

Emily Smithman*

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INTRODUCTION

“Michael Burry is focusing all of his trading on one commodity: water”¹

This article proposes amending the 2015 Colorado Water Plan² (“CWP”) to make it amenable to water trading and investing. This article further contends that Colorado in a unique positio

(“CWCB”) to create a statewide water plan.⁴ Although the CWP has successfully integrated Colorado’s water goals, this article proposes adding a provision to the state constitution that would establish and govern a water market. The proposed provision, which is inspired by water exchanges and markets in other jurisdictions, will add value to the Plan and help close the water gap in Colorado. Water is increasingly considered a

China have similar exchanges.¹³ One of the guiding rules of the Australian Water Exchange, among the first, largest, and most comprehensive of its kind, is that if one party wants more water than another must get less.”¹⁴ Historically, water has been viewed as limitless and naturally sustainable, causing mismanagement and under-valuation.¹⁵ Climate change, population growth, diversion of water to supply the environment, and increased agricultural and industrial use have increased demand.¹⁶ In fact, Australian Federal & Eastern State Governments established the National Water Initiative 2004 (NWI) to start an “era of water reform.”¹⁷ A critical part of this was separating water and land ownership so that they could be traded separately. NWI ensures that all entitlement owners have equitable access to available water. Another exchange, H2OX, was established to create a financial exchange that would facilitate electronic trading and processing of water entitlement and allocation transactions.¹⁸

In the United States, water use in western states like Colorado is based on these legal doctrines that date back to Roman law.¹⁹ In Colorado specifically, the doctrine of prior appropriation, explored in greater depth below, governs water law.²⁰ This article proposes creating a water market in Colorado that will fit within the existing doctrine of prior appropriation. However, one potential shortcoming of the doctrine, as shown in Colorado, is that it fails to view water as a tradable commodity. This article proposes that a water market comports with the doctrine of prior appropriation and would help

¹³ See generally Janis M Carey & David L. Sunding, *Emerging Markets in Water: A Comparative Institutional Analysis of the Central Valley and the Colorado-Big Thompson Projects*, 41 NATURAL RESOURCES JOURNAL 283-328 (2001).

¹⁴ See generally

market activity.²⁵ In 1880, Chicago saw a significant increase in almost all industries: gains of 23.5% in cash value of marketed produce, gains of nearly almost 16% in money received for goods sold at wholesale, and a 15% increase in the value of material that manufacturers produced.²⁶ This growth was attributable to the Chicago exchanges, and without them the growth might not have been regulated in a way that maximized its benefit to the community. Other well-documented benefits of commodity exchanges include improved price discovery, linking smallholder farmers to markets, reducing transaction costs, and increasing export earnings.²⁷

B. United States Water Law: Two Types of Water, Two Doctrines

Historically, there have been two primary water law doctrines in the United States: the riparian doctrine and the appropriation doctrine, also called the doctrine of prior appropriation.²⁸ However, neither doctrine is well-suited to solve novel problems resulting from increasing use of groundwater. Furthermore, neither doctrine is suited to address the challenges posed by increasing dependence on water and simultaneous water scarcity resulting from rising demand and climate change. This article argues that neither the riparian nor prior appropriation doctrines are sustainable in the long-run because neither gives enough weight to societal externalities. For this reason, this article proposes a solution that integrates the externalities resulting from population growth and climate change, including groundwater depletion and overall water scarcity. Before addressing these arguments, however, background information on types of water and both systems will be helpful.

²⁵ See HISTORY OF THE BOARD OF TRADE OF THE CITY OF CHICAGO 597-98 (Charles Henry Taylor, ed. 2008).

²⁶ Prices were higher, on average, than in 1879 because of “the tremendous spasm of commercial activity and speculative excitement.” The price of bread rose by almost 12%. Produce circles, where grain was traded, were also very active; the volume of receipts and shipments was larger, with the largest increase in corn. Corn receipts in 1879 were equal to nearly all receipts for all kinds of grain in the biggest year preceding 1878. Livestock traffic exceeded all former records. *Supra* note 24.

