SOFTENING THE FALL: EXPANDING WATER BANKS TO EXTEND DECLINING KANSAS AQUIFERS

*By: Jacob Turner**

I. INTRODUCTION

In 1819, explorer Stephen Long called Kansas part of the "Great Desert."[1] Famously, Long's geographer, Edwin James, stated that the scarcity of water made Kansas "almost wholly unfit for cultivation and, of course, uninhabitable by people depending upon agriculture for their subsistence."[2] However, the discovery of groundwater and the technological development of pumping water from aquifers made Kansas an agricultural hotbed.[3] In 2012, 61,773 farms existed in Kansas, with 86.4% of them being family owed.[4] Kansas ranks first in the nation for sorghum production, accounting for 46% of the crop.[5] Kansas also ranks second for wheat production and fourth for

*Jacob Turner is a 3L at the University of Kansas School of Law. First, he would like to thank University of Kansas Professor John Peck, for his guidance and instilling a love of water law in him. Second, he would like to thank the Kansas Journal of Law and Public Policy for editing guidance. Finally, he would like to thank Maggie Turek for both her unending support in the writing process and her patience to listen to countless hours of him describing water law and bodies of water on every trip they take together.

[1] D.W. MEINIG, THE SHAPING OF AMERICA: A GEOGRAPHICAL PERSPECTIVE ON 500 YEARS OF HISTORY, CONTINENTAL AMERICA, 1800–1867, at 76 (1993).

[2] *Id.*

[3] Jane Braxton, *The Ogallala Aquifer: Saving a Vital U.S. Water Source*, SCI. AMERICAN (Mar. 1, 2009), https://www.scientificamerican.com/article/the-ogallala-aquifer/ [https://perma.cc/V9MU-DQA2].

[4] *Kansas Agriculture*, KAN. DEP'T OF AGRIC., http://agriculture.ks.gov/about-kda/kansas-agriculture [https://perma.cc/CH76-TJQA].

[5] *Id.*

sunflower production.[6] Kansas' nickname is the "Wheat State" and continues to be known as the breadbasket of the world.[7] Despite Edwin James's assumptions, Kansas thrives on its agricultural and farming community.

As Kansas became an agricultural giant, its aquifers substantially declined overtime.[8] In many areas, water users have pumped 60% of the groundwater below them.[9] In a few counties, Kansas water users pumped their aquifer dry or will do so soon.[10] If nothing changes, most southwestern Kansas aquifers will be dry, at the earliest, within the next fifty years.[11] Agricultural economists have shifted their mindset from saving aquifers to extending the aquifers' lives to soften the fall for farmers.[12]

To deal with similar problems, other western states and arid countries have successfully implemented water banks.[13] Water banks allow individuals to either lease their water rights to a third party for compensation or to store their water right in a bank for future use.[14] These programs often require additional small reductions in the rights for water conservation.[15] Thus, water banks have the potential to

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[6] *Id.*

[7] KANSAS HISTORICAL SOCIETY, *Kansas—Breadbasket*, Kansapedia (July 2017), http://www.kshs.org/kansapedia/kansas-breadbasket/17616 [https://perma.cc/J6RL-6LME].

[8] Rex Buchanan et al., *The High Plains Aquifer*, KAN. GEOLOGICAL SURV. (Jan. 2015), http://www.kgs.ku.edu/Publications/pic18/PIC18R2.pdf [https://perma.cc/S7MX-JYWB].

[9] *Id.*

[10] *Id.* Greeley, Wichita, and Scott counties have exhausted the aquifer below them. Thomas county is expected to be dry within the 25 years.

[11] *Id.*

[12] Lindsey Wise, *A Drying Shame: With the Ogallala Aquifer in Peril, the Days of Irrigation for Western Kansas Seem Numbered*, KANSAS CITY STAR (July 24, 2015), http://www.kansascity.com/news/state/kansas/article28640722.html [https://perma.cc/A3U6-HGEB].

[13] *See* Amanda E. Cronin & Lara B. Fowler, *Northwest Water Banking*, WATER REP., at 10–11 (Aug. 15, 2012), http://www.washingtonwatertrust.org/file_viewer.php?id=379 [https://perma.cc/XCC9-6GPL]; *see also* PEGGY CLIFFORD ET AL., ANALYSIS OF WATER BANKS IN THE WESTERN STATES, ii, 10 (July 2004), https://fortress.wa.gov/ecy/publications/documents/0411011.pdf [https://perma.cc/6VAK-V7DG].

[14] Lawrence J. MacDonnell, *Water Banks: Untangling the Gordian Knot of Western Water*, 41 ROCKY MTN. MIN. L. INST. 22-1, 22-6 (1995).

[15] *See* KAN. STAT. ANN. § 82a-763(c)(4) (West 2018).

significantly decrease the amount of water pumped from an aquifer.[16] Kansas previously adopted a water banking statute, however the only water bank in Kansas has experienced limited success.[17] Despite the limited success, water banks remain a significant tool to alleviate problems with declining Kansas aquifers.

This article argues for Kansas to modify its existing water banking program to help extend the life of aquifers in Kansas. Section I discusses the current status of water and water law in Kansas. Section II considers water banks in general and analyzes three successful examples. Section III explores Kansas water banking in depth. Finally, Section IV advocates for changes to the current Kansas Water Banking Act to compel either Groundwater Management Districts or the State to establish water banks, require the State to fix prices for water right use, and empower Kansas water banks to purchase and lease water rights.

II. CURRENT STATUTES OF WATER AND WATER LAW IN KANSAS

Understanding water banks requires an analysis of water in Kansas. Groundwater preservation is critical due to western Kansas's reliance on it. For withdrawals of groundwater and stream water, Kansas water law guides users. Expanding effective water banks in Kansas requires an understanding of these two key areas.

A. Water in Kansas

Centrally located Kansas straddles the dry, arid western United States and the humid east.[18] In western Kansas, counties receive an average of 16" to 20" of rainfall a year.[19] In contrast, southeastern Kansas receives over 44" of rainfall a year.[20] This difference in rain,

[16] William A. Nitze, *Meeting the Water Needs of the Border Region: A Growing Challenge for the United States and Mexico, in* THE U.S.-MEXICAN BORDER ENVIRONMENT: BINATIONAL WATER MANAGEMENT PLANNING 174 (Suzanne Michel ed., 2003).
[17] *See*, *Natural Resources*, KAN. BUS. & INDUSTRY DATA CTR., http://ipsr.ku.edu/BIDC/region.php?area=Kansas&tab=7#Management [https://perma.cc/26UY-SDZU].
[18] John C. Peck, *Evolving Water Law and Management in the U.S.: Kansas*, 20 DENV. WATER L. REV. 15, 15 (2016).
[19] *DWR Map Library*, KAN. DEP'T OF AGRIC., http://agriculture.ks.gov/divisions-programs/dwr/maps [https://perma.cc/226B-DEYY].
[20] *Id.*

coupled with the high density of groundwater in western Kansas, means different regions of Kansas must rely on different sources of water.[21] Thus, to get a full picture of Kansas water and to understand the importance of groundwater management, both the stream and groundwater hydrological backgrounds must be explored.

Rivers and streams are more prominent in eastern Kansas than in the west.[22] Far western Kansas has only two rivers that consistently flow each year—the Arkansas River and the South Fork of the Republican River.[23] However, during arid seasons, both rivers run dry soon after entering Kansas from Colorado.[24] To avoid having other Kansas rivers running dry, the Kansas legislature established minimum desirable streamflows.[25] These prevent withdrawals from specific rivers that decrease that river's flow below a minimum streamflow standard.[26] However, streamflows in Kansas normally exceed established minimum desirable streamflows and serve as a powerful water source in eastern Kansas.[27] Additionally, Kansas' largest rivers are subject to interstate compacts, which are essentially Congressionally-approved contracts that limit the total water each state may withdraw.[28] Therefore, due to their concentration in eastern Kansas, minimum desirable streamflow requirements, and the limitations of interstate river compacts, rivers provide limited water sources for western Kansas.

