Liquid Gold or Water for Pecans? Valuation of Groundwater in Regulatory Takings Law

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I. Introduction

In 2012, the Texas Supreme Court's decision in *Edwards Aquifer Authority v. Day* reversed 100 years of state water law by changing the principle that establishes groundwater ownership rights from a "rule of capture" to a rule of ownership of "groundwater in place."[1] The ongoing *Bragg v. Edwards Aquifer Authority* litigation is the first of what could be a number of Texas cases invoking *Day* to claim a regulatory taking due to the Edwards Aquifer Authority's (EAA's) management of the Edwards Aquifer groundwater.

Following a 2013 decision for the plaintiff landowners by the San Antonio appellate court,[2] both parties petitioned the state supreme court for review. In May 2015, the Texas Supreme Court denied the petitions.[3] Its refusal to review lets stand the court of appeals' decision that EAA's groundwater permit denials for Glenn and JoLynn Braggs' two pecan orchards in Medina County amount to a regulatory taking under the U.S. Supreme Court's ruling in *Penn Central Transportation Co. v. New York*.[4]

The appellate court's remand to the trial court for valuation of the Braggs' damages for their taken water supply is the remaining issue in the litigation, and the subject of this Comment.[5] The disputed question is whether just compensation should be based on valuing the Braggs' water as a tradable commodity (akin to "black gold" or oil in the ground), or instead on the use value of the water, consistent with the appellate court's findings that the Braggs' forgone water use was to irrigate their pecan orchards. The answer to the question is relevant not only to the *Bragg* litigants, but also to water management policy for the state of Texas. Economic loss calculation issues in this litigation are pertinent to both the *Penn Central* test[6] and to just compensation within any regulatory takings case involving lost income.

This Comment has a narrow focus on the valuation approaches used by the litigants and the courts. Part II provides background on the *Bragg* litigation. Part III identifies the plaintiffs' and defendants' theories of damages, and the appellate court's valuation approach on remand. Part IV discusses the deficiencies of the appellate court's valuation approach, and explains the standard approach to estimate just compensation for lost income.

I conclude that the plaintiffs' persistent valuation of their taken access to EAA groundwater as if it were a tradable commodity was correctly disallowed by the appellate court. The Braggs did not trade water; indeed, they could not have traded the water they requested in their EAA permit applications because it was needed to irrigate their trees. At the same time, the appellate court's remand for valuation of the pecan orchard *land* with and without access to EAA water, in a fact pattern where it was not the land that was the taken property right, is inconsistent with standard economic practice. The appellate court's remand instruction is an economic error.

Author's Note: The author has worked on water policy and litigation across the country since 1986 and provided expert testimony on valuation of lost and contaminated water supplies. He has published extensively on the economic underpinnings of the Penn Central *test.*

1. *Edwards Aquifer Authority v. Day*, 369 S.W.3d 814, 831-32, 42 ELR 20052 (Tex. 2012), equated groundwater ownership to oil and gas ownership, concluded that differentiating "between groundwater and oil and gas in their importance to modern life would be difficult," and ruled that each landowner "owns separately, distinctly, and exclusively all the water under his land."
2. Edwards Aquifer Auth. v. Bragg, 421 S.W.3d 118, 43 ELR 20202 (Tex. Ct. App. 2013).
3. Edwards Aquifer Auth. v. Bragg, No. 13-1023 (Tex. May 1, 2015) (denying cross-petitions for review).
4. *Bragg*, 421 S.W.3d at 148 (*citing* Penn Central Transp. Co. v. New York, 438 U.S. 104, 8 ELR 20528 (1978).
5. *Id.* at 152-53. The appellate court also issued rulings on other elements of the case: (1) *Penn Central* governs the evaluation of the regulatory taking effective 2004 for one of the plaintiffs' orchards and 2005 for the other orchard; (2) the dates of the takings are the benchmarks for the valuation of damages; (3) the Edwards Aquifer Authority Act (EAA Act) was not implemented until 2004 and 2005; therefore, the Braggs' claims are not time-barred; and (4) EAA, not the state of Texas, is responsible for payment of just compensation.
6. In what has become known as the three-prong test, the Court in *Penn Central*, 438 U.S. at 124, stated that its "decisions have identified several factors that have particular significance. The economic impact of the regulation on the claimant and, particularly, the extent to which the regulation has interfered with distinct investment-backed expectations are, of course, relevant considerations. So, too, is the character of the governmental action."

