



1-10-2021

California is Thirsty for Groundwater: Could a Trading Market Encourage Year-Round Sustainable Groundwater Management?

Aliya Gorelick

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Aliya Gorelick, *California is Thirsty for Groundwater: Could a Trading Market Encourage Year-Round Sustainable Groundwater Management?*, 52 U. PAC. L. REV. 473 (2021).

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California is Thirsty for Groundwater: Could a Trading Market Encourage Year-Round Sustainable Groundwater Management?

Aliya Gorelick*

Code Sections Affected

Water Code § 1345, 1348, 1425, 1430, 1431, 1435, 1440, 1441, 1442, 1704.4 (amended).

AB 658 (Garcia); 2020 STAT. CH. 678.

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“You have two homes your entire life. This planet Earth and your body.”¹

I. INTRODUCTION

Nothing says tragedy like selling your family’s 100-year-old farm.² Doug Martin had to sell his farm because he could not maintain access to enough groundwater after an influx of groundwater regulations in 2014.³ Unfortunately, he is not the only farmer selling his farmland due to groundwater depletion.⁴ Over the next twenty years, lack of adequate groundwater conservation efforts could reduce California’s farmland by half a million acres.⁵

California’s small farmers will try to sell their land if the wells run dry—which happens when groundwater extraction occurs faster than groundwater can fully recharge.⁶ Regulating groundwater is similar to preserving funds in a bank account.⁷ Account supply problems arise when the rate of withdrawals surpasses the amount deposited.⁸ The number of small farms in California will continue to dwindle without greater incentives to recharge groundwater.⁹

Chapter 678 attempts to address groundwater depletion by creating a five-year

1. Email from Rachel Salcido, Professor of Law, University of the Pacific McGeorge School of Law, to Aliya Gorelick, Staff Writer, University of the Pacific Law Review, University of the Pacific McGeorge School of Law (Mar. 6, 2020, 10:07 PDT) (on file with the *University of the Pacific Law Review*).

2. See Kerry Klein, *California Water Cutbacks Could Take Large Area of Farmland Out of Production*, NPR (Dec. 26, 2019, 4:26 PM), <https://www.npr.org/2019/12/26/791560787/california-water-cutbacks-could-take-large-area-of-farmland-out-of-production> (on file with the *University of the Pacific Law Review*) (selling his land out of fear regarding new groundwater regulations that limit groundwater extraction for farm use).

3. See *id.* (limiting groundwater extractions, Mr. Martin would not be able to extract enough water to grow crops and raise cattle).

4. See Dale Kasler, *More California Farmland Could Vanish as Water Shortages Loom Beyond Drought*, SACRAMENTO BEE (Nov. 26, 2015, 9:14 AM), <https://www.sacbee.com/news/california/water-and-drought/article46665960.html> (on file with the *University of the Pacific Law Review*) (competing for groundwater means only those farmers will larger pumps “to get more groundwater than their neighbors” will survive the new regulations).

5. Telephone Interview with Mark Arax, Author of *The Dreamt Land* (June 24, 2020) (notes on file with the *University of the Pacific Law Review*); Klein, *supra* note 2.

6. See *Overuse*, GROUNDWATER FOUND., <https://www.groundwater.org/get-informed/groundwater/overuse.html> (last visited May 20, 2020) (on file with the *University of the Pacific Law Review*) (depleting groundwater without recharge means there will not be sufficient water for farmers because all the available groundwater was already utilized).

7. *Id.*

8. *Id.*

9. See Kasler, *supra* note 4 (recharging groundwater is one way to keep smaller farms afloat by providing adequate water for farmers to maintain their land and cattle).

permit and a five-year change order to recharge groundwater basins with surface water.¹⁰ However, Chapter 678 will not incentivize recharge because it only authorizes irregular groundwater recharge—during flash floods or heavy rainfall occurring in wet seasons.¹¹ The five-year permit will not result in sufficient groundwater recharge without a mechanism to incentivize year-round groundwater recharge.¹² Chapter 678 falls short unless the Legislature implements a groundwater trading market to account for dry-season recharge.¹³

II. LEGAL BACKGROUND

Farmland will fade away if groundwater is inaccessible during dry years.¹⁴ Groundwater recharge is a method of storing water in the ground, which is especially useful during dry years.¹⁵ Acquiring a permit to divert surface water to groundwater basins is the first step in conducting wet season groundwater recharge.¹⁶ Section A explains California's urgency to recharge groundwater through the executive order calling for expedited recharge efforts.¹⁷ Section B discusses the temporary and permanent groundwater recharge permits available under existing law.¹⁸ Section C examines the nuance that prevents California law

10. See AB 658, 2020 Leg., 2019-2020 Sess. (Cal. 2020) (issuing a conditional temporary permit and change order for five-year authorization to divert surface water during high-flow events to underground storage).

11. See *id.* (permitting only wet season recharge instead of allowing recharge during dry seasons when farmers need water most and neglecting to allow water conservation during dry years through qualifying wet season recharge only for a beneficial use).

12. See WATER § 113 (“sustainable groundwater management is best achieved locally through the development, implementation, and updating of plans and programs based on the best available science.”); AB 658, 2020 Leg., 2019-2020 Sess. (Cal. 2020) (recognizing the need for groundwater recharge but preventing a realistic solution by not allowing dry season recharge).

13. See generally *Groundwater Trading as a Tool for Implementing California's Sustainable Groundwater Management Act*, ENVTL. DEF. FUND (last visited July 8, 2020), available at <https://www.edf.org/sites/default/files/documents/water-markets.pdf> (on file with the *University of the Pacific Law Review*) (describing how short and long-term leases and water exchanges could be used as dry-season recharge options).