Where eastern Kansas has streams, western Kansas has aquifers. An aquifer is a layer of permeable rock that stores water underground.[29] These aquifers act as groundwater reservoirs from

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[21] *Id.*
[22] *Id.*
[23] *Id.*
[24] *Id.*
[25] KAN. STAT. ANN. § 82a-703b (West 2018). The actual minimum streamflows requirements for each river are under § 82a-703c.
[26] *Id.* Minimum desirable streamflows effect only water rights dated after the establishment of the standards. *Id.* §§ 82a-703a–b. Any water right dated before introduction of minimum desirable streamflows is not subject to any limitations in that statute.
[27] KAN. DEP'T OF AGRIC., *supra* note 19.
[28] *Id.*; Grant Harse, Comment, *Nebraska's Cost of Compliance with the Republican River Compact: An Equitable Solution*, 19 KAN. J.L. & PUB. POL'Y 124, 126 (2009). Kansas is a party for four interstate compacts: Big Blue River Compact, Kansas-Colorado Arkansas River Compact, Kansas-Oklahoma Arkansas River Compact, and the Republican River Compact.
[29] Kim Rutledge, et al., *Aquifer*, NAT'L GEOGRAPHIC (Apr. 21, 2011), https://www.

which water can be extracted via a well.[30] Aquifers provide most of western Kansas's water.[31] The vast Ogallala aquifer extends over much of western Kansas, but not into eastern Kansas.[32] As a result, western Kansas withdraws more water from the ground than eastern Kansas.[33] In total, Kansans meet seventy to eighty percent of their water needs from groundwater sources in Western Kansas.[34] The other water needs are met from surface water sources, including Kansas rivers.[35] Therefore, the Ogallala aquifer is extremely important to Kansas.

The Ogallala's hydrological structure leads to interesting challenges. The Ogallala formed five to ten million years ago by rocky mountain streams draining into clay and gravel.[36] Over the past sixty years, the aquifer declined over 60% due to groundwater withdrawals.[37] Across the entire Ogallala, groundwater withdrawals resulted in a depletion of 410 km^3 of stored groundwater—the equivalent of 85% of Lake Erie.[38] Precipitation recharges the Ogallala at an average rate of one-fourth to one-half an inch per year.[39] When the aquifer is exhausted, some scientists estimate it will take 6,000 years to refill it naturally.[40]

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nationalgeographic.org/encyclopedia/aquifer/ [https://perma.cc/HJQ5-TRFB].

[30] *Id.*

[31] KAN. DEP'T OF AGRIC., *supra* note 19.

[32] Buchanan, *supra* note 8. While technically called the High Plains Aquifers, most know the aquifer as the Ogallala aquifer.

[33] M. A. Sophocleous & B. B. Wilson, *Surface Water in Kansas and its Interactions With Groundwater*, KAN. GEOLOGICAL SURV. (Nov. 21, 2000), http://www.kgs.ku.edu/HighPlains/atlas/atswqn.htm [https://perma.cc/ATM4-6V9Z].

[34] Buchanan et al., *supra* note 8.

[35] Sophocleous & Wilson, *supra* note 33.

[36] Wise, *supra* note 12.

[37] Laura Parker, *What Happens to the U.S. Midwest When the Water's Gone?*, NAT'L GEOGRAPHIC (Aug. 2016), http://www.nationalgeographic.com/magazine/2016/08/vanishing-midwest-ogallala-aquifer-drought/ [https://perma.cc/FEZ8-WQBX].

[38] Joshuah Perkin et al., *Groundwater Declines are Linked to Changes in Great Plains Stream Fish Assemblages*, 114 PROC. NAT'L ACAD. SCI. 7373, 7373 (2017), http://www.pnas.org/content/114/28/7373.full [https://perma.cc/73RF-AVDZ].

[39] *Ground-water Occurrence*, KAN. GEOLOGICAL SURVEY, (2005), http://www.kgs.ku.edu/Publications/Bulletins/ED10/04_occur.html [https://perma.cc/H5XA-EHU7].

[40] LARRY KARP, NATURAL RESOURCES AS CAPITAL 320 (2017).

Groundwater in Kansas will eventually run out.[41] Kansas water users entered a classic "Faustian bargain": they focused on short-term gain while ignoring long-term conservation of the aquifers.[42] However, water is valuable and there is no value in leaving it underground.[43] Kansas groundwater is a classic example of tragedy of the commons.[44]

B. Water Law in Kansas

Kansas water law is based on property rights.[45] Prior to 1945, Kansas exclusively followed the common-law riparian doctrine, which bases water rights on land ownership next to a natural watercourse.[46] In 1945, the Kansas legislature passed the Kansas Water Appropriation Act (KWAA).[47] In the KWAA, Kansas declared that all waters inside the state—including surface waters and groundwater—are governed by prior appropriation.[48] The lone exception is that those who made actual use of water under the riparian doctrine retain a superior "vested right" to those with an appropriated right.[49]

Prior appropriation first appeared in the California Supreme Court to settle disputes between miners staking claims to use stream water.[50] At that time, the court protected those who established water rights by prior appropriation, meaning those who had an earlier claim to water held a stronger right to its use and could prevent later water users from impeding their right.[51] This theory is still in use and has been summed up by other courts that follow the doctrine with the phrase: "first in time, first in right."[52] Those with an earlier claim to water hold a

[41] Braxton, *supra* note 3.
[42] *Id.*
[43] *Id.*
[44] The tragedy of the commons is a theory that individual users, seeking to maximize their economic benefit, will exploit a shared resource and deplete it.
[45] John C. Peck, *The Kansas Water Appropriation Act: A Fifty-Year Perspective*, 43 KAN. L. REV. 735, 736 (1995) [hereinafter *Fifty-Year Perspective*].
[46] Harse, *supra* note 28, at 125.
[47] *Fifty-Year Perspective*, *supra* note 45.
[48] KAN. STAT. ANN. § 82a-703 (West 2018).
[49] *Id.*
[50] *See* Irwin v. Phillips, 5 Cal. 140 (1855).
[51] *Id.* at 146; Jonathan R. Schutz, *Why the Western United States' Prior Appropriation Water Rights System Should Weather Climate Variability*, 37 WATER INT'L 700, 702 (2012).
[52] *In re Hood River*, 227 P. 1065, 1071 (Or. 1924) (en banc).

stronger right to water and could shut down later water users who impeded their right.[53] This doctrine became popular in the western United States where water is scarcer than in the eastern United States.[54]

In response to dwindling Kansas aquifer water tables, the Kansas legislature enabled the creation of Groundwater Management Districts (GMDs) in 1972.[55] GMDs are charged with conserving groundwater resources, especially for agriculture.[56] Five GMDs sit over aquifers and are run by eligible water users in the district.[57] GMDs have the power to recommend adoption of regulations, employ individuals, levy fees, contract with others, and use a variety of other powers.[58]

While GMDs are responsible for conserving groundwater in Kansas, the Chief Engineer of the Division of Water Resources (DWR) in the Kansas Department of Agriculture can step in if the GMDs are not carrying out that duty or upon a GMD's request.[59] The Chief Engineer can establish an Intensive Groundwater Use Control Area (IGUCA) if groundwater levels are declining or have declined excessively; the rate of groundwater withdrawal equals the rate of recharge; or for other specified reasons.[60] All GMDs currently qualify for IGUCA status, giving the Chief Engineer wide discretion in establishing IGUCAs. If the Chief Engineer establishes an IGUCA, he or she can take a variety of steps to severely cut water use in the area.[61] The Chief Engineer has established nine IGUCAs, which are powerful tools in curbing water use.[62]

