FROM WINE TO WATER: Wet Markets for Dry Times

Lauren Podgorski*

I. INTRODUCTION

"Simply put, there is not enough water to go around. All must compromise and some must sacrifice."[1]

One of the last healthy flowing rivers in Arizona,[2] the Verde River, contributes substantially to the Verde Valley's high quality of life. The Verde River supplies fresh drinking water to more than two million people in Maricopa County.[3] But the river, its springs, and its tributaries face a serious threat from groundwater pumping in the Verde Valley.[4] Arizona's complicated, bifurcated water laws leave groundwater appropriation in the

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1. Ariz. Pub. Serv. Co. v. Long, 773 P.2d 988, 995 (Ariz. 1989).

2. *See* Robert M. Marshall et al., *Sustainable Water Management in the Southwestern United States: Reality or Rhetoric?*, PLOS ONE, July 2010, at 1, 2, https://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0011687&type=printable [https://perma.cc/3U28-UY46] (showing map indicating consistent, perennial Verde River flows north and northeast of Phoenix, with the majority of Arizona watercourses qualifying as "[i]ntermittent, ephemeral, or regulated reaches"). The authors contend that Arizona's streamflow depletion will worsen unless water trends change. *Id.* at 1; *see also Are There Many Perennial Rivers in Arizona?*, FRIENDS VERDE RIVER, https://verderiver.org/faq-items/are-there-many-perennial-rivers-in-arizona [https://perma.cc/S27K-5DW4] (last visited Mar. 13, 2019) (summarizing destruction of stream flows in other Arizona rivers, including the Salt and Gila, to serve human needs).

3. *10 Things to Know About the Verde River*, VERDE RIVER INST., http://www.verderiverinstitute.org/10%20Things.html [https://perma.cc/Z5QU-8LQN] (last visited Mar. 13, 2019).

4. *Community Partners Team Up to Launch "Verde River Exchange" Water "Offset" Program*, ENVTL. DEF. FUND, https://www.edf.org/media/community-partners-team-launch-verde-river-exchange-water-offset-program [https://perma.cc/BLS7-UG8T] (last visited Mar. 13, 2019) [hereinafter *Community Partners*].

valley effectively unrestricted.[5] As with many other water bodies, multiple parties hold rights to use the same Verde River water under separate legal regimes.[6] These competing water rights, coupled with the valley's rapid population growth, threaten to dry up the Verde River just like many other Arizona rivers.[7] But a growing conservation effort strives to avoid that fate, with winemakers and other businesses helping to maintain a healthy river flow by paying others to limit their water consumption.

This Comment will examine the Verde River Exchange Water Offset Program (the "Program" or the "Project"), a river conservation program in Arizona's Verde Valley.[8] Friends of the Verde River[9] and its partners have created the Program to enable groundwater users to offset their water impact on the Verde River by purchasing mitigation credits.[10]

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5. *See* ROBERT GLENNON, WATER FOLLIES: GROUNDWATER PUMPING AND THE FATE OF AMERICA'S FRESH WATERS 8 (2002) ("[L]andowners may pump as much water as they want, so long as the pumping does not unreasonably harm adjoining landowners . . . . [T]he law on groundwater pumping does not consider reduction in surface flows . . . [a] harm."); *see also* L. WILLIAM STAUDENMAIER, THE WATER REPORT: ARIZONA GROUND WATER LAW 2 (2006), https://www.swlaw.com/assets/pdf/publications/2006/11/15/TheWaterReport_ArizonaGroundwaterLaw_StaudenmaierWEB.pdf [https://perma.cc/43M2-MJGB] (groundwater pumping that causes damage permitted if landowner makes reasonable and beneficial use of water on landowner's property in Arizona areas such as Verde Valley, which are not specially regulated as Active Management Areas).

6. Meredith K. Marder, Note, *The Battle to Save the Verde: How Arizona's Water Law Could Destroy One of Its Last Free-Flowing Rivers*, 51 ARIZ. L. REV. 175, 175 (2009).

7. *Places We Protect: Verde River*, NATURE CONSERVANCY, http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/arizona/placesweprotect/verde-river.xml [https://perma.cc/8F3L-43XT] (last visited Mar. 13, 2019); *see also* Marshall et al., *supra* note 2, at 1 ("Arizona['s] . . . population is projected to double by 2050 . . . .").

8. *Sustaining Flows*, FRIENDS VERDE RIVER, https://verderiver.org/sustaining-flows [https://perma.cc/XFD7-P66Y] (last visited Mar. 13, 2019).

9. "Friends of the Verde River . . . work[s] collaboratively to restore habitat, sustain flows, and promote community stewardship to support a healthy Verde River system." *Working Collaboratively for a Healthy Verde River*, FRIENDS VERDE RIVER, https://verderiver.org/ [https://perma.cc/H6KR-N767] (last visited Mar. 13, 2019).

10. Ecosystem Economics LLC, Mitigation Pilot Policy and Guidance 2 (April 2016) (unpublished report) (per company policy, copy available upon request); *see also Sustaining Flows*, *supra* note 8. Friends also seeks to protect the river through guidance on land use and water management decisions, as well as optimization of animal habitats and irrigation systems, and a crop conversion and fallowing agreement with farmers who can avoid leaving fields dormant by switching to less water-intensive crops. *Id.* It is also instituting a report card to inform stakeholders and solicit their input on determining what constitutes a healthy watershed. Telephone Interview with Jocelyn Gibbon & Maxwell Wilson, Key Organizers, Verde River Exchange Offset Program (Oct. 19, 2018); *Healthy Watersheds Through Healthy Partnerships*, FRIENDS VERDE RIVER, https://verderiver.org/cross-watershed-network/ [https://perma.cc/PAR7-42V8] (last visited Mar. 13, 2019).

Although the Program is a necessary start, this Comment argues that Arizona law imposes serious limitations on participants that prevent its effectiveness, such as the threat of a water appropriator forfeiting rights for agreeing to restrict water use.[11] Additionally, the Program does not provide sufficient incentives to encourage the level of participation necessary to make meaningful impact on the river's conservation. Part II will discuss Arizona water law as it relates to surface water rights, groundwater rights, and Arizona's "subflow" doctrine. This bifurcated legal regime produced the Verde River's water flow concerns. Part III will give a background of the Verde River, considering its importance through an overview of its geography, hydrology, and land uses. This Part also describes how the Verde Valley's population growth has exacerbated water demand. Part IV explains water offset exchange programs generally, and introduces the Verde River Exchange Water Offset Program. This Part gives an overview of the Program, summarizing requirements and details how offset credits are calculated. Part V analyzes why this type of program was chosen and the possible challenges associated with the water-neutral[12] Program. Part VI breaks down the major risks associated with Program involvement and advocates for a quid pro quo element to motivate participation. This Comment concludes that although the Program is an essential start, the threats facing the Verde River demand further conservation efforts.

II. BACKGROUND ON ARIZONA WATER LAW

This Part gives an overview of the legal framework that sets the stage for the complex problem the Verde River faces. To understand the conflicts that Arizona's bifurcated water laws cause, it is critical to examine the legal regimes surrounding ground water, surface water, and "subflow," an Arizona legal doctrine classifying certain waters pumped from underground as surface water.[13]

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11. *See* ARIZ. REV. STAT. ANN. § 45-141(C) (2019) ("[W]hen the owner of a right to the use of water ceases or fails to use the water appropriated for five successive years, the right to the use shall cease . . . .").

12. Water-neutral refers to a concept whereby the amount of water used is balanced by the amount of water conserved or offset. *Water Neutral: Reducing and Offsetting the Impacts of Water Footprints*, UNESCO-IHE, https://waterfootprint.org/media/downloads/Report28-WaterNeutral_1.pdf [https://perma.cc/WL8C-8B8C] (last visited Mar. 13, 2019).

