

“Public Water Supply Utilities Climate Impacts Working Group”

WORKSHOP REPORT

Workshop Five

Tuesday, February 28, 2012

8:30 – 4:00pm

**Prepared by
Lisette Staal, Research Coordinator
UF Water Institute**

**Hosted by
Orlando Utilities Commission in Orlando, Florida**

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WORKSHOP Five – “Public Water Supply Utilities Climate Impacts Working Group”

Tuesday, February 28, 2012, 8:30 – 4:00 pm, Orlando Florida

Background:

The Public Water Supply Utilities Climate Impacts Working Group (PWSU-CIWG) is focused on increasing the relevance and usability of climate change and variability data and tools to the specific needs of public water supply utilities in Florida. The partners are interested in understanding and addressing how climate variability/change and sea level rise may impact planning and operations of Florida’s public water supply utilities. This is a report of the fifth workshop, the first since being awarded a NOAA CSI project bringing together interested stakeholders from public water supply utilities, water management districts and academic institutions in Florida. Initiated by the UF Water Institute, Florida Climate Institute and the UF IFAS Center for Public Issues Education in partnership with six major public water supply utilities and three water management districts, participation continues to grow. Detailed information on the “Working Group” is available at the UF Water Institute website http://waterinstitute.ufl.edu/workshops_panels/PWSU-CIWG.html

Twenty-seven people participated in this workshop, once again adding organizations that had not been represented previously (*see Appendix 1 for workshop participant list*). In addition, several people had expressed interest in participating in the effort, but were not available to attend and they have been added to the contact list.

Goal:

The goal of the each of the workshops is to create spaces for discussion, sharing and capturing knowledge from the multiple perspectives and contexts of tool providers, users, and ultimately policy makers that will contribute to increased relevance and usability of climate and sea level rise data and tools for water managers in Florida.

The specific objectives of this workshop were to:

1. Interact, gain insights, and identify common interests.
2. Learn about recent research from invited guests.
3. Participate in discussions informing plan of work and technical approaches being proposed by NOAA project task groups.
4. Begin to consider facets of communication.
5. Determine next steps.

Outcomes:

Through different activities, the participants accomplished the following during the workshop:

1. NOAA CSI project technical work groups (*Seasonal Scale Forecasts- Vasu Misra; Long term Climate Scenarios – Wendy Graham; Sea Level Rise – Keith Ingram*) -- Output from the afternoon group discussion sessions contributed to developing “roadmaps” for each project areas of technical focus. Each PI summarized these roadmaps and next steps and the summaries are included in the respective sections of the body of this report.
2. Knowledge Management and communication – (*Tracy Irani*) Recognized as a major need by the participants since the early workshop discussions, the NOAA CSI grant is providing an opportunity for the group to develop an appropriate Knowledge Management System (KMS) that will serve the group in both information sharing and knowledge creation. Participants were introduced to a draft Needs Assessment Survey and given opportunity to provide feedback on the design. The final needs assessment is now available and a survey link has been sent to all PWSU-CIWG participants. Anyone interested in additional information should contact Diedra Slough (sloughd@ufl.edu) or Tracy Irani (irani@ufl.edu).
3. Group building and next steps – Another quarterly workshop will be scheduled for approximately May, 2012. Several suggestions for future PWSU-CIWG activities/workshops were suggested and should be considered by the planning team (solicited volunteers to participate with facilitation team). Some suggestions included:
 - Continue adding expertise (climate specialists, SLR Specialists, communication/translation specialists) to the group.
 - Begin to incorporate institutional planning into the process and understanding the entry points to these planning processes. Suggested including a presentation at the next workshop on planning. Keep the discussion of a broader RESEARCH AGENDA moving forward and consider including a component for comprehensive planning in the research agenda
 - Focus on communication including useful tools and techniques for communicating climate issues for technically correct science to policy and decision makers.
 - Create quality “space” for learning together that will help to begin to communicate in both directions, mixing the disciplines, institutional affiliations and to be able to debate what the difficult issues are.

Detailed Summary of Workshop 5: *See APPENDIX 2 for the detailed agenda.*

Session 1 – Context and Background

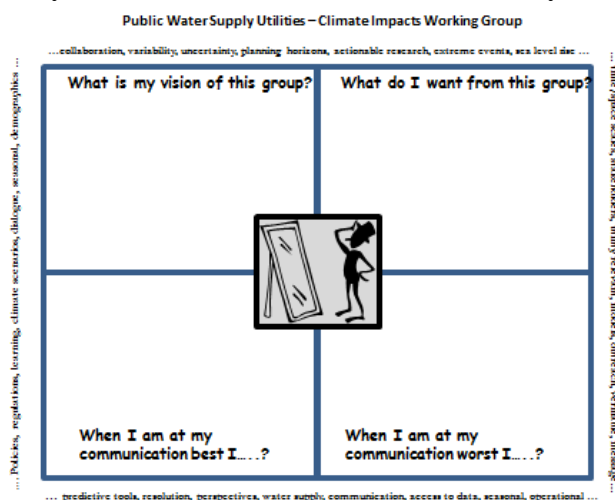
Welcome - Dr. Wendy Graham, Director of the Water Institute welcomed the participants and provided brief background on the group's activities to date.