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[53] Schutz, *supra* note 51.
[54] TIMOTHY FITZGERALD, PRIOR APPROPRIATION AND WATER QUALITY 2 (2013), http://www.leadingwithconservation.org/wp-content/uploads/2013/07/clc-fitzgerald_02.pdf.
[55] Wayne A. Bossert, *Overview of Kansas Groundwater Management Districts: Their Duties, Authorities and Expectations* in WATER ORGANIZATIONS IN A CHANGING WEST 1 (1993).
[56] KAN. STAT. ANN. § 82a-1020 (West 2018).
[57] *Id.* § 82a-1020(a)(4); *Groundwater Management Districts*, KAN. DEP'T OF AGRIC., http://agriculture.ks.gov/divisions-programs/dwr/managing-kansas-water-resources/groundwater-management-districts [https://perma.cc/T8DD-LLMB].
[58] KAN. STAT. ANN. § 82a-1028 (West 2018).
[59] *Id.*
[60] *Id.* § 82a-1036.
[61] *Id.* § 82a-1038.
[62] *Intensive Groundwater Use Control Areas (IGUCAs)*, KAN. DEP'T OF AGRIC., http://agriculture.ks.gov/divisions-programs/dwr/managing-kansas-water-resources/intensive-groundwater-use-control-areas [https://perma.cc/58LU-LCA6].

While the Kansas legislature made unique and significant changes, the status quo insufficiently meets Kansas's water needs.

III. WATER BANKS

Water banks are a globally-used tool to help reallocate and conserve water.[63] While the basic concept is the same, the practical implementation is different with every water bank. An exploration of these differences shows their potential as water reallocation tools. Additionally, success stories across the world provide guidance on possible changes and improvements for water banks.

A. Water Banks in General

Water banks, a relatively new development in water law, are organizations designed to reallocate water in prior appropriation regimes.[64] Water banks are defined broadly as an "institutionalized mechanism specifically designed to facilitate the transfer of water use entitlements."[65] Water banks often serve as intermediaries, or "brokers", between those wishing to lease their water rights and those seeking to rent water rights.[66] However, water banks are subject to an institutionalized process and often run by public entities.[67]

In general, the process for establishing water banks is fairly straight forward. Water right holders (depositors) deposit water rights into the water bank and the water bank leases use of the rights to an individual or entity (users).[68] When a depositor places a right into a water bank, the bank often reduces the water right by a percentage to save water.[69] Users pay a fee to use the remainder of the water right,

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The nine current IGUCAs include: Arkansas IGUCA, Bunton IGUCA, Hays IGUCA, Lower Smokey Hill IGUCA, McPherson IGUCA, Pawnee Valley IGUCA, Upper Smokey Hill IGUCA, Walnut IGUCA, and Pawnee-Buckner-Sawlog IGUCA.

[63] *See infra* pp. 265–68.

[64] Ronald C. Griffin, *The Application of Water Market Doctrine in Texas, in* MARKETS FOR WATER: POTENTIAL AND PERFORMANCE 51, 60 (K. William Easter et al. eds., 1998).

[65] LAWRENCE J. MACDONNELL ET AL., WATER BANKS IN THE WEST 1-4 (1994), http://scholar.law.colorado.edu/cgi/viewcontent.cgi?article=1059&context=books_reports_studies [https://perma.cc/LPY5-HJ9Y].

[66] Griffin, *supra* note 64.

[67] MACDONNELL ET AL., *supra* note 65.

[68] *Id.*

[69] KAN. STAT. ANN. § 82a-763(c)(4) (West 2018).

which is used to pay the depositor and help cover the water bank's operation costs.[70] If a depositor does not feel the price is high enough or decides he or she wants to use the water, he or she can withdraw the water right, assuming no one has leased the water right yet.[71] If no user purchases the entire water right by the end of the year, whatever is left in the bank cannot be used by the bank nor the depositor.[72] Thus, this system allows for further reductions in the amount of water used by depositors. Water banks benefit all parties: the state sees a reduction in water use, depositors may realize profit from water right leases, and users can purchase water in times of need.

Across the world, governments authorize water bank to help combat water shortages, with water banks being especially prevalent in the western United States.[73] California, Washington, and Idaho have water banks with particularly high user activity, and most other western states have some version of a water bank.[74] Internationally, Spain, Chile, Australia, and many other countries have successfully implemented water banks.[75]

While in theory different water banks operate in the same general manner; in reality, they are as diverse as the populations they serve. Each bank must respond to unique hydrological systems, types of water use, the population using the water, and other variables. To deal with these unique factors, water banks differ depending on the organizations responsible for their management, the water rights exchanged by the bank, the purposes of the bank, and the management strategies implemented by the bank.[76]

1. Organization Responsible for Management of Water Banks

Both public and private entities manage water banks.[77] If managed by a public entity, the bank is normally administered by a state agency

[70] MACDONNELL ET AL., *supra* note 65, at 1–4.
[71] *Id.*
[72] *See* KAN. STAT. ANN. § 82a-763(c) (West 2018).
[73] Nazaret M. Montilla-López et al., *Water Banks: What Have We Learnt from the International Experience*, WATER 1, 5 (Oct. 2016); NAT'L WATER COMM'N, WATER BANKS IN MEXICO 34 (2012), https://www.gob.mx/cms/uploads/attachment/file/104934/Water_Banks_in_Mexico.pdf.
[74] NAT'L WATER COMM'N, *supra* note 73, at 35, 36, 39.
[75] *Id.* at 31; Montilla-López, *supra* note 73, at 5.
[76] Montilla-López, *supra* note 73, at 5.
[77] *Id.* at 3.

with expertise in water law.[78] For example, the Arizona Water Banking Authority, created by the Arizona Department of Water Resources, runs Arizona's public water bank.[79] The Arizona Water Banking Authority board consists of Arizona's Director of Water Resources and four individuals knowledgeable of water law, including individuals who hold water rights.[80]

Private entities can also manage water banks.[81] Non-profit organizations normally run private water banks.[82] Oftentimes, these non-profit organizations have environmental focuses.[83] In Oregon, for example, a non-profit corporation administers the Deschutes River Conservancy Mitigation Bank.[84] The Environmental Defense Fund, Confederated Tribes of the Warm Springs Reservation, and local irrigation districts together established the non-profit corporation.[85] Groups without an environmental focus also manage water banks. For example, in Upper Kittias County in Washington, the Mentor Law Group in Seattle manages two of the eleven water banks in the county.[86] Occasionally, private companies run water banks, as in Montana where the Grass Valley French Ditch Company received authorization from the Montana Department of Natural Resources and Conservation to run a water bank.[87]

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[78] *Id.*

[79] SHARON B. MEGDAL & KENNETH SEASHOLES, WATER BANKING AND ARIZONA'S FRAMEWORK FOR GROUNDWATER RECHARGE AND RECOVERY (2016), https://wrrc.arizona.edu/sites/wrrc.arizona.edu/files/BB-3-10-2016-Water-Banking-Seasholes-Megdal_0.pdf.

[80] ARIZ. WATER BANKING AUTHORITY, *Membership*, http://www.azwaterbank.gov/Membership/Authority_Members/default.htm [https://perma.cc/2VLE-EK3U].

[81] Montilla-López, *supra* note 73, at 3.

[82] *Id.*

[83] *Id.*

[84] *About the Deschutes River Conservancy*, DESCHUTES RIVER CONSERVANCY, http://www.deschutesriver.org/about-us/ [https://perma.cc/S528-4BYZ].