14. See Kasler, *supra* note 4 (“Experts at UC Davis estimated that farmers have been draining the valley's underground water reserves by as much as 5 million acre-feet per year during the drought to help compensate for staggering shortfalls in water deliveries from the State Water Project and the federal government's Central Valley Project”).

15. See Lori Pottinger, *Storing Water for Dry Days*, PUB. POL'Y INST. CAL. (Sept. 21, 2017), <https://www.ppic.org/blog/storing-water-dry-days/> (on file with the *University of the Pacific Law Review*) (explaining that the primary storage source for droughts is from groundwater and that every year California's droughts continue to get worse).

16. See AB 658, 2020 Leg., 2019-2020 Sess. (Cal. 2020) (recharging requires getting a permit to recharge for beneficial use and subsequent recharge into basins during heavy rainfall or flash floods).

17. *SGMA Implementation: Water Rights Permitting Options for Groundwater Recharge Projects*, MAVEN'S NOTEBOOK (Feb. 20, 2020), <https://mavensnotebook.com/2020/02/20/sgma-implementation-water-rights-permitting-options-for-groundwater-recharge-projects/> (on file with the *University of the Pacific Law Review*); *infra* Section II.A.

18. *Infra* Section II.B; see MAVEN'S NOTEBOOK, *supra* note 17 (“there are certain times of the year or seasons where available surface water can be diverted for groundwater replenishment, and . . . there should be permanent permitting tools to be able to do that.”).

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from qualifying groundwater recharge as a beneficial use under the beneficial use doctrine—thereby limiting the amount of water that can legally be recharged into a groundwater basin.¹⁹

A. California Needs Groundwater Now

The increase in groundwater recharge permit regulations in California is in response to decades of unregulated groundwater pumping from wells.²⁰ Groundwater recharge regulations recognize that the current free-for-all, unregulated groundwater extraction system is unsustainable.²¹ The extraction system is especially unsustainable because porous rocks beneath the earth's surface lose the ability to store water when groundwater over-pumping occurs.²² When the ground loses the ability to store water, there is no backup supply when surface water depletes completely.²³

The urgency for long-term groundwater sustainability stems from California's growing reliance on groundwater.²⁴ Subsection 1 highlights the executive order that paved the way for Chapter 678.²⁵ Subsection 2 introduces the large-scale framework of recharge regulations through the Sustainable Groundwater Management Act ("SGMA").²⁶

B. State of Emergency

Due to severe drought conditions in 2014, Former California Governor Jerry Brown issued an executive order declaring a state of emergency.²⁷ Then and now,

19. *Infra* Section II.C.

20. See Klein, *supra* note 2 ("For decades, Californians have been sucking far more out of underground aquifers than rain, snow, rivers or canals could put back in.").

21. See Julia Sullivan, *Agricultural Land Retirement in the San Joaquin Valley: A Novel Conservation Opportunity*, YALE ENVTL. REV. (Feb. 11, 2020), <https://environment-review.yale.edu/agricultural-land-retirement-san-joaquin-valley-novel-conservation-opportunity> (on file with the *University of the Pacific Law Review*) (describing the water resources in the San Joaquin Valley as "overtaxed").

22. See Renee Cho, *The Growing Groundwater Crisis*, EARTH INST. (Aug. 3, 2015), <https://blogs.ei.columbia.edu/2015/08/03/the-growing-groundwater-crisis/> (on file with the *University of the Pacific Law Review*) (describing how rocks depleted of groundwater may never again reach levels of sustainability).

23. See *id.* (describing how water drops when the groundwater is completely depleted).

24. See *All About Sustainable Groundwater Management Act*, NGO GROUNDWATER COLLABORATIVE, http://cagroundwater.org/?page_id=25 (last visited June 18, 2020) (on file with the *University of the Pacific Law Review*) ("overdraft led to groundwater subsidence of several feet in some parts of the state, and the drying up of more than 1500 wells in Tulare County (accounting for more than half of dry wells in the state), leaving thousands of Californians without water from their tap.").

25. *Infra* Subsection II.A.1.

26. *Infra* Subsection II.A.2; see Tina C. Leahy, Comment, *Desperate Times Call for Sensible Measures: The Making of The California Sustainable Groundwater Management Act*, 9 GOLDEN GATE UNIV. ENVTL. L.J. 5, 8 (2015).

27. Cal. Governor's Exec. Order No. B-36-15 (Nov. 13, 2015).

harsh drought conditions and water shortages present a continuing threat to Californians' safety.²⁸ The executive order sought to encourage a statewide recharge effort targeting the feasibility of recharge groundwater basins.²⁹ California authorized the State Water Resources Control Board to accelerate approval for groundwater recharge projects during high-precipitation events.³⁰ High-precipitation events—primarily occurring during wet seasons—range from heavy rainfall to flash flood events.³¹

Groundwater recharge happens when water seeps through the ground to replenish the water supply in groundwater basins.³² Basins are large spaces where water pools for storage.³³ Through recharging groundwater basins, groundwater storage provides an essential water supply and a solution for providing safe and reliable well water.³⁴ Additionally, keeping water in storage ensures the availability of adequate water supplies during severe drought conditions.³⁵ Maintaining groundwater storage is necessary to ensure water supply availability for future droughts.³⁶

1. Paving the Way to Sustainable Groundwater Management: The SGMA

The SGMA sets requirements for groundwater basin managers to address groundwater depletion by setting goals to recharge groundwater.³⁷ Chapter 678 is distinct from the SGMA but intends to work in tandem with the SGMA to encourage groundwater recharge efforts.³⁸ Assembly Member Joaquin Arambula—author of Chapter 678—said Chapter 678 seeks to advance the SGMA's sustainability goal.³⁹

28. *Id.*; Pottinger, *supra* note 15.