Participant Introductions

With new people joining the process at each workshop, and the dynamic nature of the group, it is important to continue to bring everyone up to speed on the core interests and progress of the PWSU-CIWG identified to date. It is also important to provide opportunities for participants to get to know each other and recognize the diversity of institutional backgrounds and expectations from this working group. Lisette Staal, UF Water Institute and workshop facilitator, reminded participants that the overall goal of the workshops focused on improving climate tools through collaborative learning and improved communication. A couple of interactive activities started the day.

When signing in for the workshop, participants were asked to identify their institutional affiliation and to place a colored dot on their nametag reflecting that affiliation. In addition, they were asked to place a colored star (same color as institutional affiliation) on a map of Florida. This served to reinforce not only the diversity of the participants, but the different geographical areas represented by the group and to help consider who might be missing.

For participant introductions, Lisette asked everyone to take a few minutes individually to write their responses to four questions in the corresponding quadrant on a sheet of paper (*figure at right*), then get together in groups by finding two other people they knew the least and that were preferably from a different institutional affiliation. In those small groups the participants introduced themselves, shared their responses with each other, and engaged in conversation. Each group then introduced their members to the plenary group and shared some of their insights from the discussions, particularly focused on communication. Several of the groups emphasized that to reach their visions of the group (*collective understandings, knowledge sharing, collaboration, general agreement on using climate projections, exchange data and practice, develop useful information and tools, actionable science*) will require new skills, techniques and tools for communicating. *See Appendix 3 for complete responses.*



Working group and Project updates

NOAA-CSI Project, "Collaborative Development of Public Water Supply Utility Relevant Climate Information for Improved Operations and Planning," - Dr. Wendy Graham, PI of the project provided a brief project update on activities, short term and longer term project outcomes, and its integral relationship to the PWSU_CIWIG continuing efforts (click [here](#) to link to presentation). She noted that the Executive Advisory Committee met and established the goal of building common set of climate and sea level rise scenarios of WMD/Utility use, and formed four technical groups under direction of co-PIs to develop plans of action for 1) Seasonal scale predictions (Misra), 2) Long term climate scenarios (Graham), 3) Sea level Rise (Ingram), and 4) Knowledge Management (Irani). Each technical group lead provided a brief update on activities to date:

NOAA-CSI Project, Long term Climate Scenarios – Wendy Graham

This technical group is focused on the need to develop common climate scenarios for use in Florida that include precipitation, temperature and perhaps other climate variables (relative humidity, wind speed, solar radiation etc.). It will need to come up with recommendations for best historic gridded data sets to use for Florida, settle on emission scenarios, or RCP scenarios, that are most appropriate for analysis; come up with recommendations regarding dynamic downscaling versus the various statistical downscaling approaches; decide on what types of events to use for evaluation; and develop quantitative estimates of uncertainty associated with climate and hydrologic predictions. The group has had 3 webinars to bring itself up to speed on recent research activities. Dr. Graham outlined details of proposed future work and other items for detailed discussion in the afternoon session (*see slides #5 - #9 in the presentation - [NOAA-CSI Update](#).*)



NOAA-CSI Project, Seasonal Scale Forecasts - Vasu Misra



This sub-working group was established to explore utilizing seasonal climate forecasts for water utility operations and has had two teleconferences (1/6/2012 and 2/7/2012) and three webinars. The group's objective is to robustly diagnose seasonal predictability and skill for all 4 seasons of streamflow in five-six watersheds in Florida and 23 other watersheds spread around Southeast US and other derived variables like (length of wet season, length of cold season etc..). They plan to start first by diagnosis of seasonal prediction skill and predictability for winter forecast as a function of: 1) lead time, 2) model (good to worst model; merit of MME); 3) ensemble member (how many is good), 4) size of watershed, and then repeat the above for Spring followed by Summer and then finally Fall season. (See slides #10 - 17 in the presentation - [NOAA-CSI Update.](#))

NOAA-CSI Project, Sea Level Rise - Keith Ingram

Although the group has not had a chance to meet, several documents have been identified that will be useful in the discussion of defining the focus and activities of the Sea level rise discussion. Keith Ingram shared several documents.

NOAA-CSI Project, Knowledge Management - Tracy Irani

The process of selecting a knowledge management system for use by the PWSU-CIWG is underway. The overarching objective is to use needs assessment process to develop a technical tool and process considerations to set up a system to be shared by group members, and to utilize for various forms of content. On February 28th, the working group members in attendance were provided with a preliminary draft of the needs assessment instrument and given the opportunity to provide feedback on the instrument. It was established that the needs assessment was built to collect information on members' prior experiences with online content management systems, their expectations for the development of a system that will cater to the needs of the working group, and their perception of the barriers that might be encountered. Now that the needs assessment instrument has been updated with the suggestions from both the panelists and the working group members who supplied feedback on the draft distributed on the 28th, we invite members to provide your responses to the questions. It is available at https://ufaecd.qualtrics.com/SE/?SID=SV_5ats4Gd64GoRAEc.

