



## UvA-DARE (Digital Academic Repository)

### The tension between state ownership and private quasi-property rights in water

Bosch, H.J.; Gupta, J.

**DOI**

[10.1002/wat2.1621](https://doi.org/10.1002/wat2.1621)

**Publication date**

2023

**Document Version**

Final published version

**Published in**

Wiley Interdisciplinary Reviews: Water

**License**

CC BY

[Link to publication](#)

**Citation for published version (APA):**

Bosch, H. J., & Gupta, J. (2023). The tension between state ownership and private quasi-property rights in water. *Wiley Interdisciplinary Reviews: Water*, 10(1), [e1621]. <https://doi.org/10.1002/wat2.1621>

**General rights**

It is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), other than for strictly personal, individual use, unless the work is under an open content license (like Creative Commons).

**Disclaimer/Complaints regulations**

If you believe that digital publication of certain material infringes any of your rights or (privacy) interests, please let the Library know, stating your reasons. In case of a legitimate complaint, the Library will make the material inaccessible and/or remove it from the website. Please Ask the Library: <https://uba.uva.nl/en/contact>, or a letter to: Library of the University of Amsterdam, Secretariat, Singel 425, 1012 WP Amsterdam, The Netherlands. You will be contacted as soon as possible.

## ADVANCED REVIEW

# The tension between state ownership and private quasi-property rights in water

Hilmer J. Bosch  | Joyeeta Gupta 

Amsterdam Institute for Social Science  
Research, University of Amsterdam,  
Amsterdam, The Netherlands

**Correspondence**

Hilmer J. Bosch, Amsterdam Institute for  
Social Science Research, University of  
Amsterdam, Amsterdam, The  
Netherlands.

Email: [h.j.bosch@uva.nl](mailto:h.j.bosch@uva.nl)

**Edited by:** Kelly Alley, Associate Editor,  
Wendy Jepson, Co-Editor-in-Chief and  
Jan Seibert, Co-Editor-in-Chief

**Abstract**

A critical legal issue in water governance is who owns and who holds property rights in water. Hence, we address the question: How has the state of legal knowledge on private property rights in water evolved worldwide, and how are these rights embedded in the current existing legal constructions? In answering the question, this article reviews the legal literature to: (i) understand the current state of water ownership and water property rights in the main legal systems, (ii) understand and capture how private water “property” rights are embedded in the existing legal constructions; and (iii) reflect on the application of these rights in practice. We conclude: (a) While most states have placed water in the public domain, past statutory systems of water rights are difficult to abolish, and increasingly Indigenous peoples are successfully demanding recognition of, and reclaiming their water rights. (b) States are (re)allocating water rights through statutory mechanisms, including clearly defined bundle-of-rights. And (c), while the state ostensibly controls the water, the allocation of water through historic and new statutory instruments “encroaches” on state water ownership, and has created confusion affecting the state’s power to adaptively govern the water. This confusion reflects the tension between the need of states to own and govern water in the public interest, the rights of Indigenous peoples to their water, with the need of agriculture and industries to have reliable supplies of water, leading to water use rights that imply “quasi-property” rights in water.

This article is categorized under:

Human Water > Water Governance

Human Water > Rights to Water

**KEYWORDS**

adaptive water governance, water ownership, water property rights, water reallocation

This is an open access article under the terms of the [Creative Commons Attribution](https://creativecommons.org/licenses/by/4.0/) License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

© 2022 The Authors. *WIREs Water* published by Wiley Periodicals LLC.

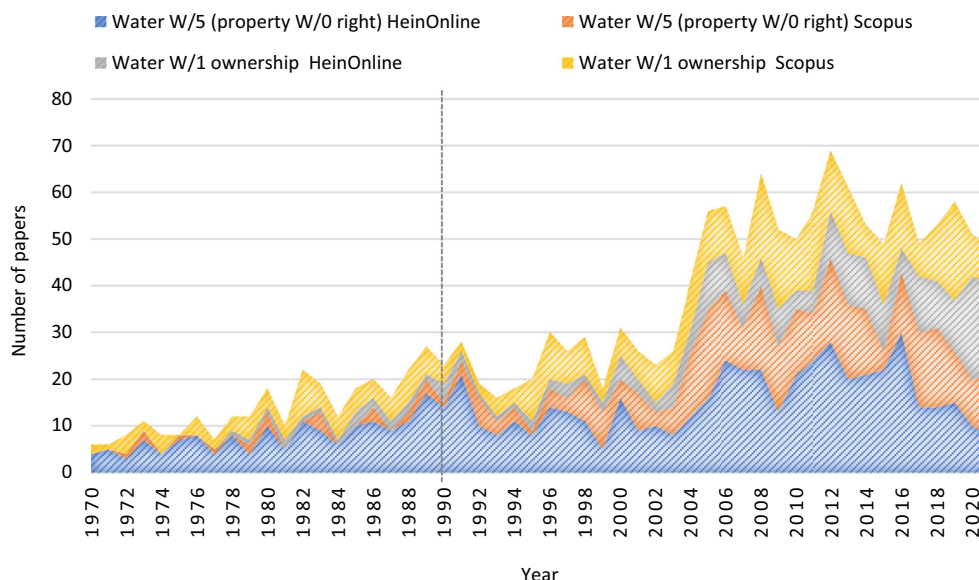
# 1 | INTRODUCTION

The development of water law reflects the struggle to control water (Gupta & Dellapenna, 2009, p. 408), and especially to own water and to hold property rights in water, through which instrument and for how long (Dellapenna & Gupta, 2021). As water demand increases (UN-Water, 2021), and availability decreases (Boretti & Rosa, 2019) or varies with climate change (IPCC, 2022), the struggle to control water continues and intensifies requiring adaptive water governance (Cosens & Gunderson, 2018). A key confusion that emerges is who owns water and who holds property rights in water. Against this background, we ask the question: How has the state of legal knowledge on private property rights in water evolved worldwide and how are these rights embedded in the existing legal constructions?

