



The Effects of 3D Visualizations on Lay Perceptions of Environmental Issues

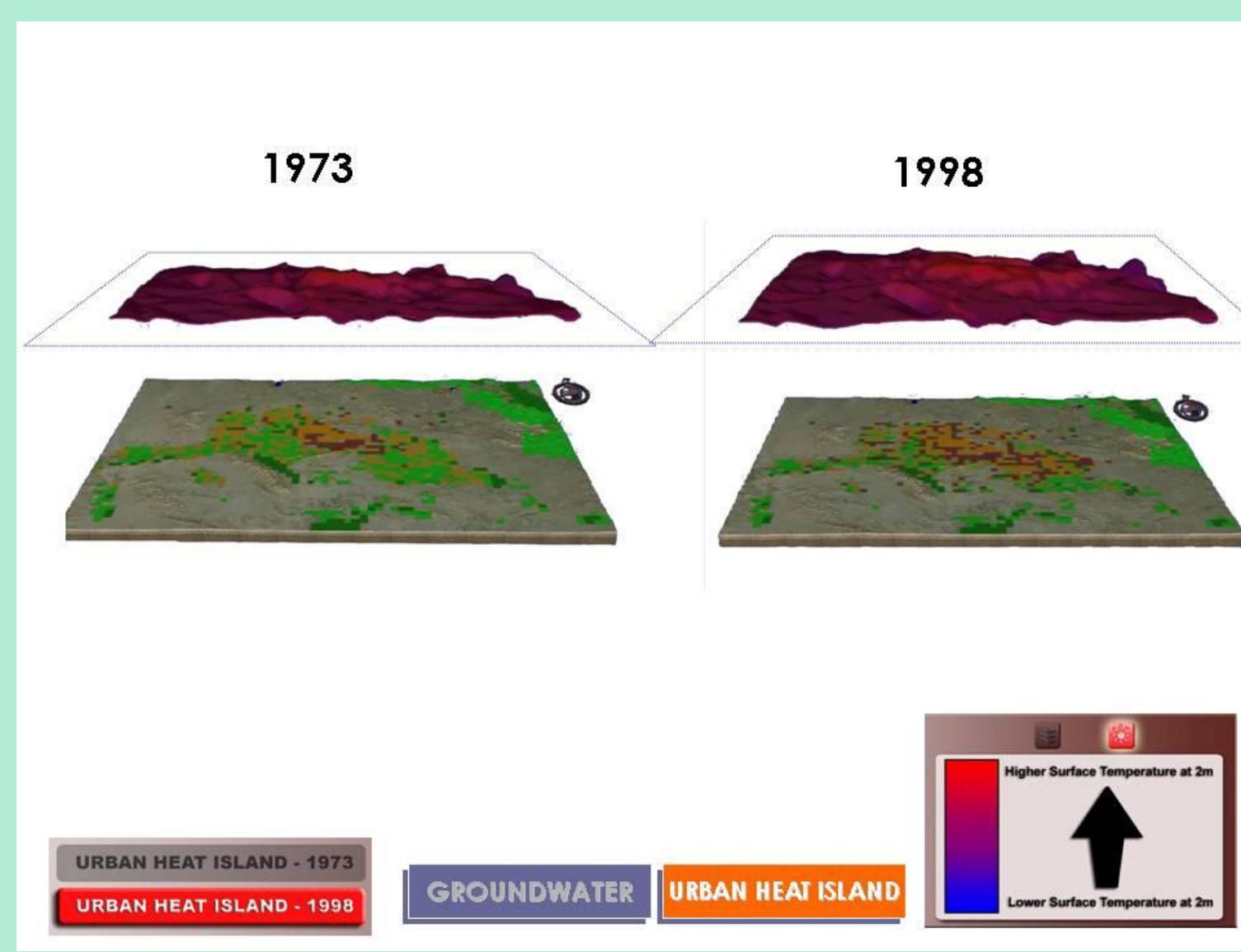
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Public Involvement in Environmental Decision-Making