[85] *Id.*

[86] Justin Pittman, *11 Private Banks Give Some Kittitas County Landowners Access to Water*, DAILY REC. (Aug. 11, 2012), https://www.dailyrecordnews.com/top_story/private-banks-give-some-kittitas-county-landowners-access-to-water/article_d1db4756-e357-11e1-b095-0019bb2963f4.html [https://perma.cc/K8TG-DGBD].

[87] David Erickson, *Grass Valley Irrigation Company Creates Montana's First Private Water Bank*, MISSOULIAN (Apr. 4, 2015), http://missoulian.com/news/local/grass-valley-irrigation-company-creates-montana-s-first-private-water/article_62a01ebd-7934-5d86-88e0-e34e0597df11.html [https://perma.

2. Water Rights Exchanged

Water banks differ on the water right uses offered.[88] Broadly, banks are categorized as permanent water banks, spot (or "temporary") water banks, or option water banks.[89] Each type of bank transfers a different type of water right use.[90] Additionally, some water banks fit into dual categories, giving users multiple types of rights to transfer.[91]

In permanent water banks, water right holders permanently transfer their water rights to the water bank. The bank then has a variety of options: the bank can transfer all or part of the water right to a new user; the bank can lease all or part of the water right and retain ownership over the right; or the bank can retire the right from public use and never reassign the right as a means of dealing with water scarcity or other environmental concerns.[92] For example, an Australian federal government program purchased water entitlements from irrigators in 2007 and 2008 to move water to important environmental assets.[93]

Temporary water banks involve short-term transfers of water rights between parties.[94] Water rights are transferred for either a specific period of time or a specific amount of water.[95] These transfers normally occur during high-demand periods, such as irrigation times or times of drought.[96] For example, the Middle Rio Grande Conservancy District Water Bank in New Mexico allows leases of water rights for up to five years, with a required annual renewal for each lease.[97]

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cc/K8TG-DGBD].

[88] Montilla-López, *supra* note 73, at 3.

[89] *Id.*

[90] *Id.* at 5.

[91] *Id.*

[92] *Id.*

[93] S. Wheeler et al., *Selling the Farm Silver? Understanding Water Sales to the Australian Government*, 52 ENVTL. & RESOURCE ECON. 133, 133 (2012).

[94] Montilla-López, *supra* note 73 at 3.

[95] *Id.*

[96] *Id.*

[97] MIDDLE RIO GRANDE CONSERVANCY DISTRICT, REVISED RULE 23: WATER BANK RULES (2017), https://www.mrgcd.com/uploads/FileLinks/03d9411f7dc247e0992f2df3c5eab7f5/Rule_No__23_revised_2017_1.pdf.

A final choice available for exchange at certain water banks are option contracts.[98] In option contracts, water banks help broker contracts between sellers and buyers.[99] The buyers have the option to buy water for a premium, meaning that buyers are not obligated to buy water, but if they do, they must pay an additional price to initiate the sale.[100] Option contracts allow sellers to keep their water rights, while giving buyers the option to buy water only if they truly need it.[101] For example, when the California Department of Water Resources anticipated a drought for 1995, it created the Drought Water Bank Program.[102] This program allowed the creation of option contracts if the drought caused water shortages.[103]

3. Purpose of the Bank

Governments organize and charter water banks for three main purposes: reallocating water resources as a production input, achieving environmental goals, and managing water-shortage risk.[104]

For economic reasons, water banks can be organized for reallocation of water resources as production inputs.[105] In these cases, certain areas have a greater supply of water than other areas, thus prompting the transfer of rights through market forces.[106] Additionally, when necessary, those with higher-value sources can obtain transfers of water from lower-value sources.[107] For example, the water market adopted in Australia in the 1980s reallocated resources throughout the Murray-Darling Basin.[108] This water market transferred water rights from water-scarce areas in the Murray-Darling Basin to less water-scarce areas, thus alleviating demand in water-scarce areas.[109]

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[98] Montilla-López, *supra* note 73 at 3.
[99] *Id.*
[100] *Id.*
[101] *Id.*
[102] *See* Scott Jercich, *California's 1995 Water Bank Program: Purchasing Water Supply Options*, 123 J. WATER RES. PLAN. & MGMT. 52 (1997).
[103] *Id.*
[104] Montilla-López, *supra* note 73, at 3–4.
[105] *Id.* at 3.
[106] *Id.*
[107] *Id.*
[108] *See* Sarah Wheeler et. al., *Reviewing the Adoption and Impact of Water Markets in the Murray–Darling Basin, Australia*, 518 J. HYDROLOGY 28, 28 (2014).
[109] *Id.*

Besides economic reasons, entities organize water banks for environmental purposes.[110] Under this rationale, states attempt to achieve some environmental goal or fix an environmental problem.[111] Water banks often seek to address water shortages due to over-allocations of a water supply or shortages during dry seasons.[112] Beginning in 2008, Australia started buying back water entitlements to preserve environmental flows in riparian ecosystems.[113]

The final common reason to create water banks is to manage the risk of water scarcity.[114] In drought-prone areas, the total amount of water in all sources varies from year to year.[115] Due to this variability, water users face a significant risk and make economically inefficient decisions.[116] To help alleviate the risk and inefficiency, banks facilitate option contracts, thereby lowering the risk.[117] In Spain, water users with option contracts were willing to pay double the current purchase price of water to exercise their option and guarantee a steady supply from a government water bank.[118] To bring the stability that water banks have brought to Spain, these banks will likely become more common in western United States with the effects of climate change stressing water supply.

While entities often organize water banks for one primary purpose, many banks can have multiple purposes. For example, besides providing additional water to a user, reallocation of resources by water banks can alleviate stress on certain environmental areas, thus achieving multiple purposes.

4. Management Strategy

Finally, water banks vary based on their management style. Management styles describe how involved the bank is in the water market it helps create and how pricing structures are adopted.[119] Water

[110] Montilla-López, *supra* note 73, at 4.
[111] *Id.*
[112] *Id.*
[113] Sarah Wheeler et al., *Evaluating Water Market Products to Acquire Water for the Environment in Australia*, 30 LAND USE POL'Y 427, 427 (2013).
[114] Montilla-López, *supra* note 73, at 4.
[115] *Id.*
[116] *Id.*
[117] *Id.*
[118] *See* Francisco Alcon et al., *Adoption of Irrigation Water Policies to Guarantee Water Supply: A Choice Experiment*, 44 ENVTL. SCI. & POL'Y 226, 233 (2014).
[119] Montilla-López, *supra* note 73, at 4–5.

banks have two main management styles for facilitating buying and selling of water rights: active and passive.[120]

In active water banks, the bank buys water rights and then sells or leases the rights to interested parties.[121] To ensure the water bank achieves its purpose, the bank sets conditions on resale or lease.[122] Organizing entities may limit the amount of water rights a water bank can hold, the money it can spend to buy water rights, or the purchase price it can set.[123] Active water banks can improve economic efficiency, reduce externalities, and maximize information between buyers and sellers.[124] A concern, however, is that active water banks may create a monopolistic market.[125] Spain has an example of an active water bank that has avoided monopolistic concerns. Spanish Water Exchange Centers allow River Basin Authorities to purchase water rights temporarily for a fixed price and then distribute the water to users for free or fixed price.[126] This free or fixed price structure attempts to prevent a monopolistic arrangement with high prices.

