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SWAT model is only as good as the data fed into it

For years, dairy prducers and industry leaders have been very aware the Soil and Water Assessment Tool (SWAT) model used to measure the amount of nutrient loadings from Upper North Bosque River (UNBR) dairies into the river, has been severely flawed. But, despite this, the model and its data were used repeatedly by the Texas Institute for Applied Environmental Research (TIAER) under the direction of past Executive Director Ron Jones. Although John Cowan, executive director for Texas Association of Dairymen (TAD) and other industry experts fought long and hard to get the model reworked, it was to no avail.

Finally, after more than 10 years, Cowan reports the model is now in the hands of the TCEQ to be revised---and he anticipates results will be much different than those in the past.

But, it has been a long and anxious wait and Cowan is convinced the flawed model contributed to assumptions by TIAER staff resulting in adverse legislation and Texas Natural Resource Conservation Commission (TNRCC renamed TCEQ) rule changes.

"I believe all of this," Cowan said, "was instrumental in wrecking Upper North Bosque River dairies with extending consequences for all Central Texas dairies."

The SWAT model hosted two major flaws: First, It did not take into account the 52 Texas State Soil and Water Conservation Board (TSWCB) reservoirs specifically located in Erath County (SCC lakes) for flood control. These lakes were designed to capture rainwater, preventing and abating potential flooding in the region. Much of the regions farm land, including dairies, are located in the drainage area of these lakes and consequently those lakes would have been the first point of collection for rainfall before reaching the Bosque River or its tributaries.

Secondly, the model incorrectly identified dairy wastewater lagoons as located adjacent to the Upper North Bosque and it assumed the affluent ran directly into the river. The mathematical calculation used by the model did not consider the spatial difference between the lagoons and the river.

Back in 2000 and 2001, TIAER used (SWAT) in a study to evaluate the effectiveness of best management practices (BMPs) to improve in-stream water quality in the Upper North Bosque. The data collection input was prior to and included the early 90s. Several monitoring stations were located along the Bosque River where at the time, the study indicated several thousand dairy cows were distributed among the Concentrated Animal Feeding Operations (CAFOs) located on the Upper North Bosque. The final results from the model readings showed these dairy waste application fields, (WAFs) as the prime contributor of pollutants into the river that travels downstream and pours into Lake Waco---the primary source of municipal water for the City of Waco.

TIAER assumed from the model's data, that 44% of the soluble phosphorus (P) load in the Upper Bosque came from Confined Animal Feeding Operations' (CAFOs) waste application fields (WAFs). A report from TIAER was submitted to the TCEQ and provided to the state Legislature.

Prior to this, the Upper Bosque watershed had already made the EPA's 303(d) list as mandated by the Clean Water Act because of elevated soluble reactive P levels. Once the impaired watersheds throughout the state were identified, the TCEQ in 2001 established and submitted a total maximum daily load (TMDL) that called for 50% reduction of soluble reactive P loadings in the impaired segments of the Upper Bosque…

The "44%" phosphorus loading into the river released in the TIAER study, stuck like wet manure to a boot. This flawed data, coupled with the Bosque recognized by the state as an impaired

watershed with TMDL restrictions, caused a string of destructive and devastating events for CAFOs on the river.

Cowan said this information was the ammunition needed by State Rep. Jim Dunham (D-Waco), who represents counties south of the Bosque River watershed, to drive the Sunset Bill, (HB 2912). The Sunset Bill is a 12-year review of state agencies by the Legislature, requiring all agency meetings are open to public observation.

During the review, Dunham claimed the TCEQ (then the TNRCC) was not doing its job on regulating the Upper North Bosque CAFOs. In a debate of HB 2912 on the House floor, Dunham brought out the TIAER information about Upper North Bosque dairies and dared any of his constituents to "put their toe in Lake Waco."

Dunham was successful in getting an amendment to the Sunset bill that changed the Texas water code to require all North Bosque River dairies to obtain individual wastewater permits.

"I know if the model had been correct," Cowan said, "it would have given good scientific evidence that shows dairies alone were not responsible for the 44% phosphorus. The landscape of the entire dairy industry in the Bosque River watershed would have been significantly different."

Cowan said when a different agency conducted a study on e-coli bacteria and tracked all animal species, they found dairy cattle made up only 15% of the nutrient loading into the Upper North Bosque River and the largest contributing factor for the bacteria in Lake Waco was human waste.

Cowan said he has preached repeatedly and publicly to the TCEQ executive directors and staff, to Ron Jones, and to Dan Hunter (current executive director for TIAER) --- that farmers need to know exactly what is going on with soil tests and the scientific analysis.

"They can't farm on false numbers and they depend on the data they get. If the information is good, they will farm it right. But, these dairies have been held to a standard that was flawed."