PWSU-CIWG Research Agenda – Tirusew Asefa

An effort to build and maintain a research agenda of topics of interest to utilities has been underway. Tirusew noted that this has developed over several workshops, and he encouraged everyone to check it out, and keep in mind topics that should be included. A participant asked about the value of including research on planning related topics, and a suggestion was made to add those. Information on the current Research Agenda is available on line at the following links: ([Research Agenda Matrix – update](#) , [Workshop 3 Report, APPENDIX 4 – Research Agenda Matrix](#), and [May 4, 2011 Presentation of initial agenda](#)).

Other updates –

Several participants shared upcoming events that might be of interest to the group. One suggestion was to consider developing a calendar to post these types of activities. In addition, Brian Kahn, visiting consultant with NOAA, shared information on the NOAA current collaboration with Tampa Bay Water to develop a video highlighting NOAA funded activities with partners. Alison Adams noted that the PWSU-CIWG is an excellent example of this collaboration and it will be included in some aspect of the video. They noted that NOAA producers would be taking advantage of this workshop to film and to interview both Alison and Vasu Misra.

Session 2 - Science Presentations - Special Invited Research Presentations/Discussion

- **Kathryn Frank, Department of Urban and Regional Planning, the College of Design, Construction and Planning - [Planning and Sea Level Rise in Florida](#)** (introduced by Keith Ingram)
- **Ben Kirtman, RSMAS, University of Miami - [Seasonal-to-Decadal Climate Projection](#)** (introduced by Vasu Misra)

Session 3 - Roadmaps and technical approaches toward building utility relevant climate modeling tools (NOAA CSI project)

After lunch, small groups convened around each of the three technical areas of the NOAA project (Seasonal Scale Forecasts, Long term Climate Scenarios, and Sea Level Rise). The small groups, led by the respective co-PIs, were asked to summarize their discussion by reporting on the following questions: 1) What is your roadmap? 2) What technical approaches? Relevance to utilities? Any bottlenecks? Next Steps. Participants self-selected into each of the groups.



Roadmap - Seasonal Scale Forecasts (Vasu Misra)

Participants: Tirusew Asefa, Louis Murray, Mike Cullum, Chris Martinez, Ben Kirtman , Bappaditya Nag, James Buckingham

Objective: The overarching objective of this group is to robustly (methodically and unambiguously) diagnose seasonal predictability and forecast skill for all 4 seasons (winter, spring, summer, and fall) of stream flow in seven watersheds in Florida and 23 other watersheds spread around the southeast US. The seven watersheds in Florida are Peace River at Arcadia, Ochlockonee River near Havana, Choctawhatchee River at Caryville, Escambia River near Century, St. John's River near Deland, Tampa Bay watershed, and the Lake Okeechobee watershed in the South Florida water management district.

Technical approaches: The FSU group will be pursuing the study on the following watersheds: Florida are Peace river at Arcadia, Ochlockonee river near Havana, Choctawhatchee river at Caryville, Escambia river near Century, St. John's river near Deland. The water institute in Florida will pursue the study on Tampa Bay watershed and SFWMD will pursue the study on the Lake Okeechobee watershed. We will be using the NMME set of seasonal hindcasts (<http://iridl.ldeo.columbia.edu/SOURCES/Models/NMME/>), which are from seven different global coupled ocean-atmosphere models. In addition FSU is also running seasonal hindcasts from 1982-2010 for winter and summer at 50km resolution using the Florida Climate Institute Global Spectral Model (FCI-GSM), which will also be used in this study.

Relevance to utilities: Peace River, St. Johns River, SFWMD, and Tampa Bay would be most likely the first of the few water authorities in the country that will have a sound scientific

analysis to convince themselves of the benefits and limitations of using seasonal climate forecasts for their operational needs.

Any bottlenecks: The availability of NMME data that is relevant for the proposed hydrological study is not available yet. The request will be formally made to NMME.

Next steps: The volume of data from NMME and the FCI-GSM will be huge (~ several Terabytes) that will be mined for detecting forecast skill as function of lead time, season, size of watershed and geographical location of the watersheds. We will approach this problem by taking one model, one season, one ensemble member at a time to wrap around this voluminous task. At the time of the possible next meeting in fall of the PWSU-CIWG we may have covered at least one model and one season completely. However as we repeat this procedure over several models and over other seasons the analysis will accelerate with the experience.