29. Cal. Governor's Exec. Order, *supra* note 27.

30. *Id.*

31. *See id.* (minimizing flood risks is the result of recharging groundwater using "available high water flows").

32. Leahy, *supra* note 26.

33. *Id.*

34. Cal. Governor's Exec. Order, *supra* note 27.

35. Cal. Governor's Exec. Order, *supra* note 27; *see* Pottinger, *supra* note 15 ("California has always relied on water storage, and in droughts today we rely on it even more.").

36. *See* Pottinger, *supra* note 15 ("Surface storage in reservoirs is very important in the first couple years of a drought, but with longer droughts we rely more and more on groundwater storage.").

37. *See* Craig A. Carnes Jr., *California's Historic Groundwater Legislation: The Sustainable Groundwater Management Act*, 17 NO. 1 ABA WATER RES. COMM. NEWSL. 11, 12 (2015) (meaning returning the basin to a sustainable yield, where the amount of water extracted is less than the amount of water replenished into the basin).

38. *See* AB 658, 2020 Leg., 2019-2020 Sess. (Cal. 2020) ("It is the intent of the legislature in enacting this measure to encourage groundwater recharge projects during times of high-flow events by creating a temporary five-year permit and a temporary five-year change order administered by the State Water Resources Control Board."); Carnes, *supra* note 37 ("The state, through the California State Water Resources Control Board (SWRCB) may intervene in the management of a groundwater basin.").

39. *See* Telephone Interview with Joaquin Arambula, Assembly Member and Author of Chapter 678, Fresno Cnty. (June 17, 2020) (notes on file with the *University of the Pacific Law Review*) (advocating for AB 658 as helping close a gap in water rights permits for groundwater recharge); MAVEN'S NOTEBOOK, *supra* note

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The SGMA's sustainability goal is to replenish the groundwater supply to keep groundwater basin storage intact.⁴⁰ By maintaining groundwater basins' ability to store water, there is a substantial chance of having water supplies during extreme drought conditions.⁴¹ Achieving the SGMA's sustainability goal requires acquiring permits to divert surface water to groundwater storage to recharge the basins.⁴²

2. *No Middle Ground: Permits under Existing Law*

Existing law provides temporary permits and change orders to divert surface water to groundwater basins.⁴³ A temporary permit is necessary when a permit applicant does not yet possess a legal right to surface water.⁴⁴ A change order is appropriate for an applicant seeking to transform an existing legal water right to a water right that permits conducting groundwater recharge.⁴⁵ Existing law provides a 180-day temporary permit, a 180-day temporary change order, and a standard permit.⁴⁶

While the 180-day permit is not a long-term solution, the standard permit provides permanent authorization to divert surface water for recharge.⁴⁷ Unlike the 180-day permit, the standard permit takes years to process.⁴⁸ Although permanent authorization through the standard permit takes years to process, the investment is worthwhile for conducting long-term groundwater recharge projects.⁴⁹

C. *The Beneficial Use Doctrine and the Obstacles it Poses to Sustainable Groundwater Management*

Before an applicant obtains a permit to divert surface water to recharge groundwater basins, the surface water needs to have an apparent and beneficial use.⁵⁰ Under California law, the beneficial use doctrine says that water rights

17 (providing a bridge between shorter temporary permits and the standard permit for surface water diversion to groundwater storage).

40. See Carnes, *supra* note 37 (prioritizing action towards sustainability in California's "critically over-drafted groundwater basins").

41. Pottinger, *supra* note 15.

42. Carnes, *supra* note 37; Arambula, *supra* note 39.

43. MAVEN'S NOTEBOOK, *supra* note 17.

44. See *id.* ("In order to issue the permit, the Division of Water Rights must make a number of findings, including that the applicant has an urgent need for the water.").

45. *Id.*

46. *Id.*

47. *Id.* (permitting renewal for a subsequent 180-day period).

48. See *id.* (encouraging investing capital into recharge projects because senior water rights will always prevail over temporary permit water rights).

49. See CAL. WATER CODE § 22263 (West 2020) (explaining the first in time, first in right principle in California water law is a system that ensures water rights have seniority when obtained earlier than subsequent water rights).

50. Matt Weiser, *Why California Law Requires a 'Clear Benefit' for Groundwater Recharge*, WATER

holders must have a reason to extract groundwater before they divert surface water to groundwater basins.⁵¹ For example, the stored water's beneficial use could be the future extractive use of irrigating crops.⁵² Erik Ekdahl—the deputy director at the State Water Resources Control Board—explained the fear is that people will hoard large amounts of water.⁵³ Upstream water rights holders taking unlimited amounts of water threatens downstream users' access to water.⁵⁴ Thus, the beneficial use doctrine requires a beneficial use for groundwater before approving a permit to divert surface water for groundwater recharge.⁵⁵ Unfortunately, groundwater recharge alone—for the sake of maintaining groundwater storage ability—is not a beneficial use according to California law.⁵⁶

III. CHAPTER 678

Chapter 678 creates a five-year temporary permit and a five-year temporary change order for surface water diversion to groundwater for recharging the basins.⁵⁷ Permits and change orders provide the right to divert surface water to groundwater storage for a temporary five-year period.⁵⁸ Chapter 678 does not alter the requirement that a person must have a beneficial use for groundwater before diverting surface water for recharge.⁵⁹ Local agencies and groundwater basin managers are encouraged to apply for Chapter 678's permits to work toward groundwater sustainability.⁶⁰

Further, Chapter 678 mandates that surface water diversion can only occur if it does not negatively affect water quality.⁶¹ The five-year permit and change order only authorize a person to divert surface water to groundwater recharge during high-flow events.⁶² High-flow events include heavy rainfall or flash floods and occur irregularly during wet seasons.⁶³ Diverting excess water during high-flow

DEEPLY (Oct. 18, 2018), <https://www.kqed.org/science/1933122/why-california-law-requires-a-clear-benefit-for-groundwater-recharge> (on file with the *University of the Pacific Law Review*).