Passive water banks involve much less action from the administrators of the water bank than with active water banks.[127] Under a passive regime, water banks only facilitate contracts between buyers and sellers of water rights or leases, with the price and quantity determined by market forces at the time of contracting.[128] This normally occurs if the market is thin; meaning there are only a few buyers, sellers, and leasers in the market.[129] In thin markets, water banks post offers on either electronic or physical bulletin boards, and trades occur if the right buyer meets the right seller.[130] In more robust markets, sealed-bid double auctions take place, creating a stock market type of system.[131]

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[120] *Id*. at 4.
[121] *Id.*
[122] *Id.*
[123] *Id.*
[124] *Id.* (explaining externalities as side effects on individuals not party to a deal or in an industry).
[125] *Id.*
[126] Sara Palomo-Hierro et. al., *Water Markets in Spain: Performance and Challenges*, 7 WATER 653, 655 (2015).
[127] Montilla-López, *supra* note 73, at 4.
[128] *Id.*
[129] *Id.*
[130] *Id.*
[131] *Id.*

B. Examples of Effective Water Banks

Besides analyzing water banks in general, analyzing successful water banks can help guide our understanding of what type and style of bank works in various conditions. California, Washington, and Australia have three successful water banks.

1. California

Water transfers became common in California due to droughts during the 1980s and 1990s.[132] Statewide, approximately 5% of all water used in 2012 by residents and businesses came from a water transfer.[133] Two of the most successful California water banks are the Kern County Water Bank and the Southern California Water Bank.[134] These banks take an active approach by acquiring water rights and then selling or leasing them.[135] These two banks have amassed reserves of nearly 3.4 million acre-feet of groundwater, which is then available for sale.[136] The banks made 1.9 million acre-feet available for sale or lease during a drought in the late 2000s, thus providing water to water users in a time of great need.[137] Some comments note the Kern County Water Bank and the Southern California Water Bank, along with the other local water banks, have helped stabilize groundwater levels in Kern County since their inception in the 1990s.[138]

2. Washington

The Yakima Basin Water Banks are the most active banks in Washington.[139] The Washington State Department of Ecology closed the basin for any new water appropriations, meaning that no one except current water users can withdraw water in the basin.[140] Additionally, in dry years, the Department of Ecology shuts down up to 1.35 million acre-feet of junior water rights to secure water for

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[132] ELLEN HANAK & ELIZABETH STRYJEWSKI, CALIFORNIA'S WATER MARKET, BY THE NUMBERS: UPDATE 2012 2 (2012), http://www.ppic.org/content/pubs/report/R_1112EHR.pdf [https://perma.cc/Q9E4-LWFG].
[133] *Id.*
[134] *Id.*
[135] *Id.*
[136] *Id.*
[137] *Id.*
[138] *Id.* at 39.
[139] Cronin & Fowler, *supra* note 13, at 11.
[140] *Id.*

senior water rights.[141] As a result, mitigation banks arose and began buying water rights and transferring the rights to the State Trust Water Right Program.[142] This program deposits water rights as "mitigation credits" that depositors can access or sell in the future.[143] The banks can then lease the rights to parties who need water.[144] Upon receiving the blessing of the Department of Ecology, private investors can establish a water bank and then buy enough water mitigation credits to start trading water.[145] These changes have led to significant, new economic developments in the basin.[146]

3. Australia

Australia's water bank is the most active in the world.[147] Commercial transactions account for approximately 20% of the water rights in Australia.[148] Due to heavy agricultural exports, Australia's Murray-Darling Basin has historically suffered from droughts, water shortages, and severe water pollution.[149] To respond to these issues, Australia underwent market-based reforms in 1994, creating tradable water entitlements.[150] This allowed the creation of water markets to trade water entitlements.[151] These entitlements are separate from any specific property and can be traded without respect to the land.[152] The lack of limitations on trading has led to a dramatic rise of transferring of entitlements.[153] In the southern Murray-Darling Basin, users traded 24% of water available for consumptive use in 2008.[154] However,

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[141] *Id.*
[142] *Id.* at 12.
[143] *Trust Water Rights Program*, DEP'T OF ECOLOGY, https://ecology.wa.gov/Water-Shorelines/Water-supply/Water-rights/Trust-water-rights [https://perma.cc/945N-94DZ].
[144] WASH. REV. CODE § 90.42.120 (West 2018).
[145] Cronin & Fowler, *supra* note 13, at 12.
[146] *Id.* at 11.
[147] Montilla-López, *supra* note 73, at 8.
[148] *Id.*
[149] SHINEY VARGHESE, WATER GOVERNANCE IN THE 21ST CENTURY 5 (2013), https://www.iatp.org/files/2013_03_27_WaterTrading_SV_0.pdf [https://perma.cc/Y4P4-ZMP].
[150] *Id.* Water entitlements are another term for a water right. The phrase "water entitlements" is commonly used in Australia.
[151] *Id.*
[152] *Id.* at 5–6.
[153] *Id.* at 6.
[154] *Id.*

Australia's water system is not without its critiques. Because Australia does not have conservation techniques for trading the entitlements, the rivers in the region are starting to run dry.[155] Additionally, local water users want a way to opt out of the program because it impedes their right to manage their own resources.[156]

IV. WATER BANKING IN KANSAS

Water banking is a relatively new tool in Kansas. It developed to alleviate water shortages in west-central Kansas.[157] Since its inception, only one water bank has been developed in Kansas.[158] Thus, water banks are currently a minor tool to fight water shortages in Kansas.

A. History of Water Banks in Kansas

The idea of water banking in Kansas first appeared in the 1995 Kansas Water Plan.[159] The plan suggested the use of water banking to redistribute water and water rights to areas with higher need and to encourage water conservation.[160] For the next five years, the idea was studied but not implemented.[161] However, the idea resurfaced in 2000 when the Rattlesnake Creek/Quivira Partnership advocated for its adoption in Kansas.[162]

The Rattlesnake Creek/Quivira Partnership is a joint task force between the Water Protection Association of Central Kansas (a group of water users), the Big Bend Groundwater Management District #5, U.S. Fish and Wildlife Service, and the Kansas Department of Agriculture.[163] These groups all have significant interest in water

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[155] *Id.*
[156] *Id.* at 7.
[157] SUPPLEMENTAL NOTE ON HOUSE BILL NO. 2047, 2001 Session (Kan. 2001), http://www.kansas.gov/government/legislative/supplemental/2002/SN2047.HTM.
[158] KAN. BUS. & INDUSTRY DATA CTR, *supra* note 17.
[159] SUSAN STOVER ET AL., CENTRAL KANSAS WATER BANK ASSOCIATION FIVE YEAR REVIEW AND RECOMMENDATIONS 3 (2011), https://cdm16884.contentdm.oclc.org/digital/collection/p16884coll78/id/181.
[160] *Id.*
[161] *Id.* at 4.
[162] *Id.*
[163] RATTLESNAKE CREEK/QUIVIRA PARTNERSHIP, RATTLESNAKE CREEK MANAGEMENT PROGRAM PROPOSAL 5 (2000), https://catalog.data.gov/dataset/rattlesnake-creek-management-program-proposal [hereinafter RATTLESNAKE CREEK].

located in the Rattlesnake Creek subbasin.[164] Groundwater withdrawals and droughts have decreased the water in the system, and currently available water cannot meet all its demands.[165] These groups came together with three goals in mind: increase streamflows, decrease salt intrusion spreading through the region's groundwater, and stabilize groundwater declines.[166]