Roadmap - Long term Climate Scenarios (Wendy Graham)

Participants: Alison Adams, Syewoon Hwang, Rick Hutton, Janyantha Obeysekera, Lydia Stefanova, Tracy Irani

Objectives: The objectives of this group are to:

1) Evaluate and share with the working group the ability of large-scale (e.g. ~2.5°) reanalysis data, dynamically-downscaled¹ reanalysis data, statistically-downscaled² reanalysis data, retrospective raw GCM output, dynamically-downscaled retrospective GCM output and statistically-downscaled retrospective GCM output to reproduce:

- a) ENSO-SST patterns and their teleconnections to rainfall over Florida
- b) Monthly and seasonal climatology (means and variances of precipitation, average number of rainy days, temperature, and evapotranspiration by month) over Florida
- c) Daily rainfall transition probabilities, by month, over the state of Florida
- d) Statistics quantifying diurnal rainfall characteristics over the state of Florida
- e) Intensity-Duration-Frequency of hydrologically significant extreme rainfall events over Florida
- f) Spatial statistics of daily precipitation over Florida (i.e. variogram, Moran's I index, Geary's C index spatial variance of rainfall vs magnitude of spatial average precipitation, number of rainy grids vs magnitude of spatial average precipitation)
- g) Monthly and seasonal hydrologic patterns (means and variances of surface flows and/or groundwater elevations over five watersheds in the state of Florida)
- h) Recurrence intervals for "hydrologically-defined" floods and droughts over five watersheds in the state of Florida

2) After "kinks" have been worked out with the reanalysis and retrospective evaluations, the future projections from the GCMs will be downscaled and evaluated in a similar manner, and changes from the retrospective simulations quantified.

Technical approaches: We will all use ERA40 and NCEP-DOE R2 re-analysis products. We will use the CCSM, GFDL and HADCM3 GCM outputs. Dynamical downscaling (with possible bias-correction) will be conducted by FSU using the RSM model. Statistical downscaling will be conducted by UF and will use the BCSA method (developed by Hwang) and/or the BCCA method developed by (Brekke et al). Comparisons will be made using a to-be-agreed upon set of historical gridded and point measurements of precipitation and rainfall. The FSU group will pursue hydrologic implications for the Peace river at Arcadia, and the St. John's River near Deland. The UF group will pursue hydrologic implications for the Tampa Bay region (Hillsborough and Alafia River watersheds) and SFWMD will pursue hydrologic implications for the Everglades region.



Note: If time permits NARCAAP products may also be analyzed.

Relevance to utilities: Input from utilities will be sought to establish the definition of “hydrologically significant extreme rainfall events” over each utilities service area, and “hydrologically-defined” floods and droughts for the seven watersheds. Results of the analysis will help utilities understand the uncertainty associated with using current climate data/models predictions at utility relevant space-time scales.

Any bottlenecks: Time and human resources!

Next steps:

1. Agree on gridded and point climate observation data sets to use for evaluating retrospective predictions (Alison, Vasu, Obey, Wendy, Syewoon)
2. Request input from all utilities on the definition of “hydrologically significant extreme rainfall/temperature events” for their operation (Wendy)
3. FSU to perform dynamic downscaling and evaluations for GFDL and HADCM3 models (CCSM already completed)
4. UF to perform statistical downscaling and evaluations for the ERA40 and NCEP-DOE R2 reanalysis data as well as the retrospective data for CCSM, GFDL and HADCM3
5. FSU, UF and SFWMD to conduct hydrologic evaluations.

Roadmap - Sea Level Rise (Keith Ingram)

Participants: Barbara Powell, Kathryn Frank Nancy Gallinaro, Bertha Goldenberg, Scott Laidlaw, Kevin Morris, Deidra Slough

The Sea Level Change (SLC) group had a broad ranging discussion, which focused on four specific themes:

1. **Improve access to information that is already available.** Assemble available maps, models, data, and tools that are germane to the region. Conduct webinars or conference calls to inform working group and others about how to use them.
2. **Catalog current projects and programs on SLC.** Start with a survey of information at the Georgetown site. Look for SLC impacts that people already observe and find out what they are doing. This information will be particularly useful when informing decision makers. If they see others taking action, they are more likely to act themselves.
3. **Develop and implement plan on how best to move from science to policy and action.** Members of the Working Group communicate well and collaborate well, but tend to stumble when we need to affect policy. There is a disconnect between the technical world and the boardroom. We need to communicate better establish buy-in from the local governments and their representatives. Planners need to better understand the scientists so that we can represent the information. The key for getting from science to policy is for us to gain a better understanding of what motivates decision makers, and then build on those motivations. A major concern is the potential loss of tax base as SLC damages infrastructure and people move away. Economic assessment is needed to understand SLC impacts on utilities. Identify critical infrastructure, vulnerable populations and properties. Communicate clearly that the worst case scenario is one with no action. Many local decision makers face conflicting interests – the opportunity to make money and increase the current tax base versus protecting people and properties from exposure to SLC.



4. **Governance structures.** Investigate the role of governance structures related to responses to SLC, especially with respect to expenses borne by a single utility. What are alternatives that would be more equitable and effective? One example could be cost sharing. We should strive to learn more from insurance companies as they are expert in risk assessment and management.

Information time frames for SCL decisions by water utilities

Time, years	Decision
50	Water treatment plant construction
20	Water supply planning
10	Comprehensive planning
3-6	Capital expenses
<3	Operational

Next Steps: We will focus first on themes 1 and 2 with the following actions. Once these are well in hand, we will develop plans for themes 3 and 4.