This article reviews the legal literature to: (a) understand the state of water ownership and property rights in water in the different legal regimes, and (b) capture how legal private (quasi-)property rights are embedded in the existing legal constructs (e.g., water use permits, tradable water permits, contracts, concessions). Within water property rights, we focus on water quantity (as compared to permitted discharges associated with water quality); the right to the water itself (not to the beds and banks of waterbodies); and we distinguish water ownership from water property rights: ownership is vested in the state (or by subnational jurisdictions, e.g., Canada and India), and property rights are held by the users. In doing so, we focus on literature that covers the world's major (most common) legal systems including customary, common, civil, and Islamic law (Joutsen, 2019).<sup>1</sup> Most countries have put water in the public domain, and legislation and case law determine whether a water right is defined as a property right (Saxer, 2010). We do not engage in this discussion, but instead explore the literature to assess what past and present “property” rights systems imply for state water “ownership” and hence the ability to adaptively govern water. Adaptive water governance requires states and other actors to deal with uncertainty and emerging challenges in the context of climate and global change, and changing social-economic conditions (Pahl-Wostl, 2007). This includes flexibility in the allocation, reallocation and redistribution of water, not only to address these challenges, but also to allow for more just and equitable patterns of water use (Gupta & Lebel, 2010; Joy et al., 2014; UNECE, 2021). Property rights in water, although not absolute, impair the control over water and the ability to adaptively govern water (Larson, 2019). Understanding the changing patterns in “property” rights in water is “critical to developing a legitimate, equitable, and effective governance system” (Gupta et al., 2013, p. 575).

The fluidity of water rights makes it hard to comprehend whether water rights can be seen as property rights (Saxer, 2010, p. 60). Property rights in water do not imply owning the physical water itself (i.e., the water molecule), but holding property in a right to use a certain volume of water (Dellapenna & Gupta, 2021; Johnson et al., 2016; Solanes, 1999), which can be seen as “a possessory interest in the right to use water” (Caponera, 2007, p. 127). The ±195 national legal regimes today have specific characteristics, but generally the right to use water is defined “in terms of the relationship of the use to the water source” (Dellapenna & Gupta, 2013, p. 9). Water property rights include a bundle-of-rights—including for example, the right to use, sell/alienate, inherit, manage, commercialize, exclude, store, divert/restrict/alter water flows, use sewage water for irrigation, and/or discharge wastes into watercourses. The bundle ranges from a minimum right of use, to having all the rights in full, including ownership rights (Bannon, 2017; Honoré, 1961; Saxer, 2010; Waldron, 1988; Zellmer & Harder, 2008). In the case of state water ownership, the state owns all the rights in the bundle. When other actors acquire water property rights, these “encroach” on state water ownership; although the state can expropriate such water rights subject to compensation (Bosch et al., 2021). While most states avoid mentioning property in relation to water (Dellapenna & Gupta, 2021), in practice, different legal water use entitlements can imply “quasi property rights” (Hodgson, 2006; Zellmer & Harder, 2008). When an actor holds a quasi-property right, *de jure* the state still owns all the property rights, while *de facto* the state has privatized the water by granting a bundle-of-rights that resemble property rights in water (Bosch et al., 2021; Bosch & Gupta, 2022). With quasi we mean “[a]s if; as it were; analogous to. ... [Indicating] that one subject resembles another, with certain characteristics, but that there are also intrinsic differences between them” (Black, 1991, p. 977). Balganes (2012, p. 1891) refers to quasi-property as “situations in which the law seeks to simulate the idea of exclusion, normally associated with property rights ...” Hodgson (2016, pp. 16–17) states that: “quasi-property rights ... are capable of being asserted against third parties and the state ... [and] they may not be expropriated by the state without the payment of compensation.”

This scoping review covers the legal literature and the works of legal scholars in other journals, including obtained through forward and backward snowballing from the reference lists (Arksey & O'Malley, 2005; Jalali & Wohlin, 2012). We used the key words “property rights” within five words of “water,” which resulted in 810 results from HeinOnline, and 321 results from Scopus for the period 1990–2021 (see Figure 1). And “ownership” within one word of “water,” which resulted in 299 results from HeinOnline and 203 results from Scopus. Based on our research question, we



**FIGURE 1** Number of papers covering “water property rights” and “water ownership” in HeinOnline and Scopus, from 1970 to 2021. In the period starting in 2003, there has been a strong increase in academic research on property rights in water and water ownership.

shortlisted 136 papers. In scoping down the literature to the shortlisted papers, we included papers that (i) are concerned with the conceptual development and understanding of water property rights beyond the *de jure* understanding, and (ii) apply and operationalize the concept of “property” rights in water. Our search may have inadvertently left out literature on Indigenous peoples rights as they do not often use the terminology of property rights. This has been corrected by a focused review of such rights. This article does not try to add to the field on comparative law. The article largely depends on anglophone scholarship, thus is limited in scope.

We first discuss the current state of water ownership and water property rights in the major legal systems: the law of Indigenous peoples and customary law at national level (see Section 2.1), followed by how customary law is institutionalized in common law (see Section 2.2), civil law (see Section 2.3), and Islamic law (see Section 2.4). Subsequently, we elaborate on how the distribution of water through policy instruments (e.g., permits) and contracts create private (quasi-)property rights in water (see Section 3), before drawing conclusions (see Section 4). In combining knowledge of the past systems of water property rights in different systems of law, with the growing use of statutory water use entitlements, we show how the allocation of quasi-property rights in water are increasingly encroaching on state water ownership.

## 2 | WATER PROPERTY RIGHTS IN DIFFERENT SYSTEMS OF LAW

This section analyses the literature on the main legal systems—covering customary, Indigenous, common, civil, and Islamic law—to understand the current state of water ownership, and water “property” rights that arise from historic water allocations and systems.

### 2.1 | Customary law, and the law of indigenous peoples and local communities

Property rights to water can be traced back to ancient systems of customary law, some of which survive even today in modified form.<sup>2</sup> In many western countries these customary systems were slowly institutionalized and codified over time into civil and common law systems (see Sections 2.2 and 2.3). Some customary systems influenced or were influenced by the rise of religions, this is discussed further in Section 2.4.

Customary systems still exist today. Many Indigenous peoples and local communities have their own (legal) regimes and systems toward land and natural resources including water, which may or may not be recognized by the settler colonial governments<sup>3</sup> or (postcolonial) nation-states.<sup>4</sup> Customs differ: customary water law of Indigenous communities

today often differs from the way in which customary law got slowly institutionalized in western systems of water “rights,” “property,” and “ownership”; such formal systems is at odds with the beliefs, relationships, and connections many communities and Indigenous peoples had and have with nature, land, and water (Curran, 2019; Johnston, 2018). In fact, many statutory water laws, property rights, and quasi-property rights were designed as colonial instruments to dispossess the “rights” of Indigenous peoples and local communities, and continue to do so today (Banner, 2005; Berry & Jackson, 2018; Curley, 2019; Curran, 2019; Daigle, 2018; van Koppen et al., 2014; Olagunju et al., 2019; Phare, 2009; Taylor et al., 2019).