For several reasons, the parties felt pressure to find an amicable solution to excessive groundwater extractions.[167] First, they felt voluntary solutions would create sustainability for water in the long run.[168] In fact, the partnership noted the success of the then-existing working relationship between water right users and government agencies.[169] Second, the group expressed concern about the establishment of an IGUCA in the subbasin.[170] In the 1990s, the Chief Engineer issued eight IGUCA orders, so the fear was justified.[171] In the year before the Partnership formed, the Chief Engineer issued a severe IGUCA for the nearby Walnut Creek Subbasin.[172] The IGUCA served as the "writing on the wall" that water users needed to take voluntary action to avoid the Chief Engineer establishing an IGUCA in their subbasin.[173] Finally, concern over strict water right administration existed.[174] If a downstream senior user decided to make a call on the river, the chief engineer would have to enforce water rights strictly, which would prevent junior water right holders from exercising their rights and could conceivably result in litigation.[175] Therefore, to avoid any resultant conflict, the parties attempted to find amicable solutions for all.[176]

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[164] *Id.* at 6.
[165] *Id.*
[166] *Id.* at 7–8.
[167] STOVER ET AL., *supra* note 159, at 4; RATTLESNAKE CREEK, *supra* note 163, at 5.
[168] STOVER ET AL., *supra* note 159, at 4.
[169] RATTLESNAKE CREEK, *supra* note 163, at 5.
[170] *Id.*
[171] *Walnut Creek IGUCA*, KAN. DEP'T OF AGRIC., http://agriculture.ks.gov/divisions-programs/dwr/managing-kansas-water-resources/intensive-groundwater-use-control-areas/walnut-creek-iguca [https://perma.cc/2AXZ-6GKH].
[172] *Id.*
[173] John C. Peck, *Legal Challenges in Government Imposition of Water Conservation: The Kansas Example*, 106 AGRONOMY J. 1, 6 (2015).
[174] STOVER ET AL., *supra* note 159, at 4.
[175] KAN. STAT. ANN. § 82a-719 (West 2018).
[176] STOVER ET AL., *supra* note 159, at 4.

The Rattlesnake Creek/Quivira Partnership created a proposal to cut withdrawals and stabilize water in the area by using new management programs, an educational program, and enhanced enforcement.[177] The management programs advocated for eight new techniques to achieve these goals.[178] The programs varied from small changes, such as removal of end guns on center pivot irrigators, to large projects, such as establishing low-head dams to recharge the aquifer.[179] The Partnership anticipated the eight new programs, taken together, would create long-term sustainability in the water supplies.[180]

One of the eight programs suggested was the development of a water bank in the subbasin.[181] The Partnership wanted to incentivize the redistribution of water in the subbasin and conserve water with water banks.[182] The Partnership made four recommendations to the Kansas Legislature to achieve this when it drafted a water banking statute.[183] First, the Partnership called for deposits and leases to decrease total water use.[184] Second, it advocated for the adoption of a safe deposit box to retain water rights between years.[185] Third, it wanted a bulletin board to help individuals lease water rights easier.[186] Finally, the water bank hoped to incentivize moving water away from hydrologically sensitive areas.[187] By developing water banks in Kansas following these recommendations, the Partnership believed the Rattlesnake Creek subbasin's water use would decrease by 498 acre-feet per year, the entire GMD's water use would decrease by 1,522 acre-feet per year, and mineral intrusion would slow.[188] After the Kansas Water Authority endorsed the plan, the Kansas Legislature created the Kansas Water Banking Act the next year in 2001.[189]

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[177] RATTLESNAKE CREEK, *supra* note 163, at 5.
[178] *Id.* at 3.
[179] *Id.* at 14, 18. Center pivot irrigators rotate around a central water point and water a field in a circular manner. End guns are water guns at the end of the irrigator to water more areas, but they are inefficient and result in wasting of water.
[180] *Id.* at 18.
[181] *Id.* at 10.
[182] *Id.*
[183] *Id.* at 10–11.
[184] *Id.* at 11.
[185] *Id.*
[186] *Id.*
[187] *Id.*
[188] *Id.* at 12.
[189] STOVER ET AL., *supra* note 159, at 4.

B. Kansas Water Banking Act

The Kansas Water Banking Act (KWBA) allows for the chartering of water banks in Kansas (K.S.A. 82a-761 *et seq*).[190] A Kansas water bank must be a private, not-for-profit corporation that both leases water from deposited water rights and provides safe deposit accounts.[191] Depositors may deposit bankable water rights either into a safe deposit box or into an account to be leased.[192] In a safe deposit box, unused water rights can pass to the next year minus a yearly 10% conservation fee.[193] In the next year, water users can use both their entire current year water right and the previous year's water right from the safe deposit box (minus the 10% conservation fee).[194] For leases, deposited water can be leased within the bank boundaries and the same hydrological unit.[195] Bankable water must be under either a vested right or a certified water appropriation right and not have been abandoned.[196] Water rights deposited or placed in a safe deposit account are not subject to abandonment.[197]

The Chief Engineer must approve a water bank's charter.[198] After five years of operation, an evaluation team assesses the bank's success and decides whether to grant a full charter to the bank.[199] The charter determines how water rights are deposited and specifies rules that govern the bank.[200] The statutes provide wide latitude on how each water bank operates; however, the Chief Engineer must approve all the water bank's rules.[201] Water banks cannot own, buy, or sell any water rights.[202]

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[190] *See* KAN. STAT. ANN. §§ 82a-761–773 (West 2018).
[191] *Id.* § 82a-762(l).
[192] *Id.* § 82a-763.
[193] *Id.* § 82a-763(c)(4).
[194] *Id.* § 82a-763(c).
[195] *Id.* § 82a-763(b)(1).
[196] *Id.* § 82a-764. In Kansas, abandonment occurs after five successive years of water not being put to beneficial use without due and sufficient cause. *Id.* § 82a-718. The water right owner must receive a notice after three years of no beneficial use and then must have his or her rights terminated at a hearing. *Id.*
[197] *Id.* § 82a-768.
[198] *Id.* § 82a-765.
[199] *Id.* § 82a-767(c)(5).
[200] *Id.* § 82a-765.
[201] *Id.* § 82a-765(b)(1).
[202] *Id.* § 82a-763(e).

C. Status of Water Banks in Kansas

After KWBA became law, the Central Kansas Water Bank Association (CKWBA) submitted a draft charter in May 2002.[203] In June 2005, the Chief Engineer chartered CKWBA, and it became a not-for-profit corporation in November.[204] CKWBA operates out of the GMD #5 office and serves all water users in the GMD region, including all the basins around the Rattlesnake Creek Subbasin.[205] To deposit water for lease, the right holder must pay a $750 initial fee and a $100 monitoring fee.[206] However, if the water is leased, the depositor may receive a profit on that initial investment.[207] For safe deposit boxes, starting an account requires a $200 contract and then maintaining an account requires a $75 per year monitory fee. CKWBA realized a $3,750 profit according to the last data available in 2010.[208]

CKWBA remains the only water bank in Kansas.[209] However, success has been mixed for the bank. CKWBA has only a few water rights in the bank.[210] In 2016, only eight water leases occurred in the bank.[211] However, over 950 safe deposit accounts were active between 2013 and 2016.[212] This indicates that water users are taking advantage of the safe deposit boxes, but not the leasing program. This is further evidenced by CKWBA rarely updating their bulletin boards, which advertise sellers and buyers of water rights.[213] Prior to updating in late

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[203] STOVER ET AL., *supra* note 159, at 4.
[204] *Id.*
[205] *Id.* at 5. The basins CKWBA serves include parts of the: Arkansas River Basin, Chikaskia River Basin, Cow Creek Basin, Medicine Lodge River Basin, N.F. Ninnescah River Basin, S.F. Ninnescah River Basin, Pawnee River Basin, Rattlesnake Creek Basin, and Walnut Creek Basin.
[206] *Id.* at 6, 25. Fees include: preliminary evaluation ($150, refundable if a contract is complete); application ($100); contract ($100); and findings and order to DWR ($400).
[207] *See generally* KAN. STAT. ANN. § 82a-763 (West 2018).
[208] STOVER ET AL., *supra* note 159, at 12.
[209] KAN. BUS. & INDUSTRY DATA CTR, *supra* note 17.
[210] *Id.*
[211] CENTRAL KANSAS WATER BANK ASSOCIATION, REGIONAL ADVISORY COMMITTEE (July 2016), https://kwo.ks.gov/docs/default-source/regional-advisory-committees/cimarron-rac/cimarron-rac-presentations/ppt-ci-ckwb-oferil-071216.pdf?sfvrsn=2 [https://perma.cc/F98B-GXB7].
[212] *Id.*
[213] *Compare* CKWBA, *Water Right Buyer & Seller Board*, https://web.archive.org/web/20180816033853/http://www.ckwba.org/wr4sale.htm [https://perma.cc/XSS5-83A5] (CKWBA's old website), *with* CKWBA, *Water*

2018, CKWBA has not updated its sellers board since 2013 and its buyers board since 2015.[214] Therefore, to increase the use of water banks in Kansas, changes could be made to help increase the use of both the safe deposit account and the leasing program at CKWBA.