Theme 1: Improve access to existing information

1. Organize webinars for various Sea Level Change viewers that are available.
 - a. Sea Level Rise and Coastal Flooding Impacts Viewer
<http://csc.noaa.gov/digitalcoast/tools/slrviewer/>
 - b. Sea Level Rise Map Viewer http://sarasotabay.org/slrmap/slrmap_viewer.html
 - c. Surging Seas <http://sealevel.climatecentral.org/> - Note that this viewer has generated a fair amount of discussion on at Linked In [Climate Change Adaptation Florida](#)
 - d. NASA Sea Level Viewer - This viewer shows sea level anomalies as observed by satellite altimeters, not sea level change.
<http://climate.nasa.gov/SeaLevelViewer/seaLevelViewer.cfm>
2. Invite PWSU-CIWG to attend next ACF Drought Briefing webinar to see if we should develop a similar effort for FL.
3. Discuss availability of SLOSH and SLAM model outputs from G. Kiker. Perhaps we should invite Greg to present those results to next PWSU-CIWG meeting.
4. Incorporate NCA reports, Annotated Bibliography of Linhoss et al (2012), and other relevant reports into project Knowledge Management System.

Theme 2: Catalog existing impacts and projects

5. Review NCA impact reports, State Dept of Economic Opportunity project listings, and Georgetown U climate adaptation web site for Florida relevant projects, SLC impacts, and information.

Roadmap – Knowledge Management (Tracy Irani)

Technical Approaches: The first step is on the technology side and will be to assess the needs of the group, identify an appropriate KMS that will fulfill the needs, and then implement the system. In addition, we will need to focus on breaking down communication barriers and build communication skills. We will do this by initially assessing communication barriers, brainstorming ways to overcome barriers, and apply the most appropriate plan.

Relevance to Utilities: What are considerations/challenges with respect to communication that need to be addressed? The utility members and social scientists within the group may be directing their communicative effort to stakeholders, politicians, superiors who make decisions about changes in the organization, etc. With this said, it is not likely that a one-size-fits-all approach will be appropriate for communicating climate change. However, it is possible that generic talking points and communicative and educational tools that include pertinent information related to climate change can be developed and disseminated via the knowledge management system.

Any bottlenecks: Will be assessed via needs assessment process.

Next steps: Field, analyze and report from needs assessment. From data make decision re technical tool approach.

Session 4: Communication - a key to integration, outreach and impact Tracy Irani (lead)

This session built on the morning update where the roadmap and technical approach being used to develop the knowledge management system (KMS) was briefly introduced. The activity and discussion focused on bringing awareness to communications needs, challenges and perspectives and helped participants consider some of the challenges of communication. Wendylin Bartels and Tracy Irani facilitated the session and utilize a scenario-based approach using a “think, pair, share” method.

Wendylin set the following scenario for the participants:

You are in an elevator returning from a meeting on climate impacts, when someone in the elevator, a father talking to his young son, mentions their skepticism re climate change/sea level rise. They turn to you and ask your opinion. What would you say in the form of a short “elevator” message that would convey your perspective in an accessible way to a non-climate scientist?



In the wrap-up discussion, facilitated by Tracy Irani, and reflecting on the responses, several themes emerged that encompassed facets of the basic communication process and the refinement needed to enable utilities to communicate the types of information brought forth in the working group, and contributed to the roadmap for knowledge management and communication.

She asked participants to write their individual responses on a sheet of paper. Then, participants shared their responses with each other in small groups. After hearing and sharing other responses, they were asked to consider the following - What do you notice? Are there similarities? Dissimilarities? Insights? The full plenary group then engaged in discussion of the experience and shared general reflections.



Session 5: Next Steps, Reflection and Evaluation (Lisette Staal)

In an open plenary discussion, Lisette briefly reminded the group of the four phase conceptual framework guiding our process --Phase 1) understanding the context/situation; phase 2) assessing tools; phase 3) evaluating practical applicability; and phase 4) using the quantitative climate information in actual planning and decision making processes. The participants were asked to indicate what they believed the next steps should be for the group to continue moving forward. Comments were noted on the flipchart and included the following:

- Adding expertise to the group— climate specialists, SLR Specialists, communication/translation specialist.
- Continue to provide updates/results on relevant, related projects (i.e., Martinez)
- Keep the discussion of a broader RESEARCH AGENDA for PWSU-CIWG moving forward (Tirusew Asefa is lead of task group) and consider including a component for comprehensive planning in the research agenda
- Getting institutional planning into our thinking and plans. It would be good to understand the entry points to these planning processes. Currently we are getting a good idea of utility needs but have not considered the needs for comprehensive planning. Suggested including a presentation at the next workshop on planning
- Demystify jargon
- Access National Climate Assessment information – Obey has a presentation that he is willing to share.
- Develop talking points- technically correct science, useful tools and techniques for communicating climate issues to policy and decision makers.

- Create quality “space” for learning together- Begin to communicate in both directions, mixing the disciplines, institutional affiliations and to be able to debate what the difficult issues are
- Climate change literature (what is important to know?)