13. Marder, *supra* note 6, at 189, 191.

A. Surface Water Laws

Arizona is among the states that treat groundwater and surface water as legally distinct.[14] Arizona statutory law defines surface water as "the waters of all sources, flowing in streams, canyons, ravines or other natural channels, or in definite underground channels, whether perennial or intermittent, floodwater, wastewater or surplus water, and of lakes, ponds and springs on the surface."[15] Like many of its fellow Western states, Arizona controls surface water distribution under prior appropriation doctrine.[16] Prior appropriation arranges claims to water by a "first-in-time, first-in-right" seniority.[17] In Arizona's regime, a surface water appropriator is also subject to the doctrine of beneficial use.[18] Surface water appropriators must meet certain criteria and the beneficial use doctrine establishes a quantitative limit to water use based on how much water is necessary to sustain that activity.[19] The beneficial use doctrine encouraged development of the once-sparsely populated desert of Arizona; it is a relic that was a result of the policy goals of its time.[20] Beneficial uses include "domestic, municipal, irrigation, stock watering, water power, recreation, wildlife, including fish, nonrecoverable water storage . . . or mining uses."[21] In our era, development is no longer society's top priority, and the sustainability of the environment is a major concern.[22]

As a result of its surface water policies, Arizona's rivers are over-appropriated with thousands of surface water claims, each dependent upon priority dates and rights associated with senior users.[23] General stream adjudication procedures were developed as a way to address the uncertainty

14. Sharon Megdal et al., *The Forgotten Sector: Arizona Water Law and the Environment*, 1 ARIZ. J. ENVTL. L. & POL'Y 244, 246 (2011).

15. ARIZ. REV. STAT. § 45-101(9) (2019).

16. Megdal et al., *supra* note 14, at 246.

17. Irwin v. Phillips, 5 Cal. 140, 145–47 (1855); Rhett B. Larson, *Institutional Federalism*, 62 UCLA L. REV. 908, 921 (2015); *see also* Eddy v. Simpson, 3 Cal. 249, 249–50 (1853) (noted as first case to state the doctrine of prior appropriation).

18. ARIZ. REV. STAT. § 45-141(A) (2019).

19. *Id.* §§ 45-141(B), 45-153(A) (water rights may be denied if they "conflict[ ] with vested rights, [are] a menace to public safety, or [are] against the interests and welfare of the public"); Megdal et al., *supra* note 14, at 289.

20. Ariz. Pub. Serv. Co. v. Long, 773 P.2d 988, 1007–08 (Ariz. 1989) (Haire, J., concurring in part and dissenting in part); Megdal et al., *supra* note 14, at 267.

21. ARIZ. REV. STAT. § 45-151(A) (2019); Megdal et al., *supra* note 14, at 266.

22. *See, e.g.*, Jean-Louis Martin et al., *The Need to Respect Nature and Its Limits Challenges Society and Conservation Science*, 113 PROC. NAT'L ACAD. SCI. U.S. 6105, 6106 (2016) ("The second half of the twentieth century saw attempts to reconcile acknowledgment of energetic and ecological limits and a continued push for economic growth . . . .").

23. Marder, *supra* note 6, at 190.

surrounding these conflicting claims.[24] An adjudication procedure "bring[s] all water users in a given watershed together in a single litigation that will adjudicate the priority and scope of their rights."[25] Arizona has two ongoing general stream adjudications.[26] The larger is the Gila River water adjudication, during which the Salt River Project ("SRP") filed motions with the court requesting an order to "cease and desist from water uses that were allegedly depleting water flows in Arizona's Verde River."[27] That adjudication concerns rights to the Verde River (a tributary to the Gila River),[28] and the results of such an adjudication will shape and interpret much of Arizona's water law.[29]

B. Groundwater Laws

Groundwater is defined by statute as "water under the surface of the earth regardless of the geologic structure in which it is standing or moving" and does not include "water flowing in underground streams with ascertainable beds and banks."[30] Unlike surface water, groundwater is not subject to quantitative claims under prior appropriation doctrine. Arizona's common law dictates that landowners outside of state-designated Active Management Areas (explained below) can pump as much groundwater as they desire, limited only by the reasonable use doctrine.[31] Reasonable use operates much

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24. *Id.*

25. Robert Jerome Glennon & Thomas Maddock, III, *In Search of Subflow: Arizona's Futile Effort to Separate Groundwater from Surface Water*, 36 ARIZ. L. REV. 567, 569 (1994).

26. *Id.* at 569 n.10, 570.

27. Joseph M. Feller, *The Adjudication that Ate Arizona Water Law*, 49 ARIZ. L. REV. 405, 405, 406 (2007) (citing *In re* Gen. Adjudication of All Rights to Use Water in the Gila River Sys. & Source, No. W-1, W-2, W-3, W-4 (Consolidated) (Ariz. Super. Ct. Maricopa Cty. 2004)).

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> The Adjudication is supposed to determine the quantities and relative priorities of all legal rights to the use of water from the Gila River and its tributaries within Arizona. . . . [I]t has already spawned one extensive revision of Arizona's water code, nine decisions of the Arizona Supreme Court . . . and one decision of the United States Supreme Court.

Feller, *supra* note 27, at 406–08.

29. The Verde River Exchange Water Offset Program could be among the potential approaches to resolve the stream adjudication; however, that is beyond the scope of this Comment. For a more comprehensive understanding of adjudications, see generally Feller, *supra* note 27.

30. ARIZ. REV. STAT. ANN. § 45-101(5) (2019).

31. Davis v. Agua Sierra Res., L.L.C., 203 P.3d 506, 508 (Ariz. 2009) (citing *In re* Gen. Adjudication of All Rights to Use Water in the Gila River Sys. & Source (*Gila River IV*), 9 P.3d 1069, 1073 (Ariz. 2000)); Town of Chino Valley v. City of Prescott, 638 P.2d 1324, 1328 (Ariz.

along the lines of the rule of capture: landowners can pump as much as they can reasonably use, with no consequences if they hinder the water supply of others.[32] The "reasonable use" concept is vague,[33] though it has been defined by the Arizona Supreme Court to mean "so long as it is taken in connection with a beneficial enjoyment of the land from which it is taken."[34] Much like the policy considerations behind the beneficial use doctrine, the reasonable use doctrine was a way to incentivize and stimulate development, giving settlors the promise of unrestricted use of groundwater.[35]

Decreasing groundwater supply prompted Arizona to pass conservation legislation. In 1980, the state enacted the Groundwater Management Act,[36] changing the common law doctrine of reasonable use for *some* parts of Arizona, not including the Verde Valley.[37] Groundwater makes up roughly half of Arizona's water supply and its levels were dropping in many areas.[38] The Act recognized the importance of groundwater to the state's water supply, and it created rights and requirements for water conservation in an effort to reduce overdrafting, or depletion of underground water faster than aquifers naturally recharge their supplies.[39] This water conservation system

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1981); Bristor v. Cheatham (*Bristor II*), 255 P.2d 173, 179 (Ariz. 1953); Megdal et al., *supra* note 14, at 275.

32. *Bristor II*, 255 P.2d at 180 ("If it is diverted for the purpose of making reasonable use of the land from which it is taken, there is no liability incurred to an adjoining owner for a resulting damage."); Robert G. Schaffer, Davis v. Agua Sierra Resources*: Bringing Some Clarity to Groundwater Rights in Arizona*, 1 ARIZ. J. ENVTL. L. & POL'Y 25, 30 (2010) ("[R]easonable use . . . gave no relief to users who were harmed by a neighbor's use of groundwater on his own land.").

