
CALUMET STORMWATER COLLABORATIVE

MEETING SUMMARY – February 6, 2015

Metropolitan Planning Council

140 S. Dearborn St., Suite 1400, Chicago



Attendees

Christina Negri, Argonne National Laboratory
Robin Graham, Argonne National Laboratory
Doug Sisterson, Argonne National Laboratory
Petra Stieninger, CCJM
Hal Sprague, Center for Neighborhood Technology
Burrell Poe, Center for Neighborhood Technology
Mason Throneburg, CH2M HILL
Jason Navota, Chicago Metropolitan Agency for Planning
Nora Beck, Chicago Metropolitan Agency for Planning
Bob Dean, Chicago Metropolitan Agency for Planning
Karen Miller, Chicago Wilderness
Thomas Burke, Christopher Burke Engineering
Jodi Prout, City of Blue Island
Aaron Koch, City of Chicago Department of Water Management
Amy Ellingson, Cook County – Office of Commissioner Gainer
Chris Lipman, Cook County Department of Environmental Control
Jane Hornstein, Cook County Department of Planning & Development
Alex Simmons, Cook County Land Bank Authority
Peter Nicholson, Foresight Design Initiative
Lyndon Valicenti, Foresight Design Initiative
Eric Otto, Forest Preserve District of Cook County
Maddie Mahan, Friends of the Chicago River
Dennis Dreher, Geosyntec
Mary Ellen Guest, Historic Chicago Bungalow Association
Emily Baily Burns, Historic Chicago Bungalow Association
Lisa Cotner, Illinois Department of Natural Resources
Amy Walkenbach, Illinois Environmental Protection Agency
Mancilo Markus, Illinois State Water Survey
Edith Makra, Metropolitan Mayors Caucus
Josh Ellis, Metropolitan Planning Council
Danielle Gallet, Metropolitan Planning Council
Peter Skosey, Metropolitan Planning Council
Daniel Wolf, Metropolitan Planning Council
Kelsey Pudlock, Metropolitan Planning Council
Kevin Symcox, Metropolitan Planning Council
Brent Shraiberg, Metropolitan Water Reclamation District of Greater Chicago



Olivia Kellner, Midwest Regional Climate Center
Beth Hall, Midwest Regional Climate Center
John Legge, The Nature Conservancy
Tiffany Ingram, Natural Resources Defense Council
Joel Scata, Natural Resources Defense Council
Mollie Dowling, OAI Chicago Southland
Daniella Pereira, Openlands
Andrew Szwak, Openlands
Sean Kelly, Robinson Engineering
Katrina Phillips, Sierra Club, Illinois Chapter
Bill Wood, SmithGroup JJR
Kris Lucius, SmithGroup JJR
Joel Schmidt, U.S. Army Corps of Engineers
Bob Newport, U.S. Environmental Protection Agency
Sarah Coulter, Village of Park Forest
Daniel Goldfarb, Wildlife Habitat Council

Introductions

Danielle Gallet, Metropolitan Planning Council, started off the meeting by asking attendees to give their names and their affiliated company/organization. Josh Ellis, Metropolitan Planning Council, gave a brief introduction of the Calumet Stormwater Collaborative. It was the first meeting for many of the meeting's participants. Josh explained that the Collaborative is one in fourteen priority projects within the Millennium Reserve. The group's mission is to improve the coordination of stormwater management across the Millennium Reserve/Calumet, identify problems and challenges (e.g. non-overbank flooding, maintenance of green and grey infrastructure, develop a systematic framework/model (working away from pilot projects) for regional stormwater management and planning, and work toward solutions.