The next steps agreed upon included:

1. NOAA PIs for technical work groups will
 - a. summarize output from the afternoon group work sessions focused on developing Roadmaps for their areas of focus to be shared with the participants (*Seasonal Scale Forecasts- Vasu Misra; Long term Climate Scenarios – Wendy Graham; Sea Level Rise – Keith Ingram*)
 - b. Send a letter to Ben Kirtman requesting “data” from NNME on behalf of the PWSU-CIWG. The letter will need to be drafted after determining specifically what data we are asking for, (daily data/monthly data)
2. NOAA Knowledge Management/communication – (*Tracy Irani*) all participants were asked to complete the NEEDS ASSESSMENT SURVEY to help with Knowledge Management planning for the PWSU-CIWG (see above for link). Also, one suggestion made during the workshop was to include a calendar on the Knowledge Management System.
3. Plan for the next ‘quarterly’ workshop (Lisette Staal, facilitation team and participant volunteers). Please let me (lstaal@ufl.edu) know if you are interested in contributing to the planning of the agenda for the next workshop. Incorporate suggestions made during this session listed above.

Evaluation

Re- emphasizing the important role of feedback and research in the continual process of group building. Lisette distributed a feedback form and requested written input from the participants. Overall satisfaction was high with responses in all categories greater than 4.0 on as scale of 1.0 – 5.0 with 5.0 being the highest. The lowest of those were for clear next steps (4.0) and ensuring participating/involvement (4.35). A brief summary of exit feedback survey responses appears in Appendix 4.

Lisette Staal thanked the participants for their contributions and OUC for hosting the workshop.

APPENDIX 1 – List of Participants

Last name	First name	Organization
Adams	Alison	Tampa Bay Water
Asefa	Tirusew	Tampa Bay Water
Bartels	Wendylin	University of Florida/Florida Climate Institute/ Southeast Climate Consortium
Bartol	Tom	Saint Johns River Water Management District
Bastola	Satish	FSU
Buckingham	James	Tampa Bay Water
Cullum	Mike	Saint Johns River Water Management District
Frank	Kathryn	University of Florida-Department of Urban and Regional Planning - College of Design, Construction and Planning -
Gallinaro	Nancy	Palm Beach County Water Utilities
Goldenberg	Bertha	Miami-Dade Water and Sewer Department (WASD)
Graham	Wendy	University of Florida Water Institute
Hutton	Rick	Gainesville Regional Utilities
Hwang	Syewoon	University of Florida
Ingram	Keith	University of Florida/Florida Climate Institute/ Southeast Climate Consortium
Irani	Tracy	University of Florida Center for Public Issues Education
Kahn	Brian	NOAA consultant
Kirtman	Ben	University of Miami
Martinez	Christopher	University of Florida/Florida Climate Institute/ Southeast Climate Consortium
Misra	Vasu	Florida State University/Florida Climate Institute/ Southeast Climate Consortium
Morris	Kevin	Peace River Manasota Regional Water Supply Authority
Murray	Louis	USGS-Florida Integrated Science Center
Nag	Bappaditya	FSU- COAPS
Obeysekera	Jayantha	South Florida Water Management District
Powell	Barbara	Broward County Environmental Protection and Growth Management Department, Natural Resources Planning and Management Division
Slough	Deidra	University of Florida
Staal	Lisette	University of Florida Water Institute
Stefanova	Lydia	Florida State University/COAPS

APPENDIX 2 – Agenda



“Public Water Supply Utilities Climate Impacts Working Group” WORKSHOP 5 –Agenda

Tuesday, February 28, 2011 8:30 – 4:00pm

Orlando Utilities Commission (OUC), Safety & Training Conference Room
at the Gardenia Avenue office, 3800 Gardenia Avenue, Orlando, FL

Objectives: The workshop participants will:

1. Interact, gain insights, and identify common interests.
2. Learn about recent research from invited guests.
3. Participate in discussions informing plan of work and technical approaches being proposed by NOAA project task groups.
4. Begin to consider facets of communication.
4. Determine next steps.

Agenda:

8:30 – 9:00 Registration and Coffee

9:00 – 9:30 Day’s agenda, introductions, participant updates (Lisette Staal)

9:30 – 10:30 NOAA – CSI Project Updates (Wendy Graham and task group leads) 45 minutes
PWSU-CIWG Utility relevant Research AGENDA – (Tirusew Asefa)
Other projects or funding opportunities of relevance to the group?

10:30 – 10:45 BREAK


10:45 — 12:00 Science **Presentations- Special Invited Research Presentations and Discussion**

- Kathryn Frank, Department of Urban and Regional Planning, the College of Design, Construction and Planning - Planning and Sea Level Rise (introduced by Keith Ingram)
- Ben Kirtman, RSMAS, University of Miami - predicting/forecasting seasonal to decadal climate variability, and uncertainty (introduced by Vasu Misra)

12: 00 – 1:00 LUNCH

- 1:00 – 2:30 **NOAA project areas – roadmaps and technical approaches toward building utility relevant climate modeling tools**
- Seasonal Scale Forecasts
 - Long term Climate Scenarios
 - Sea Level Rise
- 2:30 – 2:45 BREAK
- 2:45 – 3:30 **Communication - a key to integration, outreach and impact** Tracy Irani (lead)
- 3:30 - 4:00 **Next Steps, Reflection and Evaluation** (Lisette Staal)