33. Megdal et al., *supra* note 14, at 276; *see Bristor II*, 255 P.2d at 180; *In re* Gen. Adjudication of All Rights to Use Water in Gila River Sys. & Source (*Gila River III*), 989 P.2d 739, 743 n.3 (Ariz. 1999).

34. *Bristor II*, 255 P.2d at 180 (formally adopting the doctrine of reasonable use).

35. *Id.* ("If it is diverted for the purpose of making reasonable use of the land from which it is taken, there is no liability incurred to an adjoining owner for a resulting damage."); *see also* Schaffer, *supra* note 32, at 29 ("American courts following this rule were undoubtedly influenced by a desire to encourage the development of groundwater resources by permitting virtually unrestricted use of groundwater.").

36. Groundwater Management Act ("GMA"), ch.1, § 86, 1980 Ariz. Sess. Laws 1339 (codified as amended at ARIZ. REV. STAT. ANN. §§ 45-401 to -704 (2019)).

37. 1980 Ariz. Sess. Laws 176 (codified as amended at ARIZ. REV. STAT. ANN. §§ 45-401 to -704 (2019)); Davis v. Agua Sierra Res., L.L.C., 203 P.3d 506, 509 (Ariz. 2009); Strawberry Water Co. v. Paulsen, 207 P.3d 654, 661 n.7 (Ariz. Ct. App. 2008); Megdal et al., *supra* note 14, at 279 n.265.

38. *Community Partners*, *supra* note 4.

39. "Overdraft occurs when, over a period of years, more water is pumped from a groundwater basin than is replaced from all sources–such as rainfall, irrigation water, streams fed by mountain runoff and intentional recharge." *Overdraft*, WATER EDUC. FOUND.,

measured groundwater rights for existing users in certain areas, labeled Active Management Areas.[40]

C. The Relationship Between Ground and Surface Water and the Creation of the Doctrine of "Subflow"

Arizona imposes separate legal regimes on groundwater and surface water. This may have been practical at its inception, but the bifurcated legal approach seems to disregard the reality that the water sources are often indistinguishable.[41] Groundwater and surface water are interconnected, so pumping impacts groundwater as well as stream flow.[42] In a 1931 case commonly referred to as *Southwest Cotton*,[43] the Arizona Supreme Court introduced a new legal concept, now known as "subflow."[44] Subflow was presented as a means of classifying certain water found underground as appropriable surface water and other groundwater as non-appropriable.[45] The court defined the concept of subflow as "those waters which slowly find their way through the sand and gravel constituting the bed of the stream, or the lands under or immediately adjacent to the stream, and are themselves a part

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http://www.watereducation.org/aquapedia/overdraft [https://perma.cc/LV5D-5A7P] (last visited Mar. 17, 2019); *see* Megdal et al., *supra* note 14, at 279.

40. For the purposes of this Comment, the significance of the Groundwater Management Act and its designated Active Management Areas is that *outside* of these areas, the common law doctrine of reasonable and beneficial use still controls. ARIZ. REV. STAT. ANN. § 45-453 (2019). Because the Verde Valley is outside of an Active Management Area, groundwater pumping in the valley is still governed by Arizona's common law, and thus, pumping is subject to virtually zero restrictions. ARIZ. REV. STAT. ANN. § 45-411; *see Davis*, 203 P.3d at 509 (citing. ARIZ. REV. STAT. ANN. § 45-453 (2008)); Megdal et al., *supra* note 14, at 279–80.

41. Collier v. Ariz. Dep't of Water Res., 722 P.2d 363, 366 (Ariz. Ct. App. 1986).

42. *See* Aaron Citron, *Working Rivers and Working Landscapes: Using Short-Term Water Use Agreements to Conserve Arizona's Riparian and Agricultural Heritage*, 1 ARIZ. J. ENVTL. L. & POL'Y 7, 15 (2010) ("Surface water and groundwater are physically and hydrologically connected by interactions between streams and underground aquifers. Groundwater discharge supports surface water flows, and surface water recharges aquifers. As groundwater levels decline, streams may be dewatered and associated riparian vegetation will die off."); *see also* John D. Leshy & James Belanger, *Arizona Law Where Ground and Surface Water Meet*, 20 ARIZ. ST. L.J. 657, 659 (1988) ("[N]early all states have abandoned the old, artificial distinction between ground and surface waters. . . . In Arizona, however, the legal waters are more opaque.").

43. Maricopa Cty. Mun. Water Conservation Dist. No. 1 v. Sw. Cotton Co. (*Southwest Cotton*), 4 P.2d 369 (Ariz. 1931), *reh'g denied and opinion modified*, 7 P.2d 254 (1932).

44. *Id.* at 380 (introducing the concept of "subflow").

45. Schaffer, *supra* note 32, at 46.

of the surface stream."[46] Subflow has been controversial.[47] In subsequent cases, Arizona's Supreme Court conceded that it has not been able to keep the law up to speed with technical reality.[48] The judiciary acknowledges the arbitrary division[49] and has openly asked the Legislature to address this concern:[50]

> [W]e recognize that the line between surface and groundwater drawn by the *Southwest Cotton* court and reaffirmed by this court today is, to some extent, artificial and fluid . . . . however, we do not feel free to redraw or erase that line. It is important to remember that the *Southwest Cotton* court did not create an all-encompassing set of common law principles. It purported, instead, to interpret the relevant statutes codifying the doctrine of prior appropriation and identifying the water sources to which the doctrine applied. Those statutes remain relatively intact. *Southwest Cotton* argued at the time for a different interpretation of the statutes and the Arizona Constitution. Since *Southwest Cotton,* many have criticized Arizona's adherence to a bifurcated system of water management. Now, sixty years later, similar arguments are made that *Southwest Cotton* misinterpreted our statutes and constitution. We recognize compelling arguments in favor of unified management of Arizona's water resources. Nonetheless, in the decades since *Southwest Cotton* was decided, the Arizona Legislature has not significantly altered the opinion's reach.[51]

In the meantime, the legal misrepresentation of ground and surface water as separate regimes that has resulted in "subflow" will continue to complicate this issue.[52] The reluctance to align the legal regime with scientific reality stems from the fact that this would implicate thousands of well pumpers who improperly take subflow water intended for the prior appropriation regime of surface water.[53]

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46. *Southwest Cotton*, 4 P.2d at 380 (citing 2 CLESSON S. KINNEY, A TREATISE ON THE LAW OF IRRIGATION AND WATER RIGHTS § 1161 (2d ed. 1912)).

47. Marder, *supra* note 6, at 191.

48. *In re* Gen. Adjudication of All Rights to Use Water in Gila River Sys. & Source (*Gila II*), 857 P.2d 1236, 1240–42 (Ariz. 1993); Glennon & Maddock, *supra* note 25, at 573.

49. Davis v. Agua Sierra Res., LLC, 203 P.3d 506, 508 (Ariz. 2009) ("Arizona law distinguishes groundwater from surface water, even though such waters may be hydrologically connected.").

50. *Gila II*, 857 P.2d at 1246–47; Glennon & Maddock, *supra* note 25, at 573.

51. *Gila II*, 857 P.2d at 1246–47 (internal citations omitted).

