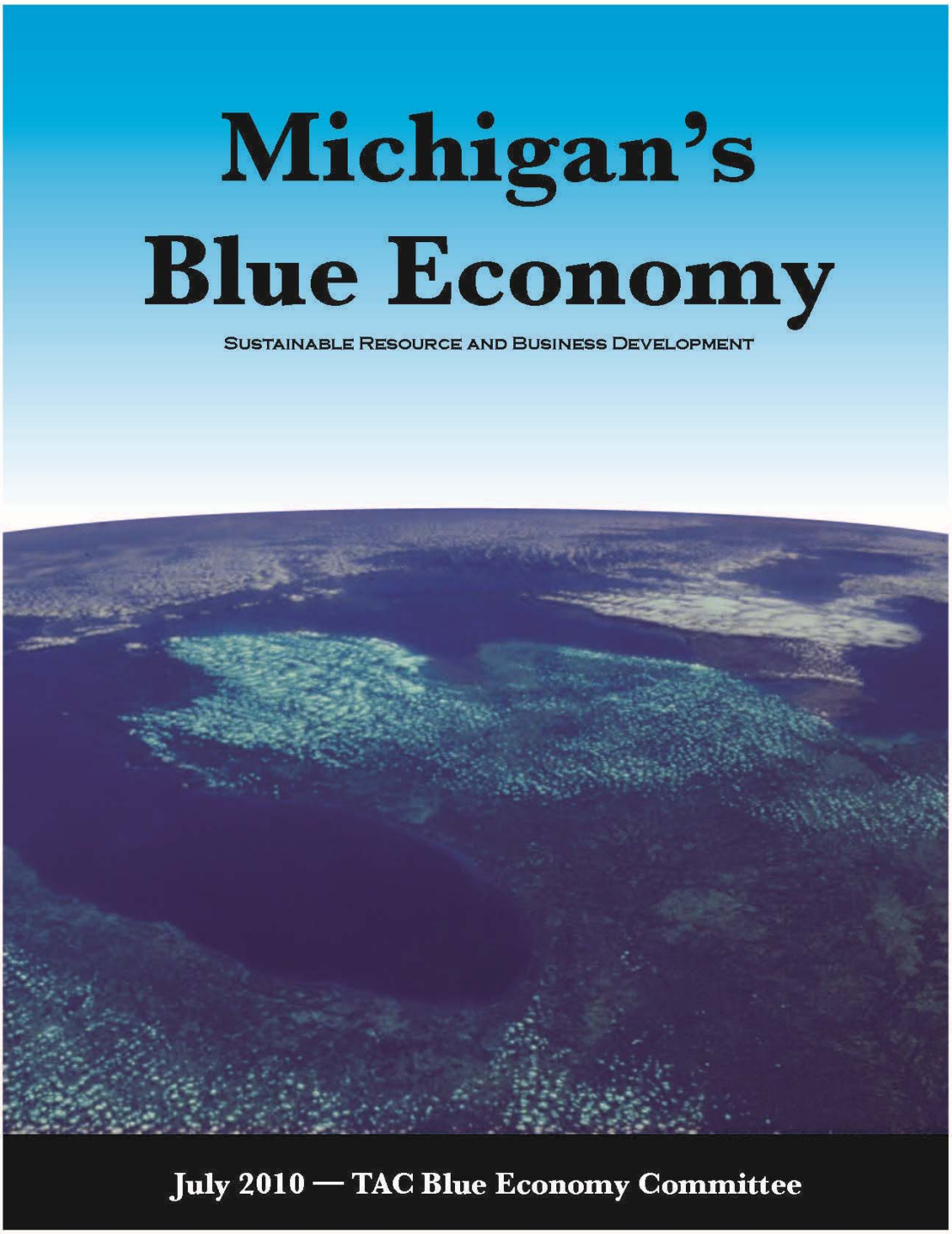
   Upon merging of Miller and Coors in 2008, the joint company strengthened its sustainability initiative by reducing water usage in production as well as exploring innovative techniques for reducing water waste on corporate and family-owned source farms. As Director of Sustainability for MillerCoors, Kim Marotta declared that water is not only an issue for the company, but for everyone: "Collaboration and cooperation are needed to engender change not only in the water sector, but in all public and private sectors as well."

