



# Learning from Recent Modeling Projects

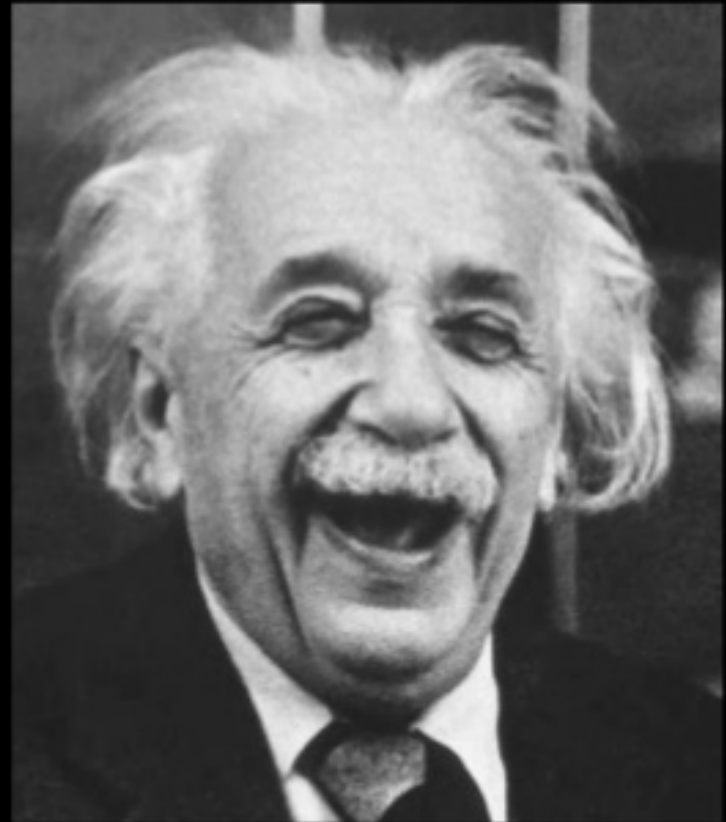
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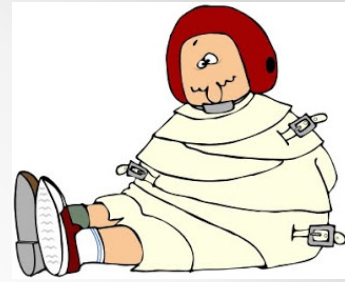
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“The definition of insanity is doing the same thing over and over again but expecting different results.”

Albert Einstein  
(maybe)



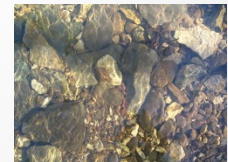
# Are we Insane?



- How many major watersheds/waterbodies in OK have been modeled just ONE time?
- When an issue is identified with a water model, how many times is it the same issue identified with a previously completed model?

# Purpose of Presentation

- To summarize comments/ideas from regional water management experts in order to explore possible action to improve the effectiveness and utility of water models
- This presentation is NOT intended to:
  - Complain about any person/agency/other entity's performance/experience in modeling
  - Throw out the baby with the bathwater
  - Imply that good work and/or useful results have not been accomplished through the use of water quality or water quantity models
  - Solve the world's problems or necessarily identify new ideas that haven't been heard from before
- Just a summary so we can further discuss; just to be we're not trying to be



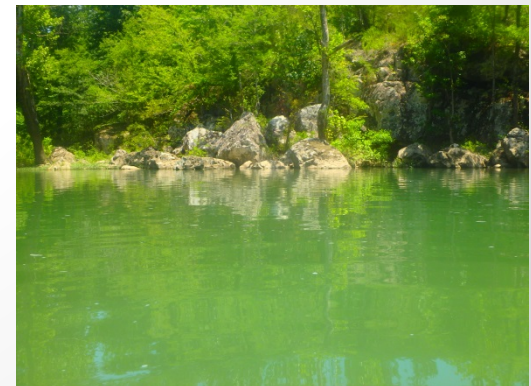


# Method:

- Conducted phone or in-person interviews of the following people and asked them the same set of basic questions.
  - Monty Porter and Chris Adams – Oklahoma Water Resources Board
  - Joe Long, David Akakpo, and Soojung Lim- OK Dept. of Environmental Quality
  - Darrell Townsend- Grand River Dam Authority
  - Brian Haggard- Arkansas Water Resources Center and University of Arkansas
  - Thad Scott- Baylor University
  - Greg Kloxin- Oklahoma Conservation Commission
  - Randy Worden- Central Oklahoma Master Conservancy District
- Summarized the common themes as well as the many different insights and suggestions about how we could work together to improve model input, output and usage

# Benefits of Models

- Estimating system responses
- Evaluating management scenarios
  - Standards changes
  - Conservation practices
  - Manipulation of hydrology
  - Other things humans can control
- Filling in for missing data
- Total Maximum Daily Loads



# Benefits of Models

- They're so SEXY!!!

