

Lower Santa Cruz River Basin Study
Second Public Meeting
March 12, 2018
3:30 – 5:30 pm
Pima Association of Governments (PAG)

1. **Welcome** - *Marie Light, Chair, PAG Watershed Planning Subcommittee*

This meeting is hosted by PAG's Environmental and Water Subcommittees who are dedicated to involving local officials and ensuring diverse stakeholders are engaged to inform the study. The public's inputs are included in this study to enhance planning for improved safety and health of the community.

2. **Introduction** - *Dr. Sharon Megdal, Director, Water Resources Research Center, University of Arizona*

A lot of effort is going into this significant project. The first public meeting was last fall; the next public meeting will be in 2019. Questions of clarification will be allowed after each speaker, but at the end there will be more opportunity for questions.

3. **Study Purpose - Modeling Framework and Local Climate Scenarios**

Eve Halper, Water Resources Planner, Reclamation Phoenix Area Office

Eve reviewed the study's purpose and approach. She started with key term definitions, including "scenario," "risk," etc. The point of the study is not to make a specific recommendation for a future project, but rather to provide a basis for future planning activities. The study focuses on impacts of changing climate, population and other factors on water use in the Tucson AMA, including an analysis of environmental conditions (riparian areas). It employs a scenario approach to explore a range of futures, using multiple climate projections. The study incorporates input from public and stakeholder advisors.

Objectives are to identify where physical water resources are needed to mitigate supply-demand imbalances in order to be prepared for the future. Reclamation is an agency of the Department of the Interior. They work to manage resources within water basins, promote conservation, recharge, treatment, wetlands, irrigation efficiency, etc. Tucson is in the lower Colorado Region. There are six cost-share partners on this study. The Southern Arizona Water Users' Association, or SAWUA, which is one of the study partners, has 15 water users and providers as members. They promote water policy and planning and wrote the original proposal for the study. There are many other partners who have joined the effort.

Step 1 of the study is projecting supply and demand imbalances, using the ADWR Tucson AMA Groundwater Model. The study will also use surface water flow models. Groundwater overdraft will be assessed as an output for each scenario. Climate inputs from global climate models, (temperature and precipitation) will lead to inputs to the surface water and groundwater models. Socioeconomic factors are going into the demand scenarios.

Step 2 is evaluate risk; Step 3, develop adaptation strategies; Step 4, perform tradeoff analysis. Public outreach has been ongoing with a number of public events and sub-committee meetings.

Representative Concentration Pathways (RCP), which are greenhouse gas emission scenarios, have been generated for use in national and international climate studies. This study is using two available climate scenarios: RCP 4.5 and 8.5. RCP 4.5 is the "best case" and RCP 8.5 is "worse

case.” We are calling it the “worse” case because it actually is not a “worst” case or doomsday scenario, conditions could actually be worse than RCP 8.5. The study is also looking at the “base case” (conditions without climate change) for comparison, so we can isolate the effects of socio-economic factors.

Questions from the Public:

- What is “Reclamation”? Answer: a federal government agency that is part of the Department of the Interior, also known as the Bureau of Reclamation.
- Are you worried about funding for this study? Answer: No, full funding exists for the duration of the study.
- Are you using regional models as well as global climate models? Answer: yes, we are looking at temperature and precipitation over the basin using regional modeling.
- What about RCP 2.6, the lowest climate scenario? Answer: we don’t have data for this climate scenario, because it is considered unrealistic at this time. It projects declines in emissions, rather than a “low emissions” scenario.

4. **CAP Service Area Model (CAP:SAM) Scenarios -**

Ken Seasholes, Manager, Resources Planning and Analysis, Central Arizona Project (CAP).

Models are tools we use to understand the future. CAP:SAM is designed to look at supply and demand scenarios for the 3-county service area of CAP (Pima, Pinal and Maricopa Counties). There are a lot of interconnections between the water use of others in the service area and what is available for use in the Tucson area, so the model includes a lot of complex interrelationships. What are the factors affecting supply and demand? There are many driving forces – growth, shortage, climate, socioeconomics, sectoral trends, policy changes, and behavioral shifts.

When using a tool for supply and demand, growth rate and the location of the growth are both important. The Arizona Department of Administration develops high, medium and low population growth rate information, which is converted into housing units. The spread between the projections across the 3 counties ranges from 30,000 to 60,000 new housing units *per year*. The location of growth matters, not just because of different water use patterns in different communities, but because the supplies that are available to meet those demands differ.

