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Response to Mr. Peter Balleau: The Convergence of Water Rights, Structural Change, Technology, and Hydrology: A Case Study of New Mexico's Lower Rio Grande

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Response to Mr. Peter Balleau: The Convergence of Water Rights, Structural Change, Technology, and Hydrology: A Case Study of New Mexico's Lower Rio Grande

We appreciate Mr. Balleau's interest in and comments on our article, "The Convergence of Water Rights, Structural Change, Technology, and Hydrology: A Case Study of New Mexico's Lower Rio Grande" in *Natural Resources Journal* Volume 51, No. 1, pages 95-117. Mr. Balleau's central point is that the hydrologic risks of water rights decrees which differ from actual water use are avoidable through public administrative actions and private water management.¹ However, recent technological developments now make it possible to accurately estimate basin-wide crop consumptive use, and application of this technology in New Mexico's Lower Rio Grande Valley has found great variability between theoretically optimum and actual crop consumptive use. Water rights adjudication that is based on theoretical crop water use—rather than a basin's historical and long-run average water use—can result in extreme water deficits, groundwater overdraft, reduced downstream deliveries, further divergence between wet and paper water quantities in already over-appropriated basins, and compromised hydrologic sustainability. Mr. Balleau has much more faith than we do in the ability of public administration and private water management to address the ongoing problem of water rights over-adjudication in New Mexico.

Historic beneficial use of surface and groundwater determines non-tribal water rights in New Mexico. Water rights are defined both in terms of consumptive irrigation requirements and farm delivery requirements. Thus the state's actual historic water use is the foundation of the long-term sustainability of the hydrologic system. Using remotely sensed data, we now have the ability to accurately estimate historic and current basin-wide water use across the spectrum of crop production conditions, rather than rely on the fiction of widespread, optimal, well-watered crop production conditions. Our article presents a case study of New Mexico's Lower Rio Grande (LRG) to illustrate the divergence between ac-

1. Peter Balleau, *Commentary on The Convergence of Water Rights, Structural Change, Technology, and Hydrology: A Case Study of New Mexico's Lower Rio Grande*, 52 *Nat. Resources J.*, 95 (2012).

tual water use and theoretically “optimal” water use in pecan orchards. We explain how the changing structure of agriculture in the LRG and numerous technical factors contribute to the divergence between theoretically optimal and actual consumptive use.

Mr. Balleau believes it is possible to avoid hydrologic risks in cases of mismatched actual consumptive use and court-ordered rights to water use. We agree in theory with Mr. Balleau; however, managing an over-allocated water supply is easier said than done. History provides clear examples of the negative consequences of these types of situations. New Mexico’s surface water supply and most of the groundwater supply are fully or over-appropriated.² If all claims on the state’s water supply were fully exercised, water use would exceed the renewable, sustainable supply. The result would be hydrologic imbalance, with negative socioeconomic, environmental, political, and legal consequences.

Over-appropriation of limited water resources in New Mexico, and elsewhere in the United States, results from decades of wishful thinking as well as the use of limited data from reference periods with historically high precipitation levels. Over-appropriation also is a function of speculative property right claims driven by the assumption of increasing scarcity value. Establishing water rights for fields that were once barely irrigated—according to often flimsy historical records—also contributes to over-appropriation. Moreover, as we note in our article, over-appropriation results from disconnected agronomic and economic realities of crop water use and consumptive use theory. Unfortunately, while theory-based adjudication can produce short-run good feelings and the belief in a temporary financial windfall, the consequences are very costly and painful when the water high wears off and the hydrologic and legal implications set in. Creating paper water rights that have no basis in hydrology devalues all water rights—including rights that have a real, sustainable water supply attached to them. Adjudicating agricultural water rights in excess of historic consumptive irrigation requirement and/or farm delivery requirement is similar to floundering third-world countries printing trillion dollar notes during an economic disaster: as more water rights are “created” the real value of all water rights is degraded.

Over-allocation not only jeopardizes the sustainability of local water resources, it can also result in failure to meet downstream obligations, leading to protracted and costly litigation. The consequences of inadequate downstream deliveries on the Pecos River resulted in the U.S.

2. New Mexico Office of the State Engineer, Interstate Stream Commission, *Frequently Asked Questions*, available at http://www.ose.state.nm.us/faq_index.html (last visited June 30, 2012, 2:37 PM).

Supreme Court case, *Texas v. New Mexico*,³ and required the state of New Mexico to purchase and retire water rights, some of which should never have been allowed in the first place.⁴ The lengthy legal battle over the Pecos River cost New Mexico millions of dollars through litigation and compliance with the Supreme Court decree. A former New Mexico State Engineer has stated that “[b]asically, over-appropriation or over-allocation is not in the state’s vocabulary.”⁵ We believe a fundamental reason for over-allocation has to do with the mysteries surrounding water resources in New Mexico. Lack of transparency and inaccurate accounting of who uses how much water contribute to a water resource management structure that relies on ignorance to protect and preserve the status quo. Research such as ours helps to remove some of the mysteries of crop water use in the state, and provides new insight into the divergence between theoretically optimum and actual crop water use.