51. *Id.* (illustrating that surface water becomes groundwater when it reaches the basin and the prerequisite to diverting surface water is to have a designated use for the groundwater once it is put into the ground).

52. *See id.* (“The applicant would have to specifically target some ancillary benefit of recharge, such as salinity control in an aquifer or reversing land subsidence caused by over-pumping groundwater.”).

53. *Id.*

54. *Id.*

55. *Id.*

56. Weiser, *supra* note 50.

57. AB 658, 2020 Leg., 2019-2020 Sess. (Cal. 2020) (intending to provide temporary permits to conduct groundwater recharge projects when rainfall or flash flooding increase the amount of water in a river creating excess water—more water than the river normally holds due to the rainfall or flash flooding).

58. *Id.*

59. *Id.*

60. *Id.*

61. *See* AB 658, 2020 Leg., 2019-2020 Sess. (Cal. 2020) (“The proposed change may be made without injury to any other lawful user of water, including the water user's ability to meet water quality objectives.”).

62. *Id.*

63. *Id.* (“The proposed diversion to underground storage will occur only when flow in the source waterbody

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events is permissible through the temporary permits.⁶⁴ Chapter 678 approves diverting excess water from high-flow events for groundwater recharge.⁶⁵

The high-flow event requirement attempts to prevent injustice against existing water rights by not giving duplicative water rights.⁶⁶ Moreover, diverting surface water to groundwater storage must not negatively impact downstream water quality.⁶⁷ Downstream water quality assessments consist of monitoring water users' self-reports regarding recharge quantities.⁶⁸ The surface water diversion must also leave enough water volume in the water source to sustain fish and wildlife habitats.⁶⁹ These conditions ensure that surface water diversion occurs solely through diverting excess water without causing damage to water users or the water source itself.⁷⁰

The five-year temporary permit aims to promote groundwater recharge by giving a longer option between the existing 180-day temporary permit and the existing standard permit.⁷¹ A permit holder immediately loses their water rights when a temporary permit expires.⁷² Renewals of 180-day temporary permit applications are not guaranteed.⁷³ Additionally, the standard permit application takes years to process.⁷⁴ Therefore, the five-year temporary permit fills the gap between the existing permit options so applicants can maintain water rights while applying for standard permits.⁷⁵

exceeds the claims of all known legal users who divert water downstream of the proposed point of diversion.”).

64. *Id.*

65. *Id.*

66. AB 658, 2020 Leg., 2019-2020 Sess. (Cal. 2020) (illustrating that water rights holders own every drop of water in the water source and that diverting excess water when there is heavy rainfall means that water rights holders claim to the amount of water typically in the water source remains unaffected when the excess water is authorized for diversion to recharge).

67. *Id.*

68. *See id.* (locating the point of diversion is the geographical point where redirection of the natural course of river flow occurs).

69. *Id.*

70. *Id.*

71. AB 658, 2020 Leg., 2019-2020 Sess. (Cal. 2020); Hearing on AB 658 Before the Assemb. Comm. on Water, Parks, and Wildlife, 2019 Leg., 2019-2020 Sess. (Cal. 2019) (on file with the *University of the Pacific Law Review*).

72. *See* MAVEN'S NOTEBOOK, *supra* note 17 (explaining that the permit does not automatically renew and the applicant must submit an application to renew the permit).

73. *See id.* (showing that the five-year permit is ideal because an applicant will not have to renew their permit as often as with the 180-day permit).

74. *Id.*

75. *See id.* (intending the five-year permit “to be a bridge between temporary and permanent water rights”).

IV. ANALYSIS

Groundwater recharge is a reliable method of preserving water in groundwater basins for use during dry years.⁷⁶ Without constant recharge, porous rocks in the ground lose their ability to store water causing infrastructure damage and an unreliable water supply.⁷⁷ That loss is significant because approximately 33% of California's residents depend on groundwater as a primary water supply source.⁷⁸ Also, 40% of California's water supply comes from groundwater in a normal year, and 60% comes from groundwater during dry years.⁷⁹ Section A explains that Chapter 678 does not go far enough because it does not account for dry-season recharge.⁸⁰ Section B discusses why groundwater trading markets are ideal for incentivizing for dry-season recharge.⁸¹ Section C shows that a groundwater trading market—in conjunction with Chapter 678—should maintain a sustainable groundwater supply to last throughout drought conditions.⁸²

A. Chapter 678 Is Not Good Enough Because It Does Not Account for Dry-Season Recharge

Assembly Member Arambula said the law seeks to provide farmers with an opportunity to store water during wet seasons.⁸³ Chapter 678's high-flow requirement makes certain that groundwater recharge can only occur solely through diverting excess water.⁸⁴ Water sources experience high-flow during heavy rainfall and flash flood events.⁸⁵ For example, if a river typically carries 500-acre-feet of water and substantial rainfall increases that amount to 800-acre-feet, 300-acre-feet is excess.⁸⁶ Accordingly, Chapter 678 does not provide groundwater recharge opportunities during dry seasons.⁸⁷

76. See Leahy, *supra* note 26 (recharging groundwater during dry years is a reliable method of preserving water because it is practical to save for water depletion for future droughts).

77. See Cho, *supra* note 22 (describing how rocks depleted of groundwater may never again reach levels of sustainability).