The laws of Indigenous peoples and local communities often do not recognize private water ownership, such as in most Sub-Saharan African (Ogendi & Ong’oa, 2009), Latin American (Del Popolo & Reboiras, 2014; Ramazzotti, 2008) and Asian communities (Kho & Agsaoay-Saño, 2006; Misiedjan & Gupta, 2014), but recognize communal or collective “ownership.” For example, in Ghana, water (including the seas) is regarded as public property vested in stools,<sup>5</sup> communities and families, not subject to individual appropriation (Sarpong, n.d.). In Tanzania and Nigeria, all water is “owned” by all members of a community/tribe (Ajai, 2012; Nkonya, 2006), and in Papua New Guinea, “customary water rights are possessed by a clan ... and [i]ndividual members of the clan ... merely exercise those rights from the clan” (Kalinoe, 1998, p. 41). In South Pacific Island countries, “property rights” over rivers, lakes, and streams are claimed by the Indigenous peoples which arises from the relationship, tradition, and customary practices regarding the resource (Kalinoe, 1998, p. 2).

Some Indigenous communities, for example, the Aboriginal and Torres Strait Islander people (Australia), American Indians and Alaska Natives (USA), Māori (New Zealand), and First Nations, Inuit and Métis (Canada), do not use the concept of “ownership” in governing water. There is thus tension between these communities that claim the right to self-determination (Cosens, 2021), and the nations where they are located that have claimed state water ownership. Recent court cases have recognized Indigenous rights: for example, in 2017, the Maori ancestral Whanganui River was granted legal personality, including “the rights, duties, powers and liabilities of an entity with legal standing including the ability to sue those who harm it” (Collins & Esterling, 2019, p. 197), with the Maori as guardians (Cosens, 2021, p. 414); and in the United States, a Court has recognized that the Cahuilla Indians’ use of groundwater “takes precedence over the state’s water allocation regime” (Lankford, 2018, p. 10).<sup>6</sup> The literature shows that there is a discrepancy between a nation-state’s statutory law on water, and the law of Indigenous peoples living on the land within those nation-states. However, in the past decades, Indigenous peoples are increasingly successful in demanding recognition of their water rights, forcing states to acknowledge their rights to water, affecting the institutionalized nation-state ownership claim over the water.

## 2.2 | Common law

Customary law in England got institutionalized in common law,<sup>7</sup> and spread to its colonies. Traditional English common law did not allow for the ownership of, or right of property in running water of natural flowing water channels (Caponera, 2007)—water was seen as a “fugitive resource: incapable of ownership until it is captured” (Johnston, 2018, p. 40). The waters were considered common to those who had a right of access to these waters; only riparian landowners were able to withdraw water. The ownership of land included the right to use water from adjacent water bodies (e.g., rivers or streams), which was considered an integral right to the land (Matthews Glenn, 2011; Odgers & Odgers, 1920; Puthucherril, 2014; Radosevich, 1976). This right existed by virtue of law (Barton, 2010; Saxer, 2010), and did not depend upon a specific act of the state, such as the grant of a water use entitlement (Puthucherril, 2014). While it did not give ownership/property rights in the water (Caponera, 2007; Kwasniak, 2012; Odgers & Odgers, 1920), it allowed riparian landowners to use surface water as long as the water use was reasonable and it did not harm other riparian uses (Caponera, 2007; Odgers & Odgers, 1920). However, landowners were allowed to abstract groundwater under their land without regard to others, implying “property” rights to the groundwater (Getzler, 2004). Such rights existed except when the groundwater flowed in a defined and known channel, where the groundwater related rights were considered the same as riparian rights to surface water (Caponera, 2007). Although many religions and Indigenous systems see water in a more holistic light (Poelina et al., 2019), historically, in western systems due to the lack of scientific understanding of the interconnectedness between surface and groundwater, both were governed separately in common and civil law countries (Winter et al., 1998).

While many countries have “unbundled” land ownership from the right to access water, land ownership still gives holders access to water in many countries. For example, in India, landowners still hold property in

groundwater (Aguilar, 2011; Koonan, 2010), where “percolating groundwater is considered part of the soil and belongs to the owner of the land” (Richardson, 2017, p. 63). This system has been in place since the 19th century, and is incorporated into Indian law through the Indian Easement Act (1892) (Aguilar, 2011; Cullet et al., 2017); granting owners an unrestricted right to extract water below the land, without regulatory oversight (Aguilar, 2011; Cullet et al., 2017). According to Cullet (2014, p. 56): “groundwater law [has] a strong property focus” which gives landowners an “overwhelming control over groundwater.” Furthermore, in Canada,<sup>8</sup> while groundwater use was historically governed under the common law “rule of capture,” today, water is owned by the Crown and groundwater rights are water use entitlements, not property rights. However, Brandes & Curran (2017, p. 51) argue that in practice common law groundwater rights “exhibit many of the characteristics of a property rights regime,” and that the public and politics treat these groundwater rights *de facto* as property rights. As such, this limits the ability of governments to govern groundwater use. For example, the government of British Columbia, which only recently started a general permit system for groundwater, is reluctant to limit the “quasi-property” rights in water fearing compensation claims (Brandes & Curran, 2017, p. 51). In both countries, “water” remains a provincial matter: in India, water legislation is developed and enacted by the individual States, with the Union Government having an advisory role and is not directly involved (Gupta, 2004). In Canada, as a decentralized federation, the “constitutional authority for water resources belongs primarily to the ten provinces” (Bradford et al., 2017, p. 272). Also in Australia, Brazil, and the United States, jurisdiction over water resources falls under the mandate of subnational entities (Benjamin et al., 2005; McKay, 2005, p. 41; Trelease, 1961). In South Africa,<sup>9</sup> although the 1998 National Water Act (NWA) abolished the riparian right system that was in place under the 1956 Water Act, in practice this water use is continued under the Existing Lawful Use provision of the NWA, 1998 (Kidd, 2009, 2016). To date, the South African government struggles to get this water back (Bosch & Gupta, 2020; Kidd, 2016).