52. Rhett Larson & Kelly Kennedy, *Bankrupt Rivers*, 49 U.C. DAVIS L. REV. 1335, 1365 (2016).

53. Marder, *supra* note 6, at 209.

III. AN OVERVIEW OF THE VERDE RIVER

Arizona's picturesque Verde River is 192 miles long, beginning from the south of Paulden, continuing to the peripheries of Phoenix, and running southeast through the communities of Clarkdale, Cottonwood, and Camp Verde.[54] A forty-mile segment of the river has been recognized as a Wild and Scenic River, one of only two in the state.[55] As this designation suggests, the Verde River supports a lush landscape. The majority of the land (71.3%) in the Verde River basin is federally-owned and managed by the United States Forest Service and is used for recreation, grazing, and timber.[56] Most of the remaining land (20.2%) is privately owned and used for domestic, commercial, mining, farming and ranching.[57] Smaller portions of the land (0.1% and 0.1%, respectively) are owned and managed by the National Park Service, for cultural preservation and recreation, and the Arizona Game and Fish Department, for wildlife preservation and recreation.[58] Further, the Verde River supports hundreds of species of plants, birds,[59] fish, and other animals.[60] Significantly, many species the Verde River supports are endangered.[61] Just as the river attracts wildlife seeking a reprieve from the desert, the river also attracts many tourists seeking the same. The Verde River is often enjoyed for mild whitewater boating, canoeing, kayaking, and stand-up paddle-boarding.[62]

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54. 5 ARIZ. DEP'T OF WATER RES., ARIZONA WATER ATLAS § 5.5, at 241, http://www.azwater.gov/azdwr/statewideplanning/wateratlas/CentralHighlands/documents/volume_5_VRB_final.pdf [https://perma.cc/7T4Z-K9BC] (last visited Mar. 2, 2019).

55. *Verde River*, AM. RIVERS, https://www.americanrivers.org/river/verde-river [https://perma.cc/9DJS-EGJ2] (last visited Feb. 27, 2019). For a background and explanation on a river's designation as "Wild and Scenic," see *About the WSR Act*, NAT'L WILD & SCENIC RIVERS SYS., https://www.rivers.gov/wsr-act.php [https://perma.cc/F4K6-CF2Z] (last visited Feb. 16, 2019) ("The National Wild and Scenic Rivers System was created by Congress in 1968 (Public Law 90-542; 16 U.S.C. 1271 et seq.) to preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition for the enjoyment of present and future generations.").

56. 5 ARIZ. DEP'T OF WATER RES., *supra* note 54, at 243.

57. *Id.*

58. *Id.* at 244.

59. *10 Things to Know About the Verde River*, *supra* note 3 ("The Verde River supports about 240 species of birds, and is one of the most diverse and productive birding spots in the United States. Birds like the Bald Eagle, Common Black Hawk, Yellow-billed Cuckoo, Bell's Vireo, Song Sparrow, Great Blue Heron, Belted Kingfisher and many more are 'riparian obligates', meaning they only live along a river or other waterway.").

60. Marder, *supra* note 6, at 177.

61. *Id.* at 177 n.7 ("The endangered species include Southwestern Willow Flycatcher, American Peregrine Falcon, Spikedace, Roundtail Chub, Western Yellow-Billed Cuckoo, Arizona Toad, Verde Valley Sage, Arizona Cliff Rose, and others.").

62. *Verde River*, *supra* note 55.

The Verde River is a perennial stream, meaning it flows throughout the year,[63] and it is between several mountain ranges.[64] A perennial stream is dependent upon constant groundwater discharge,[65] and, in fact, 100% of the Verde River's flows are derived from groundwater.[66] The Verde River is one of the largest perennial streams in the Southwest,[67] and it is among the few remaining free-flowing perennial rivers left in Arizona.[68] The river supplies fresh drinking water to more than two million people in Maricopa County and is the county's least expensive water supply.[69]

With close proximity to Phoenix, but without the Phoenix heat, coupled with a low cost of living,[70] the Verde Valley is a strip of green paradise amid a dry, hot desert. It is no wonder that the population in the basin more than doubled from 36,049 in 1980 to 89,309 in 2000.[71] In 2005, the basin's population was approximately 102,000,[72] and the estimated population for the year 2020 is around 138,000.[73] Going hand-in-hand with the population increase, groundwater use has increased from an average of 16,000 acre-feet[74] per year in 1971–1975 to an average of 29,500 acre-feet per year in 2001–2005.[75] The number of private wells in 2004 was roughly 5,600, and it is

63. A perennial river is one that flows continuously throughout the year, as opposed to seasonally. *What Is a Perennial River?*, WORLDATLAS, https://www.worldatlas.com/articles/what-is-a-perennial-river.html [https://perma.cc/KNQ3-92BV].

64. Leshy & Belanger, *supra* note 42, at 665.

65. *Id.* at 663.

66. *10 Things to Know About the Verde River*, *supra* note 3.

67. Marder, *supra* note 6, at 177.

68. *Id.* at 176. Additionally, the Verde is the last river in Arizona that still flows yearlong in its entirety. *10 Things to Know About the Verde River*, *supra* note 3.

69. *10 Things to Know About the Verde River*, *supra* note 3; *see also* MARICOPA CTY., RIO VERDE FOOTHILLS AREA PLAN 131, https://www.maricopa.gov/DocumentCenter/View/6724/Water-Resources-PDF [https://perma.cc/3XVE-4QN2] (noting relatively high cost of water diverted via canal from Colorado River to county).

70. Telephone Interview with Jocelyn Gibbon, Key Organizer, Verde River Exchange; Leader, Freshwater Policy Consulting (Oct. 19, 2016).

71. 5 ARIZ. DEP'T OF WATER RES., *supra* note 54, at 292.

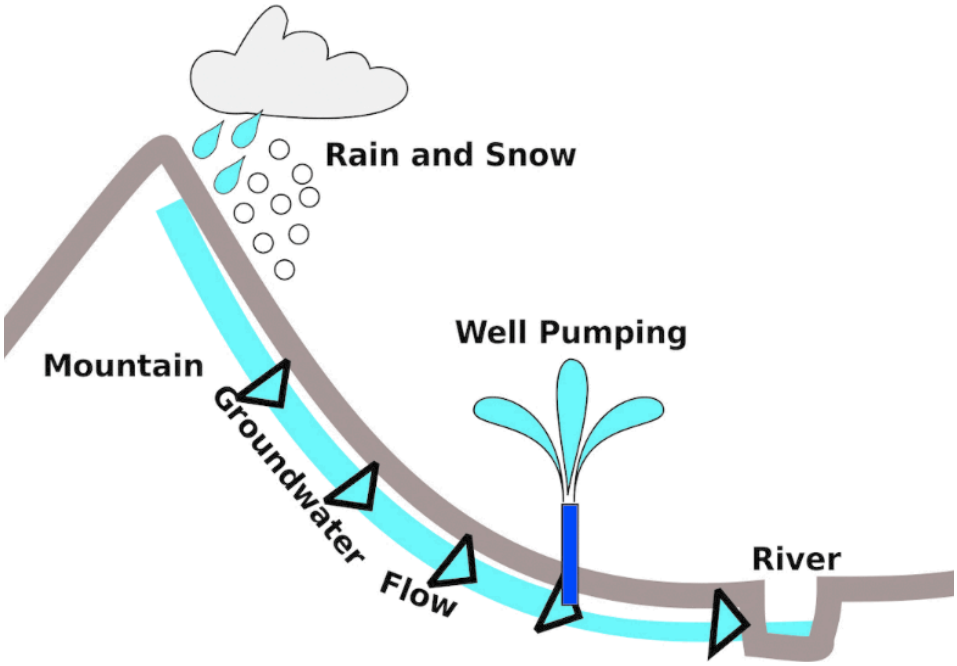
72. *Central Highlands Planning Area Population*, ARIZ. DEP'T WATER RESOURCES, http://www.azwater.gov/AzDWR/StatewidePlanning/WaterAtlas/CentralHighlands/PlanningAreaOverview/Population.htm [https://perma.cc/CMC2-6HWX] (last visited Mar. 13, 2019).