The Braggs lost the *use* of water to irrigate their pecan orchards and produce a crop; therefore, the correct valuation method would be the difference in the present value of *farm income* past and future, with and without access to the EAA water, not the fair market value of the land. Valuing the land when lost farm income is at stake is no more relevant than valuing apartment buildings when rental income is reduced by some change in regulations that proscribed expected rental rate increases to fair market rental values.[7]

The *Bragg* litigation problems with both the plaintiffs' and defendants' valuation approaches, together with the deficient appellate remand instructions, have ramifications for future *Penn Central* litigation attendant to *Day* and *Bragg*. A long history of *Penn Central* regulatory takings cases reveals that *Penn Central*'s three-prong test entails a quantitative measurement of plaintiff's severity of economic loss, which must be substantial.[8] The test requires proper economic measurement of losses and standard benchmarking of those losses to a denominator value that reveals whether the plaintiff's distinct (or reasonable) investment-backed expectations have been frustrated.[9]

Texas is a big state with a big water supply problem. As a water resource economist, I hope that Texas courts will establish precedential standard economic approaches that both aid in evaluation of the economic prongs of the *Penn Central* test and provide just compensation where appropriate. *Penn Central*'s balancing of private rights and public benefits, discussed below, is pertinent to Texas' management of its limited water supplies after *Day* to ensure that future needs are met. Groundwater supplies for all citizens must be protected and balanced with private property rights.

II. Background on the EAA Act and *Bragg* Litigation

In 1993, the Texas Legislature enacted the Edwards Aquifer Authority Act (EAA Act), which established a regulatory system to govern use of groundwater from the Aquifer and created the EAA to administer it. The EAA Act requires a permit to withdraw water. Existing users who had beneficially used groundwater from the Aquifer prior to June 1, 1993, were eligible to obtain a permit.

Glenn and JoLynn Bragg, farmers in Medina County, own two properties located over the Aquifer: Home Place Orchard, bought in 1979 to serve as their homestead and a commercial pecan farm; and D'Hanis Orchard, bought in 1983 as a commercial pecan farm. Pecan trees require a significant amount of water in order to produce a profitable crop.[10] In their farming location atop the Edwards Aquifer, the Braggs anticipated unfettered access to needed water from the Aquifer.[11] They drilled an aquifer well on their Home Place Orchard property for irrigation of the pecan orchard and consumptive household use. They used groundwater from a shallow aquifer to irrigate the D'Hanis Orchard property until 1995, when they drilled and began pumping from the Edwards Aquifer.

The Braggs filed two permit applications with the EAA in compliance with the statutory requirement in the Act. They applied for a permit for 228.85 acre-feet for the Home Place Orchard, although they had used only as much as 60.4 acre-feet of Aquifer water during any one year of the historical period. They were issued a permit for 120.2 acre-feet. Following extensive administrative hearings, the EAA denied the D'Hanis Orchard permit application in September 2004, because the Braggs lacked usage there within the historic period before June 1993. The lowered and denied pumpage precluded the Braggs' anticipated needs for their maturing pecan orchards. On November 21, 2006, the Braggs sued the EAA, alleging an unlawful taking of their property under Article I, §17, of the Texas Constitution.[12] The trial began in Medina County District Court in March 2010.