78. Joyia Emard, *California Marks Key Step Toward Achieving Sustainable Groundwater Management*, CAL. DEP'T WATER RES. (Jan. 31, 2020), <https://water.ca.gov/News/News-Releases/2020/CA-Marks-Key-Step-Toward-Achieving-Sustainable-Groundwater-Management> (on file with the *University of the Pacific Law Review*).

79. *Id.*

80. *Infra* Section IV.A.

81. *Infra* Section IV.B.

82. *Infra* Section IV.C.

83. See Arambula, *supra* note 39 (explaining that Californians need to take advantage of wet years to better prepare for future droughts).

84. AB 658, 2020 Leg., 2019-2020 Sess. (Cal. 2020).

85. See *id.* (using the term high-flow to describe when the source waterbody exceeds its normal amount and diversion of excess water will not disadvantage other water users).

86. See *id.* (illustrating that the 300-acre-feet in excess can be diverted from surface water to groundwater recharge for a beneficial use).

87. See AB 658, 2020 Leg., 2019-2020 Sess. (Cal. 2020) (prohibiting surface water diversion to

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Prolonged drought conditions and surface water depletion in dry years indicate California's future dependence on plentiful groundwater supplies.⁸⁸ On the surface, creating a five-year temporary permit incentivizes investments in groundwater recharge.⁸⁹ However, groundwater recharge through Chapter 678 will not have a substantial impact because the law only authorizes recharge during high-flow events—which occur during wet seasons.⁹⁰ Chapter 678 would be more effective if it permitted recharge during wet seasons and dry seasons, instead of only wet seasons.⁹¹

Wet-season groundwater recharge laws are insufficient because high-flow events may only occur every five to seven years.⁹² Due to infrequent and unpredictable high-flow events, the opportunities for permittees to divert surface water to groundwater basins for recharge under Chapter 678 are slim.⁹³ Dry-season recharge, on the other hand, encourages sustainable groundwater management whereby farmers can save water for future droughts during both wet seasons and dry seasons.⁹⁴

Wet-season recharge alone through Chapter 678 does not adequately remedy groundwater depletion because the water will be subject to use when the five-year permit expires.⁹⁵ Additionally, the beneficial use requirement poses the risk of permittees losing water rights if the beneficial use is not exercised in a reasonable

groundwater recharge absent excess flow in the source waterbody and allowing temporary recharge opportunities when there is excess water from high-flow events); Pottinger, *supra* note 15 (warning that dry drought seasons will increase in length and wet seasons will decrease because of the warming climate).

88. See Emard, *supra* note 78 (“Groundwater acts as a drought buffer by providing water that is available to use when surface water supplies are diminished” and “groundwater storage will become even more important as California’s changing climate produces less snow and more rain.”); see also Pottinger, *supra* note 15 (“California has a very long dry season, which is when we use most of our water, and a fairly short wet season, when we try to gather and store water.”).

89. See Kasler, *supra* note 4 (giving farmers the false impression that they can cope with the new groundwater legislation by recharging during dry years); see also Arambula, *supra* note 39 (explaining that Chapter 678 only provides an opportunity to recharge during wet seasons with excess water in the water source).

90. See AB 658, 2020 Leg., 2019-2020 Sess. (Cal. 2020) (allowing only recharge projects to divert surface water for groundwater recharge during heavy rainfall or flash flood events). *Contra* Pottinger, *supra* note 15 (explaining the need for groundwater recharge in wet seasons and dry seasons is to combat more extended drought periods).

91. See AB 658, 2020 Leg., 2019-2020 Sess. (Cal. 2020) (allowing only recharge projects during wet seasons). *Contra* Pottinger, *supra* note 15 (emphasizing the need to utilize water storage in dry seasons as well as wet seasons).

92. ELLEN HANAK & ELIZABETH STRYJEWSKI, CALIFORNIA’S WATER MARKET, BY THE NUMBERS UPDATE 2 (Public Policy Institute of California, 2012) (on file with the *University of the Pacific Law Review*).

93. See *id.* (“During the eight-year period from 1987 to 1994, California experienced only one ‘normal’ precipitation year (1993); five of the remaining seven dry years were deemed ‘critically dry.’”).

94. See generally AB 658, 2020 Leg., 2019-2020 Sess. (Cal. 2020) (neglecting to consider dry-season recharge). *Contra* Pottinger, *supra* note 15 (urging California to seriously consider recharging during dry seasons to prepare for drought conditions).

95. See AB 658, 2020 Leg., 2019-2020 Sess. (Cal. 2020) (authorizing water diversion until the permit automatically expires five years after permit authorization); Weiser, *supra* note 50 (disallowing water to stay in the ground once it is put there because it must constitute a supply for another use that is deemed beneficial).

amount of time because of the Legislature's fear of water hoarding.⁹⁶ Wet-season recharge alone does not create water use opportunities during dry years since the water must have a further extractive beneficial use.⁹⁷ With the limited ability to keep water in the ground, the difficulty of adequately storing wet season recharge water for dry years increases exponentially.⁹⁸ Therefore, Chapter 678 fails to account for California needing dry season recharge to achieve a reliable groundwater supply to last throughout drought conditions.⁹⁹

B. A Groundwater Trading Market Can Account for Dry-Season Recharge

A groundwater trading market would promote sustainable groundwater management in conjunction with Chapter 678 by providing recharge opportunities throughout wet and dry seasons.¹⁰⁰ Recharging in wet and dry seasons requires a regulatory system that can punish detrimental water hoarding.¹⁰¹ Subsection 1 explains how groundwater trading markets foster investments in dry-season recharge.¹⁰² Subsection 2 explains why California should follow Australia's model for a groundwater trading market.¹⁰³

1. How Groundwater Trading Markets Account for Dry-Season Recharge

Groundwater recharge is not considered a beneficial use because the Legislature fears it will encourage "cold storage."¹⁰⁴ Cold storage occurs when water rights holders store unlimited amounts of water for recharge.¹⁰⁵ Taking too much water into cold storage affects the availability and cost of water to

96. See Weiser, *supra* note 50 (fearing creating more buyers in the market, suggesting it would create a greater monopoly for water than already exists). *But see* AB 658, 2020 Leg., 2019-2020 Sess. (Cal. 2020) (requiring the recharge water to have a separate beneficial use, including an extractive use like irrigation).