APPENDIX 3 – Responses to Introductory Exercise focused on expectations and communication

	<h3>What is my vision of this group?</h3>
Utility	<ul style="list-style-type: none"> ○ To frame the issue of climate change in such a way as to allow me to interpret how it will affect my utility. ○ We will have a collective understanding of how climate change and sea rise affects utilities and how to communicate that to our political body. ○ Knowledge sharing and collaboration. Reaching a general agreement on using climate projections. ○ Share and learn from each other ○ Exchange data/practices to help improve other organizations and their practices; Collaboration amongst institutions. ○ Provide collaboration from different perspective as to what are the critical climate impacts to utilities ○ Develop useful information on the impacts of climate change on factors affecting utilities.
Government	<ul style="list-style-type: none"> ○ Sharing expertise related to climate change projections and subsequent water supply issues. ○ To establish a collaborative approach in assessing SL Rise and Climate change impacts over regional water resources and to build reliable tools and processes in water supply planning. ○ It is a unique collection of people who should be talking (and maybe were informally) and now they are formally. I also see this group as a solutions oriented group.
Water Mgt. District	<ul style="list-style-type: none"> ○ The group will help keep a wide variety of interests (stakeholders) abreast of current progress in climate change sciences. ○ Coordinate strategies for dealing with climate change in the planning and operation of PW Utilities. ○ Tools to assist in understanding (?) climate effects to water supply develop and planning long-term.
University	<ul style="list-style-type: none"> ○ “We” are the model for bring information users and information producers together to assure the long term sustainability of our water resources. ○ Eliminate working in silos; share information ○ Shed light on hydrology ○ No vision, but it seems like a friendly environment ○ Make climate research relevant to utilities, WMD and Govt. ○ Enabling collaborative dialogue on climate variability and change ○ Collaborative group which defines for Florida the best tools, data, best practices, best processes for adapting to climate change and variability. ○ Information sharing, network building, actionable research ○ Statewide networking focused on intersection between climate change and water utilities and how to adapt practice given locally relevant sciences, and specific institutions and places. ○ Understanding and knowing each other. ○ Collaborative activity directed at scientists, managers, planning regulators to share tools, applications, best practices and climate making decisions



What do I want from this group?

Utility	<ul style="list-style-type: none"> ○ Get power points or technical papers we can disseminate to our team at home. ○ To <u>clearly</u> understand the science and modeling behind climate change so that I can communicate this to others in my organizations. To meet people to network with and call upon for information. ○ Thoughtful deliberation using analysis and climate data/climate projection to reach a general agreement on tools and techniques and how to use climate information. ○ Changing the state of the science/art to the state of practice. ○ Information about available climate data, its usefulness in seasonal forecasting. The application of climate data, practices/ideas. ○ Information and evidence as to what climate impacts we need to consider in our long term planning. ○ Better understand impacts of climate change on a local, nationwide and global perspective on issues such as temperature, rainfall, sea level, weather extreme, etc. Better understand how I can use this information.
Government	<ul style="list-style-type: none"> ○ To learn about what methods/models are currently being used to make climate projections, and how the results can best be applied. ○ Reliable set of assessment tools; implementable policies ○ I want to see this group succeed and have it be a model for how other regional utilities can collaborate for the greater good.
Water Mgt. District	<ul style="list-style-type: none"> ○ Interactions with the Florida experts in (CC) climate change to keep up with the latest progress in CC science. ○ “Actionable science” that we all agree and have a consensus on ... ○ To hear the perspective of other disciplines /institutions
University	<ul style="list-style-type: none"> ○ Understand as to how a group like this might wish to create ?, positive actions and change ○ For everyone to feel comfortable, committed, valued, and for us all to work together to solve shared problem. ○ Understand needs ○ Suggestions on research ○ Understanding how different disciplines’ research can be connected; who needs what from whom? ○ Their appetite for probabilistic climate prediction/projection. Understand that climate prediction can never be wrong. ○ Collaboration on using climate predictions/projections for real decisions ○ Broad participation, cutting edge science; actionable outputs ○ Predictive tools, framework for communicating science with utilities. ○ To enrich understanding of planning approaches to sea level rise in a general sense and to encourage work focused on the intersection with water utilities; and for me to learn about utilities perspective and resources on this issue. ○ I want to know in terms of climate change, what other want (in more detail). Not like “show me the future”