In several states of the United States, groundwater is seen as property (Dellapenna, 2012). For example, in Indiana, Maine, and Texas, groundwater is governed by the “absolute dominion” rule in which landowners hold property rights to the groundwater below their land (Dellapenna, 2012; Kaiser, 1996; King et al., 2010; Owen, 2013; Schaffer, 2010). Regarding surface water, the riparian rights system persisted in several eastern states (Dellapenna, 1990) and were seen as property rights (Dellapenna, 2011; Saxer, 2010). However, with water getting scarcer in these states, states moved away from traditional riparian rights toward “regulated riparianism”: a regulatory “permit system that is based on riparian, rather than appropriative principles,” (Dellapenna, 2011, p. 85). According to Dellapenna (2010, p. 25): “[a]ll who own land contiguous to a surface water body are co-owners of the right to use the water.”

In the more arid western states of the United States, the prior appropriation system was developed as a basis for obtaining water rights, as the riparian right system did not allow non landowners to access water (Dellapenna, 2004; Dellapenna, 2011). This system unbundled land from water, and gave an actor a right to divert and beneficially use water (Saxer, 2010). The prior appropriation system specifies the location, period, volume, and priority of the water use right (Dellapenna, 2011), and is also referred to as “first in time, first in right” (Tarlock, 2000, p. 885). This means that when a stream flow is low, a senior appropriator is allowed to divert its full volume of water until the stream is depleted, at the cost of more junior appropriators. While the system was initially designed explicitly not to function as property rights to prevent speculation, it still promoted new settlements in the American west (Schorr, 2005). Today, the rights in the western states are treated as “a species of private property under the law of appropriative rights” (Dellapenna, 2004, p. 552). According to Johnson (2007a, p. 217), “Western water rights are assumed to be a complete commodification and privatization of water ... [and] appropriative rights are somewhat more akin to real property than are riparian rights.” In nine states (i.e., California, Kansas, Nebraska, North Dakota, Oklahoma, Oregon, South Dakota, Texas, and Washington) a hybrid system exists (i.e., the “California Doctrine”) that combines elements from both the riparian and prior appropriation system (Kanazawa, 1998).

While surface and groundwater were governed separately in the past, in many states this bifurcated system still exists, in which groundwater and surface water are governed by a different set of legal rules (Larson, 2017; Sax, 2003; Thorson et al., 2005). For example, in Arizona the prior appropriation system governs surface water, while groundwater is governed by a “separate and equally complex set of rules and legal doctrines” (Larson, 2018, p. 201). Also in India surface- and groundwater are largely governed separately, in different laws (Cullet, 2014). This results in several problems; it is difficult, if at all possible, to draw a clear hydrological line between both, which in turn determines what rules apply to the water rights (Larson, 2017), complicating water governance.

## 2.3 | Civil law

Customary law in continental Europe, with roots in Roman law, got institutionalized in civil law.<sup>10</sup> Ancient Roman water law distinguished between public (water belonging to a public body), private (exclusive and unlimited water use), and common water ownership (waters not owned by anybody) (Caponera, 1992; Dellapenna & Gupta, 2008). A re-examination of Roman law shows that rights of ownership were separated into different bundle-of-rights, which differed between different water bodies and instruments (Bannon, 2017; Quintavalla, 2020). Traditional civil law classified water into private waters and public waters (Caponera, 2007; Schorr, 2017). Public waters were subject to a government authorization, concession, or permit, while private waters could be used freely, subject to statutory limitations (Caponera, 2007). The use of private surface- and groundwater derived from land ownership (Caponera, 2007). The French Civil Code (1804) saw groundwater as the property of the landowner above (Hodgson, 2006). Over time, private waters became increasingly subject to state control, and the distinction between public and private water ownership has become obsolete (Schorr, 2017), although some countries still struggle to make this distinction obsolete. For example, in Spain, while the 1879 Water Act gave landowners private water rights to groundwater, which were considered private property (Ariño Ortiz & Sastre Beceiro, 2009; Casado-Perez, 2015), in 1985 the new water law put all continental waters in the public domain and encouraged landowners to give up their private water rights, but many did not do so (Irujo, 2003).

## 2.4 | Religious law

Historically, customary law was also institutionalized in religious law, for example, in Hindu (Dharmaśāstra), Jewish (Torah), Buddhist (Vinaya Piṭaka) (Schonthal, 2021), Indigenous Chinese traditions,<sup>11</sup> and Islamic (Sharia) law.<sup>12</sup> Most religions, if not all, discuss water. For example, Hindu law allows only for usufructuary rights to water (Cullet & Gupta, 2009), and Judaism allows for private ownership of well water and for state/municipal ownership of water (Laster et al., 2009). In ancient China, the idea that the natural cosmic order and the human social order are closely related was reflected in the approach to water (Caponera, 2007, p. 18). Human behavior in harmony and unity with water. Islamic law does not recognize water ownership unless it is taken in full possession, which derives from an input of labor, for example, water in a private dug well (Naff, 2009). Furthermore, Islamic law recognizes two water rights, the right of thirst; and the right of irrigation (Caponera, 2007) and hence, Muslims should not take water in excess to their needs, and they are obliged to allow free access to any amounts of water beyond these needs. It is prohibited to sell, lease, or rent water, nor may water be taxed (Naff, 2009). Nevertheless, Al-Awar et al. (2010, p. 34) state that “Islam supports privatization of water supply as long as it leads to a fair and free market”; here people pay for the supply service and not the water itself.<sup>13</sup> Religious law has been modified over time and space and only exists today in pure form in specific areas.

## 2.5 | Inferences

In assessing the current state of water ownership and water property rights in the main legal systems, the literature shows that despite contextual differences worldwide, countries sought to gain and increase control over water by abolishing customary law systems and unbundling land ownership from water use rights. However, some states grapple with gaining control, (i) some states have not been able to limit or revoke historical water use rights which de facto and jure continue to exist, including the water use rights based on land ownership; which in some cases continue to be re-enforced (e.g., India, the United States), (ii) in some countries, jurisdiction over water is parsed out constitutionally and water remains a State subject in which the role of the national government's mandate remains limited. This encroaches on institutionalized state ownership and may impair the role of the state in adaptive water governance. And (iii) while largely ignored, countries are under pressure to acknowledge Indigenous rights to water and their understanding and approach to water rights; in recent decades, Indigenous peoples and communities have been partly successful in claiming back their water rights.