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the water and less on which parties, if any, may have rights to the water.³⁸ Likewise, there

Jurisdiction over water allocation and quality falls to the CWCB.⁶⁵ The institutions governing Colorado water law are interstate compacts and equitable apportionment decrees; Colorado water law; and local control.⁶⁶ The CWP takes all three

new uses requires reduction in existing uses—the motto in Colorado has always been “first in time, first in right.”⁷⁴

More recently, the CWP has synthesized and revolutionized the state’s water laws by creating measurable goals for future water use in the state. Facing a future of drought, wildfires, flooding, climate change, and unprecedented population growth, Coloradans realized that their water laws were outdated and would not sustain the water needed for future growth.⁷⁵ The CWP is the result of a series of roundtable discussions with local governments, water providers and other stakeholders, and the general public, and sets forth a series of actions and policies for Coloradan public officials and the citizens.⁷⁶ As a regional and national leader in water laws, it also provides a concise and useful summary of the direction of water law in the United States⁷⁷

Currently, a series of acts and the Colorado Constitution govern the state’s water laws. Surface waters are governed by the doctrine of prior appropriation and specifically by Article XVI of the Colorado Constitution,⁷⁸ and by the Water Right Determination and Administration Act of 1969 (“1969 Act”).⁷⁹ Surface waters include all natural stream water and all tributary groundwater that is hydrologically connected to a surface stream.⁸⁰ In Colorado, all groundwater is presumed to be tributary unless it is defined otherwise by law or unless facts prove it to be otherwise.⁸¹ Other groundwater, the second legal category, is governed by a modified prior appropriation approach.⁸² This category includes groundwater that neither law nor fact has found to be significantly hydrologically connected to a surface stream.⁸³ This water is allocated as correlative rights that are usually based on overlying land ownership.⁸⁴ The Colorado Ground

⁷⁴ *Id.*

⁷⁵ INTRODUCTION: COLLABORATING ON COLORADO’S WATER FUTURE, COLORADO WATER PLAN

water. At the state level, this would likely require laws involving cooperation with the CFTC and/or FERC.

This article does not propose adding an amendment directly to the CWP, but rather amending the state constitution, passing a state executive order, or proposing a new project at the local level. There are ways to integrate a market into Colorado's water plans, but the CWP is the result of countless meetings and should arguably be respected as a finalized product. Many state agencies are involved in water law, including: the Colorado Department of Public Health and Environment, the Colorado Water Resources and Power Development Authority, the Colorado Department of Agriculture, and the Colorado Energy Office.⁹⁹ For this reason, an executive order asking agencies to work out the mechanics of a market might be the most efficient method increase efficiency, favoring agency discretion and expertise. This article proposes an amendment to the State constitution, which may be a more complicated process but will help to illuminate how market laws might be implemented. Although the specific solution outlined here is an amendment to the constitution, it is important to note than an executive order may be more viable.

A. Water is a Commodity

Merriam-Webster defines a commodity as “an economic good ... a product of agriculture or mining; an article of commerce especially when delivered for shipment ... a mass-produced unspecialized product” or “something useful or valued.”¹⁰⁰ The CFTC provides that: “[a] commodity, as defined in the Commodity Exchange Act, includes the agricultural commodities . . . and all other goods and articles . . . and interests in which contracts for future delivery are presently or in the future dealt in . . . [a] physical commodity such as an agricultural product or a natural resource as opposed to a financial

⁹⁹ *Supra* note 2 at 2.

