Integrating NASA Earth Systems Data into Decision-Making Tools of Member Utilities of the Florida Water and Climate Alliance

UF UNIVERSITY of FLORIDA





www.FloridaWCA.org



Contextual Model of Decision Making: Specific Aims

- Explore the development, implementation and refinement of high resolution seasonal forecasts that can be used by water managers to make decisions about water resource allocations
- Understand factors that may affect adoption and integration of the project's tools
 - What process do utility decisionmakers use in deciding how they will use climate data in their operations (benefits/risks, decision support tools,)
 - What are the key enabling factors/barriers that affect adoption and sustainability
 - Comparatively, is this process affected by utility characteristics (management considerations, boards, regulatory)

The Classical Model of Decision Making

When faced with a decision situation, managers should...

Obtain complete and perfect information. Eliminate uncertainty. Evaluate everything rationally and logically...

...and end up with a decision that best serves the interests of the organization.

Decision Making Process



Typology of factors that may affect decision making as a problem solving process

Project Overview

- In the Fall of 2020, we deployed an online survey of decision-makers in two water utility agencies: Tampa Bay Water and the Peace River Manasota Regional Water Supply Authority.
- The method of data collection was previously set to include in-person semi-structured interviews; however, COVID-19 restrictions on human science studies forced all data collection to be moved to an online descriptive survey-based
- The survey asked decision-makers their opinions of the utility of high-resolution climate forecasts in making
 water management decisions as well as the benefits/risks of adopting this information into their decision-making
 processes.
- The instrument also gathered information regarding what factors in the forecasts would be most useful, such as precipitation, evapotranspiration, etc., factors that would determine if a utility would integrate the forecasts, and the usefulness of decision-support tools.







About our Respondents

PLACE OF EMPLOYMENT

Tampa Bay Water Peace River Manasota Water Supply Authority



Job Title

Operations Manager Acting Chief Operating Officer Principal Water Resource Systems Engineer Systems Decision-Support Manager Resource Management and Planning Manager Director of Operations

Years at Current Facility





Asian/Pacific Islander = Black/African American = White





■ 1-5 years ■ 5-10 years ■ 10-15 years ■ 15-20 years



Key Decision Influencers

Who is involved in the decision-making process at your facility?

"Operators, operations management, planning department managers."

"Collaboration between operations, water resources, and planning & executive team...Board and Executive Director" "Decision-support manager, chief operating officer, operations managers, water quality managers."

"Operations and engineering/planning...assistance from a consultant firm,"

"Florida Department of Environmental Protection, water management boards, American Water Works Association, the Association of Metropolitan Water Agencies"



The Water Resource Management Process

We asked respondents to indicate the relative importance of the following factors when making water resource management decisions

- Cost of option (and overall cost/net present value)
- Economic (e.g., growth, employment, income, productivity)
- Technical feasibility
- Biodiversity and wildlife protection
- Water quality enhancement
- Water quantity and supply
- Fairness and equity
- Security and reliability of water supply
- Political and legal feasibility
- Energy supply
- Human Health



The Water Resource Management Process

The factors deemed most important when making water resource management decisions...



The factors deemed less important when making water resource management decisions...



Integrating New Information into Existing Operations

What is the most important to consider when deciding whether to integrate new information/data into your operations?

"..if the information/data enable us to make better decision in short-term water supply management and long-term planning...if the information can enhance our confidence...e.g., reducing uncertainty, improving forecasting results."

"Our water use permits.... weather, stream flows and levels, water quality, and user demands as drivers for source selection."

"Potential improvement on the consequence of the decision making and the ease of implementation (e.g., staff time, priority, and cost)."

"Delivery of safe drinking water and customer satisfaction."

"Data integrity, validation, and applicability."



"The relevance of that data to our current operations and future planning efforts."

Integrating New Information into Existing Operations

If you decided to integrate new information into your operations, what is the best way to do so?

"Collaborative effort and decision making."

"Electronically integrate information from various sources ...and program the models to consider those data."

"Test it in the modeling group to develop a prototype...then incorporate it into our standard operating procedures...then present to operators to seek feedback for finetuning."

"Pilot test first to demonstrate the value of the information and deploy full scale if there is value"

"Collaboratively between operations, resource management, and administration."

> Peace River Manasota Regional Water Supply Authority Regional

"Through collaborative discussions with other departments within the organization such as Planning, Engineering and Operations & Maintenance."

Integrating New Information into Existing Operations

Describe the perceived benefits to adopting a high-resolution climate forecast

"Understanding future drinking water demands (for irrigation) and availability of surface water sources."

"More accurate forecasts of water resources availability"

"Decisions that would result ultimately in environmental protection, reasonable actionable information"

"Identification of longterm trends for use in long term planning"

Describe the perceived risks to adopting a high-resolution climate forecast

"Long term projections - that we get it wrong and do not have enough water supply to meet demands." "Developing and calibrate model to consume such information; and the use of (still) uncertain information for decision making." "Acceptance, cost (both staff resources and outside support) to integrate into system or create decision support that will take advantage of the data"

"Uncertainty that what has happened in the past predicts what will occur in the future."



- Water utility decision makers are extremely interested in tools that help them reduce uncertainty when it comes to water resource allocation.
- Tools that help reduce uncertainty include accurate water demand projections, the onset of durations of drought seasons, seasonal streamflow forecasts, etc.
- Water utility decision makers are interested in a collaborative approach and pilot testing when integrating new information into their operations.





- Water utility decision makers do not find evapotranspiration information as useful as precipitation information when making water management decisions.
- Water utility decision makers find decision support tools largely effective with respect to making water resource management decisions.
- Water utility decision makers are concerned about potential risks of using such tools, such as demand-supply imbalance and making inaccurate water projections.





- Our research team will conduct additional interviews with various water management stakeholders (water district managers, academics, hydrologists, etc.) to develop a deeper understanding of the barriers and enablers associated with the adoption of decision-support tools
- The goal of these interviews is to create robust tools, case studies and recommendations that will assist resource managers in future decision making.