# Common Issues: Is There Ever Enough Data?

- How much is not enough?
  - Too short a time period (i.e. only one year)
  - Limited hydrologic conditions/hydrologic data
  - Limited spatial coverage of data
  - Limited chemical and hydrologic data for watersheds of Oklahoma lakes
  - Assessment programs don't typically collect all types of data required for water models
  - Frequently lack sufficient data to do independent calibration and validation of models
  - May lack data to fully evaluate water quality standards impairment
  - Who knew that temperature of inflow was one of the most critical factors to predict strength of stratification in a SE OK lake?
- Sometimes available data is not used in a model
- Aren't we using a model to substitute for data we don't have???



# Common Issues: Knowledge

- Most people are not trained to or do not actively model
- Many modelers are experts in IT but not in ecology
- 
- Models are often run by experts unfamiliar with the waterbody
- Use of a water quality standards in model is not necessarily the equivalent of use of a standard for assessment purposes

# Common Issues: Communication

- Many diverse groups with different backgrounds, skills, and goals generally involved in modeling
  - Sometimes we don't speak the same "language" or allow sufficient opportunities for everyone to give input
- Considerable work often happens in the lag time between communication among modeler and people who will use the model
- Sensitive issues related to possible regulation can serve to limit communication
- Frequently, we only have the output of a model to evaluate; the most complicated models are too expensive for average entities to maintain and therefore we can't replicate model output ourselves

# Common Issues: Choose the Right Model/Parameters/Data

- Not always certain that we use the best model
  - Often must rely on experts to make that choice. Experts may have bias and may also not really understand the conditions in the waterbody
  - Tend to favor most complex models that we may lack sufficient data for
- Not always certain that we focus on the most appropriate endpoint(s) for the model
  - Nitrate in lake models can be an effective guide for how well the model is working



# Common Issues: Resources



- Trying to do too much with not enough
  - **Money:** many models were limited in scope because of available resources, leading to a poor product
  - **Time-** we typically don't allow enough time:
    - For communication
    - For the changes in management resulting from the model to work
  - **People:** we don't have the right stakeholders and experts at the table throughout enough of the process
  - **Follow-up:** in many cases, once the model is done, there isn't much done to verify that it was right or to collect missing pieces necessary to improve it.

# How Can We Improve??

...

Is it even possible?



# Possible Solutions

- More communication from the beginning, maybe going as far back as the workplan
  - Prioritize watersheds or parts of watersheds for intensive focus
  - Force the modelers to talk to you frequently along the way
- Involve EVERYONE- even the **SCARY** people
  - The more partners, the more potential resources you have
  - People involved from the beginning are generally less inclined to pick apart the end product if they feel they had a role in designing it
  - Need modelers, ecologists, hydrologists, water users, water managers...
- Collect/Use more (appropriate) data
- Simpler models

# Possible Solutions, cont.

- **What about something other than a model???**
  - In the Wister Watershed, we're investing about \$40,000 to monitor all HUC 12s in the watershed for one year and determine where it makes the most sense to focus future efforts
  - Lets spend more money on fixing the problem and less money on coming up with a number that defines the problem- maybe delay the regulatory approach...
  - Watershed Plan in Lieu of TMDL- lets make this a reasonable alternative in places where it makes sense.

# Possible Solutions, cont.

- **Do some follow-up**

- Keep working in the same place to evaluate whether what you're doing is working.
- Expect that solutions take a while to happen
- Collect more data-
- spend money on those things and you might be further along than if you had a million dollar model.

# Final Thoughts

- Interviewee thought: “Science needs to drive these things but science in a vacuum doesn’t fulfill all the goals. We need to have politics and input from other sources to have a workable solution.”
- Interviewer thought: Everyone we interviewed wanted the same thing- better models (or use of) to protect water resources- none of the solutions recommended are impossible if we support each other and work together

# Questions???

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