¹⁰⁰ *Commodity*, MERRIAM-WEBSTER'S COLLEGIATE DICT. (10th ed. 1999).

instrument such as a currency or interest rate.”¹⁰¹ A critical characteristic of a commodity is that it is the same, regardless of its producer: no matter where it comes from, it should be interchangeable with the same commodity from a different producer. In this vein, agricultural products such as apples or wheat are commodities, but constructed goods such as tables or chairs are not.¹⁰²

Water can be traded and is fundamentally the same no matter its source. Water can therefore be considered a commodity. Thus, water laws should reflect the commodification of water for the benefit of the general public, water utilities, and businesses with a financial interest in the water market. Water laws should do this by setting up and regulating a water marketplace.

In addition to fitting the economic definition of a commodity, water will be increasingly considered a commodity because it will become scarcer. Deane Dray, a Citigroup analyst who leads global water-sector research, stated that “[i]t’s intuitively appealing to talk about water as a traded asset. If you look at projections over the next 25 years, you’ll see that global water supply and demand imbalances are on track to get worse. The majority of the world population is living in water-scarce and water-stressed regions of the world.”¹⁰³ Further, climate change and population growth will make drinking water scarce in the future.¹⁰⁴ This scarcity makes water increasingly tradable, as scarcity would with any other commodity, and creates investment opportunities.¹⁰⁵ Recently, there has been an increase in the demand for investments attempting to profit from the need for fresh, clean water.¹⁰⁶

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B. How Would a Market Reduce or Fill the Remaining Gap?

Importantly, there are practical reasons for endorsing a market approach to close the remaining supply-demand gap. The CWCB already exists as an overseeing agency, water markets are successfully fighting water scarcity elsewhere, and strong collaboration between agencies and stakeholders in Colorado ensures that a robust cash market with plenty of actors could develop successfully. Finally, the prior appropriation and riparian doctrines support the creation of a market.

The CWP takes several specific steps to reduce the supply-demand gap. These include the following:

- (1) Supporting the evaluation, feasibility, and completion of BIPs through grants;
- (2) Supporting increased consistency and technical support in the BIPs in the following ways:
 - a. Providing technical support for many of the BIPs through continued decision-support development and maintenance to explore municipal, industrial, agricultural, and environmental shortage analyses;
 - b. Providing technical support to several other BIPs to explore the use of project information sheets and project prioritization;
 - c. Supporting the further quantification of costs associated with projects and methods, development of new acre-feet, development of new irrigated acres, and protection of stream-miles;
- (3) Incorporating BIP information into the next version of Statewide Water Supply Initiative (SWSI) and reassessing the municipal, environmental, industrial, recreational, and agricultural gaps at that time; and
- (4) Establishing guidelines for basin-roundtable grants, enabling basin roundtables to facilitate the implementation of BIPs in their basins, with

did.¹⁰⁸ Finally, it would also do the following: improve price discovery, link smallholder water sellers to the market, reduce transaction costs, and increase export earnings.¹⁰⁹

While the actions above create a comprehensive plan, they fail to put a price on water. A price is critical because it signals that a commodity should not be wasted, and if it is wasted, there is a monetary opportunity cost to accompany the physical one.¹¹⁰ The CWP creates a system that values water, demonstrated by the careful monitoring described above. Therefore, a price is a natural accompaniment.

Physical water could be traded as easily as one basin turning off a pump while another basin simultaneously turns on a connected pump. Alternatively, stakeholders could register shares of water that would be traded with the help of a broker.

- (3) that by 2025, 75% of Coloradans will live in communities that have incorporated water-saving actions into land-use planning;
- (4) that agricultural economic productivity will keep pace with growing state, national, and global needs;
- (5) to attain 400,000 acre-feet of water storage to manage and share conserved water and the yield of IPPs by 2050 (which equates to an 80% success rate for these planned projects);
- (6) by 2030, to cover 80% of locally prioritized lists of rivers with stream management plans, and 80% of critical watersheds with watershed protection plans;
- (7) to sustainably fund the Plan by the State investigating options to raise additional revenue in the amount of \$100 million annually (\$3 billion by 2050), starting in 2020; and
- (8) to improve public awareness by 2020, as determined by public surveys.¹¹³