   MillerCoors believes that water efficiency is essential not only to their success, but for the future of our global water resources as well, which is why they advocate doing everything possible to reduce the amount of water used. By allowing workers to participate in the decision making process with respect to changing standard daily practices, and instilling a culture of water stewardship, MillerCoors reduced the amount of water used to produce 1 barrel of beer from 4.1 barrels in 2008, to less than 3 barrels in May of 2014. Last year alone 90 million gallons of water were saved in Milwaukee breweries.

4. *Attacking Water Loss: Georgia's New Water Mindset:* Presenters: Will Jernigan, Director of Water Efficiency, Cavanaugh Inc.; Jason Bodwell, SRF Program Manager, Georgia Environmental Protection Division (EPD); M. Steve Cavanaugh Jr., President & CEO, Cavanaugh

As a result of the Water Stewardship Act of 2010 (stimulated by searing droughts) the state of Georgia focused on reducing water demand, reducing unaccounted for water and improving infrastructure.

Appendix B: Bibliography and Endnotes



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ACKNOWLEDGEMENTS

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This project was financially supported by the Detroit Water and Sewerage Department (DWSD). As a major infrastructure provider with wholesale partners, DWSD promotes water resource stewardship and regional growth to create clean, abundant, and affordable water for its customers. **The Blue Economy is sustainable development of Michigan's resources to create a global water hub.** The idea of the Blue Economy has brought together many regional stakeholders to understand the potential of Michigan's most important resource and asset—water. The purpose of this report is to provide regional and state economic development organizations with a framework to design the Blue Economy.

"Sustainable Development to Create a Global Water Hub"

The Blue Economy will produce, use, and return Michigan water to its many sources with sustainable methods that preserve and enhance water quality, but the Blue Economy is more than an environmental opportunity. It can create jobs by integrating Michigan's passion for water, its industrial prowess and its technical competence. Today's water issues result from yesterday's mechanistic solutions. Tomorrow's solutions must be holistic. The Blue Economy will bring together environmentalists and business people underneath our own sustainable water brand.

There is no substitute for water. The global challenges of population growth, industrial expansion, infrastructure deterioration, dependency on fossil fuels, climate change, pollution and depletion of ground water will continue to drive sustainable water innovation. Since the Great Lakes represent 20% of the world's potable surface water, Michigan has a vested interest in improving watershed and lake quality and using our waters to grow a new economy, a Blue Economy. Communities across the globe are entering the race to build a global water hub and there's no reason why Southeast Michigan can't win the race.

PREFACE

Up to now, national leaders have viewed water scarcity as a regional problem. Business leaders have viewed it as a limitless resource. But after a decade of global warming, leaders are becoming aware of an oncoming water shortage, giving Michigan, whose borders touch 20% of the world's remaining fresh water, an extraordinary opportunity.

As most observers loosely use the term, "the water industry" includes a very broad array of sectors: steel and concrete pipe manufacturers; specialty chemical producers; measurement; monitoring and testing firms; tank manufacturers; all kinds of treatment equipment manufacturers; new technology developers of all stripes; manufacturer's representatives who sell all of these things to different end users; engineers and consultants; contract operators of water plants, and many others—companies which may be quite different and whose only similarity is that they are somehow involved in the process of providing clean water.

—Steve Maxwell, "The State of the Water Industry"

Few would argue that Silicon Valley is known as the world's hub for information technology. Where are its salient characteristics as a global hub? Large information system companies have their headquarters in Silicon Valley: Apple, Intel, Google, Hewlett-Packard, etc. Silicon Valley companies produce a significant number of patents—almost 100,000 from 2000 to 2008, and more than 10% of the total U.S. patents in 2008. Silicon Valley draws large amounts of venture capital—$5 billion in 2009 and over $80 billion since 2000. And of course, Stanford University is located in Silicon Valley and has been an innovation engine for almost three decades.

What does it take to make a global technology hub successful? What made Silicon Valley, Raleigh's Research Triangle and Boston's Biotechnology Centers work? Marc V. Levine of University of Wisconsin makes compelling points in, *The False Promise of the Entrepreneurial University,*[1] that university commercialization is more than entrepreneurial research and development of groundbreaking technology. Successful technology hubs have regional support to create businesses in the targeted sector. They focus on transitioning R&D into innovation. It requires a culture of competition, collaboration and community. Successful technology hubs leverage the academic, business, and political commitment to promote focused R&D, and economic development **in their communities**.