Member Updates

Aaron Koch, City of Chicago Department of Water Management, highlighted that one of the materials found at the sign-in sheet was a flyer that the City of Chicago is distributing to advertise the 'weather resilience workshops' they are hosting as a part of the HUD National Disaster Resilience Competition, and get people to talk about flood risk within their one communities. A big component of the competition is community engagement, so public participation and input is invaluable. The five locations where communities meetings are going to be held are:

- Austin: Monday, 9, Feb. at Town Hall Park, 5610 W. Lake St. Chicago
- North Lawndale: Tuesday, 12, Feb. at Homan Square Park, 3517 W. Arthington, Chicago
- Humboldt Park: Wednesday, 11, Feb. at Humboldt Park, 1400 N. Sacramento, Chicago
- Little Village: Tuesday, 17, Feb. at St. Agnes of Bohemia, Bishop Manz Hall, 2658 S. Central Park, Chicago
- Garfield Park: Wednesday, 18, Feb. at Garfield Park Conservatory Community Room, 300 N. Central Park Chicago

Jane Hornstein, Cook County Department of Planning and Development, commented that Cook County will also be hosting set of meetings in the south Calumet region. The tentative dates are:

- Blue Island, 12, Feb.
- Calumet City, 19, Feb.
- Robbins, 23, Feb.

Bob Dean, Chicago Metropolitan Agency for Planning (CMAP), stated that the agency is planning on increasing their capacity on resilience planning in terms of stormwater management planning. CMAP received a grant with a two year duration from the MacArthur Grant Foundation. They intend on using the grant money to help them integrate stormwater and resilience into the larger planning context and process, with a particular focus on urban flooding.

Climate Change and Precipitation Trends: What do We Know, How do We Know It, & What Does it Mean?

Doug Sisterson, Argonne National Laboratory

Doug Sisterson, with a background in meteorology, has been with Argonne National Laboratory for nearly forty years. As a basic introduction to Argonne's climate modelling, Sisterson gave an overview on climate change (or global warming) describing the earth's climate from a 'big picture' perspective—energy from the sun enters the earth's atmosphere and is released back into space at night; however, with the presence of greenhouse gases in the atmosphere, not all heat is released; rather, it is trapped in the atmosphere leaving the earth at an average of 60°F. Today there is general consensus that the earth is getting warmer. One of the major greenhouse gases contributing to 'global warming' is carbon dioxide—primarily created by the burning of fossil fuels. Scientists have been able to test this because carbon 13—the carbon isotope found in plant material. He went further to explain the significance of climate models in that they can help us understand the earth's complexity and uncertainty as a global system. Global warming can often be misleading at smaller scales; for example, Chicago experienced -40°F temperatures in 2014, yet the world collectively experienced the hottest year in recorded history in the same year. Sisterson pointed out that there is a socialization of climate change. We need to realize that climate change is affecting a number of components that comprise the earth's complex system. He continued to emphasize that the earth is not a static system; when heat is distributed over one component (e.g. landmass, and/or water in the form of a liquid or ice), it triggers a number of other issues in various regions across the globe.

Sisterson went into talking about how climate change relates to modelling. First he made the distinction between climate and weather—climate is the prediction and weather is what happens in reality. Climate most often represents 30 years of weather data. Similar to climate, what defines a '100-year flood event' is based on a stable/static climate. However, it is clear that our climate is changing. The distribution that define these storms are changing but they are not sure what direction it is going. When this phenomena is phrased as 'climate disruption,' Sisterson claims this is not always a bad thing, but there is a need to find complacency. Based on future climate scenarios, Chicago might be characterized by the following: 1) Considerably warmer with less precipitation, 2) Lake Michigan might drop two feet, and 3) period of flood and water deficits. Another example was that Chicago might feel like Houston, Texas in ninety-nine years.

Beth Hall, Midwestern Regional Climate Center

Beth Hall gave a presentation on the kinds of products and services that the Midwestern Regional Climate Center (MRCC) can provide for a group like the Calumet Stormwater Collaborative. According to Hall, MRCC is a part of the Regional Climate Center (RCC)—a group of six regional centers, first initiated by a group in Urbana-Champaign, Ill. The group had formed in response to the National Climate Project Act of 1978, and the Regional Climate Center visionary, Stan Changnon. Illinois State Water Survey and Cornell University developed the first RCC demonstration projects awarded by NOAA in 1982. A third center developed at the University of Nebraska-Lincoln, which focused on irrigation and the climate's impact on agriculture. The group was then formally recognized by Congress with the group's addition of the Desert Research

Institute in Nevada in 1986. By 1990, southern and southeastern RCCs were established—Louisiana State University and South Carolina Department of Natural Resources, respectively.