73. ARIZ. DEP'T OF WATER RES., *supra* note 54, at 293.

74. The acre-foot is a term used in measuring the volume or amount of water needed to cover one acre (43,560 square feet) one foot deep (325,851 gallons or 1,233.5 cubic meters). *Glossary*, BUREAU RECLAMATION, http://www.usbr.gov/library/glossary [https://perma.cc/3ZPY-329U] (last visited Mar. 13, 2019).

75. ARIZ. DEP'T OF WATER RES., *supra* note 54, at 292.

estimated that in 2008, there were about 7,000 wells.[76] The Verde Valley communities of Clarkdale, Cottonwood, and Camp Verde use roughly twice as much water as the Prescott area uses.[77] However, these communities reside *outside* of Prescott's Active Management Area,[78] and thus, their water use is effectively unrestricted.[79] Well pumpers' interception of groundwater is one of the biggest threats to the Verde.[80] The wells are so close to the river that they are removing water that would otherwise contribute to the Verde's flow rather than distinct groundwater.[81] A diagram from the Verde River Institute's website helps illustrate the problem:[82]



"If nothing is done, area water levels and river flows will potentially continue to decline,"[83] said Jocelyn Gibbon, one of the Verde River Exchange Water Offset Program organizers, in 2016.[84] "Our Program is not by itself going to do that because our problems are much bigger and deeper," she

76. Marder, *supra* note 6, at 182.
77. *Id.*
78. ARIZ. REV. STAT. ANN. § 45-411 (2019).
79. Marder, *supra* note 6, at 182.
80. *See 10 Things to Know About the Verde River*, *supra* note 3.
81. *Id.* For discussion on the interrelated nature of groundwater and surface water, see *supra* Part I.
82. *See 10 Things to Know About the Verde River*, *supra* note 3.
83. *Community Partners*, *supra* note 4.
84. *Id.*

added in 2018.[85] The preservation of the Verde River is vital to its surrounding communities, as well as to the plants and wildlife it supports. Recognition that the Verde is a crucial water supply coupled with an understanding of the unrestricted nature of groundwater use in the watershed has prompted many river protection and water conservation groups to focus on the Verde River.[86] The Verde Valley community is expanding rapidly, and collaborative conservation efforts are continuously striving to allow the area to grow and thrive while protecting the river that is facilitating its development.[87] Gibbon and Maxwell Wilson, Friends of the Verde River's manager for sustaining flows, are cautiously optimistic that their exchange program can be one of the "building blocks" toward a workable conservation system.[88] "We do have a flowing river now, [we're] not trying to revive a dead river, and that gives us an advantage and something to lose," Wilson said.[89] "I feel hopeful, but it's not a foregone conclusion that we will figure out how to save the river," Gibbon said.[90]

IV. WATER OFFSET PROGRAMS & THE VERDE RIVER EXCHANGE WATER OFFSET PROGRAM

A. Water Offset Programs Generally

A water offset exchange[91] is a relatively new policy mechanism that, generally speaking, facilitates the transfer and exchange of various types of

85. Telephone Interview with Jocelyn Gibbon & Maxwell Wilson, *supra* note 10. This author would like to take the opportunity to commend the Program for its brave start.

86. *This Key Tributary of the Colorado River Gives Water and Life, from Prescott to Metro Phoenix*, NATURE CONSERVANCY http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/arizona/placesweprotect/verde-river.xml [https://perma.cc/YR37-DZ48] (last visited June 1, 2019).

87. Telephone Interview with Jocelyn Gibbon, *supra* note 70.

88. Telephone Interview with Jocelyn Gibbon & Maxwell Wilson, *supra* note 10.

89. *Id.*

90. *Id.*

91. A water offset exchange can also be referred to as a "water bank," "mitigation bank," "water neutral program," or a "demand offset program." For the purposes of this Comment, these terms are used to describe programs aimed at offsetting new water use by retiring other uses in an effort to conserve the water in the system. *See* Amanda E. Cronin & Lara B. Fowler, *Northwest Water Banking*, WATER REP. (The Water Report, Eugene, Or.), Aug. 15, 2012, at 10, www.washingtonwatertrust.org/file_viewer.php?id=379 [https://perma.cc/ZW8D-KDP6]; Jennifer L. Harder, *Demand Offsets: Water Neutral Development in California*, 46 MCGEORGE L. REV. 103, 104 n.5 (2014) ("Water neutral programs may also be referenced as a means for reducing 'water footprint,' and thus called 'zero water footprint.'").

water entitlements.[92] The core concept involves matching supply with demand.[93] On the "supply" side is one who agrees to reduce consumptive use of water, thereby supplying a credit to the program. Meanwhile, "demand" is created by a ground water pumper who purchases the credit that has been generated by a supplier's reduction in use.[94] The long-term goal is to reduce the impact of groundwater pumping through this balancing act.[95] There is no prototype available; there is no magic, one-size-fits-all mitigation program.[96] Normally, a program will involve the following: "matching buyers with sellers; setting prices; handling administrative water right transfers; setting rules and criteria for water bank transactions; and certifying the validity of water rights."[97]

B. Verde River Exchange Water Offset Program

Friends of the Verde River, a non-profit organization aimed at preserving and promoting the Verde River,[98] along with a team of various partners, launched the Verde River Exchange Water Offset Program on July 21, 2016.[99] "As the population grows, so does the demand for water. There are few tools for communities to manage its use, and so we believe the Verde River Exchange is launching at an opportune time," said the President of Friends of Verde River Greenway, Chip Norton.[100] The Program is entirely voluntary and aims to provide a mechanism for willing groundwater users to offset their impact on the Verde River through purchase of mitigation credits that the Program creates and retires.[101] A "Supplier" is someone on the supply

92. Cronin & Fowler, *supra* note 91, at 10 (quoting a 2004 Washington State Department of Ecology report's definition of a "water bank").

93. Ecosystem Economics LLC, *supra* note 10, at 2.

94. *Id.*

95. *Frequently Asked Questions*, FRIENDS VERDE RIVER, https://verderiver.org/verde-river-exchange/verde-river-exchange-frequently-asked-questions-faq [https://perma.cc/5NU6-8B9Y] (last visited Mar. 3, 2019) ("The Verde River Exchange is a voluntary water offset program that allows Verde Valley residents and businesses to reduce their water 'footprint' and the collective impacts of groundwater pumping on the Verde River."); *Glossary*, *supra* note 74 (defining a "water budget," or "water balance model," as "[a]n analytical tool whereby the sum of the system inflows equals the sum of the system outflows. A summation of inputs, outputs, and net changes to a particular water resource system over a fixed period.").