7. *Bragg*, 421 S.W.3d at 139. The appellate court cited *Mayhew v. Town of Sunnyvale*, 964 S.W.2d 922, 935-36 (Tex. 1998), for its consideration of the "diminution in the value" of the Braggs' properties. However, *Mayhew* was a case about the down-zoning of 1,196 acres of land in Sunnyvale, TX. Valuation of land was the appropriate method in that case because no income stream of a going concern was at issue. Failure to match appropriate valuation methods to the property right at issue—land or income—bedevils regulatory case decisions. *See, e. g.*, CCA Assocs. v. United States, 667 F.3d 1239 (Fed. Cir. 2011), *cert. denied*, No. 11-1352 (U.S. Oct. 9, 2012). In *CCA Assocs*., the plaintiffs lost substantial income from HUD-regulated apartment buildings. However, confusion in interpreting the economic testimony caused the court to devolve the measure of economic impact to an 18% diminution in building value, judged too small to justify a taking under *Penn Central.*
8. *Mayhew*, 964 S.W.2d at 935-37 (*citing Penn Central*, 438 U.S. at 124.
9. *Id.* at 935-36 (*citing Penn Central*, 438 U.S. at 130-31). Economic losses must be measured against the "parcel as a whole." (This comparison has come to be known as the "takings fraction," which compares the *with* and *without* regulation values as the numerator, to the owner's stake in the entire property as the denominator, to evaluate the severity of economic impact. *See* Keystone Bituminous Coal Ass'n v. Debenedictis, 480 U.S. 470, 497, 17 ELR 20440 (1987). Thousands of words by hundreds of litigators, jurists, and scholars (including myself) have sought to explicate the *Penn Central* test. *See, e.g.*, William W. Wade, *Temporary Takings,* Tahoe Sierra*, and the Denominator Problem*, 43 ELR 10189 (Feb. 2013).
10. Bragg v. Edwards Aquifer Auth., No. 06-11-118170-CV, Amended Findings of Fact and Conclusions of Law (Tex. 38th J. Dist. Ct. Mar. 11, 2011).
11. *Bragg*, 421 S.W.3d at 143. Court records show that Glenn Bragg is an agricultural economist and former Texas agricultural extension agent.
12. Bragg v. Edwards Aquifer Auth., No. 06-11-118170-CV (Tex. 38th J. Dist. Ct. May 10, 2010). *See* Texas Const. art. I, §17 ("No person's property shall be taken, damaged, or destroyed for, or applied to, public use without adequate compensation being made.").

III. Conflicting Valuations, Complicated Litigation

A. *Valuation Issues at Trial*

The Braggs initially and persistently calculated losses linked to the commodity trading values of their claimed water rights on the open market. In contrast, the EAA estimated the Braggs' just compensation as the replacement cost of leased water to maintain their pecan orchards. Nearly four million dollars separated the parties' respective estimated losses, a gap that prolonged the litigation.

1. Plaintiffs' Theory of Damages

The Braggs claimed that damages for the amount of water lost were equal to the amount they could beneficially use, less the water (120.2 acre-feet) that they received in their Home Place Orchard permit.[13] Their expert witness calculated that the Braggs could have withdrawn and applied 6.4 acre-feet per acre per year. The D'Hanis and Home Place orchards total 102 acres; the Braggs thus claimed a total of 650 acre-feet per year of needed water. EAA permitted 120.2 acre-feet. Accordingly, the Braggs claimed that EAA unlawfully took approximately 530 acre-feet.

Their expert's testimony valued the Edwards Aquifer water rights at $7,500 per acre-foot (at the time of trial in 2010) as a tradable commodity. For the approximately 530 acre-feet taken from them, the Braggs requested just compensation of $3,975,000.