Today the RCC program has been providing a regional, place-based approach to climate services for approximately thirty years. The RCC had a vision to figure out what are the regional needs (in terms of data), so others could benefit from data and data interpretation. With the support of NOAA, the group continues to follow their four missions:

- 1) Provide high-quality climate data, derived information, and data summaries for the region;
- 2) Monitor and assess regional climate conditions and their impacts
- 3) Prepare specialized historical climate data sets; and
- 4) Coordinate and conduct applied research on climate-related issues and problems

In addition to these four missions, RCCs are also working toward outreach and education. Hall claims that what makes MRCC's tools unique is that they work directly with the data. They also access, organize and function as stewards of historical climate data. With the observed and derived data, RCCs develop decision-support tools as well as value-added climate tools and monitoring resources that can be tailored to specific regions. Others climate centers that function as data centers and tools usually have a very specific focus (e.g. sea grant and/or oceanic influences), and often have more of a social component.

Climate Products and services that the Midwest Regional Climate Center provide include data and data interpretation related to:

- 1) Temperature and Precipitation
 - a. How does it compare to our expectations
 - b. Climate change weather
 - c. Radar of ground water precipitation
 - d. cli-MATE: (MRCCs daily, operation climate monitoring site)
 - i. Ranking capabilities across time (yrs.)
 - ii. Threshold searches
 - iii. Can create products (maps) based on found data
 - iv. Customized maps—good for case study analysis
 - v. Time series charts
 - e. Climate Watch (a second MRCC daily, operation climate monitoring site)
 - i. Growing degree data
 - ii. First freezes
 - iii. Map interfaces per station data
 - iv. GIS interactive maps
 - f. Mobile apps
 - i. MRCC Mobile Maps (mobile version of Climate Watch suite of products)
 - ii. WxAlmanac (MRCCs native mobile apps for iOS and Android)

Hall began taking questions after her presentation. Josh Ellis, Metropolitan Planning Council, asked if there are any particular industries now such as water utilities that are using MRCC's data. Beth replied that input data for stormwater models is the most commonly used dataset. A second participant asked how quickly the data is available to users. Beth explained that it is based on the data being inquired; some data is in real time (e.g. the airport) and therefore can be attained in real time, while others that come from cooperative sites can take longer. One participant commented that hydrologists often use maps as well for monthly summaries within their every-day work, alluding to the usefulness of MRCC's data and tool sets. A final question directed at Hall was what kinds of tools can be made for a large and diverse group such as the Collaborative? Beth stated

that if it is related to taking the data and making it useful, they have the data and capability of interpreting the data in a way that extracts what the users want to see from the data. MRCCC primarily works for the good of the region at large, so if a group of constituents the size of Collaborative all collectively want the same tool, developing a tool can easily be worked into a base contract.

Momcilo Markus, Illinois State Water Survey

Momcilo Markus gave a brief background of his career path. Through his career, Markus worked in Europe, Colorado, the National Weather Service (NWS), Federal Emergency Management Agency (FEMA), and has been working in Illinois on stormwater, flooding and climate change related projects since 2000. He transitioned into a discussion on the past trends in heavy rainfall and flooding, and how they compare to more current trends that the region has and continues to experience (e.g. the catastrophic storm on 18, April, 2014). Using the Des Plaines River as a case study, he illustrated that flood peaks per year around 1987 were pretty mild. Around this year, there was a 100-year storm that was seen more as an outlier. Yet, over the past 40 years, there have been three 100-year storm events. Up until 1993 these storms were calculated under the 'natural record' of magnitude and frequencies; however, all storm events from 1993 onward or considered to be affected by urbanization. At large, we know that it is not just urbanization, but rather a more combined effect of urbanization and climate change. The off-the chart storm event of April 2013 exemplified this combined effect.

Drawing from these past trends, Markus talked about future trends in accordance to climate models, as well as statistical downscaling and regional climate modeling. The Illinois State Water Survey uses climate modeling to determine future flood risk. They use large models that incorporate the physics of the atmosphere, oceans and processes that comprise the earth's complex system. Regional climate models (RCMs) are used to downscale global climate models. According to Markus in his presentation, "calculations are based on future climate projections of climatic data generated by [global climate models] GCMs and downscaled to [the] watershed scale using statistical (or dynamical RCM) downscaling methods." Therefore, downscaling is accomplished by using future climatic data (precipitation and temperature) as inputs for hydrological models and then results of hypothetical flood flows are analyzed statistical to produce 2- to 100-year events.