96. Cronin & Fowler, *supra* note 91, at 10; Harder, *supra* note 90, at 110–111.

97. Cronin & Fowler, *supra* note 91, at 10.

98. FRIENDS VERDE RIVER, https://verderiver.org [https://perma.cc/EQ2T-3MWJ] (last visited June 1, 2019).

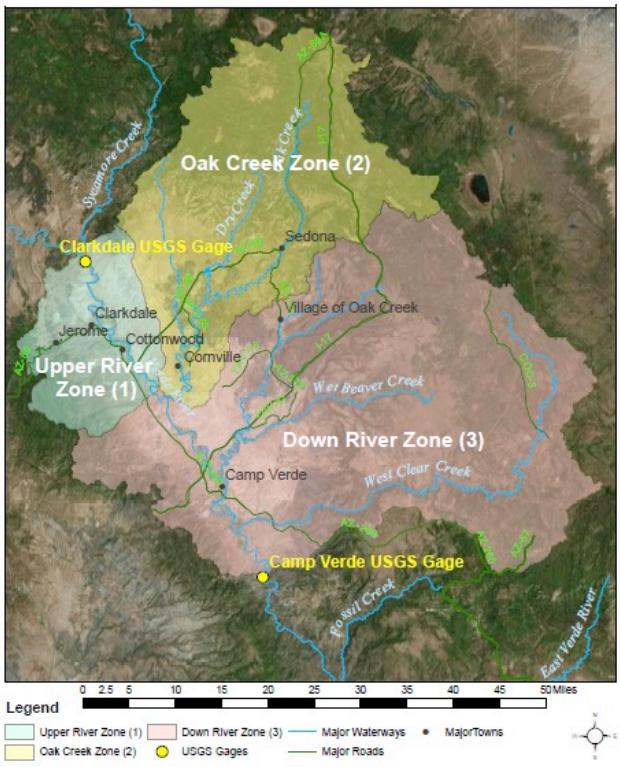
99. *Community Partners*, *supra* note 4.

100. *Id.*

101. Ecosystem Economics LLC, *supra* note 10.

side, who reduces consumption of a certain amount of water, thereby creating a "Water Offset Credit" which can be purchased by a "Buyer" seeking to reduce his water footprint.[102]

Supply and demand need to be closely matched to ensure adequate credit availability. In determining this, the location of specific water use is a major factor.[103] For the purposes of the Project, the Verde Valley is divided into three "mitigation zones." These zones were created based on hydrologic and water use characteristics. The Project's area of operation is depicted in the map below:[104]



102. *Frequently Asked Questions*, *supra* note 95.

103. The reason that location of the water use is such a major factor is because proximity to the river has a higher impact on the river, while water uses that are farther away will have a lower impact on the river. Thus, to ensure that a water footprint is being adequately offset, the water use locations should be similarly situated to ensure that their impact on the river is also similar. Ecosystem Economics LLC, *supra* note 10, at 3. For a discussion concerning the importance of avoiding the calculation of any one water user's *actual* impact, see *infra* Section V.C.

104. FRIENDS OF THE VERDE RIVER GREENWAY, VERDE RIVER GROUNDWATER MITIGATION PROGRAM MAP (2017), https://verderiver.org/wp-content/uploads/2017/09/mitigation_map_final.pdf [https://perma.cc/9ASR-LXNY].

The Program has been offering mitigation credits and certificates that offset a specific water use within a specific zone on a bucket-for-bucket basis.[105] A Buyer is in Oak Creek Zone 2 must be offset by a Supplier in that same zone. As a result, the demand side ultimately drives the selection of Suppliers. For that reason, the Program's key organizers began by finding Buyers. Buyers were given options in deciding how much of their groundwater use they wanted to offset.[106] Page Springs Vineyards and Caduceus Cellars and Merkin Vineyards each agreed to purchase Water Offset Credits in 2016.[107] The Fish's Garden and Out of Africa Wildlife Park joined in 2017,[108] and the organizers expected to add two Buyers in 2018.[109] In 2016, the two vineyards agreed that they were willing to offset use associated with five acres of vineyard.[110] Then, the Program matched that quantity to a Supplier.[111] The Program found a family that agreed not to irrigate its pasture for the summer. The Program allowed the vineyards to offset around 4.4 acres each.[112] Contractually, this was accomplished via a short-term forbearance agreement to cease irrigation.[113]

The Program's organizers relayed that the initial Buyers gave positive feedback and agreed to renew their participation.[114] The Suppliers have been a mix of commercial farmers and landowners with small pastures who request to remain anonymous for privacy and as a precaution against possible reductions of their water rights through Arizona's forfeiture doctrine.[115] "We . . . are proud to advance solutions that will sustain the well-being of our communities, economies, and rivers," said one Buyer, Page Springs' Eric Glomski.[116]

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105. *Id.* at 4.

106. Telephone Interview with Jocelyn Gibbon, *supra* note 70.

107. *The Verde River Exchange's Participants*, FRIENDS VERDE RIVER, https://verderiver.org/verde-river-exchange/the-verde-river-exchanges-participants [https://perma.cc/Z3XS-FJRN] (last visited June 1, 2019).

108. *Id.*

109. Telephone Interview with Jocelyn Gibbon & Maxwell Wilson, *supra* note 10.

110. Telephone Interview with Jocelyn Gibbon, *supra* note 70.

111. *Id.*

112. *Id.*

113. Ecosystem Economics LLC, *supra* note 10, at 7.

114. Telephone Interview with Jocelyn Gibbon & Maxwell Wilson, *supra* note 10.

115. *Id.*

116. Eric Glomski, *Investing in Arizona's Water Future*, FRIENDS VERDE RIVER, https://verderiver.org/friends/investing-in-arizonas-water-future [https://perma.cc/6PYJ-V9XK] (last visited June 1, 2019). Page Springs Cellars is a picturesque winery, located about twenty minutes from Sedona, that is more than worth a visit. For more information, see the winery's website: http://pagespringscellars.com/.

The Program's primary long-term goal is to reduce the impact of groundwater pumping in the Verde Valley on the Verde River and its springs and tributaries.[117] To implement the water offset program, the organizers believed the first task was to understand what was possible. Creating a water conservation policy that would be legal in Arizona and work for the participants proved to be the Program's principal ongoing challenge.[118]

"Some people are less interested in participating because there is so much challenge and uncertainty in water rights," Gibbon said.[119] To avoid forfeiture concerns, Program deals operate only in one-year terms.[120] Although the Program organizers have not made efforts to petition lawmakers for any legislative support, they are introducing the voluntary water exchange concept to other states to help other threatened waterways.[121]

C. Program Requirements

The Program's policy outlines criteria for eligibility for Buyers as well as Suppliers. To be eligible as a Buyer, the criteria are simple: Any groundwater user inside the Project area, as depicted in the map above, will qualify.[122] Eligibility on the supply side is more detailed. To qualify as a Supplier, surface water users must show that they have a claim to a historic surface water right with supporting evidence of historic, beneficial use, as well as a water rights filing. Groundwater users will only be considered if they can show recent history (a minimum of three out of the last five years) of beneficial use. If the groundwater use is from a well in the Holocene zone, where underground water may qualify as surface water,[123] the same evidence used to show a claim to a surface water right can be used.

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117. Ecosystem Economics LLC, *supra* note 10, at 2.

118. Telephone Interview with Jocelyn Gibbon, *supra* note 70.

119. Telephone Interview with Jocelyn Gibbon & Maxwell Wilson, *supra* note 10.

120. *Id.*; *see also* ARIZ. REV. STAT. ANN. § 45-141(C) (2019) (declaring that water forfeiture will happen only "when the owner of a right to the use of water ceases or fails to use the water appropriated for five successive years").

121. Telephone Interview with Jocelyn Gibbon & Maxwell Wilson, *supra* note 10.

122. However, mitigation will not be offered for *new uses* (those established after January 1, 2015) in the Holocene zone. Ecosystem Economics LLC, *supra* note 10, at 12.

123. The "Holocene alluvium" is the sedimentary material in a river valley that resulted from floods causing rivers to carry and deposit certain materials, originating from erosion of bedrock and basin fill deposits. *See* AM. GEOLOGICAL INST., GLOSSARY OF GEOLOGY 17, 301 (Julia A. Jackson ed., 4th ed. 1997); *see also In re* Gen. Adjudication of All Rights to Use Water in Gila River Sys. & Source, 9 P.3d 1069, 1083 (Ariz. 2000) (explaining that subflow zone is defined as the "saturated floodplain Holocene alluvium").