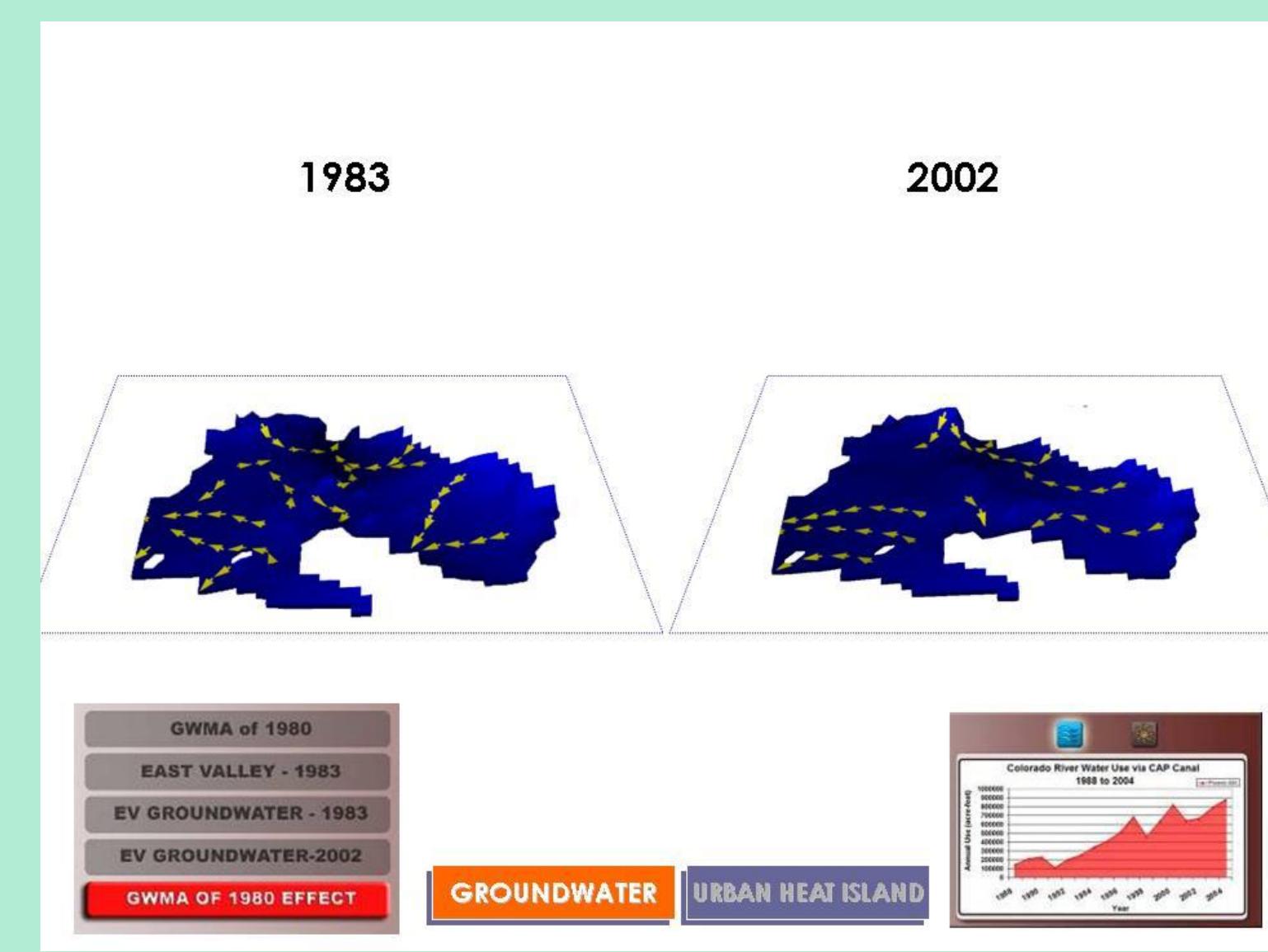
- Resolution of environmental problems requires public input because:
 - 1) The public is an important stakeholder
 - 2) The public is not satisfied by technocratic decisions
- Many environmental issues are too complex for the public to understand
- Computer visualizations may solve this dilemma by making detailed, complex information easily understandable to the average viewer
- The Decision Theater: a 270-degree, 7 screen, immersive 3D theater
- DT's mission: "To serve as a home for policy makers and the community to participate in immersive, collaborative decision making"
- This study examines the Decision Theater as an educational tool used to inform the public about complex environmental issues

RQ: How is lay perception of environmental issues affected by the Decision Theater Visualizations?

Participants saw a presentation on two environmental issues: the urban heat island and groundwater overdraft. They were divided into a test and a control group. The test group saw the presentation in the Decision Theater and others saw a similar presentation, constructed for this experiment using DT images, on a 2D surface in a normal classroom. Each individual answered questions relating to general environmental views and the specific issues addressed in the demonstrations both before and after seeing the presentations.