97. See Weiser, *supra* note 50 (losing water rights is a result of nonuse of allocated water). *But see* WATER § 1433.1 (advocating for recharge projects that can only happen in wet seasons).

98. See Weiser, *supra* note 50 ("The problem is that groundwater recharge by itself is not considered a 'beneficial use' under state law, and meeting that definition is a requirement to obtain a permit to divert water."); *see also* AB 658, 2020 Leg., 2019-2020 Sess. (Cal. 2020) (requiring that recharge water has an ancillary beneficial use aside from the actual recharge itself).

99. See Pottinger, *supra* note 15 (explaining that California "often lack[s] enough water to get good recharge"); *see also* AB 658, 2020 Leg., 2019-2020 Sess. (Cal. 2020) (failing to authorize dry season recharge because of the flawed belief that recharging in wet seasons alone is sufficient to maintain California's groundwater supply throughout drought years).

100. See Pottinger, *supra* note 15 (highlighting the need to recharge during wet seasons and dry seasons because the dry seasons will get longer with the warming climate). *But see* AB 658, 2020 Leg., 2019-2020 Sess. (Cal. 2020) (allowing recharge only during high-flow events that occur during wet seasons); ENVTL. DEF. FUND, *supra* note 13 (outlining sustainable practices include recharging to the greatest extent to prepare for dry years).

101. HANAK & STRYJEWSKI, *supra* note 92; ENVTL. DEF. FUND, *supra* note 13.

102. *Infra* Subsection IV.B.1.

103. *Infra* Subsection IV.B.2.

104. Weiser, *supra* note 50.

105. *Id.*

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downstream users.¹⁰⁶ The Legislature cannot confidently allow groundwater recharge to be a non-extractive beneficial use without a system of enforcement.¹⁰⁷ A groundwater trading market would monitor upstream users' water allocations and transactions to ensure no one abuses recharge opportunities.¹⁰⁸

Groundwater trading creates an annual water leasing and trading system through monitoring of well water extractions.¹⁰⁹ Water trading markets are property rights management systems that allow trading between users.¹¹⁰ Water trading creates a voluntary trading system to reallocate water resources.¹¹¹ Groundwater trading markets operate as gatekeepers for recharge by providing monetary incentives to keep water in the ground for storage during dry seasons.¹¹² During dry seasons, no surface water is available to put into the ground.¹¹³ Dry-season recharge occurs by extracting less water instead of using the total amount of allocated water.¹¹⁴ Using less water means the water can remain in the ground, thereby recharging the groundwater basin.¹¹⁵ Trading markets bypass the beneficial use requirement by permitting groundwater rights to be transferable.¹¹⁶ Transferable rights ensure recharge water has an ancillary beneficial use.¹¹⁷ Because Chapter 678 only permits wet-season recharge, a trading market for dry-season recharge will result in adequate groundwater supplies to mitigate the global water crisis.¹¹⁸

106. *Id.*

107. *See id.* (fearing lack of enforcement will encourage senior water rights holders to partake in cold storage).

108. *See id.* (explaining the need for something to bypass the beneficial use requirement because the legislature has no intention of making recharge a beneficial use).

109. ENVTL. DEF. FUND, *supra* note 13.

110. Sarah Wheeler, *Understanding Participation in Murray-Darling Basin Water Markets: A Comparison of the Southern and Northern Basins*, GLOBAL WATER FORUM (Mar. 10, 2020), <https://globalwaterforum.org/2020/03/10/understanding-participation-in-murray-darling-basin-water-markets-a-comparison-of-the-southern-and-northern-basins/> (on file with the *University of the Pacific Law Review*).

111. ENVTL. DEF. FUND, *supra* note 13.

112. *See* Pottinger, *supra* note 15 (explaining that dry season recharge requires a “better accounting system to improve incentives”); *see also* ENVTL. DEF. FUND, *supra* note 13 (detailing the need for dry year recharge preparations). *But see* AB 658, 2020 Leg., 2019-2020 Sess. (Cal. 2020) (West 2020) (focusing only on wet-season recharge).

113. *See generally* ENVTL. DEF. FUND, *supra* note 13.

114. *See generally* ENVTL. DEF. FUND, *supra* note 13 (explaining short and long-term leases and water exchanges are dry-season recharge options). *But see* AB 658, 2020 Leg., 2019-2020 Sess. (Cal. 2020) (specifying recharge options only for high-flow events).

115. ENVTL. DEF. FUND, *supra* note 13.

116. *See generally* ENVTL. DEF. FUND, *supra* note 13 (advocating for voluntary trading and water reallocation to ensure sustainable groundwater recharge). *But see* AB 658, 2020 Leg., 2019-2020 Sess. (Cal. 2020) (focusing on recharge without considering transferable water rights through recharge).

117. *See* Weiser, *supra* note 50 (requiring an added benefit from storing water); *see also* ENVTL. DEF. FUND, *supra* note 13 (leasing and trading groundwater to accommodate higher value needs ensures there will be a beneficial use for the water).