Wilson and Lucero determined the crop-weighted consumptive irrigation requirement in New Mexico’s LRG to be 2.31 acre-feet.⁶ There is a hidden potential risk in defining farm delivery requirement by using an estimated efficiency: in practice, water right owners who are regulated by the farm delivery requirement can stretch the consumptive irrigation requirement to a farm delivery requirement of 4.5 or 5.5 acre-feet through the use of advanced technologies. Exceeding the historical consumptive irrigation requirement could tip the balance of the hydrologic basin, something that cannot be avoided through restricting water use to senior water users. The majority of water users in the LRG are junior and the Elephant Butte Irrigation District shares deliveries under a single right. Curtailing or preventing water use by the majority of users has serious economic and political consequences, which many prefer to avoid to the detriment of water resource sustainability.

Mr. Balleau describes neat, clinical and technocratic scenarios regarding the ability of priority systems to deal with over-appropriation. We are not optimistic that priority administration can or will be used to manage over-appropriation in New Mexico because of political and prac-

3. *Texas v. New Mexico*, 462 U.S. 554 (1983).

4. Emlen Hall, *HIGH AND DRY: THE TEXAS-NEW MEXICO STRUGGLE FOR THE PECOS RIVER*, 212. (2002).

5. Tom Turney, Former State Engineer of New Mexico, *The Fundamental Problem: Over-Allocation*. Presentation to 9th Middle Rio Grande Water Assembly, Albuquerque, NM (2005), available at <http://www.waterassembly.org/archives/9th%20Assembly/Tom-Turney-2%20-%20Fundamental%20Problem-Transcr.pdf> (last visited July 1, 2012, 7:56 PM).

6. BRIAN WILSON AND ANTHONY LUCERO, NEW MEXICO STATE ENGINEER OFFICE, *WATER USE BY CATEGORIES IN NEW MEXICO COUNTIES AND RIVER BASINS, AND IRRIGATED ACREAGE IN 1995* 132-140, tbl. 9 (1997), available at <http://wrti.nmsu.edu/lrgwuo/rwp/LowerRioGrandeRegionalWaterPlan.pdf> (last visited July 18, 2012, 10:00 PM).

tical constraints. Furthermore, while priority administration in an over-allocated surface water system could theoretically be used to prevent long-lasting damage to the system, it would not be so easy in an over-allocated groundwater system where the majority of users hold junior water rights. An example of such a situation is the Ogallala Aquifer, where over-allocation has resulted in significant and irreversible aquifer depletion. According to the Texas 2012 State Water Plan, the Ogallala Aquifer's volume is projected to decrease by 51 percent between 2010 and 2060.⁷ In New Mexico, junior rights holders have caused rates of water consumption in excess of a sustainable supply by pumping groundwater. This has caused the state to default on interstate compact delivery requirements and has caused drastic and permanent reductions in water use.⁸

In previous articles we asserted that accurate accounting of basin-wide water use is essential in New Mexico, and elsewhere, to conserve water and to equitably distribute water resources based on existing legal entitlements.⁹ Short and long-run hydrologic sustainability require accurate basin-wide water accounting. We stated that ignorance—resulting from the lack of rigorous water measurement and accounting—undermines water equity and efficiency. However, as new technologies become available that cheaply and quickly measure consumptive use, much of our ignorance about water will disappear.

As noted by Richards, “[t]he consequences of over-allocation can be severe. At the most basic level, consuming water at the rate that exceeds the renewable supply means that water shortages will occur more often and with greater severity, with the rate at which this will occur depending on the degree of over-allocation.”¹⁰ The primary objective of

7. Texas Water Development Board, *Water for Texas 2012 State Water Plan*, available at http://www.twdb.state.tx.us/publications/state_water_plan/2012/2012_SWP.pdf (last visited July 1, 2012, 8:02 PM).

8. See Elizabeth Richards, *Over-Allocation and the Doctrine of Prior Appropriation: Water Rights Settlement Agreements in New Mexico* (2008) (unpublished Ph.D. dissertation, Stanford University).

9. See Zohrab Samani and Rhonda Skaggs, *The Unintended Consequences of Water Conservation*, WATER RESOURCES OF THE MIDDLE RIO GRANDE: SAN ACACIA TO ELEPHANT BUTTE, May 2007, at 112-115, available at http://geoinfo.nmt.edu/publications/decisionmakers/2007/DM_07Chapter4.pdf (last visited July 1, 2012, 8:10 PM); Zohrab Samani and Rhonda Skaggs, *The Multiple Personalities of Water Conservation*, 10 WATER POLICY, 285-204 (2008).

10. Elizabeth Richards, *Can Negotiated Agreements Facilitate Market Transfers of Water? Lessons from New Mexico* (Sept. 2, 2009) (Unpublished discussion draft for presentation at “Water Markets: Why Not More?” Workshop) (on file with the Property and Environment Research Center, Bozeman, Montana) available at <http://www.perc.org/files/Richards%20market%20transfers%20of%20water%20draft.pdf> (last visited July 1, 2012, 8:22 PM).

our recent article in the *Natural Resources Journal* is to contribute to the reality-based assessment and discussion of how water is used in New Mexico. Our primary concern is that water over-appropriation or over-allocation not be made *worse* than it already is in New Mexico. We have noted that actual beneficial agricultural water use is unlikely to align with theoretical notions of how much water crops *should* or *can* consume. Hydrologic balances founded on actual agricultural water use are likely to be disturbed by higher levels of depletion. We believe mismatched actual agricultural consumptive use and water right decrees will negatively alter LRG hydrology.