## 3 | WATER “PROPERTY” RIGHTS IN STATUTORY INSTRUMENTS

In the different systems of law, water ownership and property rights developed differently. In addition, certain ideologies influenced the treatment of water—under Communism water was and is owned by the state (Kotov, 2009;

Szelényi & Mihályi, 2019); while neo-liberal capitalism is increasingly calling for the commodification and privatization of water (Sarwat & Mahmud, 2017; Zhang, 2021).

In states where water is put in the public domain, the core of water law is the granting of rights to use water (Barton, 2010). States grant actors water use rights through different instruments (e.g., water use permits, tradable water permits, contracts, and concessions). This section examines how private water “property” rights are embedded in these existing legal constructions, and how these rights translate into practice.

### 3.1 | Water property rights through water use permits

Globally states are allocating water use rights through water use permits (and/or consents, licenses, rights, concessions, or authorizations) (Barton, 2010; Bosch et al., 2021; Hodgson, 2016). Generally, a water use permit: (a) is based in law, (b) has clearly defined conditions, (c) is subject to registration, monitoring, and enforcement, (d) is legally backed by the state, (e) may be transferred, subject to state approval, and (f) can be granted without the applicant owning land (Barton, 2010; Bosch & Gupta, 2020; Hodgson, 2006, pp. 1–3; Schorr, 2011). This allows states to remain the legal owner of the water, and have the power to regulate and control the access and priority of water use, influencing a country’s “economic productivity, social and cultural wellbeing, and ecosystem quality” (Brandes & Curran, 2017, p. 50; Schorr, 2011).

Since water is put in the public domain, the rights that are allocated through the granting of permits are not considered property rights (unless defined so by legislation and case law) (Hardberger, 2013; Saxer, 2010; Schorr, 2011). However, some scholars argue that the rights that are allocated through water use permits, are in fact akin to quasi-property rights (Bosch et al., 2021; Hodgson, 2006; McKenzie, 2009; Snyder & Utley, 2009; Soltau, 1999). As Hodgson (2006, p. 47) states: “[t]he fact that [water rights] gain their existence from an administrative or regulatory procedure does not by itself preclude them from being property rights.” For example, while in South Africa a water use license is seen as an entitlement to use water, Glazewski and Du Toit (2013, pp. 16–29) “suggests that [licences] are possible ‘new property’ rights ... subject to the limits imposed by the nation of the public trusteeship and the requirement of beneficial use.” The two main arguments to support this claim are that the NWA allows for compensation in the event of expropriation of the water right, and that the right may enjoy constitutional protection (Glazewski & Du Toit, 2013). Moreover, Bosch and Gupta (2020) found that in South Africa, holders of a water use license hold several quasi-property rights in water. They argue that the NWA allows actors to use water for up to forty years with the possibility of renewal, to legally protect their entitlement through litigation, and to claim compensation in certain instances. In looking at how property rights in water have evolved through the granting of water use permits and allocation of rights in 60 developing countries in Africa and Asia, Bosch et al. (2021) identified five categories of quasi-property rights including the right to: (1) use water, (2) alienate the permit, (3) legal protection, (4) compensation, and (5) state protection. They conclude that countries “end up de facto privatizing water by allocating ‘property-like’ rights to actors through the granting of water use permits” (Bosch et al., 2021, p. 274).

In Georgia, large water users need to obtain a permit to withdraw water (Snyder & Utley, 2009). The law makes a distinction between permits for farmers and other water users. A permit given to a farmer grants the holder an unlimited use of water, which is irrevocable, fully transferable, and granted in perpetuity. As Snyder & Utley (2009, p. 191) state: “[t]he rights given to farmers ... closely resemble the general characteristics and attributes associated with private property.” Compared to the traditional characteristics of property, permit holders have a “property right for the use, transfer, and exclusion of the water on [their] property” (Snyder & Utley, 2009, p. 185). Similarly, the Israeli water law states that water is public property and water is allocated through granting permits. However, Schorr (2011, p. 52, 67) argues that: “[t]he public property established by the Water Law is being replaced, step by step, with a regime of private rights that can be classified as ‘new property’, if not full-blown private property,” and “practice in the water sector indicates a quasi-private-property view of water.” This is because: (1) the High Court has ruled that a water allocation may create a “reliance interest worthy of recognition” meaning that in case of damage the actor could possibly be compensated, (2) water allocations are in practice renewed automatically, (3) rights are based on priority in time (senior over junior water rights), (4) the water laws allow for free transfers of extraction permits, (5) instead of the Water Authority, the Agriculture Ministry (representing the farmers) is responsible for water allocations, and (6) “Farmers’ reliance on previous allowances receives constant encouragement by the practice of ‘compensating’ them for ‘cuts’ to their allowances from previous years” (Schorr, 2011, pp. 66–67). Also in Canada, water rights are allocated through permits, which are subject to specified terms and conditions that can change. In Ontario and eastward provinces, the riparian right

system continues to exist as a “regulated riparian model” in which water users need a permit (Benidickson, 2018; Kwasniak, 2012; Mascher & Curran, 2017). In the western provinces, Alberta, British Columbia, Manitoba, and, Saskatchewan the riparian right system has been replaced by a prior allocation system (Percy, 1988). This system is based on the government allocation of water licenses coupled with priority, in which the “older licences take precedence over more junior” (Mascher & Curran, 2017, p. 207). While these licenses are not considered to be property rights (Brandes & Curran, 2017), de facto the licenses show characteristics of property rights (Brandes & Curran, 2017). Not only do many licenses have no expiry date, amending these licenses comes with the concern of compensation claims (Brandes & Curran, 2017).

The scholarship on New Zealand shows that it put water in the public trust and allocates water through granting so called “water consents” (a water use entitlement similar to permits). The New Zealand Resource Management Act (RMA) 1991, section 122(1), reads: “[a] resource consent is neither real nor personal property.” Hence, water permits do not constitute a property right in water (Grinlinton, 2011; Memon & Skelton, 2007). Nevertheless, these water consents are in practice seen as a property right. De facto, “water permits are regarded as a property right within the farming community ... and within the real estate industry” (Memon & Skelton, 2007, p. 258). Discussion on reviewing permits may lead to the risk that the permit holder claims financial compensation (Memon & Skelton, 2007). Grinlinton (2011, p. 2930) argues that the consent regime in fact creates certain rights that have the “characteristics of both real and personal property.” Consents are transferable, have an economic value, can be used as security, and in certain circumstances, may vest in personal representatives upon death (Grinlinton, 2011, p. 296). These characteristics are normally assigned to property rights as defined by the state, the consents are “arguably, new forms of quasi-property rights” (Grinlinton, 2011, p. 291).