The one model currently being used by the Illinois State Water Survey is the Variable Infiltration Capacity (VIC) model. The VIC model incorporates both water balance and energy balance. It takes one year to run and one year to calibrate, although it produces many calculations including frequency of future flooding. One major finding is that the model suggests 100-yr flood peaks for 2100 will be approximately 15% higher than present estimates. In support of this finding, Markus and colleagues used an Illinois-Sea Grant to study the effects of increased precipitation and urbanizations in 12 watersheds within Chicago. They looked at 1950s data and more present data to study the urbanization of each watershed. Results from the study indicated that urban streams statistical showed an increase in maximum annual flood peaks (cfs), and the causation of the increase was 50% urbanization and 50% increased precipitation. Also another major factor that likely added to the increase in maximum annual flood peaks is the time of the analysis in relation to the dataset used for the input data. Traditionally, hydrological modelling uses precipitation data tables heavily influence by historic precipitation levels (e.g. TP40, ISWS Bulletin 70, and NOAA Atlas 14). Bulletin 70 produces peaks that are much higher than TP40—approximately 2-3 inches greater or even 50% greater in some places. Bulletin 70 is a highly localized dataset focused on the northeastern Illinois region. NOAA Atlas 14, which has a national focus of precipitation levels, can often produce lower results than Bulletin 70.

Markus moved on to a second topic coined as the 'North-South Separation.' In attempt to confirm results from the VIC model, Markus and his team looked at heavy rainfall for 2050 (using the VIC model) and 2000 (using observed data). The dataset for 2000 was derived from the Cook County Precipitation Network. They research team found that when the southern half of Chicago has high precipitation, the south does not; and when there is urban flooding in the north, there is less severe flooding in the south. Given that correlations were strong across stations for both 2000 and 2050 datasets confirmed the accuracy of future scenarios produced by the VIC model. Markus explained that the North-South Separation is significant in that it provides hope for more reliable data for future hydrological modeling. Nevertheless, like all modelling efforts, he noted that some of the uncertainties found within the study include data observations, data aggregation, data downscaling, model structure, model calibration, initial conditions, and future climate. He specifically mentioned that the largest uncertainty is in the formulation of the scenario(s). Predicated range of future climate change is typically wider than the predication of present range. It is challenging to build accurate scenarios because it is difficult to measure how wide the ranges could be in the future. Markus concluded that if we continue to use standard methodologies, they are accurate enough to continue using for predication, but it is very likely that these methodologies are underestimating what is actually occurring.

After Markus' presentation, the first question asked was whether or not his confidence (in his findings) were higher after the confirmation of the 'North-South Separation.' He replied that in places like Calumet, it is likely that the Calumet region storms will not get any worse than they are now; however, he reiterated that although it is likely to improve, you cannot be *that* certain. Following Markus' response, an audience member commented that the science paradigm makes researchers give an explanation of their observations, and it can be difficult to know whether or not the found explanation makes sense.

Someone else asked whether or not ISWS is planning on updating the Bulletin 70, given that the data suggest that 100-yr design storms are underestimated. Markus said that Cook County is building something similar to the Bulletin 70 that will provide a more update dataset. Aaron Koch, City of Chicago, stated that with the momentum of the City's Green Infrastructure Strategy action plan, the City is trying to update figures and have a great interest in seeing numbers (precipitation input data) that are as accurate as possible. He stressed its precedence given that billions of investment dollars are based on these numbers.

Mason Throneburg, CH2M Hill, asked Markus, "If you have 150 years' worth of data, how much are the last 10 to 30 years weighted to discount the data?" Markus said that you don't. He explained that Atlas 14 considered the entire history of precipitation data leaving, allowed the data to be homogenous with equal weight. Yet, Bulletin 70 is based on scientific judgment, and has given slightly higher weights to more recent data. Markus continued to explain that NOAA Atlas 14 is a little newer, that uses a state of the arc methodology—a statistical approach that is tested nation-wide; Bulletin 70 does not have this nation-wide experience, but has the experience at the local scale.