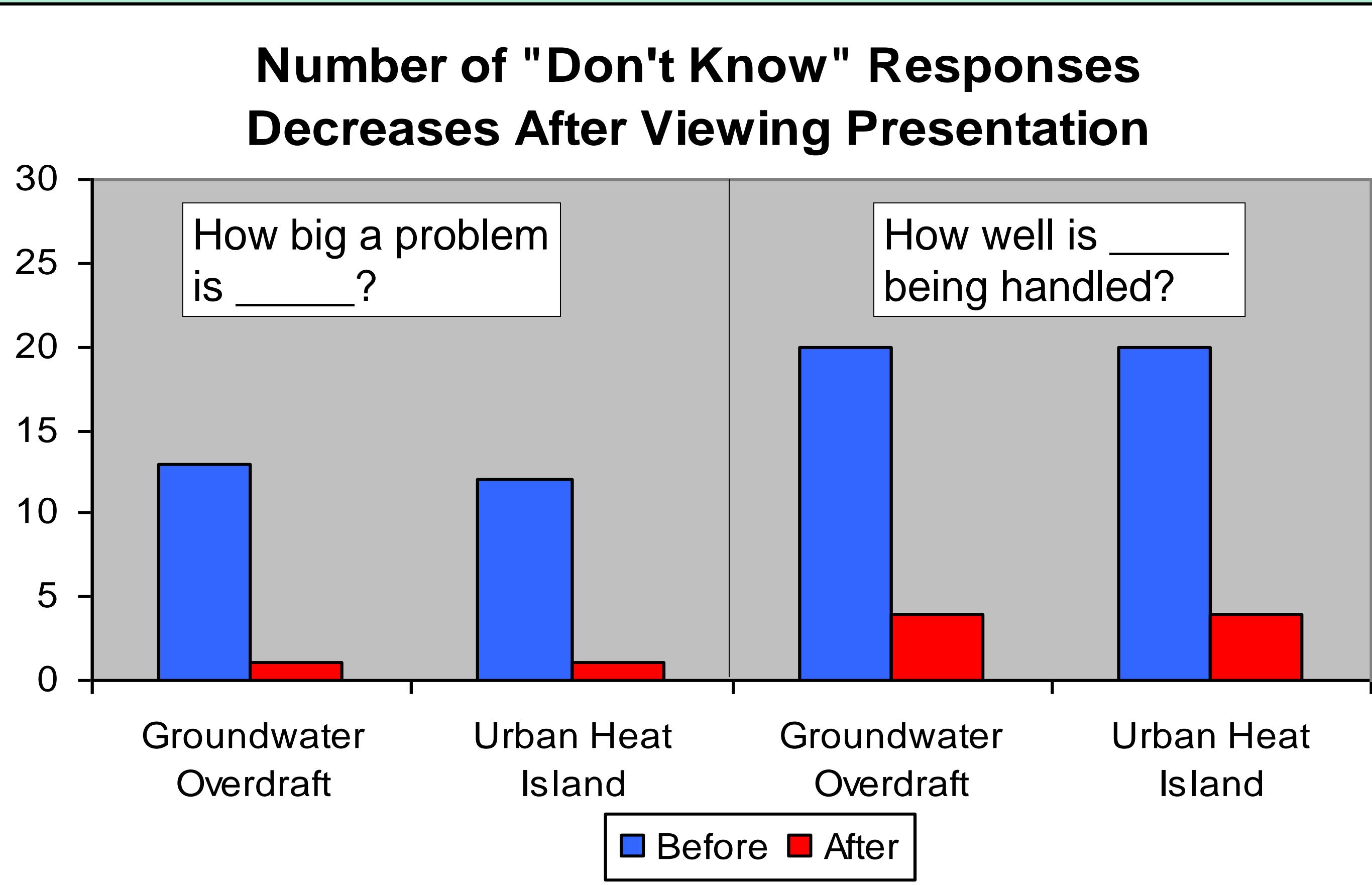


Screenshot of urban heat island image from presentations

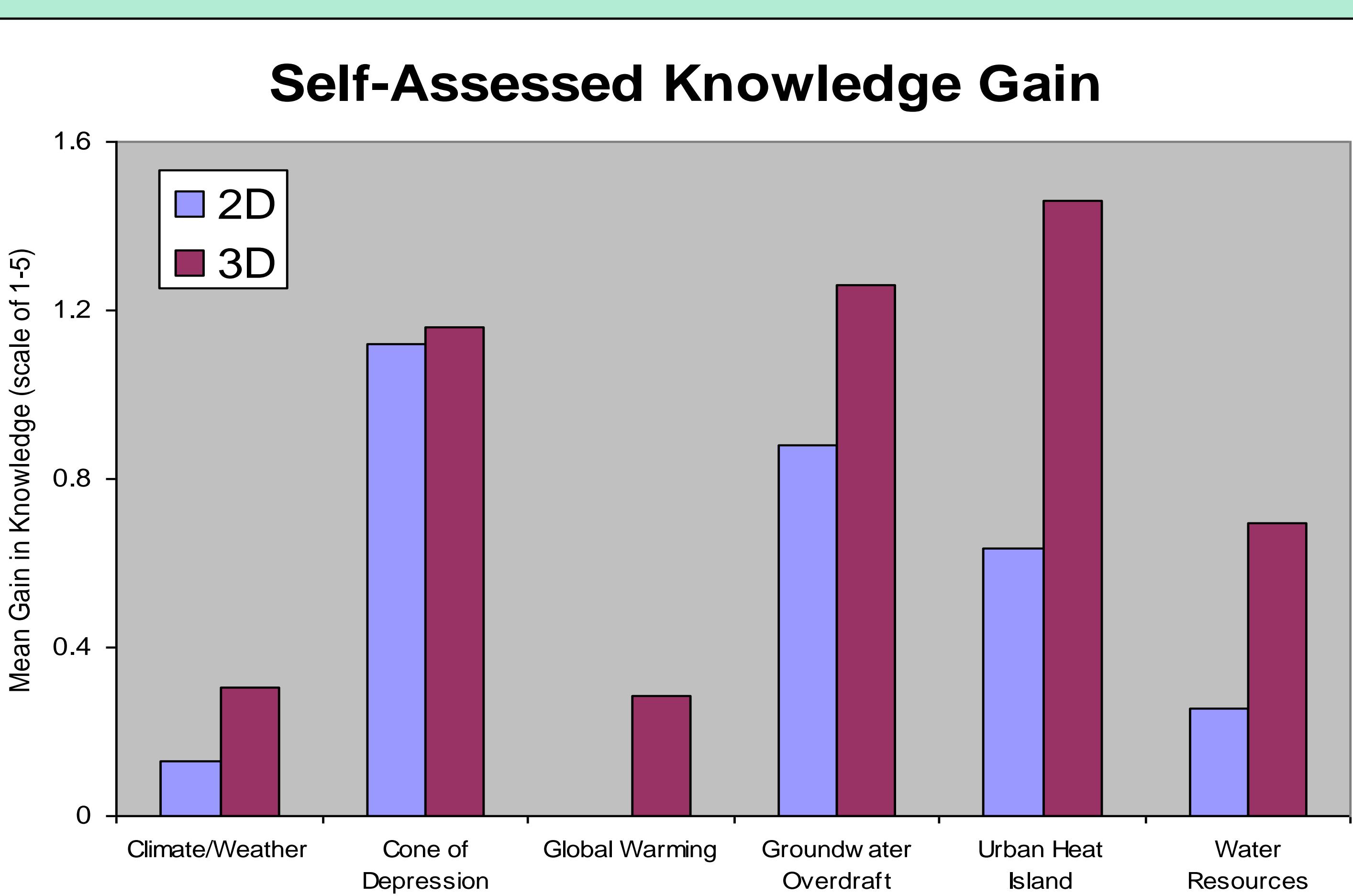


Screenshot of groundwater overdraft image from presentations

Effects of the Presentation on Perceptions



After watching the 3D presentation, participants indicated a greatly increased level of knowledge. This was especially true for particular technical terms such as "groundwater overdraft," "urban heat island," and "cone of depression." The data rather clearly indicate that the subjects felt more knowledgeable after seeing the presentation than they had before. **The participants who saw the 3D presentation showed more knowledge gain than those who saw the 2D presentation.** This was especially the case with the specific issues on which the presentation focused.



Positive Impacts of 3D

The results showed that the 3D presentation in the Decision Theater had a positive impact on the participants' understanding of the environmental issues that was substantially greater than the impact of the 2D presentation. The students who saw the presentations responded to open-ended questions about them very favorably. Typical responses characterized the presentations as "very informative." In addition, many of the 3D participants enjoyed the 3D, as exemplified by one student who simply wrote "sweet 3D" on his survey. Open-ended questions also elicited more complex sentiments such as:

"[The presentation] was very good and impressive. The presentation in 3D was amazing and the data was substantial..."

-3D Participant

The 2D and 3D presentations were very similar and so it is not surprising that they had somewhat similar effects. In an attempt to keep as much the same as possible between the control and test, **the images used in the 2D presentation were taken directly from the 3D**. However, **this may have negatively affected the quality of the 2D presentation** as several participants complained that they were hard to read or understand.

"The information was interesting but the graphs and visuals were terrible. I had a hard time reading the three dimensional images and the oddly slanting map of Phoenix was impossible to match up to the graphs..."

-2D Participant

Further Research

- Currently being expanded to "expert" sample of professionals in the water management and land-use planning fields
- Further research needed to test the DT against better quality 2-dimensional visualizations
- The ability of the Decision Theater to aid people in making decisions should be studied in real-world decision-making situations

Acknowledgments

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