2. EAA's Theory of Damages

EAA argued that the Braggs used their Home Place and D'Hanis properties only for pecan farming. They neither marketed water nor treated their interest in Aquifer groundwater as a separate economic unit; instead, they irrigated two pecan orchards with groundwater from pumps on their orchards. Defense counsel argued that the economic impact to the Braggs' properties should be measured by the cost to obtain the replacement water through leasing.[14]

JoLynn Bragg testified that she and her husband leased water from third parties to irrigate their trees after the 2005 implementation of the Home Place Orchard permit had limited Aquifer use to 120.2 acre-feet.[15] Expert testimony showed that the market value for leasing Edwards Aquifer groundwater in Medina County in 2004-2006 was $40 per acre-foot. Using the value of 2.64 acre-feet of irrigation water per acre—the amount estimated by the defense expert, net of precipitation—the Braggs required 264 acre-feet for both orchards. Subtracting the 120 acre-feet of permitted Home Place water, they needed an additional 144 acre-feet of water. The economic impact of the EAA Act was to increase the Braggs' cost to irrigate by an average of $5,760 per year, which counsel valued into perpetuity at $57,600, capitalized at 10%.

3. Trial Court Decision Valued Braggs' Losses Two Ways

The district court ruled[16] that the Braggs suffered a compensable taking of their two pecan orchards under Article I, §17, of the Texas Constitution, and the Fifth Amendment of the U.S. Constitution.[17] The court's valuation methods differed for the two orchards. For the Home Place Orchard, the trial court awarded damages as the difference between the market value of the permitted water rights requested and the permitted rights actually received at the time of trial. The court adopted a market value for water rights of $5,500 per acre-feet at the time of trial. The court imputed the Braggs' loss of water as 108.7 acre-feet (the 228.9 acre-feet sought less the 120.2 acre-feet permitted) and calculated just compensation of $597,575.

For the D'Hanis Orchard, which had no permitted water rights to the Edwards Aquifer, the trial court compared the value of a farm with irrigation rights ($5,000 per acre) and the value of a farm without irrigation rights ($1,800 per acre) and awarded the Braggs the difference of $134,918 for their 42.2-acre farm.[18] The court's total award for the two orchards was $732,493. Both parties appealed.[19]

B. *Valuation Issues in the Appellate Court*

1. Litigants' Valuations

On appeal, EAA requested de novo review, claiming that the trial court incorrectly valued the Home Place Orchard's taken water rights standing alone.[20] Counsel for EAA, following *Penn Central*'s black-letter law requiring the calculation to be based on the "parcel as a whole,"[21] argued that the correct measure of just compensation is the difference between the value of the whole property *with* and *with-*

13. Brief of Plaintiffs, Bragg v. Edwards Aquifer Auth., No. 06-11-118170-CV (Tex. 38th J. Dist. Ct. Apr. 15, 2010).
14. Post-Trial Brief of Defendants, Bragg v. Edwards Aquifer Auth., No. 06-11-118170-CV (Tex. 38th J. Dist. Ct. Apr. 15, 2010).
15. *Bragg*, 421 S.W.3d at 126.
16. Bragg v. Edwards Aquifer Auth., No. 06-11-118170-CV, Amended Findings of Facts and Conclusions of Law (Tex. 38th J. Dist. Ct. Mar. 11, 2011).
17. Bragg v. Edwards Aquifer Auth., No. 06-11-118170-CV, Second Amended Final Judgment, at 2464 (Tex. 38th J. Dist. Ct. May 25, 2011). The trial court ruled that no physical taking occurred, nor was there a categorical taking of "all economically beneficial or productive use of their property." While *Penn Central* is not mentioned, the decision concludes that "[t]he Plaintiff's property still has value."
18. The alternative to EAA water use was not dry land farming; the Braggs leased water. The trial court did not report the sources of these values. The U.S. Department of Agriculture (USDA) does not report any irrigated pecan farming in Medina County. EAA appraiser Martyn Dale reported values for pecan farming in Zavala County, TX, as of Feb. 26, 2010; his values do not match the decision-reported Medina County irrigated and dry land farming values.
19. Brief of Appellant EAA, Edwards Aquifer Auth. v. Bragg, 421 S.W.3d 118, 43 ELR 20202 (Tex. Ct. App. 2013); Brief of Cross-Appellants, *id.*
20. Brief of Appellant EAA, *supra* note 19, at 17.
21. *Id.* at 16 (*citing* Mayhew v. Town of Sunnyvale, 964 S.W.2d 922, 935-36 (Tex. 1998); Penn Central Transp. Co. v. New York, 438 U.S. 104, 130-31, 8 ELR 20528 (1978).