We see that although states have put water in the public domain, and govern their water resources through some sort of nationwide water use permit system, they allocate several rights that resemble some form of quasi-property—creating new challenges regarding water governance.

### 3.2 | Water property rights through purchase in water markets

Economists generally see markets based on private property regimes as one of the most efficient ways to manage and allocate resources within an economy (Dellapenna & Gupta, 2021; Gupta & Dellapenna, 2021). In some countries, this paradigm has also been applied to water which has resulted in the development of tradable water permits (Gupta & Dellapenna, 2021). Water markets promote effective (optimal allocation) and efficient water management (reallocation of water to high-valued uses), and it is said that they do not function to their full potential without the legal recognition of clearly defined property rights (Zellmer & Harder, 2008). Water markets, whether functioning or not, are in place in Alberta (Canada) (Block & Forrest, 2005; Hurlbert, 2018; Hurlbert & Diaz, 2013; Percy, 1996, 2005), Australia (Bjornlund & McKay, 2002; Pilz, 2010), Chile (Vergara & Rivera, 2018), Mexico (Hernandez, 2003), Spain (Casado-Perez, 2015), South Africa (van Koppen et al., 2021), and China (de Bonviller et al., 2020; Easter & Huang, 2014; Schiller, 2009; Zhang, 2021).

Although the Chilean Constitution and its Water Code (1981) put water in the public domain by legally defining water as a “national good for public use” (Vergara & Rivera, 2018), in 1981 Chile enabled a (fully functioning) system of private tradeable water rights based on the principle of private property, and decoupled water from land (McNallen, 2005). Water rights are measured in water volumes and are considered private property in which the state's role in governing the water resource is curtailed to a bare minimum. The rights are granted as a “concession in perpetuity,” and are owned as any other good capable of private appropriation (Vergara & Rivera, 2018, p. 83). They are governed by civil (private) not administrative law, and are protected by the 1980 Constitution (Vergara & Rivera, 2018). Disputes are settled by the courts or private arbitrators (Rivera et al., 2016). The rights can be inherited, gifted, leased, sold, mortgaged and traded, and can only be expropriated by the state subject to market value compensation (McNallen, 2005). Similar to Chile, while water in Australia is considered state property, the country developed a market for trading water licenses in the Murray Darling Basin (Mascher & Curran, 2017; Pilz, 2010); the rights that actors hold are not defined by statute as actual private property rights (Rochford, 2011). The water licenses for a specific volume of water or a share of a consumptive water pool are granted in perpetuity, but are subject to fluctuation which depends on the annual flow; these licenses do not interfere with the water use rights itself (Mascher & Curran, 2017, p. 204). McKenzie (2009) and Mascher and Curran (2017) examine whether water rights in New South Wales reflect the characteristics of property rights. McKenzie (2009, p. 463) looked at the exclusivity, duration, security including

compensation, quality of title, and transferability and divisibility of the permits, and concludes that: “there is probably enough to suggest that the water rights under access licences do amount to rights of property.” Mascher and Curran (2017, p. 206) look at “the four characteristics of property including exclusivity, security, duration and transferability,” and conclude that the license “possess the mentioned features”; however, “the limitations ... may suggest they do not possess enough of these characteristics to be considered private property rights.” Hence, the water use licensing system can be seen as a market system that:

“draws on the strengths of markets and private property-like water rights to incentivize efficiency but positions those rights within a framework that allows for flexibility and adaptive management to deliver an efficient and sustainable water allocation system” (Mascher & Curran, 2017, p. 202).

Also in Spain, all water resources are put in the public domain, and water is allocated through the administrative granting of permits. In 1999, Spain introduced water market mechanisms by the Water Law Amendment (Law 46/1999) which allowed for the trade in water permits between users (Casado-Perez, 2015). Permits are needed for both surface- and groundwater and are subject to specified conditions (including e.g., period up to 75 years, max volume of flow, and location). Casado-Pérez (2015, p. 189) states that: “the bundle-of-rights in Spanish permits seems to be closer to an ownership scheme, given the long length of the permits, the fact that they can be traded, and the ease of renewability.”

Several states in the United States allow for the transfer of existing appropriations (Grant, 2005), for example, Colorado and California. Water rights in Colorado are firmly based on property law theories, which strongly limits the public trust doctrine. For example, granted water rights can be transferred without considering the public interest, as long as they do not harm other appropriators (Zellmer & Harder, 2008). In California all water is put in the public trust and “water rights are considered rights in real property” which can be transferred (Hicks, 2011, p. 114). The literature shows that putting water in the public domain does not preclude the development of water markets and the development of “property” rights in water. Now that most countries in the world, including some communist countries in transition (e.g., China, Vietnam) (Bosch & Gupta, 2022; Zhang, 2021), have a water use permit system in place, a move to markets is not far away.

### 3.3 | Water property rights through contract, lease, concession

Since the 1990s, with the growing dominance of neo-liberal capitalism and recognition of water as an economic good (ICWE, 1992), there has been a tendency to encourage greater private control over water (Gupta & Dellapenna, 2009). Water is crucial for almost any economic activity and is increasingly seen as a lucrative investment opportunity.

The interest in investing in water gained momentum in 1989, when the government of Prime Minister Margaret Thatcher set off the global movement of privatization (“the sale of enterprises owned by public companies to private companies” [Black's Law Dictionary, 2021]) of water utilities by selling public utilities in Great Britain (Petrova, 2006). Specifically, in the global South, privatization was strongly promoted by the international financial institutions (Moyo, 2011) by making it a prerequisite for loans, debt restructuring, or loan waivers (Petrova, 2006, p. 578). However, because of the resistance to full privatization, the private sector involvement in the public sector often continued under the heading of public–private partnerships (PPP), which was seen as an alternative solution (Dellapenna, 2008; Minow, 2003; Murthy, 2013). Over the years, a wide range of different PPP forms developed, in which the form determines the degree of private participation (Roehrich et al., 2014). While ultimately the assets are still public property (owned by the state) (Miranda, 2007), during the period of the agreement, private companies are given the full responsibility to operate, maintain, and invest in the assets (Murthy, 2013). Hence, instead of selling state-owned enterprises to the private sector, states remain the *de jure* owner of the infrastructure. By concluding state-investor contracts, states grant private (inter)national companies the rights to “maintain, produce, or provide a good or service” for a period which can be up to 75 years (Miranda, 2007, p. 512). Whether through the granting of state rights, or the water infrastructure and services being “privatized,” it boils down to *de facto* water “privatization” and control over the water resources, as control from the public sector is transferred to the private sector (Gupta & Bosch, 2021). These rights are protected by the property provisions of national, state or provincial constitutions (Solanes, 2010, p. 29).