A Supplier receives money in return for a credit, which is represented by a "mitigation certificate," and is dually incentivized by the opportunity to participate in a Program that is enhancing their community.[124] Mitigation certificates represent an offset of water use for the calendar year in which the certificate is issued.[125] The Program sells the mitigation certificates at a price that reflects the cost to the Supplier and the specific amount of mitigated water.[126] The Program organizers sell certificates at a price that only includes the cost to create the credit; the Program still relies on philanthropic donations to cover other operational expenses.[127] Although the Program's goal is to be self-sustaining, organizers currently do not expect to recoup these early costs.[128] Buyers purchase the credit represented by the mitigation certificate, thereby reducing their water footprint.[129] The Program enables Buyers to become leaders, educating others on methods of creating a sustainable watershed, using the mitigation certificate as a way to tell the story to their customers and stakeholders.

D. Calculation of Offsets

A calculation of the consumptive use[130] of water is required to determine the annual volume of the offset credit.[131] The Program has been outlining procedures and calculations and seeking stakeholder input for mitigation involving irrigation water uses.[132] Estimates of consumptive use and impacts of groundwater pumping on local hydrology are inexact, even when studied thoroughly with the best science. To address this uncertainty, the Program will rely on a "trading ratio" of 1:1.25.[133] A trading ratio measures the

124. Telephone Interview with Jocelyn Gibbon, *supra* note 70.

125. Ecosystem Economics LLC, *supra* note 10, at 13.

126. Telephone Interview with Jocelyn Gibbon, *supra* note 70.

127. *Id.*; Ecosystem Economics LLC, *supra* note 10, at 17; Telephone Interview with Jocelyn Gibbon & Maxwell Wilson, *supra* note 10.

128. Ecosystem Economics LLC, *supra* note 10, at 17; Telephone Interview with Jocelyn Gibbon & Maxwell Wilson, *supra* note 10; Telephone Interview with Jocelyn Gibbon, *supra* note 70.

129. Telephone Interview with Jocelyn Gibbon, *supra* note 70.

130. Consumptive use is "water use that permanently withdraws water from its source; water that is no longer available because it has evaporated, been transpired by plants, incorporated into products or crops, consumed by people or livestock, or otherwise removed from the immediate water environment." AMY VICKERS, HANDBOOK OF WATER USE AND CONSERVATION 425 (2001).

131. Ecosystem Economics LLC, *supra* note 10, at 5.

132. Telephone Interview with Jocelyn Gibbon & Maxwell Wilson, *supra* note 10.

133. Ecosystem Economics LLC, *supra* note 10, at 12; Telephone Interview with Jocelyn Gibbon, *supra* note 70.

mitigation provided relative to the mitigation credits awarded. Uncertainty or risk is addressed through the trading ratio to provide insurance that the mitigation will be sufficient. This trading ratio will be applied in calculating a buyer's offset amount. The buyer will be required to purchase mitigation that is 1.25 times the amount of the groundwater use being offset.[134]

V. ANALYSIS OF THE VERDE RIVER EXCHANGE PROGRAM & PROPOSALS FOR REFORM

Growth and development are essential for any community. In the Verde Valley, growth is dependent on groundwater—the only available water supply. At the same time, the unrestricted use of groundwater in the watershed is depleting the vital Verde River. Faced with these competing interests, a water conservation effort is needed that will enable the area to grow and change while simultaneously protecting the economically integral river. Whatever the long-term solution to the depletion of the Verde watershed may be, it *must* allow for new and changing uses for the area to continue to grow and develop. Most critically, the conservation mechanism must allow for this growth while protecting and preserving the river.

Friends of the Verde River and its partners launched their project by examining programs in other states that aimed to deal with groundwater management in areas where the interconnected nature of ground and surface water was a particular concern. Many success stories stemmed from the implementation of groundwater offsetting methods.[135] From a survey of similar offset concepts, the Washington Water Trust outlined the following factors as critical to a water offset policy's success: collaboration and local accountability, adequate supply and demand, and legal ability and implications.[136] The subsequent parts will evaluate the Verde River Exchange Program in regard to these factors. Following that evaluation, this Part concludes by suggesting a range of reforms.

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134. Ecosystem Economics LLC, *supra* note 10, at 12.

135. For sample case studies in water banking, see Cronin & Fowler, *supra* note 91, at 10–14.

136. *Id.* at 15–16; Telephone Interview with Jocelyn Gibbon, *supra* note 70.

A. Collaboration and Local Accountability

A water offset program requires a "level of trust and willingness to experiment, even on a small scale."[137] A water program's early growth has resulted from a receptive and cooperative community.[138] In the Verde Valley, many organizations and local community groups' missions are river protection and water conservation. The existence of these collaborative efforts prompted the Program to do this work in the valley.[139] In the Program's planning stages, the organizers presumed that finding the first Buyers would be a major implementation challenge.[140] As it turned out, that was actually one of the simplest steps. Two vineyard owners were recommended to the Program as forward thinkers who cared about the Verde Valley and its natural resources.[141] Both vineyard owners agreed wholeheartedly to join the Program.[142]

Many of the other water conservation programs that the organizers examined for inspiration involved a legal requirement to offset water use.[143] The Program in Arizona is not mandated by statute. The Program is voluntary but allows participants to make a difference. This was the Program organizers' conscious choice.[144] They felt that in Arizona, locally tailored Programs produce the best solutions.[145] The initial objective is to show that this kind of water conservation program is feasible, and the Program is leaving participation up to the community.[146] It will be up to the watershed's stakeholders to decide if this program should be mandatory.[147]

Intuitively, the concept seems more effective as a legally mandated program. While there is a lot of value to participating in the Program, such as being a community leader and helping to conserve the river, there are concerns. Importantly, Buyers are voluntarily paying to offset water use. While more trailblazers are becoming leaders in this conservation effort, the Program may not find enough participants to endure long enough for make a meaningful impact on river preservation. The Program organizers created a

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137. Kevin B. Pratt, *Water Banking: A New Tool for Water Management*, 23 COLO. LAW. 595, 597 (1994).
138. Cronin & Fowler, *supra* note 91, at 15.
139. Telephone Interview with Jocelyn Gibbon, *supra* note 70.
140. *Id.*
141. *Id.*
142. *Id.*
143. Cronin & Fowler, *supra* note 91, at 10–14.
144. Telephone Interview with Jocelyn Gibbon, *supra* note 70.
145. *Id.*
146. *Id.*; Ecosystem Economics LLC, *supra* note 10, at 2.
147. Telephone Interview with Jocelyn Gibbon, *supra* note 70.

website in an effort to address potential participants' concerns and keep their effort growing.[148] This could spur more interest, but it may not be enough to support a long-term program. If the Program is to continue on a voluntary basis, it must offer more tangible benefits.

B. Adequate Supply and Demand

Supply and demand are at the core of a groundwater mitigation program. The idea is to maintain a balance—to come out "neutral."[149] A regulatory cap could promote this neutrality.[150] However, new water uses or new wells in the Verde Valley face no legal restrictions.[151] Demand remains an artificial concept so long as the Program operates on a voluntary basis. There is no real "demand" for a water credit because Arizona has no regulatory cap or restriction on water use. The Program is attempting to imitate actual demand through charitable volunteers, but this will not achieve neutrality. Nonetheless, anything is better than nothing. While the Program cannot create a net zero water footprint, it can help preserve the river.