Thomas Burke, Christopher Burke Engineering, LLC., recalled that Markus mentioned the difficulties of determining climate change impacts versus urbanization impacts. Based on this comment, Burke asked what was done to look into these implications, and what variable were used? Markus replied that his research group look at the urbanization before and after within the 12 watersheds selected for the study, and then used two factors to calculate flood peaks.

Work Group Update: Data Sharing and Modelling Group

Thomas Burke, Christopher Burke Engineering

Thomas Burke stated that his firm is working on developing an updated precipitation data. He said they are only working with data that goes as far back as 1980. They are following the same methodology that the Bulletin 70 used to determine what is now considered a 100-year rainfall. Data is being gathered and likely averaged from 25 rain gauges. Burke emphasized that the data affects the size and depth of infrastructure (both green and grey), so with more updated data, we can stop building for past storms and start building for future storms.

Mason Throneburg, CH2M Hill

Mason Throneburg who is participating in the Collaborative's modelling and data sharing work group want to be a resource for the Collaborative, at large. They are collecting information on what planning tools are out there, and the current state of practice for present and future scenarios. Moving into 2015, the group is determining what do to with the information collected. A few projects that are moving the work plan forward include:

- 1) Aggregating data into layers
- 2) Working together with the South Suburbs Mayors and Managers Association to develop a mapping portal to use for project-by-project basis
- 3) Develop a data-sharing portal (this will include figuring out what a regional planning tools looks like, gathering the best available info, and developing a series of what if scenarios, e.g. basement flooding)

Discussion: What Do We Do with that Info in the Calumet Context and in the Region's HUD National Disaster Resilience Competition application?

Josh Ellis continued to give a quick update on what is currently being done within the Calumet. Currently there is more advocacy and awareness around flooding; however, developing actual solutions is becoming prudently slower than increasing in magnitude. Metropolitan Water Reclamation District's Phase II pilot study within the Calumet is the same geographic scope for the HUD National Disaster Resilience Competition. Overall, the reality of moving away from grey infrastructural changes presents some challenges. The calculated benefit/cost ratio shows that there is a not a lot of benefit. However, the ratio not be the most representative of all possible benefits. The ratio did not take into consideration social or economic benefits (e.g. aesthetics, increased property value, social well-being, and greater quality of life) that could be of value to the community at large.

Collectively this work related to future development in that Chicago and Metropolitan Water Reclamation District plan to integrate a more updated dataset (when one is fully developed) into both city and county-wide ordinances, such as the most recent Cook County Watershed Management Ordinance, and at multiple regulatory levels.

Discussion: Linking tools, data sets and institution to support a "regional resilience framework"

Josh Ellis and Mason Throneburg, gave an update on the Collaborative's modelling group. Using the framework on the HUD National Disaster Resilience competition, the group is looking into specific projects that can be used as a catalyst or platform to build regional tools. He mentioned that there is a relatively good chance for getting Illinois EPA funding to help with these efforts. The group is working toward a robust H&H model that will help users see and understand a more comprehensive systematic picture of stormwater interconnectivity—highlighting how stormwater interacts and moves through systems. Ellis presented a diagram that articulated the framework of the model moving forward.

Currently the model is using rainfall/climate data as an input from updated stream gauge monitoring. With additional funding we will be able to build better connections between the local and regional systems. However, the model still does not take hyperlocal work, such as CNT's RainReady Program, into account. Nevertheless, outcomes of these modeling efforts will help with preparedness, capital improvement plans and operational optimization (i.e. better define at-risk assets, develop infrastructure toolkits, and improve operational planning). It will also help communities build capacity by enabling non-expert users to understand, and certified users to figure out solutions.

After Josh presented to the group, Robin Graham, from Argonne National Laboratory, asked where within the model's framework is land use change taken into consideration. Mason replied that it is embedded within alternative scenarios and where the baseline scenario is defined. Lisa Cotner, Illinois Department of Natural Resources, asked where cost parameters were located within model's framework. Ellis replied that cost parameters are embedded within the local systems and regional system(s) framework (see grey boxes on diagram).

Next Meeting

Friday, March 6, 2:00pm to 4:00pm

Metropolitan Planning Council

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