out unfettered irrigation, not the value of the water rights. EAA also argued that the date of valuation was established incorrectly at trial for both orchards. Valuation before and after should have been benchmarked either to the enactment date of the regulation that caused the taking (May 30, 1993), or the date of the regulation when it became effective (June 28, 1996). The Braggs presented no evidence of the before and after value of the whole property, nor did they establish the value at the date of the taking, whether 1993 or 1996.[22]

Although the district court had entered a judgment in the Braggs' favor on their takings claims, they appealed the award of damages as "plainly inadequate" to provide the full compensation the Texas Constitution requires.[23] Their counsel argued that the district court applied the legally proper method for calculating just compensation for the Home Place Orchard, but deviated from that method for the D'Hanis Orchard taking, and incorrectly valued the D'Hanis taking based on a comparison between the values of "dry" and "irrigated" farmland.[24] The Braggs' counsel reiterated that their taken water rights at the Home Place and D'Hanis orchards, valued at the correct prevailing market price of $7,500 per acre-foot, totaled $3,785,250—slightly lower than the plaintiffs' trial court calculation of $3,975,000.[25]

2. Appellate Decision

The court of appeals ruled against severance of water rights and remanded for valuation of irrigated and non-irrigated pecan orchard land.[26] The court corrected the trial court's valuation errors, and confirmed that the proscribed groundwater should be valued as part of the land to grow pecans, or in the language of *Penn Central*, valued as the "parcel as a whole."[27] A central finding of the decision is that the Braggs' ability to sell their water is irrelevant to the calculation of just compensation. The appellate court ruled that the "use" of water is not the ability to sell or lease water under a permit. Rather, the "use" of water is the Braggs' ability to irrigate their pecan orchards to produce a commercial pecan crop in Medina County.[28]

The Braggs cited Texas Property Code §21.0421 to support their argument that groundwater rights should be valued as property apart from the land at the time of the trial. The court ruled that "property" as discussed in that section was not identical to the Braggs' taken water rights. The groundwater in the sub-surface estate of the cited cases consisted of a "'commodity' that comprised the business of [those] plaintiffs."[29] In contrast, the court ruled that the water beneath the Braggs' land is not the source of their business; they do not buy, sell, or lease water as a commodity, but instead use it to benefit commercially viable pecan orchards.[30]

The court concluded that the Braggs' use of water to irrigate their pecan orchards should be valued before and after the provisions of the EAA Act were implemented at the Home Place Orchard in 2005 and the D'Hanis Orchard in 2004. While the court agreed with the Braggs that EAA's final action on their permit applications is the date of the taking, the decision confirmed that the value of the property taken should be calculated at the time of the taking, not at the time of trial.

The appellate court remanded to the trial court to calculate the compensation owed on the two orchards as the difference between the value of the land as a commercial-grade pecan orchard with access to Edwards Aquifer water, compared to commercial-grade pecan orchards with no access to Edwards Aquifer water, immediately after implementation of the EAA Act at their respective valuation dates.[31]

Based on the appellate decision, the correct amount of compensation for the takings of the Home Place and D'Hanis orchards devolves to a single issue in the pending remand trial: the proper method by which compensation should be calculated.