Buyers and Suppliers must be matched according to their relative impacts on water consumption.[152] To sufficiently offset a Buyer's impact, the Supplier's impact must be relatively similar. Location is a major factor influencing any participant's impact on the river. Pumping water closer to the river has a higher impact on the water level. To determine each participant's actual consumptive use on a case-by-case basis would not only be inefficient but may subject the participant to negative legal consequences.[153] For these reasons, the Program divides the Verde Valley into three mitigation zones based on hydrologic and water use characteristics. Demand must be offset by supply in the same zone. In this way, the Program is effectively matching supply and demand without implicating its participants.

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148. FRIENDS VERDE RIVER, *supra* note 98; Telephone Interview with Jocelyn Gibbon, *supra* note 70.

149. *See* Sarah Bates, *Bridging the Governance Gap: Emerging Strategies to Integrate Water and Land Use Planning*, 52 NAT. RESOURCES J. 61, 87 (2012) ("[T]he goal is 'no net increase' in water demand through mandatory offsets for new uses.").

150. Cronin & Fowler, *supra* note 91, at 15; *see* Bates, *supra* note 147, at 87 ("The city of Santa Fe's Water Budget Program, for example, requires that the impact of proposed new development be offset either through conservation in existing development or transfer of water rights to the city.").

151. The Verde Valley is outside of an Active Management Area. *See supra* Section II.B.

152. Cronin & Fowler, *supra* note 91, at 15.

153. For a discussion concerning the legal implications involved in determining any one water user's actual consumptive use, see *infra* Section V.C.

C. Legal Ability and Implications

Legal and practical considerations of a water offset program are fundamental.[154] To ensure continued involvement, property rights implications as a result of participating in the Program must not be detrimental to Buyers or Suppliers. One major concern for Verde pumpers is potentially admitting that they are illegally pumping surface water by signing a contract. Luckily, the Program is based on the understanding that the groundwater resources in the area are interconnected with surface water. The Program carefully avoids explicitly calculating how much any well is pumping over any period. The Program's policy states:

> In general, in calculating an offset amount, a user's consumptive use is multiplied by the percent of impact on surface water from pumping. However, identifying a groundwater pumper's percent impact on surface water is challenging and varies depending on the depth of the well and its proximity to the Verde River and its tributaries . . . . While the [U.S. Geological Survey] data is helpful for illustrating the general trend of groundwater pumping on surface flows the precise impact of pumping at one location within the Valley cannot be inferred from the available information. *Given this lack of certainty, [the Program] will assume that one hundred percent of consumptively used water ultimately has an impact on surface flows for the purposes of determining water offset amounts*. While this is a conservative assumption for voluntary water offset amounts, it will avoid additional calculations of impact for individual wells. This assumption—and the agreement to purchase a mitigation credit itself—*will not* be viewed by the [Program] as evidence of the existence, nature, or amount of impact of a given well on surface flows, and this statement will be made in contracts with project participants and other project documents.[155]

Effectively, this policy allows participation without having to make any concessions about how much of an impact any one participant has on the river or the legal implications of that impact.

Another concern for Suppliers agreeing to reduce their irrigation is avoiding forfeiture due to non-use of their surface water rights.[156] The Program is limiting the Buyer-Supplier contracts to short periods of time in order to alleviate this concern: "Forbearance agreements for pilot mitigation

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154. Cronin & Fowler, *supra* note 91, at 16.

155. Ecosystem Economics LLC, *supra* note 10, at 13.

156. Megdal et al., *supra* note 14, at 269 ("There are three ways an appropriator can lose a right: by abandonment, forfeiture, and adverse possession.").

projects will be for [one to four] years to avoid triggering the potential for forfeiture under Arizona law after five years of non-use."[157] While the Program has been careful to structure contracts so as to avoid admissions of improperly pumping subflow or triggering forfeiture, these risks are still real for many water rights holders and will likely have a negative impact on participation.

D. Proposals for Reform

This Part offers a broad range of proposals for reform after having analyzed the Program's likelihood of success with the following factors as framework: collaboration and local accountability, adequate supply and demand, and legal ability and implications. Without taking away from the importance of the Program, one concern is that the Program may be misguided. The majority of the land (71.3%) in the Verde River basin is forest and used for recreation, grazing, and timber production, and only 20.2% is privately owned. Better forestry management should be the first priority, and private land and private wells should be prioritized second. A mix of both might be the most effective approach to water conservation in the valley.

The Program also needs a stronger quid pro quo element if it is to acquire the requisite community participation and collaboration to succeed. The participants face a lot of risk, and the Program should offer them something in return. In order to increase participation, the Program must offer Suppliers formal, statutory protection from the forfeiture of their water rights.[158] The Arizona Water Code does not provide any formal protections from forfeiture for water rights for conservation participants.[159] The current system does not favor efficiency.[160] For example, if a farmer discovers a way to cut back on water use, he risks losing that unused portion of his water rights. In an attempt to mitigate this fear, the Program uses informal, short-term forbearance agreements. Legal barriers in Arizona still make this difficult and uncertain.

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157. Ecosystem Economics LLC, *supra* note 10, at 10.

158. Political obstacles are beyond the scope of this Comment.

159. ARIZ. REV. STAT. ANN. § 45-188(A) (2019).

160.

> Some states expressly exempt conserved water from forfeiture to encourage increased efficiency. Others, like Oregon, Washington, Montana, and New Mexico have adopted programs that allow conserved water to be transferred or applied instream to encourage efficiency and conservation. Arizona does not exempt conserved water from forfeiture. Nor has it created an efficiency incentive program.

Citron, *supra* note 42, at 21–22.

The forbearance agreements should provide formal, legal protection from forfeiture through a statutory mechanism creating new exceptions to Arizona water distribution law.

A mandatory regulatory cap would also benefit the program. Many successful water offset programs involve a legal, statutory requirement to offset water use. To achieve neutrality in the water system, the Verde Valley needs a restriction on new water uses or new wells. Placing a cap on water use requires a system where water credits can be bought and sold, and thus, the Program would have real value. As it stands, no real demand for a mitigation credit can grow because there is a legal requirement to offset new water use. A new state statute imposing a water use ceiling would enable the Program to make a meaningful impact on the Verde River.

With a regulatory cap on water use, the Program would become an effective way to facilitate the buying and selling of mitigation credits. Since demand for mitigation credits would rise, the Program could use some of its revenue to create an online market. At present, the Program is expending a lot of its energy and resources in locating Suppliers and Buyers. The transaction costs would be far lower if this was achieved through an online database.

VI. CONCLUSION

River conservation is critical, and while there is a lot of value to the Verde River Exchange Water Offset Program, it is necessary to realize that this is a voluntary program with many risks. It needs a quid pro quo if it is to survive or make any meaningful impact on river conservation. The Program needs to go a step beyond avoiding forfeiture of water rights through non-use. It should emphasize the implementation of a formal mechanism to shield a participant from forfeiture. Efforts should be focused on obtaining statutory protection from forfeiture for Program participants. This would create more certainty that participants would not lose property rights.

The Program is not the sole answer; it is potentially the kernel of an answer. The pilot Program primarily works with existing water users to conserve the Verde, as they are naturally the most invested in river conservation. However, if the Program were mandatory for new users to offset using this mechanism, it would start to look more like the core of an answer. A regulatory cap is an essential element to a water offset program, and it is lacking here, even for newcomers to the valley. New water users should be required to offset their water footprint. Otherwise, it is difficult to assemble sufficient incentives to attract enough participants to voluntarily

pay to offset their impact. The Program may not grow without a legislatively imposed regulatory cap.

Substantial changes are necessary if the Program is to make any meaningful impact on the conservation of the Verde River. However, further support from the Arizona Legislature to carve out incentives from existing Arizona water distribution law could give the Program some bite. Still, perhaps the Program's greatest achievement will be spurring the idea that something must be done before the Verde is completely depleted.