118. *See* ENVTL. DEF. FUND, *supra* note 13 (“If individuals understand that they can be rewarded and compensated for implementing water-saving strategies, it should help smooth the transition to sustainable

2. Australia's Groundwater Trading Market is a Model California Should Follow

California's current water allocation system encourages using every ounce of water.¹¹⁹ A water market, with annual groundwater leasing, provides farmers the flexibility to buy groundwater to support their farms.¹²⁰ Farmers could buy water from neighbors when wet-season recharge or surface water is unavailable.¹²¹ Disseminating water resources encourages farmers to be water conscious by monitoring pumping levels to lease and buy water.¹²² The inability to trade, transfer, or sell groundwater highlights the insufficiencies in California's current groundwater system.¹²³ A groundwater market incentivizes dry-season recharge by giving parties the ability to buy, sell, and trade groundwater depending on need.¹²⁴ Dry-season recharge occurs through fewer groundwater extractions because the seller must extract less water to conduct water trading for profit.¹²⁵ California should look to Australia's model for a thriving groundwater trading market because Australia's groundwater market is active and sees fewer groundwater extractions.¹²⁶

Australia's Murray-Darling Basin groundwater market's success is mainly due to the inclusion of transferable rights, enforceable limits, and reliable databases.¹²⁷ Australia's groundwater trading market helps users identify the best water use through databases that function as gatekeepers for groundwater recharge transfers.¹²⁸ Water rights transferability in Australia's Murray-Darling Basin

groundwater governance.”).

119. See Alastair Bland, *A New Groundwater Market Emerges in California. Are More on the Way*, NEWS DEEPLY (June 22, 2018), <https://www.newsdeeply.com/water/articles/2018/06/22/a-new-groundwater-market-emerges-in-california-are-more-on-the-way> (on file with the *University of the Pacific Law Review*) (“A ‘use-it-or-lose-it’ system of water allocation has historically required growers in California to irrigate their land or lose their water rights, whether market forces compelled them to grow crops or not.”).

120. See *id.* (meaning that farmers would not have to sell their farms due to lack of water because of the availability to purchase groundwater from their neighbors).

121. See *id.* (incentivizing farmers to buy water from neighbors if they believe their groundwater use will be curtailed by new groundwater legislation).

122. See *id.* (describing California's success with surface water transactions to suggest that groundwater trading could incentivize groundwater sustainability just like surface water trading emphasizes surface water sustainability).

123. See Chris Austin, *Groundwater Market: A case study of the Fox Canyon Groundwater Market*, MAVEN'S NOTEBOOK (Nov. 20, 2019), <https://mavensnotebook.com/2019/11/20/groundwater-markets-a-case-study-of-the-fox-canyon-groundwater-market/> (on file with the *University of the Pacific Law Review*) (“A groundwater trading market is a . . . cap and trade scheme where the cap is represented by the sustainable yield or the total amount of pumping that can be allowed in the basin, and the trading happens at the allocation level between individual water users.”).

124. *Id.*

125. See ENVTL. DEF. FUND, *supra* note 13 (trading groundwater deals with pumping allocations rather than physically conveying the groundwater).

126. Wheeler, *supra* note 110.

127. See ENVTL. DEF. FUND, *supra* note 13 (trading programs must monitor, enforce, verify, and maintain a groundwater rights database as well as set rules for water allocations to succeed).

128. Wheeler, *supra* note 110.

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encourages diversity in water usage leading to less frivolous use.¹²⁹ Achieving fewer groundwater extractions from farms happens with crop diversity because farmers will invest in crops that can survive with less water.¹³⁰ Farmers have a monetary incentive to invest in low-water crops with a system that allows water rights transfers.¹³¹

A groundwater market would directly benefit California's farmers in the Central Valley by allowing water reallocation based on the water volume crops require.¹³² A groundwater trading system will supplement Chapter 678's shortcomings for failing to permit dry-season recharge.¹³³ Australia's thriving groundwater trading market is a model that California should follow to promote recharge in conjunction with Chapter 678.¹³⁴

C. A Groundwater Trading Market in Conjunction with Chapter 678: A Hopeful Promise of Sustainable Groundwater Maintenance

Wet-season recharge alone is insufficient to ensure a plentiful groundwater supply to use during drought conditions.¹³⁵ Since California's droughts worsen every year, wet- and dry-season recharge must exist simultaneously to maintain a decent groundwater supply.¹³⁶ Extended drought periods in California highlight the need to employ wet- and dry-season recharge to maintain a portion of Earth's water storage ability.¹³⁷ With longer dry seasons and shorter wet seasons, wet-season recharge will not produce enough water for long-term sustainable recharge.¹³⁸

Chapter 678 provides an avenue for wet-season recharge but does not provide

129. *Id.*

130. *See id.* (creating a robust and sophisticated trading system that will incentivize fewer groundwater extractions requires "variability of water extractions across time and space by industry" to facilitate greater participation in water trading).

131. *See id.* (facilitating water trading requires diversifying crops and investing in low water crops to encourage robust participation, otherwise industries remain the dominant players).

132. *See* Ellen Hanak & Jelena Jezdimirovic, *Water Marketing That Helps Nature*, PUB. POL'Y INST. CAL. (Sept. 13, 2016), <https://www.ppic.org/blog/water-marketing-that-helps-nature/> (on file with the *University of the Pacific Law Review*) (improving water trading conditions will reduce conflicts about allocation over scarce water supplies).

133. *See* ENVTL. DEF. FUND, *supra* note 13 (providing an avenue to conduct dry season recharge—extracting less groundwater—for the beneficial use of groundwater trading itself).