C. Valuation Issues in Petitions to State Supreme Court

1. Litigants' Valuation Issues

Both parties petitioned the Texas Supreme Court in 2014 for review. Counsel for the Braggs reiterated their argument that the lower courts correctly found a taking, but incorrectly valued the loss by method and time of valuation.[32] Counsel for EAA argued extensively that neither the trial court nor the appellate court addressed the severity of economic impact with quantitative evidence within the *Penn Central* test.[33]

Counsel for EAA proffered a novel argument linking the valuation of losses to the *Penn Central* test. EAA argued that the appellate decision could lead other courts to find a taking every time there is *any* limitation on property rights, regardless of the degree of impact. Citing to *Penn Central*'s three-prong test,[34] EAA counsel emphasized that no proper evaluation of severity of economic impact occurred, and the Braggs submitted no proper evidence of the value of the parcel as a whole before and after the alleged taking. The

22. *Id.* at 17.
23. Brief at Cross-Appellants, *supra* note 19, at 18.
24. *Id.* at 20.
25. *Id.* at 21.
26. *Bragg*, 421 S.W.3d 118.
27. *Id.* at 148 (*citing* Penn Central Transp. Co. v. New York, 438 U.S. 104, 130-31, 8 ELR 20528 (1978)).
28. *Id.* at 151.
29. *Id.*
30. *Bragg*, 421 S.W.3d at 151.
31. *Id.* at 152-53.
32. As discussed above, the appellate court overturned the trial court's valuation as of the time of trial and set the valuation benchmarks to the respective dates of the takings (2004 and 2005) for the two orchards.
33. Brief of Petitioners Glenn & JoLynn Bragg, at 14-17, Edwards Aquifer Auth. v. Bragg, No. 13-1023 (Tex. 2015) ("[T]he court of appeals' opinion is an unhelpful and misleading precedent, indicating that courts can find a taking without a particularized inquiry into the 'severity of the burden'—the touchstone of takings jurisprudence.").
34. *Id.* at 18. I find no evidence in the *Bragg* litigation of the typical quantitative evaluations of *Penn Central*'s three-prong test, *supra* note 6, which has survived 37 years since the Supreme Court decision.

extent of a regulation's economic impact on a landowner's property must be *quantified* in order to determine whether it is severe enough to establish a taking.

Cleverly, the EAA petition noted that the court of appeals identified the method to be used to determine just compensation and then remanded so that the value of the pecan orchards could be evaluated before and after the implementation of the EAA Act. But this evidence was not presented by the Braggs at trial for any date. If the evidence was not in the record to determine just compensation, it also was not in the record to determine whether the severity of economic impact was sufficient to decide at taking.

2. Consequences of Texas Supreme Court Review Denial

The state supreme court's denial of the parties' cross-petitions overlooked broad implications for management of Texas water policy. The outcome of the *Bragg* litigation for Texas water policy is not merely an issue of private-property rights. Managing limited water supplies to match growing demands is vital to the entire state of Texas.[35] Careful attention is needed to *Penn Central*'s three-prong ad hoc balancing[36] of property rights and government regulation for the common good, and it would seem that the Texas Supreme Court's denial of the *Bragg* petitions is a missed opportunity. Left unresolved is the issue whether the Braggs might enjoy a sufficient reciprocity of advantage, as identified in *Penn Central*,[37] by EAA's pumpage regulations to offset their losses, or whether the gains all accrue to the rest of Texas while the Braggs unfairly shoulder the burden that in all fairness should be shared across society.[38]

IV. Errors in the Remand Valuation Instruction

A. *The Remand Valuation Instruction Should Be Modified*

As the Federal Circuit ruled 15 years ago, "Whether a taking is compensable under the Fifth Amendment is a question of law based on factual underpinnings."[39] The appellate court's remand to calculate the compensation owed for the two orchards is the lynchpin to sort out both the economic prongs of the *Penn Central* test and just compensation. The factual underpinnings for calculation of economic losses must conform to standard economic practice.