Currently, the water industry is localized and has organized itself around the world's cities and towns, providing discrete design, engineering and operations services (mainly for water and wastewater treatment) to government, utilities and industry. According to Goldman Sachs, of the world's top 40 water companies, four are located in New York, and two each in Boston, Chicago, Dallas, Los Angeles and Philadelphia. Measured by locations of offices and plants, the top players in the U.S. water industry are Houston and Boston, neither of which is located near a large source of fresh water. Clearly, Michigan, and Southeast Michigan in particular, has an opportunity to seize the moment and begin the process of aggregating this fragmented industry. Detroit's advantage is world class R&D, TechTown, DWSD/DTE, designers, engineers, industrial property availability and an overarching need to replace the technical and industrial void left by the decline of the auto industry.

The concept of the Blue Economy originated initially in the chambers of the Honorable Judge John Feikens, who fostered a dialogue with regional stakeholders to explore the possibilities of the Blue Economy. One of the key outcomes was a request for DWSD to take a leadership role. DWSD tasked Project Innovations under contract number CS-1445, to produce: "A Proposal for a Blue Economy[2]." As Michigan's automotive economy has contracted, water usage in Southeastern Michigan has declined almost 20%. This proposal focused on how to attract water intensive businesses to grow water usage in the DWSD system. As the "architecture" of the Blue Economy evolved with contributions from the Engineering Society of Detroit (ESD), Michigan Economic Development Corporation (MEDC), Southeast Michigan Council of Governments (SEMCOG), and the Technical Advisory Committee (TAC), the need emerged to understand the potential market for the Blue Economy.

In March 2010, the TAC, the DWSD-suburban water customer partnership that has spent six years building a collaborative relationship between the region's major supplier of water and its customers, chartered a Blue Economy Committee to conduct a market survey. Not having the charter to prepare a formal marketing study, the committee developed a scope of work that would survey regional businesses that might have an interest in building a Blue Economy and multi-national companies that used high volumes of water in their production processes.

Regional interviews focused on current Michigan business conditions, corporate decisions on locating new plants and the current perception of DWSD water and wastewater quality, cost and service. National surveys focused specifically on corporations in the CERES *Murky Waters*[3] Report to determine the importance of water and wastewater services in locating plants and the critical criteria for locating a facility in Michigan. The CERES *Murky Waters* Report provided a basis for further exploration as it analyzed the SEC disclosure filings of 100 major corporations in business sectors dependent on water. Both regional and national interviews provided a fundamental understanding of corporate priorities and how water fits into those decisions in different market sectors as well as the importance of water innovation.

Two major points emerged:

- DWSD water and wastewater system infrastructure alone is insufficient to attract new plants and facilities to increase system usage and regional employment.
- DWSD water and wastewater system infrastructure can be an economic development tool. Southeast Michigan can brand itself as a sustainable water innovation hub with academic, business, government and regional economic development collaboration.

EXECUTIVE SUMMARY

DWSD initiated a partnership in 2003 with its suburban community water customers, in conjunction with the development of a Fifty-Year Comprehensive Water Master Plan. This partnership became known as the Technical Advisory Committee (TAC) and has proven highly effective in decreasing conflict and building momentum toward a progressive regional relationship that balances individual and system interests.

In the past two years, water shortages in California have shuttered new housing developments and forced farmers to abandon or leave unplanted more than 100,000 acres of agricultural land, resulting in more than $1 billion in lost revenue. At the same time, chemical companies like Dow and DuPont see vast opportunities in providing products that can help ensure adequate freshwater supplies globally. Dow, for example, is pushing to achieve a 35 percent reduction in the cost of water reuse and desalination technologies by 2015.

—CERES, "Murky Waters? Corporate Reporting on Water Risk"

The interviews also revealed a broad range of interest in the Blue Economy concept. The following are consistent themes and representative comments from these companies:

- Southeast Michigan water, wastewater and energy infrastructure is a competitive advantage, but corporate awareness outside of Michigan is limited.
- Sustainable water development branding could be important to "Green Companies."
- Companies recognize the need for water, wastewater, and stormwater innovation, and is especially important to most of the interview set, especially those companies which consider themselves "High Tech".
- Michigan's environmental academic prowess, regulatory openness and world-class infrastructure support the Blue Economy concept.

All in all, this study validated the Blue Economy concept and has led to the development of a strategy to support local economic development agencies in the pursuit of businesses who want to be on the ground floor of Michigan's Blue Economy development, and the committee is currently conducting dialogues with the Michigan Economic Development Corporation and the Detroit Economic Growth Corporation (DEGC) to determine the most effective path forward.

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