134. *See* Austin, *supra* note 123 (showing California has the capacity to start a groundwater trading market); Wheeler, *supra* note 110 (detailing Australia's groundwater markets' success by providing transferable rights with monetary incentives for using less water); ENVTL. DEF. FUND, *supra* note 13 (outlining California's need for a reliable groundwater trading market). *But see* AB 658, 2020 Leg., 2019-2020 Sess. (Cal. 2020) (West 2020) (neglecting to acknowledge the need for a groundwater trading system and silent on dry-season recharge).

135. Pottinger, *supra* note 15.

136. *Id.*

137. *See id.* ("California has 400-500 million acre-feet in groundwater storage" which is the primary water storage for use during drought conditions).

138. *Id.*

an avenue for dry-season recharge.¹³⁹ A groundwater trading market encourages dry-season recharge by incentivizing decreased groundwater extractions.¹⁴⁰ Without the element of compensation—inherent to a groundwater trading market—groundwater basin managers and farmers will not invest in groundwater recharge.¹⁴¹ A groundwater trading market also promotes Chapter 678 by providing monetary incentives for wet-season recharge.¹⁴² With a thriving groundwater trading market, farmers like Doug Martin might not need to sell their farms prematurely.¹⁴³

Increasing incentives for dry-season recharge also increases wet-season recharge since parties can capitalize on year-round trading in the groundwater market.¹⁴⁴ Dry-season recharge requires storing water from initial water supplies by extracting less water.¹⁴⁵ However, wet-season recharge operates with surplus water from high-flow events.¹⁴⁶ Profiting from dry-season recharge incentivizes using Chapter 678 to increase profitability in wet seasons.¹⁴⁷ A groundwater trading market and Chapter 678 will work together to incentivize wet- and dry-season recharge to maintain groundwater storage and increase sustainable groundwater management.¹⁴⁸ Stimulating recharge in wet and dry seasons will provide a more reliable groundwater supply for use throughout drought conditions.¹⁴⁹

139. AB 658, 2020 Leg., 2019-2020 Sess. (Cal. 2020).

140. See ENVTL. DEF. FUND, *supra* note 13 (giving farmers the option to sell groundwater instead of extract will foster a “gradual decrease of allocation over time, helping users adjust to pumping reductions that may be necessary to achieve sustainability”).

141. See Arax, *supra* note 5 (“The solution is not to get rid of extraction, but the extraction needs to be reinvented” to level the playing field between people who can afford water and people who can afford to conserve water).

142. See ENVTL. DEF. FUND, *supra* note 13 (promoting dry-season recharge as a means to increase wet-season recharge); see also AB 658, 2020 Leg., 2019-2020 Sess. (Cal. 2020) (intending to promote recharge during wet seasons without an adequate incentive).

143. See Klein, *supra* note 2 (losing water accessibility for farmland also reduces property value and “there is a point where you’ve got to fold them and run”).

144. See Wheeler, *supra* note 110 (showing the benefits of creating an incentive-based recharge initiative through a groundwater trading market).

145. ENVTL. DEF. FUND, *supra* note 13.

146. *Id.*

147. See *id.* (creating a groundwater trading market with monetary incentives promotes inter-annual flexibility thereby encouraging pumping less in drought years or switching water sources depending on availability).

148. *Id.*; AB 658, 2020 Leg., 2019-2020 Sess. (Cal. 2020).

149. See Pottinger, *supra* note 15 (“Almost all the water people use in summer has been stored someplace, either in a reservoir or groundwater” in California and “you need three things to recharge groundwater: porous land above an aquifer, enough water available above that land, and enough empty space under that land to store it.”).

V. CONCLUSION

A groundwater trading market will support farmers in dry seasons by allowing sellers to reallocate water supplies through annual leases.¹⁵⁰ California's current water market only contains buyers due to fear that allowing sellers into the market will incentivize water hoarding.¹⁵¹ Groundwater trading markets protect against cold storage and water hoarding while encouraging dry- and wet-season recharge.¹⁵² Long-term sustainable groundwater management and conservation requires a market that freely allows people to recharge during dry and wet seasons.¹⁵³

On its own, Chapter 678 is an insufficient groundwater recharge law.¹⁵⁴ Chapter 678 would be more effective if it did not have a restriction for recharge solely during wet seasons.¹⁵⁵ Additionally, achieving meaningful progress towards sustainable groundwater management can only happen with an incentive for wet- and dry-season recharge.¹⁵⁶ A groundwater trading market is the best way to facilitate and account for dry-season recharge.¹⁵⁷ Therefore, unless the Legislature implements a groundwater trading market to account for dry-season recharge, Chapter 678 will fall short and fail to address California's groundwater shortage.¹⁵⁸

150. See ENVTL. DEF. FUND, *supra* note 13 (“Water trading has been an important water management tool in California for decades, which has helped agricultural, municipal, industrial, and environmental uses alike.”).

151. *Id.*

152. ENVTL. DEF. FUND, *supra* note 13.

153. See *id.* (trading groundwater will help groundwater basins reach a sustainable yield—“the maximum quantity of water . . . that can be withdrawn annually from a groundwater supply without causing an undesirable result”).

154. See AB 658, 2020 Leg., 2019-2020 Sess. (Cal. 2020) (West 2020) (permitting only wet-season recharge—during high-flow events—without permitting dry-season recharge will not secure an adequate groundwater supply to help groundwater basins reach a sustainable yield and reliable water supply for droughts).

155. *Id.*

156. *Id.*

157. See Pottinger, *supra* note 15 (“To improve recharge locally, we need a better accounting system to improve incentives.”).

158. See ENVTL. DEF. FUND, *supra* note 13 (“Trading enhances a range of options available to groundwater users” that will diversify crops and engage market participants by incentivizing water conservation, while slowly ramping-down annual groundwater extraction levels).