United States-Mexico Transboundary Groundwater Conference: Innovation and Creativity Strategies for Unprecedented Challenges

PANEL IV wrap-up by Alfonso Rivera, moderator

This panel discussed transboundary groundwater and the state of current numerical models; the scope was on the use of numerical models on the physical-chemical issues of transboundary aquifers and the dynamics of groundwater in the aquifers.

Three experts discussed the issues centered in four key questions: (1) how to treat jurisdictional boundaries in numerical models of TBA; (2) the top three challenges in building that type of models; (3) specific processes to model in the TBA context; and (4) examples of real cases where numerical models have been useful.

On the ***boundaries issue***, it became clear that it is challenging to define jurisdictional boundaries in numerical models. It was noted that boundaries are dynamic and can change through time as land, supply and demand relations change, or jurisdictional boundaries change. Thus, these boundaries could be treated as other changing boundaries. It was interesting to hear that aquifers could be sub-divided into sub-regions to deal with an essential component of the models: the water balance. The knowledge of finite water balances could then be used in shared management practices.

Furthermore, binational factors such as pumping, water users, residual waters and management practices, can be defined as jurisdictional boundary conditions. It was also noted that integrated hydrologic system models could be better adapted to dealing with jurisdictional issues

In general, the panelists agreed on the main ***challenges*** in building a TBA model. A conceptual framework is needed before a numerical model is built; data sharing, observation data, geochemical data, and institutional asymmetry and accuracy of the available information are factors that prevent building robust and credible models. Moreover, predictions with numerical models are uncertain because there is no agreement on future water demands and policy changes.

The list of the ***physical-chemical processes*** to model included: water sources, land use, salinity, climate variability, pumping, and SW/GW interactions, coupled processes and climate change. However, not all of these are really specific to TBAs. I had hoped to hear inclusion of social and/or economical processes in the modeling, and the transboundary effects in pumping, land use, and groundwater storage changes.

Finally, four ***examples of real cases*** were presented where numerical models have been useful; three in the Mexico/US international border and one in Europe; these are: the Hueco-Bolson, the Rio Grande, and the Rio Colorado, as well the Genevese TBA.

In conclusion and clearly, the state of numerical models, built in the transboundary context, is far from being ideal. Considerable efforts are still required to accommodate homogenized data, agreement on specific processes to model, and overall conceptual understanding of the TB aquifer on both sides of the jurisdictional boundary. Yet, numerical models are perhaps the best existing tools to support shared management of TBAs.