The modeling of demand starts with water utility service area maps and local growth projections that are spatially explicit, showing the location of future housing units. CAP:SAM scenarios look at variations in those growth patterns, as in “infill” vs “single-family expansion.” Demand has been changing over time, decades of decreasing per capita use, changes in water use indoors and outdoors and economic influences all need to be considered.

Clearly one of the factors we have to consider is shortages on the Colorado River. The degree of availability of water varies depending on the impact of climate change, the rules of operation of the river, and the levels of shortage sharing among users. Ken developed “synthetic shortage sequences” to simulate periods of reduced supply and to test system resilience. These include “historic climate” and “dry climate” that involves more persistent and severe shortages.

The Model Scenarios handout provides a summary of the work that the subcommittees have been doing about the demand assumptions that can be used for modeling. The general framework is to

look at a range from low risk to high risk. Rapid outward growth, with no mining replenishment leads to the highest risk. Infill and slow growth reduce the risk of groundwater overdraft. The scenarios match up the climate and the growth factors along with groundwater pumping location assumptions. Different projections are done for each water utility based on the agreed-on scenarios.

Even though there is continued growth within the Tucson Water service area, the per capita use reductions are offsetting growth rates in a low growth scenario. In a dry climate with rapid outward growth, there is a significant increase in water use. However, Tucson has so much CAP it doesn't affect them much by 2060. Marana, however has much bigger groundwater impact even in the slower growth scenario because they have a smaller CAP allocation. In high risk scenario there is a much larger reliance on groundwater mining.

Questions from the public:

- What is “replenished groundwater”? Answer: Arizona’s Assured Water Supply rules require that groundwater mining be offset by recharge. Replenished groundwater is the water that must be “paid back” to the aquifer under these rules.

Ken also provided examples of Farmers Water Company and Lago del Oro Water Company. The latter shows tens of thousands of new units on reliant upon groundwater.

Comparing the difference between the scenarios tests the potential stresses on the groundwater system.

- What about the quality of CAP water, compared to groundwater? How safe is it for human health and sustainability? Answer: it is surprisingly high quality, but CAP is much higher in dissolved solids than groundwater, about 600 ppm vs 300 ppm. It meets all of the other primary drinking water standards. There is an active effort to look at quality issues, and information is available on the CAP website. In Tucson, the CAP water is recharged and recovered prior to delivery. Soil aquifer treatment improves the water even further.
- Is there a way to test the model to do experiments, using a web interface? Answer: no, it is a complicated model with a lot of embedded assumptions, but there are summary reports available, including documentation for the Basin Study for the West Valley in Phoenix. The ASU DCDC has a model that allows testing of assumptions/sensitivities.
- Did you run a scenario with the Central Arizona Groundwater Replenishment District (CAGRD)? Answer: The model was developed to support the CAGRD, so yes, it does very detailed calculations of CAGRD obligations. The wedge of green in the slides is based on the rules set for each utility. In the pre-adaptation scenarios we are not showing the replenishment offset... we will show that in the later part of the study, including assumptions about where the recharge occurs.
- Do the calculations assume different per capita demand, tailored for each water provider? Answer: The gallons per capita per day (gpcd) rate is declining within each water utility using consistent assumptions. The demand components are in the calculations now, including the effect of hotter climate on outdoor water use.

5. **Supply-Demand Scenario Matrix** - *Kathy Chavez, Water Policy Manager, Pima County*
Pima County is a member of SAWUA, which is their connection to the study. The study is using multiple projections of the future, focusing on low risk versus high risk. The climate component for high emissions leads to high risk, or “worse case.” For demand, the range of projections is based on slow compact vs fast outward growth. We can’t look at all 20 scenarios, but we do want to be strategic about which scenarios we want to select for evaluation. There is interest in the “best” and the “worse” scenarios, and some in between, as well as the official projections, which are called the “base case”.

What is next: for the local climate scenarios, we start with downscaled information from global climate models, which provide inputs to the surface water hydrology model, leading to the groundwater model. We will then identify where we think groundwater levels will increase and decrease under each scenario. We only can do about 5-6 scenarios; currently we are on “step one” in the process, without adaptation inputs. We will look at risks next, then think about adaptation options, the tradeoff analysis, and then the study report in fall 2020. The third public meeting will be summer or fall of 2019. By fall of 2020 we will have a study report and the final public meeting.

