Speaker Biographies/Abstracts

Pickles, Beer and Cloud Computing: The Case for Sustainability

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University of Minnesota
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Presentation: *Can Groundwater be Use Sustainably? Groundwater Depletion; an Assessment and Some Suggestions for Action*

Summary and Abstract

- An overview of aquifer depletion across the United States
- Groundwater models and their reliability
- Measures to reduce aquifer depletion

Agriculture is the largest user of groundwater in the nation, based upon net loss of groundwater. Farms are far apart, and the extraction of groundwater for irrigation is not concentrated in relatively small regions such as is the case for city wells and most industrial needs. Aquifers, the term derives from Latin and means 'water carriers', play a role for farming befitting their name; they carry water to the irrigation wells. Therefore, the observed reduction in water levels of the majority of aquifers in the nation threatens to have a profound effect on food production, and is a reason for major concern.

The first third of the presentation regards information on aquifer depletion, obtained mostly from data gathered by the USGS. Much of the aquifer depletion results from withdrawal for irrigation. In California, a recent increase in withdrawal from aquifers results from decrease of other sources, such as snow melt, resulting in dramatically dropping reservoir levels.

The second third of the presentation regards basic principles that govern groundwater flow, some explanation as to how flow in aquifers occurs, and a brief summary of aquifer systems. Some elementary calculations are presented to illustrate the counter-intuitive behavior often observed in groundwater flow, for example the very low flow rates and long travel times. A brief summary will be presented of the ideas, held by some respected experts in the field, on the reliability of groundwater models and the problems faced by groundwater modelers in terms of obtaining the necessary parameters.

The final third of the presentation is concerned with measures that can be taken to reduce aquifer depletion in the future, and may help to use groundwater sustainably. Some of these measures regard changes in irrigation practice, e.g., more efficient irrigation systems that require less water, changes in farm practices, such as adjusting crop to water availability and making a better use of surface runoff. Other measures are the development of simple models that can be used to assess sustainability; these models would focus not on a detailed representation of the actual flow system, but on the water balance. Such models require far less data than complete models, and could be easily adapted to changing circumstances.

Joshua Stamper, jstamper@umn.edu

University of Minnesota, Irrigation Extension Specialist, CPAg/CCA,

Presentation: *Agricultural Uses and Impacts on Groundwater*

Abstract

Water is the principle ingredient for life, and we all share a finite amount of water. Every organism consumes water and is part of the water cycle, and agricultural crops represent a large portion of water use. We will take journey through the barley and cucurbit fields and the hop yards of Minnesota to look at water demand for the agricultural ingredients in our favorite bar fare, and how Minnesota farmers use supplemental irrigation to adapt to crop water demands in an increasingly volatile climate.

Biography

Joshua Stamper was raised on a diversified farm in North Carolina, and has a B.S. in Agriculture from Berea College, and a M.S. in Agronomy from Kansas State University. Joshua serves as the irrigation Extension Specialist for the University of Minnesota, and is a Certified Crop Advisor and a Certified Professional Agronomist. His work focuses on maximizing the water and nitrogen use efficiency of the irrigated crops that are grown on sandy soils in Minnesota. Joshua holds the firm conviction that canned beer is the best thing since sliced bread.

James R Cook, jcook@gedneypickle.com
Gedney Foods Company

Presentation: *Gedney Pickle's Groundwater Management*

Abstract
The Gedney Foods Company is a pickling plant based out of Chaska, Minnesota. Established in 1881, Gedney is one of Minnesota's oldest food companies and employs approximately 200 employees. It began in 1879, when founder Mathias Anderson moved to Minneapolis ideas for making pickles and related products. He searched for farmers to grow cucumbers - challenging the belief that the semi-tropical vine fruit won't thrive in Minnesota. The first Gedney pickle plant opened in 1881. By 1903, growing cucumbers in Minnesota was an unqualified success. Today, cucumbers from all over the world are brought in from the receiving dock or tank yard, washed and desalted, packed into jars along with brine and various spices, and then pasteurized, completing their transformation into a pickle.

The Gedney Company has long been concerned with reducing its impact on the environment. A recent project done in partnership with the Minnesota Technical Assistance Program and intern Ryan Venteicher provides one example of how challenges have been approached. Gedney draws its water from two wells and has endeavored for years to reduce its overall water usage. The company's water usage, and the impact its wastewater stream has on the surrounding ecosystem, is of high concern. Gedney also has a limited wastewater treatment system. Permits stipulated by Minnesota regulatory agencies prevent the discharge of wastewater until environmental requirements are met. If Gedney cannot discharge its wastewater, production would be shutdown. As such, Gedney must conserve water so its waste disposal system does not reach capacity. Also, reducing the salt usage for the plant would lessen the consumption of a costly ingredient and would reduce the strain felt on the company's wastewater stream. This presentation covers some of the details related to these and other challenges.