Moreover, while (developing) countries welcome foreign investment, foreign investors want their investments secured (Solanes, 2010). In order to protect and create an investment climate that is favorable to foreign direct

investment (FDI), most countries have signed International Investment Agreements (IIA)—the majority of these being Bilateral Investment Treaties (BIT) (2298) and Treaties with Investment Provisions (324) (Chaisse & Polo, 2015; Yackee, 2010). The United Nations Conference on Trade and Development defines a BIT as an: “agreement between two countries regarding promotion and protection of investments made by investors from respective countries in each other’s territory” (UNCTAD, 2021, p. 1). The legal framework that is created through IIAs: (a) ensures that foreign investors can access the markets of host countries, (b) protects investments including against expropriation without compensation, and (c) allows for investor-state arbitration (Chaisse & Polo, 2015). A state’s public water is affected by the “privatization” of water supply services, and through the signing of investor-state contracts, both protected by IIAs. Foreign investors enjoy significant protection by IIAs and arbitration clauses (UNCTAD, 2004), and arbitration cases are often ruled in favor of the investor. There are multiple examples where host states have been found liable for breaching a BIT against a foreign company in which compensation had to be paid. For example, in *Azurix Corp. v. Argentina* (2006), *Vivendi Universal v. Argentina* (2010), *Mpregilo v. Argentine Republic* (2011), and *SA UR International v. Argentine Republic* (2014), in which Argentina had to pay \$165 million, \$105 million, \$21 million, and \$39 million in compensation respectively because of breaching the relevant BIT agreement (Chaisse & Polo, 2015). Thus, even though water is in the public trust, states lose control over that part of the water that falls under these investment agreements that are protected by expropriation subject to compensation.

Water rights can be created (indirectly) on the bases of contracts (e.g., supply contract, investment contract, service contract, and mineral, petroleum and land contracts) between an actor (national or international) and a state (Bosch & Gupta, 2022; Cotula, 2011; Hodgson, 2016; Scott & Coustalin, 1995). Saxer (2010, p. 79) argues that the: “rights to the use of water can ... be transferred by the state via permit and subsequent state delivery contracts to end users.” Contracts falling under national or international law subsequently define the terms, risk, cost, and benefit distribution of the investment project (Cotula, 2011). States can be held responsible for the economic damage in case of breaching the contract, which can result in the requirement to pay compensation (Gray & Lee, 2018). Water is increasingly becoming part of land leases or purchase contracts between investors and governments (Cotula, 2012), as some of the motivation behind the global land rush is to control the water (Lee, 2015; Robbie & van der Sijde, 2020). In assessing how property rights in water evolved through investor-state contracts on mineral, petroleum and land issues in Africa and Asia, Bosch and Gupta (2022) assessed 80 investor-state contracts and conclude that States de facto privatize water through including water use rights in contracts to foreign international investors. Contracts that are protected by IIAs, arbitration rules, and compensation claims, are increasingly causing problems for the host state and affect water governance.

### 3.4 | Inferences

Based on the analysis of legal literature on how private “property” rights are embedded in the current water allocation instruments, we see that: with putting water in the public domain, countries have developed and implemented a water governance system including instruments (e.g., water use permits, tradable water permits, contracts, concessions) that allocate clearly defined rights, including for example, the right to use water for a specified period, the right to priority in time, the right to alienate or transfer the entitlement, the right to dispute resolution and litigation, and the right to compensation. These rights, allocated through the granting of water use entitlements, may share the characteristics of a property rights regime, and can imply private quasi-property (“new property,” “property-like”) rights in water and may in fact encroach on state water ownership affecting water governance. States are grappling with the development of rights in water that are not in line with the fugitive and public nature of water especially in the context of the need for adaptive water governance.

## 4 | CONCLUSION

This article has assessed the state of legal literature on “property” rights in water. It shows that states grapple with gaining and keeping control over water, affecting water governance. First, although countries sought to gain and increase control over water by putting water in the public domain, this is challenged by (i) the historical water use rights that continue to exist de facto and de jure, (ii) the jurisdiction over water in some federal countries is being parsed out constitutionally to states, and (iii) increasingly Indigenous peoples are successfully demanding recognition of, and reclaiming their water rights. Second, the states that have managed to gain control over water, then try to allocate water use entitlements through some sort of statutory water allocation system. Relatively new water allocation

instruments have been developed including “modern” water use permits, tradable water permits, contracts, leases, and concessions. Third, these entitlements encompass clearly defined bundle-of-rights which differs between waterbodies and instruments. While the unique characteristics of water make it difficult to transfer the traditional property concepts to water, the granted bundle-of-rights through a statutory water allocation system resemble property rights in more fixed resources. Such allocation has, according to the literature, increasingly implied a quasi-property right in water—especially when these allocations are for long periods of time, and are subject to compensation when taken away. This has further encroached into the state's ability to govern water flexibly. Thus, the dual forces of trying to regain control over water from existing water rights holders and from new water rights holders creates challenges for water governance and confusion on who actually ‘owns’ and controls water, and is able to govern it.

We have entered an opaque phase in which old and new “property” rights continue to encroach in different ways on state control over water. This article has shown that changing existing property rights in water is not easy, and countries need to understand the pros and cons of creating “strong” rights in water, which may imply de facto property rights. A good understanding about the way in which these rights come about is a critical first step toward adaptive water governance. Many regions of the world have higher water demands than supply (UN-Water, 2021); if water is to be reserved for nature in order to support the functioning of the ecosystems as suggested by many scholars (Richter et al., 2003), this implies that the availability of water shrinks. Moreover, climate change is making dry regions drier and wet regions wetter (IPCC, 2022); this implies that especially in drier countries states may have to flexibly manage water resources from month to month in order to ensure that they meet the different needs of different sectors and users (Marston & Cai, 2016). Such flexibility of response is increasingly compromised by the growing rigidity of water allocations through diverse legal instruments and especially water scarce areas of the world will consequently face new problems unless they understand the property rights and quasi property rights that are being distributed through these instruments, and how to shape these in such a way that they can enable adaptive water governance.