Questions from the public:

- What is the “current climate” compared to the low and high emissions future? This is confusing. Answer: the Base Case has no climate change, climate was not included in the official projections. We are currently trending toward the higher emissions scenario (RCP 8.5), but if we reduce carbon output it will lead to lower emissions rate that could lead to the RCP 4.5 level. Comment: It is hard to tell what is static and what is changing in the graphic.
- Are there models of how water conservation can have an impact? Answer: The change in per capita use is one of the factors varied by provider in the CAP:SAM model. It is currently a rather coarse aggregate but the assumptions can be changed. In the model, we want to be able to isolate the factors, e.g. growth without climate change.
- Were there any demand scenarios for growth in commercial or industrial growth not related to mining? Answer: Mining is looked at separately because of the concentrated effect in Green Valley. The commercial sector is incorporated into the gpcd housing rate, rolled together into the total rate of the water provider. Tucson Water has a significant component of its demand that is non-residential, so commercial growth is accounted for in the housing unit projection.

6. **Opportunity for Additional Questions and Comments**

- Are you following what is going on in the state legislature, including reductions in regulations, e.g. S.B. 1515? Answer: This is a long-term study to 2060. What we know now is the Groundwater Act and the Assured Water Supply (AWS) Rules – we are using current laws as our assumptions. However, staff does follow proposed legislation.
- What about the non-CAP:SAM uses, e.g. water use by riparian vegetation? Answer: The groundwater elevation map will show areas that are rising and falling. Riparian areas get their water from shallow groundwater and surface water. We will be developing threshold demands for riparian habitat support, and figure out if the streams are

permanent, intermittent or ephemeral, leading to an assessment of riparian impacts. A Reclamation hydrologic engineer is working with the Environmental Sub-team on this.

- How sure are you about recoverable groundwater, the cost of deeper wells with drought, etc. Answer: there are issues with recovery of groundwater. This is actually one of the outputs of this study – because groundwater is so important here it is important to understand declines. That may be one of the most important outputs of this study, and lead to potential mitigation options.
- Where is the CAGRDR plugged into the model formation? Answer: The replenishment obligation is the green wedge of the demand on the graphs. We don't include replenishment in the first round of demand, we do that in the second round, when the adaptation strategies are included. The study assumes that the AWS rules are in place, that designations continue, that new certificates are issued. It is built into the fabric of the model.
- Question: Where will the CAGRDR get the water to meet the obligations? Answer: That question is a bit beyond this study. The groundwater-based demand will be removed from the aquifer, without replenishment in the first round. When we get to the stage of replenishment, we can decide where it will be recharged.
- What is the CAGRDR? Answer: The CAGRDR (Central Arizona Groundwater Replenishment District) is a replenishment district of the CAP; it replenishes groundwater pumped by its members. There are strict rules about new development, they must have a 100 year supply that is mostly renewable. The CAGRDR does the recharge on behalf of subdivisions and water providers.
- Comment: A House Environment and Natural Resources committee presentation by Dr. Sharon Megdal was recorded and could be useful for people who have questions.

7. Next Steps and Future Opportunities for Input – Eve Halper

- How do the subcommittees work? Answer: The project team consists of the study partners; they will make the final recommendations on which scenarios will go forward. The stakeholder advisors are about 30 people giving input to the project team. There are multiple sub-teams, one is demand – water providers who are giving input on assumptions. The Environmental sub-team discusses how to address riparian impacts. The Outreach and Communications team helps with communications. The University of Arizona's Hydrology and Atmospheric Sciences department provides a lot of technical support on climate projections.
- There will be several technical reports coming out of the study. The first relates to climate, global and regional climate projections, including precipitation and temperature. There will be another report on the surface water model outputs, which uses a well-calibrated model that is also used by the Pima County Regional Flood Control District. Another technical report will be produced on the different scenarios that go into the CAP:SAM model and how each water provider will serve their residents, also how the CAP:SAM results get translated into groundwater pumping, and on impacts to riparian areas.

- Do you do work with disaster planning? Answer: Yes, the surface water modeling is of interest to the Pima County Regional Flood Control District, there may be more intense storms even in the context of more drought. The University of Arizona's Hydrology and Atmospheric Sciences specializes in regional modeling. The surface water model outputs will be provided to the Regional Flood Control District, so they can assess future infrastructure and flooding impacts.

8. **Closing** – *Marie Light*

There are over 50 people in attendance, asking great questions, so thank you. People are interested in safety and health, impact of water conservation and adaptation strategies; representing businesses besides mines, and farms in the scenarios, how gpcd is incorporated into the Study. Additional questions addressed the impact to riparian habitat, including threshold water needs for riparian habitat. The importance of riparian habitat is related to the part of our economy that is based on birdwatching, which is a \$2 billion industry for Arizona. The audience was also interested in avoiding disasters through planning. Please submit cards if you have more comments and questions. Also, there is a website and email link on the agenda to get more information. The slide presentations will be on the website in a few days.

Thanks to the speakers and participants. The meeting concluded at 5:21 p.m.