V. POLICES TO POTENTIALLY INCREASE THE EFFECTIVENESS OF WATER BANKS IN KANSAS

While CKWBA has achieved mixed results, Kansas still has great potential for water bank success. In 2013, Governor Sam Brownback released a *Fifty-Year Water Vision Statement* for Kansas.[215] The vision statement emphasizes water bank usage, among other free market-based techniques, as a mechanism to extend the lives of Kansas aquifers.[216] The legislature implemented some of Governor Brownback's market-based suggestions and, as a result, the aquifers' useable lifespan has slightly increased.[217]

While Governor Brownback's market-based techniques achieved some success, the water market in Kansas needs more government intervention to operate efficiently. For three reasons, the market is currently not working at peak efficiency. First, the market is too thin to work at full capacity. With only one water bank, it is difficult for the market to achieve equilibrium with supply and demand matching. Second, most Kansas water right holders do not have access to a water bank. CKWBA is the only Kansas water bank and only serves a small portion of the state.[218] Only having one bank impedes water banks' success in Kansas. Finally, since only one water bank exists, information on its use and availability for would-be depositors and

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Right Buyer & Seller Board http://www.ckwba.org/bulletin-board [https://perma.cc/RBC7-6CDE] (CKWBA's new website).

[214] *Id.*

[215] KANSAS WATER OFFICE, A LONG-TERM VISION FOR THE FUTURE OF WATER SUPPLY IN KANSAS 6 (Jan. 2015), https://kwo.ks.gov/docs/default-source/water-vision-waterplan/vision/rpt_water_vision_reformatted_kf1d56e11da40b6667970cff000032a16e.pdf?sfvrsn= [https://perma.cc/HBB7-E6WS].

[216] *Id* at 10.

[217] Bryan Thompson, *Conservation Efforts Spearheaded by Brownback Slowing Depletion of Ancient Aquifer*, KCUR (July 19, 2017), http://kcur.org/post/conservation-effort-spearheaded-brownback-slowing-depletion-ancient-aquifer#stream/0 [https://perma.cc/G5XG-9DM7].

[218] *See supra* p. 272.

users is limited. Individuals may not know about the benefits of water banking, thus making existing and future banks underutilized.

With these inefficiencies in mind, certain potential policy changes could revitalize water banks in Kansas and help alleviate these market issues. These changes could make water banks a stronger tool to battle water shortages. These policy changes include expanding the number of water banks in Kansas, establishing water prices on water leases, and allowing water banks to purchase water rights from water users. Adopting these policies could arguably make water banks more effective in achieving Governor Brownback's *Water Vision*, even though they break from traditional market-based solutions for water problems.

A. Expanding the Number of Water Banks in Kansas

The biggest obstacle to water bank success is the lack of water banks in the State. If water banks do not exist, then water users cannot take advantage of storing or leasing water rights through the system. To combat this, entities need to establish more water banks. Kansas should have a goal of at least one water bank in every Groundwater Management District. This would allow most groundwater users to utilize a water bank. Additionally, if water banks opened in each GMD, then the publicity of water banks would cause more individuals to know about and utilize the banks.

To expand the number of water banks in Kansas, the state should enact one of three options. Option one is requiring GMDs to establish and run a water bank within their district. Option two is creating state-run water banks by the Kansas government. Option three is giving GMDs the first choice to run a water bank, and if they refuse, then having the state create a state-run water bank for the district.

1. Option One: Requiring GMDs to Run a Water Bank in their Districts

GMDs in Kansas are uniquely situated to run water banks. As previously mentioned, local water users administer each GMD.[219] Additionally, specific regulations, tailored for the hydrological and cultural conditions of the area, govern each GMD.[220] Due to these unique features, nobody knows more about the local water situation than members of the GMD. Keeping the situation with local water

[219] *See infra* p. 7.
[220] *See infra* p. 7.

users would allow individuals to invest more and become more trusting of the water bank. Additionally, GMDs already have the infrastructure in place to run a water bank. Despite being separate entities, CKWBA shares an office with Big Bend GMD #5.[221] Big Bend GMD #5 also includes information about the bank in its newsletter.[222] With all the in-place infrastructure and knowledge of the specific area, local GMDs are uniquely situated to establish water banks in their district.

Cost is one concern of requiring GMDs to operate active water banks in their district. GMD board members will rightly be worried about having to spend their budget on an unfunded mandate by the Kansas state government. However, this concern is likely insignificant for two reasons. First, as previously mentioned, GMDs already have the infrastructure in their region to host a water bank, as evidenced by the experience of CKWBA in GMD #5. Thus, each GMD's upfront cost would likely be slim. Second, the only water bank in Kansas turns a profit. The last publicly available data for CKWBA shows a lifetime profit of over three thousand dollars beyond all its expenses.[223] If run efficiently and effectively, GMD water banks can provide additional funds for its other programs and help conserve water in their district. Therefore, cost should not be a concern for GMD-run water banks.

A second concern is the lack of participation in the only current Kansas water bank. While CKWBA has many water deposits, the number of water leases are minimal.[224] It is possible that water users will not participate in the banks and the banks will be ineffective tools. While this concern is real, it is likely misplaced. Since Kansas water rights are currently not marketed through water banks outside of CKWBA, no true measure exists to ensure there is a demand for water banks. Therefore, the best place to look at water bank success is to the water banks in other states and countries. As previously mentioned, water banks across the world often experience success after their widespread implementation.[225] This historical evidence indicates that

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[221] STOVER ET AL., *supra* note 159, at 5.
[222] *Central Kansas Water Bank Association*, GROUNDWATER HI-LITES, (Big Bend Groundwater Management District No. 5), December 2015, at 2, http://archive.gmd5.org/Newsletters/2015/Newsletter_Dec15.pdf [https://perma.cc/H47P-5EPQ].
[223] STOVER ET AL., *supra* note 159, at 12.
[224] *See infra* pp. 22–23.
[225] *See infra* pp. 15–17.

markets would surface for water banks in similar situations, such as Kansas. Therefore, this concern is also likely misplaced.

2. Option Two: Creating State-Run Water Banks Throughout the State

Instead of relying on GMDs, the State of Kansas could take an active role and create water banks across the state. Under this option, the State would run all Kansas water banks. Kansas would take advantage of the economies of scale the state government possesses. State-run water banks would utilize the best knowledge and expertise of state governmental subdivisions, including DWR, GMDs, and the Kansas Geological Survey, to make banking decisions. Additionally, the banks could utilize state funding to establish and run the operations, thus ensuring their continued viability. These advantages make state-run banks an attractive option for water banks.