Biography
I have a BS degree from the University of Wisconsin in Food Science, Bacteriology, with a strong background in Chemistry. I recently retired from the Gedney Foods Company in Chaska, Minnesota, having served as the Company's Vice President of Technical Services and being employed by that company for 45 years.

During my time at Gedney I was in charge of quality control, quality assurance, product development and regulatory matters. The Gedney Company has an NPDES discharge permit for wastewater and I have overseen the development and operation of the wastewater operation and its permits. I have worked closely with many staff member from the Minnesota Pollution Control Agency over the years and have strived to make the Gedney Company the best environmental citizen it can be in Minnesota. I am currently consulting for the Gedney Company in environmental matters.

I have always had a keen interest in the environment and recently completed designing and building for my wife a greenhouse that has solar powered lights, vents, fan and watering system.

Omar Ansari, omar@surlybrewing.com
Surly Brewing Company

Richard Manser, rmanser@barr.com
Barr Engineering Company

Presentation: *Surly Brewing Company's Groundwater Management*

Abstract
Groundwater has long been a key ingredient to beer made in Minnesota. Surly continues that tradition by making beer with groundwater from the Prairie du Chien / Jordan Aquifer. Groundwater chemistry of the water from wells at their new Minneapolis brewery is similar to what is used at their Brooklyn Center facility. Groundwater use is optimized through the use of new state of the art brewing equipment.

Biographies

Omar Ansari started Surly Brewing Company in 2006. After outgrowing their Brooklyn Center location that was started in his parent's abrasives factory, he set his sights on building a new destination brewery. Before that could be done, Omar led the charge for enacting what became known as the 'Surly Law' that allowed production breweries to sell pints of their own beer at their brewery. Construction began on Surly's new destination brewery in 2013 and they opened the doors of their new beer hall and brewery to the public in December 2014.

As a Senior Consultant with Barr Engineering Company, **Richard Manser** primarily works on projects that include groundwater, soil, geology, or brownfield related issues. During his 30 years as an environmental consultant, Richard has supported a wide range of environmental site characterization and site remediation projects across the Country. He is particularly interested in supporting re-development projects that convert underutilized urban properties into viable enterprises that support job growth and add to the local tax base. In addition to working at Barr Engineering, he is actively involved with the Minnehaha Creek Watershed District and is on the City of Edina Energy and Environment Commission.

Kathryn Jones, kathryn.jones@hdrinc.com
HDR Inc.

Presentation: *Envison™ and Indicators for Sustainable Infrastructure*

Abstract
Envision™ is a sustainable infrastructure design tool and rating system designed to provide a holistic framework for evaluating and rating the community, environmental, and economic benefits of all types of civil infrastructure projects (roads, bridges, water treatment plants, power generation facilities, etc.). It was created out of a collaborative effort between the Zofnass Program for Sustainable Infrastructure at the Harvard University Graduate School of Design and the Institute for Sustainable Infrastructure.

The Envision™ rating system uses a metrics-based approach to assess sustainability across 60 criteria, or credits, in 5 categories including Quality of Life, Leadership, Resource Allocation, Natural World, and Climate and Risk. The system rewards infrastructure projects that use transformational, collaborative approaches, and which account for the sustainability of a project over the entire life cycle.

The presentation will include an overview of the Envision™ Infrastructure Rating System, and will highlight the rating system credits that address water use and water resources. Examples from recent projects will be discussed.

Biography
Kathryn is a project manager with HDR's Minneapolis office. She has over 15 years of experience working on water, wastewater and environmental projects in the public and non-profit sectors. She has a bachelor's degree in Civil Engineering from the University of Wisconsin – Madison, a master's degree in Science, Technology and Environmental Policy from the Humphrey Institute of Public Affairs at the University of Minnesota, and is an Envision™ Environmental Sustainability Professional.

Andrew Streitz, andrew.streitz@state.mn.us
Minnesota Pollution Control Agency

Presentation: *Minnesota's New SWB Recharge Model — Understanding an Important Limit on Groundwater Resources*

Abstract
Groundwater recharge is an important, but poorly understood boundary condition of water budgets. Modelers have traditionally relied on crude methods of estimating recharge for groundwater simulations, often at the cost of badly constrained models. Because Minnesota depends on groundwater for 75% of its drinking water and 90% of irrigation, it is critical to develop a better system. To that end the Minnesota Pollution Control Agency contracted with the US Geological Survey to provide a state-wide estimate of groundwater recharge based on the Soil-Water-Balance model. The model uses commonly available geographic information system data layers including land cover, soil properties, and daily meteorological data to produce a temporally and spatially variable gridded potential recharge estimate. The dataset provides an important tool for modelers building simulations, for government regulators reviewing models submitted by responsible parties, and to researchers investigating groundwater/surface water interaction. The gridded dataset and supporting documentation are available on the State Geospatial Commons website.