The court remanded for the trial court to calculate the difference between the value of the land as commercial-grade pecan orchards immediately before implementation of the Act with access to Edwards Aquifer water compared to commercial-grade pecan orchards with no access to Edwards Aquifer water immediately after implementation of the Act at their respective valuation dates (2004 and 2005).[40]

Problematically, the remand valuation instructions themselves are erroneous, and need to be reconciled with long-standing economic valuation methods.[41] The trial court's original valuation of the D'Hanis Orchard land—farms with and without irrigation—might have influenced the appellate-directed calculation. While appraisers sometime use this method to impute either the value of water at-site or average land value, the calculated values depend on the crops grown.[42] Thus, averaging data either from an appraiser's selected comparable properties or capitalized farm income flows can amount to land values that represent an average value of "apple and orange farms" having no relevance to pecan orchard land—or to damages in this case.

The trial court record had adopted the difference between values of irrigated and non-irrigated farm properties as the measure of the Braggs' loss. However, the U.S. Department of Agriculture (USDA) reports that cotton and winter wheat are the only crops irrigated in Medina County. USDA does not report whether pecan acreage is irrigated or not; data do not report pecan farming in Medina County.[43]

This is only one of the serious deficiencies of the appellate court's remand valuation instruction. The remand instruction should be modified to create the quantitative results missing from the trial record and required by both *Penn Central* and the proper measure of just compensation.

35. Texas Water Dev. Bd., *Water for Texas 2012 State Water Plan* (2012). The most recent Texas Water Development Board study provides an outlook of growing population, dwindling water supply, and calls for critical planning.
36. Penn Central Transp. Co. v. New York, 438 U.S. 104, 124, 8 ELR 20528 (1978).
37. *Id.* at 147 *(citing* Pennsylvania Coal Co. v. Mahon, 260 U.S. 393, 415 (1922): "[This] Court has ruled that a taking does not take place if the prohibition applies over a broad cross section of land and thereby secure[s] an average reciprocity of advantage."). The interested reader who wonders exactly what this phrase means may find useful the author's article, *Average Reciprocity of Advantage: Magic Words or Economic Reality: Lessons From Palazzolo*, 39 Urb. Law. 319 (Spring 2007).
38. *Penn Central*, 438 U.S. at 123 (*citing* Armstrong v. United States, 364 U.S. 40, 49 (1960):
> The question of what constitutes a "taking" for purposes of the Fifth Amendment has proved to be a problem of considerable difficulty. . . . [T]his Court has recognized that the "Fifth Amendment's guarantee . . . [is] designed to bar Government from forcing some people alone to bear public burdens which, in all fairness and justice, should be borne by the public as a whole."
39. Bass Enters. Prod. Co. v. United States, 133 F.3d 893, 895, 28 ELR 20446 (Fed. Cir. 1998).
40. Edwards Aquifer Auth. v. Bragg, 421 S.W.3d 118, 152-53, 43 ELR 20202 (Tex. Ct. App. 2013).
41. Standard textbooks include Van Horne, Financial Management and Policy (12th ed. 2004); Appraisal Inst., The Appraisal of Real Estate (12th ed. 2001); and Shannon Pratt et al., Valuing a Business (4th ed. 2000).
42. The capitalized value of farm land embeds the price stream of the crops grown, whether irrigated or not. The standard calculation of the valuation of the marginal product of incremental units of water depends on the price of the crop and knowledge of the incremental units of water. The resultant difference in values reveals the value of water to the landowner for the crops grown. Crop prices at issue and amounts of applied water are missing from the trial record. Ignoring the amounts of water applied to irrigated farms yields a land value, averaged over the selected farms in the appraiser's data set.
43. USDA Nat'l Agric. Statistics Serv., County Profile for Medina County, Texas (2012), *at* http://www.agcensus.usda.gov/Publications/2012/Online_Resources/County_Profiles/Texas/cp48325.pdf.