The primary concern for state-run banks is the bureaucratic headaches that could occur from government operations. First, state-run banks may result in higher costs. When one entity has a monopoly on a market, prices tend to be higher as compared to markets without monopolies.[226] In this case, the state would have a clear monopoly on the water market. However, prices would likely not go up. Since a government organization would manage the banks, there is no profit motive to increase price. If anything, the state would want prices low to encourage use of water banks. Additionally, any extra profit would be returned to the state rather than be disgorged to CEOs or shareholders. Therefore, water users would receive benefits from their fees through a larger state budget.

A second concern is that a state-run bank might be slower in operation than a GMD-run bank. Oftentimes, governments are criticized for slow operations. However, this concern is misplaced, as the state has the sufficient funding and extra expertise that could allow a quick set-up of its operations and, therefore, a faster start to provide banking services to water users than GMDs could. In sum, state-run water banks are a strong possibility to expand water banks in Kansas.

3. Option Three: Giving GMDs First Option to Run State Water Bank

[226] JOHN BELLAMY FOSTER, THE THEORY OF MONOPOLY CAPITALISM 63 (2014).

A final option is a dual GMD-state water banking system. The state could give water users on each GMD board the option to vote on establishing a GMD-run water bank for their district. If the water users wanted the GMD board to create a water bank, it would begin chartering one. If the water users did not want the GMD board to establish a water bank, the state would create a water bank for the district. This would allow each GMD board to have the option without forcing it to act. The GMD board could weigh the costs and benefits before deciding to act.

B. Setting Water Prices on Water Leases

Setting water prices for leases can help encourage the number of buyers and sellers in the water market. The current system has two major pricing problems. First, water is not a commonly marketed good for individuals.[227] While most individuals pay a water bill to a public water supplier, irrigators often do not purchase water by the acre-foot.[228] Therefore, irrigators may not be aware of a reasonable price for water. This is exacerbated by the second issue for Kansas water markets: the water market is thin. As previously noted, very few Kansans are buying or selling water through water banks. Thin markets discourage individuals from participating in the market because prices are volatile and assets are less liquid.[229] A buyer can receive a wide range of prices depending on how many sellers are in the market and when the buyer enters the market.[230] This lack of predictability likely discourages the use of water banks.

If DWR were to set prices for water leases, DWR could combat the pricing issues Kansas experiences with the thin water market. First, prices would not be volatile because individuals would know the price they will pay when they buy or sell water. Second, set prices would allow individuals to plan better. Irrigators could look to the price of water when deciding what crops to plant and when to plant them. If their expected increased yield for a water-intensive crop over less water-intensive crops outweighs the cost of water, then irrigators

[227] The only water commonly marketed in the United States is bottled water.
[228] While irrigators experience a cost in pumping water from an aquifer and maintaining their water right, there is no additional cost per acre-foot—if pumping directly from the aquifer.
[229] *Thin Market*, INVESTOPEDIA, http://www.investopedia.com/terms/t/thinmarket.asp [https://perma.cc/3MQH-MRS2] (last visited Feb. 3, 2018).
[230] *Id.*

could plan to purchase water and plant water-intensive crops. Finally, set prices could help combat water scarcity during drought months. If DWR foresaw a dry growing season, it could set a higher price for water, thereby discouraging individuals from planting water-intensive crops. This would allow farmers to maximize their profits in dry years and minimize their risk. Additionally, it would prevent senior appropriators from having to shut down junior appropriators because less water would be used. Setting the price would yield higher benefits to water users in Kansas.

Two options exist for setting prices: one price or variable prices. Under a one price structure, DWR would set the price of water at the beginning of the year that would be the same throughout the year. This would encourage water users to decide earlier if they want to buy or sell water, thereby jumpstarting the market. However, it may not be as efficient, and if the price is set too high or too low, economic equilibrium may not be achieved. As a result, the market could be flooded with water or experience a scarcity of water. Therefore, based on historical data and forecasting, DWR would need to set the price carefully.

A more flexible option would be to create variable prices. Under a system like this, DWR would adjust the price of water each month to account for changes based on supply and demand, weather considerations, and other factors. This would allow the market to achieve a sense of equilibrium more easily. However, it does have drawbacks. First, since the water price would not be known at the beginning of the season, water users would not be able to plan their crops for the season as easily as with one set price. Additionally, it could create a market for water speculation. Individuals hypothetically could purchase water at low-priced months, and then sell it at a high-price month for a profit, which provides no value to society. However, either system might provide benefits to Kansas water banks and increases their potential to help combat water scarcity.

C. Allowing Water Banks to Purchase Water Rights

A final beneficial change to increase the effectiveness of Kansas water banks would be to allow water banks to purchase water rights. Currently, Kansas law prevents water banks from buying, selling, or owning water rights.[231] Consequently, Kansas water banks act only as

[231] KAN. STAT. ANN. § 82a-763(e) (West 2018).

intermediaries or brokers in the buying and selling of rights. For several reasons, allowing water banks to buy, sell, and lease water rights could increase the effectiveness of the banks.

First, it would jumpstart the water market. If water banks can buy water rights and then lease them for a small profit, GMDs, or whoever runs the bank, would have an incentive to purchase and then lease out the rights. The banks would then become much more active in the community and ensure that the market takes off. It would also help ensure a set of water rights for lease every year from the bank, thus helping jumpstart the market.

Second, allowing water banks to purchase rights would result in the transfer of water from water scarce areas. In water scarce areas, such as the Rattlesnake Creek or Walnut Creek subbasins, the banks could buy water rights and then take one of three possible actions to help alleviate water scarcity in the subbasin. First, the bank could just hold them. By not re-leasing the rights, water use would decrease. Second, the bank could lease them out in part, thus cutting down on the total appropriations for the water scarce area. Finally, the bank could lease the right to a less water-scarce area, thus providing more water to the water scarce area. Any possible action could help water scarce areas succeed.

A major concern is the possible monopoly on the water market a bank may receive. If the bank could buy as many water rights as it wants, and the market lacked price controls, the bank could set the price at whatever level it wanted. This would completely commodify water and leave farmers at the will of the water banks. However, this concern is likely misplaced if Kansas continues to prevent private individuals from running a water bank. If the state, a GMD, or a nonprofit runs the water bank, prices would likely not skyrocket as there is no incentive to increase the price. However, if a private for-profit entity owns a water bank, this concern is a real possibility. California experienced this problem with the Kerns Water Bank Authority.[232] California developed a water bank in Kern County and then transferred it to a private group, controlled by huge agricultural

[232] Josh Harkinson, *Meet the California Couple Who Uses More Water Than Every Home in Los Angeles Combined*, MOTHER JONES (Aug. 9, 2016), http://www.motherjones.com/environment/2016/08/lynda-stewart-resnick-california-water/ [https://perma.cc/E9V2-8D8W].

companies.[233] The group controlled 488 billion gallons of water.[234] California received heavy criticism for the transfer, which gave the group a monopoly on water in the region.[235] Therefore, if water banks can own rights, private for-profit groups should not run them.

VI. CONCLUSION

The aquifers in Kansas will eventually run dry, forcing farmers to return exclusively to dry land farming. However, Kansas could extend the lives of the aquifers to help soften the fall for farmers. Water banks are a proven tool to extend aquifers' lives if implemented aggressively. To utilize water banks effectively, Kansas should make three major changes to water banking. First, it should expand the number of water banks in Kansas with either GMD-run or state-run water banks. Second, it should fix the price of water, thereby encouraging leases of water rights and helping farmers in drought-stricken years. Finally, it should empower water banks to purchase water rights and lease them to water users. These changes could revitalize water banks in Kansas, making them a tool to fight declining aquifers and helping Kansas farmers succeed.

[233] *Id.*
[234] *Id.*
[235] *Id.*