Biography
Andrew Streitz is a research scientist with the Minnesota Pollution Control Agency. During his 30 years with the State he has served on the original Metropolitan Area Groundwater Model project, studied the effect of irrigation on stream flow in farm country, and is currently conducting research into the interaction of groundwater and surface water in the vicinity of lakes enrolled in the Department of Natural Resources Sentinel Lakes project. Andrew has a BA in History from St. Olaf College, and a MS in Geology from the University of Minnesota, Minneapolis.

Stephen Thompson, M.S., P.G., Stephen.Thompson@state.mn.us
Minnesota Department of Natural Resources

Presentation: *Measuring Sustainability*

Abstract
Minnesotans are committed to sustainable use of groundwater and surface water.

The Minnesota DNR (DNR) is mandated to ensure water resources are used sustainably. DNR has the responsibility to issue permits to high volume users of groundwater (defined as 10,000 gal/day or 1,000,000 gal/yr).

Sustainable use of groundwater is defined in statute MS 103G.287. It states: "The commissioner may issue water use permits for appropriation from groundwater only if the commissioner determines that the use is sustainable to supply the needs of future generations and the proposed use will not harm ecosystems, degrade water, or reduce water levels beyond the reach of public water supply and private domestic wells… ". The same statute directs that groundwater "…appropriations that will have negative impacts to surface waters are subject to applicable…" surface water appropriation mandates.

DNR has concluded that groundwater models are needed to clarify relationships between surface water, ecosystems, and groundwater resources. Such models will help DNR meet its sustainable use mandates. Data and information that support model development include: 1. identifying aquifer connectivity to streams; 2. stream flow measurements/estimates; 3. development of a 3D hydrogeologic framework; 4. determination of aquifer hydrologic properties; 5. groundwater recharge estimates; 6. evapotranspiration rates.

Biography
Steve leads the Hydrogeology and Groundwater Units at Minnesota Department of Natural Resources. Areas of responsibility include: mapping of aquifers and their hydrologic properties (County Atlas Program) and technical review of groundwater permit applications.

Steve is a professional geologist with over 29 years of experience. Prior to joining the DNR in 2013, Steve worked at the Minnesota Pollution Control Agency in groundwater remediation programs (Petroleum Remediation Program and Superfund Program) and in ambient groundwater monitoring programs. While at the MPCA, Steve led the establishment of the Watershed Pollutant Load Monitoring Network.

Steve also has experience as an environmental consultant, a petroleum geologist, and a high school science teacher.

Anneka Munsell, Anneka.Munsell@metc.state.mn.us
Metropolitan Council

Evan Christianson, **P.G.**, EChristianson@barr.com
Barr Engineering Company

Presentation: *Connecting Sustainability Metrics and Groundwater Pumping with Optimization Modeling*

Summary and Abstract
How much is too much? Minnesota statues define sustainable water use as water use that "does not harm ecosystems, degrade water quality, or compromise the ability of future generations to meet their own needs." Quantifying these criteria, or setting limits for sustainable use, is a difficult task that regulators have struggled with for some time. Thresholds are difficult to define and even more difficult to measure, particularly from a regional planning perspective.

Cumulative impacts from incremental increases in pumping within the Twin Cities metropolitan area are increasingly being recognized as potentially reaching a limit of sustainability in some areas. Understanding the potential long-term cumulative impacts from additional pumping is extremely difficult without a comprehensive groundwater model. Complex geospatial relationships, and significant time-lags to ultimate impacts, make forecasting sustainable use for the region extremely difficult with traditional methods or monitoring. Optimization of pumping using a groundwater model, with a goal of extracting as much water as possible without exceeding sustainability screening criteria (baseflow, drawdown, etc.), allows for estimation of ultimate sustainable use for the region. Results from these optimizations can be used to help guide future planning and additional study so that the region to grow sustainably.

Biographies

Evan Christianson, P.G.

Education

- MS – Geology and Environmental Science, Iowa State University, 2008
- BA – Geology, Gustavus Adolphus College, 2005

Experience

- 2008-present: Hydrogeologist, Barr Engineering Company

Anneka Munsell

Education

- M.S. – Civil Engineering, South Dakota School of Mines and Technology 2011
- B.S. – Civil Engineering, South Dakota School of Mines and Technology 2010

Experience

- 2013- present: Environmental Scientist, Metropolitan Council Water Supply Planning Unit
- 2012-2013: Environmental Engineer, CH2M Hill
- 2009-2011: Student Hydrologist, United States Geological Survey