B. Braggs' Orchards Should Be Valued as Ongoing Business

The Braggs bought and developed the pecan orchards to sell pecan crops to create revenues and net income. The orchards are an operating business, akin to a rental property. What matters to the calculation of their losses are the changes in their revenues and costs, the same as for a rental business. Neither rental building values nor land values are the proximate target for valuation when lost income is the issue that initiated the litigation.

The standard valuation question to determine just compensation for litigation involving an operating business differs from the appellate court's remand instructions. Properly phrased: What would the Braggs have gained if they had been able to carry out their plans for the two orchards as expected?

This question explicitly directs the analysis to estimate revenues and net income *with* and *without* the unfettered groundwater, rather than to reappraise land values at different dates from those the trial court adopted. The land has not been taken; rather, the pecan business has been impaired by unexpected limitations on the use of the essential groundwater. The actual annual cash flows of the operation of the Braggs' two orchards are the relevant data to examine, not the average land values of some set of farms chosen by an appraiser.

C. Standard Economic Approach to Estimating Braggs' Losses

The Braggs lost the opportunity to grow and sell pecans, a reportedly water-intensive crop, using Edwards Aquifer groundwater at only the cost to pump and distribute the irrigation. The proper measure of just compensation would restore the Braggs to the economic position they anticipated prior to the date of the regulatory taking for each orchard: 2004 for D'Hanis Orchard and 2005 for Home Place Orchard, as decided by the appellate court.

The corrected analysis to determine just compensation and evaluate the severity of economic impact becomes:

1. Estimate what the Braggs would have earned if they had been able to pump aquifer water when and as needed to grow their pecans; and
2. Determine what the Braggs actually earned with only the permitted 120 acre-feet of water for the Home Place Orchard subsequent to the benchmark taking date.

The above two tasks can be sorted out with ex post data over the years since the 2004 and 2005 benchmark dates set by the appellate court. Information is readily available for pecan yields, prices, and leased water costs; the Braggs should be expected to provide their income statements to support a competent damage claim. Consequently, the analysis devolves to the present value at the taking date of the annual difference between farming with the pumping costs of their existing two Edwards Aquifer wells compared to the costs of farming with leased water.

Assuming leased water to be more costly than pumped water, here is my proposed formula: Economic Loss = [Present Value of annual Net Operating Income with cost of leased water] less [Present Value of annual Net Operating Income with cost of pumped aquifer water].

The calculation of past losses through the time of trial would be benchmarked to the 2004 and 2005 dates set by the appellate decision. The calculated result for past losses discounted to the takings benchmark dates would be compounded forward to the trial date with a Texas prejudgment interest rate. Annual future losses would be discounted back to the trial date. Just compensation is the sum of pretrial and post-trial losses.

Just compensation is estimated with discounted cash flow models using historical data as a starting point. Where the Braggs' data are unavailable, abundant public-sourced data exist from the 2004 and 2005 valuation dates on their orchards to generate models of the Braggs' farming operations during the last 10 years to estimate past losses. Information from the analysis of past losses can be used to project future losses.

V. Conclusion

Texas overwhelmingly depends on its groundwater to meet current and future growth. *Day*'s creation of absolute ownership of groundwater property rights in situ cannot be construed to preclude management of Texas' aquifers for the common good of urban, rural, and industrial water use. Clearly, some reform is needed. In the context of this Comment, one reform begins with the proper use of standard economic tools to value the managed water at stake. With values correctly established, an omniscient judge might achieve that elusive balancing of private property and public good in Justice William J. Brennan's *Penn Central* opinion.[44] But if the values are wrong to begin with, future water supplies for the people of Texas may prove to be as ephemeral as the Colorado River as it disappears into Mexico.

44. *See Transcript: Looking Back on* Penn Central*: A Panel Discussion With the Supreme Court Litigators*, 15 Fordham Envtl. L. Rev. 287, 288 (Spring 2004).