The CWP also places responsibility for implementation of the plan in the CWCB, which is the agency responsible for the following: (1) streams, (2) watersheds, (3) lake protection, (4) water conservation, (5) flood mitigation, (6) stream restoration, (7) drought planning, (8) water supply planning, (9) and water project financing.¹¹⁴ The agency works with other state and federal agencies to protect Colorado's water apportionments.¹¹⁵ In the 2013 executive order calling the CWCB to take action, the executive order explicitly stated that "[t]he [CWCB] was created in 1937 '[f]or the purpose of aiding in the protection and development of the waters of the state, for the benefit of the present and future inhabitants of the state.' . . . More than 75 years later, we reaffirm this purpose and seek to tap Colorado collaboration and innovation in addressing our water challenges."¹¹⁶ The CWCB should have a central role in a water market because of its longstanding leadership position in Colorado water issues.

Colorado has the system in place to tweak its water laws to make them more amenable to water as a tradable commodity. Many of the goals of the CWP could also be achieved through water trading and investing, and the CWCB could act as a trading board with responsibilities similar to the United States Commodity Futures Trading

¹¹³ See *id.* (describing the critical action plan).

¹¹⁴ *Id.*

¹¹⁵ *Id.* (describing the collaboration on the Plan in the introduction).

¹¹⁶ C

Commission (CFTC).¹¹⁷ The CWCB is part of the Colorado Department of Natural Resources, maintains expertise in a variety of programs, and provides technical expertise to many of these programs. Its statutory authority comes from the agency's strategic framework.¹¹⁸ The variety of expertise and capacity to work with technical issues makes the CWCB a prime candidate to oversee the water market, but doing so would require an amendment to the strategic framework. Further, the Strategic Plan mandates that the CWCB "provides common technical platforms for planning and policy decisions" and "works with partners to develop policies and implement strategies for meeting Colorado's consumptive and non-consumptive water needs."¹¹⁹ The CWCB is a natural body to act as a trading platform.

Lastly, Colorado's water values, which are at the core of the CWP, reflect the characteristics of a healthy industry and reveal a regulatory scheme that would be welcome to a market.¹²⁰ The following are Colorado's water values:

- (1) "A productive economy that supports vibrant and sustainable cities, viable and productive agriculture, and a robust skiing, recreation, and tourism industry;
- (2) Efficient and effective water infrastructure promoting smart land use; and
- (3) A strong environment that includes healthy watersheds, rivers and streams, and wildlife."¹²¹

The overarching goals of collaboration and transparency would also be seen in a market where transparency is the leading goal. A water market is in line with the CWP's values and would help to meet its goals.

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Crowley farmers.¹²⁸ This was followed by a period of significant sales as Crowley farmers realized how much they could profit from the water.¹²⁹

The early sales permanently diverting a large amount of the region's water had, dried up thousands of acres of pasture, and opened farmer's eyes to the impressive cash value of the remaining water.¹³⁰ Crowley farmers, who had been struggling with low crop prices, youth emigration, and an aging population, saw the quick profits of unregulated water trading as a solution.¹³¹ This problem has been foreseen by other experts as well.¹³²

Crowley County illustrates the added utility of commodity exchanges compared to simpler water trading. Water trading laws should be receptive to a commodity exchange because of the tremendous benefits, especially in drought-prone places like Colorado. In Ethiopia, bumper harvests in 1984 and 2002 were shortly followed by food starvation crises.¹³³ During Eleni Gabre-Madhin's research for her graduate thesis on the topic, she observed that there was a shortage in northern Ethiopia but a surplus in the west.

is similar to Gabre-Madhin's exchange in that it is an innovative solution to the problem of a commodity shortage. This article proposes that a merging of the two ideas would help to close the water gap in Colorado and meet the goal of the CWP by incorporating the best of both worlds into a fully comprehensive solution.