	When I am at my communication best I.....?	 When I am at my communication worst I.....?
Utility	<ul style="list-style-type: none"> ○ Feel comfortable speaking freely about issues ○ Feel like I can contribute and will share ○ I can explain well what we do , what we need and how we may proceed ○ Eye contact, taking notes, not pressured to participate/allowed to observe ○ Later in the day after discussions ○ Smile, speak clearly and thoughtfully and don't say anything stupid 	<ul style="list-style-type: none"> ○ Feel cornered by judgmental critics ○ Drift and think about other things ○ Get bogged down in the details ○ I don't know what I am talking about ○ No eye contact—pressured to participate ○ Early in the day at the start of communication ○ Curse and use obscene gestures. Hopefully I won't be doing that today.
Government	<ul style="list-style-type: none"> ○ Get to the point and stick with it ○ Listen to others before I speak. ○ Listen 	<ul style="list-style-type: none"> ○ get nervous ○ ...don't do a very good job listening to others before I speak ○ Shut down
Water Mgt. District	<ul style="list-style-type: none"> ○ Make cognitive eye contact with everyone in the room ○ Think before I speak, organize my thoughts ○ Able to get my perspective across 	<ul style="list-style-type: none"> ○ Put everyone to sleep ○ Talk over other people without listening ○ Don't say anything and (?) ○
University	<ul style="list-style-type: none"> ○ Am able to clearly articulate my point of view ○ Have planned my communication strategy- listen fully and respectfully ○ Am concise, clear ○ Want to understand questions which arose in my mind ○ Communicate well ☺ high as a (drawing of kite) ○ Talk loud, unstoppable, listen the least ○ Am describing my own research. ○ Am writing ○ Communicate – happy ○ Rested and know what I have to say. ○ Am confident, am understood universally, am fun/engaging ○ Start to speak about climate 	<ul style="list-style-type: none"> ○ Unclear and not effective at ? my point of view ○ Tell jokes (badly). Am distracted by my own thoughts ○ Have difficulty explaining technical information to a non-technical or semi-technical audience ○ Should not confuse people ○ Feel bad and frustrated ○ Hear but not listen ○ Am not listening ○ Have already formed an opinion and may not listen well ○ The opposite of being rested and knowing what I have to say ○ Am not well understood; am clammy; am scared ○ Wrap up my talk

APPENDIX 4– Summary of feedback survey responses (1 low - 5 high)

	Public Water Supply Utility	Water Management District	University	Government	TOTAL
Output	4.29	5	4.38	4.0	4.42
Organization	4.86	5	4.67	4.0	4.70
Use of Time	4.86	5	4.44	4.0	4.60
Participation-involvement	4.57	4.5	4.33	4.0	4.35
Next Steps clear	4.29	4.0	3.86	4.0	4.0
What are your current expectations for the Group?	<ul style="list-style-type: none"> • Deliberate collaboration • Provide useful outcomes for me and my organization. • Learn about climate change information useful to utilities • Develop useful information on climate change impacts on factors relevant to utilities. • Create an actionable climate data set for utilities to implement. • Improve our means of communicating science to policy makers. • Get/keep up to speed with technological advances in CC analyses. • Learn and understand the issues and effects of climate change on water supply. • Develop consensus strategy to use climate and sea level rise information in planning and management of public water utilities • Learn more about the models, current research, and confidence in results • Work together to collaboratively collect, evaluate and apply Florida relevant climate data. • Make myself more useful/relevant to group • Basic understanding of what WWSU-CIWG is trying to achieve • More on collaboration • See more science moving into action • Collaboration on using seasonal forecast information for decision support • Improve sharing of info and needs • Better understanding climate science/scientists 				
If you were monitoring the success of this group, what types of indicators would you select to evaluate over time?	<ul style="list-style-type: none"> • Actionable product, way to communicate, database all can use. • Participation by entity (are we growing or shrinking?); consistency of attendees (do they stay the same or do some lose interest and drop out); website hits • Actions taken by participants as a result of participation; data availability • Do we achieve the goal we set at onset?; Are we all on the same page?; products/results improve our decision making process? • Final conclusions that are understandable to a lay or semi-technical person. • Follow through on "roadmaps"; Future support and grants; data pushed out to the public. • Action steps and utilization of materials by utilities; ability to communicate/share with stakeholders; increased coverage of institution coverage • technology transfer from experts (x3) • Directions clear for group; open to multiple perspectives/ideas; a comprehensive approach • number of products for utility groups; how they are used by the utilities; capacity building 				

	<ul style="list-style-type: none"> • repeat attendance; level of outside interactions/communications • Attendance at quarterly meetings, diversity of attendees, success of technical tasks, successful communication of technical results to utility audiences and beyond. • Continued attendance of members; creating information and tools requested by the group; tools/info making a positive impact in utilities and communities • people changing their current way of operation. • publication • research; collaboration; results • Data, information, tools used in decision processes; More utility managers and WMDs want to attend • Demonstrating that climate information affects decisions; Assessing the fidelity of climate forecasts based on application models; enabling interdisciplinary collaboration • use of climate information; feedback from any documents/information sources developed
<p>If you could offer one suggestion for improving the work of the group, what would it be?</p>	<ul style="list-style-type: none"> • consider more than 4 meetings a year - we have a lot to cover. • more time together? • Maybe a bar chart that shows where we are timewise (or %complete) on the whole. • read information ahead • I would like the technical presentations to continue • Keep up the good work. • We are on the right track – • Keep up the good work. • Not sure. Did think the format today was excellent. • presentation(s) by utilities on their needs • get more utilities and communities (to balance universities and have greater impact) • change destination to closer to TLH. • more interaction/presentation • technical collaboration • Turn up the thermostat in the room • more whole group Q and A. • separate group in better way. Good workshop • Every now and then, have a two-day meeting.