Regulating exchanges, as opposed to an unregulated free market, is important for risk management, transparency, public trust in the market, and price control. Commodity exchanges can ensure that natural resources are used in a way that maximizes benefits to as many members of the public as possible. Fledgling commodity exchanges in developing countries provide a good example of the type of exchange and regulatory laws that might work in Colorado; these exchanges are developing in relatively underdeveloped markets—similar to the proposed Colorado water market. In Africa, Eleni Gabre-Madhin founded the continent's first modern exchange, which established a reliable interface for buyers and sellers to meet.¹³⁹ The African Development Bank Group has stated that “[c]ommodity exchanges are highly efficient platforms for buyers and sellers to meet; primarily to manage their price risks better, but also to improve the marketing of their physical products. They. . . [make] economies more inclusive, boosting the links between agriculture and finance, and making the commodity sector more efficient and competitive.”¹⁴⁰

D. How Should the Proposed Provision be Worded to Create the Regulatory Framework?

The proposed provision could be either an executive order or codified in the

appellate chamber could alleviate these concerns.¹⁴⁸ Vesting appellate jurisdiction in the water courts would mean that parties would appeal market cases directly to the water court and bypass the seven local courts entirely.¹⁴⁹

Finally, the provision is inspired by the Australian model because Australia, like Colorado, has a semi-arid climate and has faced similar problems in the water market.¹⁵⁰ It is also firmly based in Colorado's doctrine of prior appropriation because it involves trading water rights. A slight deviation from the doctrine of prior appropriation occurs where physical water is traded, but this could also be interpreted as a form of trading property rights. Given Colorado's long-standing history of using the doctrine of prior appropriation and its continued loyalty to the doctrine, it is crucial that a market not disturb the doctrine.¹⁵¹ For example, incorporating the courts is possible in a water rights market partly because the courts are already involved in water rights.¹⁵²

Considering the policy and legal addressed above, the following sections outline the proposed provision.

Section One:

Water licenses must be attained by any legal person who desires to exercise their property right to water. There will be four types of licenses: two for individuals who are interested in physically trading water, and another two for individuals who are interested in trading water titles. In each group, there will be one license for those in possession of water/water titles and another for those interested in obtaining possession. If a single entity wishes to do both, then they must obtain multiple licenses.

Section Two:

Water users, both personal and industrial, should indicate what volume of water they need for irrigation, agricultural, industrial, and personal use, and inform the CWCB.

¹⁴⁸ The water courts have filing fees ranging from \$20 to \$447. *Supra* note 120. The CWCB may wish to reimburse parties for these fees, or the courts might waive them for cases arising from the market, furthering the policy goal of promoting participation in the market.

¹⁴⁹ In states without water courts, appealing directly to the state court could provide a viable alternative.

¹⁵⁰ Yee Huang, *A Tale of Two Countries: Lessons from Australia for Water Law in the United States?*, CENTER FOR PROGRESSIVE REFORM (Nov. 1, 2016), <http://www.progressivereform.org/CPRBlog.cfm?idBlog=860CB207-02D4-BB7A-B891B40E9ECFF220>.

¹⁵¹ *Supra* note 20.

¹⁵² The courts define water rights as “[a] property right to the use of a portion of the public’s surface or groundwater resource obtained under applicable legal procedures.” *Supra* note 78 at 17. This definition applies to the sections of the proposed provision that mention water rights.

Individuals wishing to do so may install pumps to withdraw groundwater. The physical pumps will be the property of the State of Colorado, which will also mandate a percentage of groundwater that may be pumped. Groundwater will be subject to all provisions applicable to surface water once withdrawn from the ground.

Section Three:

The CWCB may allocate the amount of water that can be taken from a river system as a percentage. Individuals collecting diffused surface waters should inform the CWCB of this use.