## AUTHOR CONTRIBUTIONS

**Hilmer J. Bosch:** Writing – original draft (lead). **Joyeeta Gupta:** Writing – original draft (supporting).

## ACKNOWLEDGMENTS

The research was conducted at the Governance and Inclusive Development Programme Group, Amsterdam Institute of Social Science Research, of the University of Amsterdam. We want to thank the anonymous reviewers for their valuable and constructive comments, which significantly improved the quality of this article.

## CONFLICT OF INTEREST

The authors have declared no conflicts of interest for this article.

## DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

## ORCID

Hilmer J. Bosch  <https://orcid.org/0000-0001-8992-0329>

Joyeeta Gupta  <https://orcid.org/0000-0003-1424-2660>

## RELATED WIREs ARTICLES

[The Taniwha and the Crown: defending water rights in Aotearoa/New Zealand](#)

[An overview of water reallocation and the barrier](#)

[The need for green and atmospheric water governance](#)

## ENDNOTES

- <sup>1</sup> These major legal systems have not developed and do not exist in isolation (Glenn, 2001), other legal systems did have influence and contributed to these systems. For example, Hindu law possibly influenced the legal traditions of the Greek and Roman (Menski, 2009), while the Talmudic and Islamic legal traditions contributed to the common law (Glenn, 2001). Jewish law (Halakhah) finds its basis in the Torah (Laster et al., 2009), and is only part of Israel's legal system. Hindu law is an ancient legal system (Menski, 2009), however, it remains an “integral element of Indian and wider South Asian and globally Indic identity” (Menski, 2010, p. 45).

- <sup>2</sup> Customary law is a “blanket description” to denote different and multiple legal systems worldwide (Ndulo., 2011, p. 88) which evolved from the regularized practices and behavior of people. In some areas, customary law got codified and/or institutionalized, for example, in the: Code of Hammurabi in the Babylonian empire; Manusmriti, Vedas and Arthashastra in India; Law of The Twelve Tables in ancient Rome; common law in England; civil law in continental Europe; Islam (Koran, Ottoman Majalla), Judaism (Torah), indigenous law, and more recently in international law (Thirlway, 2019). In other areas, customary law is not “formalized,” existing in parallel to national legislation and/or religious laws (also referred to as legal pluralism) (Tamanaha, 2018). Such plural legal systems can be found in Africa (Akuffo, 2009; Bentsi-Enchill, 1964; van Koppen et al., 2021), Asia and Latin America (Anaya & Williams, 2001; Aponte Miranda, 2008, Roldán Ortega, 2004), but also in Australia, Canada, the United States, and New Zealand (Brandes & Curran, 2017; Collins & Esterling, 2019; Nikolakis, 2011), where state law diverges from the law of the local people.
- <sup>3</sup> For example, Laws of the Aboriginal in Australia; First Nations, Métis and Inuit in Canada; Maori in New Zealand; and Native Americans in the US (Hodgson, 2009).
- <sup>4</sup> The UN estimates that there are 476 million Indigenous peoples that live across 90 countries (Dhir et al., 2019). In many nation-states, sovereign statehood nor the right of self-determination is recognized (Cook & Sarkin, 2009; Engle, 2011; Hodgson, 2009; Johnson, 2020).
- <sup>5</sup> Stools refer to an “immortal entity ... [representing] the spiritual and physical embodiment of the people” (Mahama & Baffour, 2009, p. 28).
- <sup>6</sup> *Agua Caliente Band of Cahuilla Indians v. Coachella Valley Water Dist.*, 849 F.3d 1262, 1268 (9th Cir. 2017).
- <sup>7</sup> In common law, “any distribution of rights and privileges among persons with respect to things can be dignified with the ... label ‘property’” (Merrill & Smith, 2001, p. 357); ownership of a “thing” (tangible or intangible) is seen as a bundle of legal rights held against others (Chang & Smith, 2012; Clarke & Kohler, 2005; Johnson, 2007b; Penner, 1996; Zellmer & Harder, 2008). These rights (e.g., the right to own, possess, use, sell; Hohfeld, 1913; Honoré, 1961; Merrill, 1998; Penner, 1996), are “distinct and separable” and can be clustered into smaller bundles (Waldron, 1985, p. 315) in different permutations (Akkermans, 2017). When all rights of a bundle are owned by a single actor, the actor has absolute ownership of the “thing” (although in reality absolute ownership does not exist). Conversely, when one holds a subset of the rights, the ownership is not absolute. Whether something is considered property depends on national law and court rulings. Thus, property is fluid and over time new property rights have evolved, for example intellectual property (Australian Law Reform Commission, 2015; Granstrand, 2009).
- <sup>8</sup> The Canadian legal system is based on both common law and civil law; Quebec is based on the civil code while the other states use common law (Department of Justice, 2015, p. 4). Quebec, however, recognizes both surface- and groundwater as *res communes* (common things), as formulated in Roman law. Therefore water cannot be property (Cumyn, 2010). The *res communes* approach to water is affirmed in Quebec’s 2009 Water Act.
- <sup>9</sup> South Africa has a hybrid legal system, with elements of both common and civil law (Frolova et al., 2017).
- <sup>10</sup> In civil law, property is generally not seen as a bundle-of-rights (di Robilant, 2013) but “as an absolute right in a thing” (Dusollier, 2020, p. 145), where there is only one right of ownership and it is not considered a “matter of degree” (Akkermans, 2014, p. 78). Property rights are a relationship between a person and a tangible or intangible thing (Akkermans, 2014; Chang & Smith, 2012) and is distinct from rights against other persons which are personal/relative rights. While in common law any right can be a property right, civil law countries apply the “*numerus clausus*” doctrine (van Erp, 2003) where, by statute, there are limited property rights to choose from. These rights have restricted content and rules dictate how property rights are created, transferred, and end (Akkermans, 2017; van Erp, 2003). While there is a core of property rights that exist in most of the different legal systems in the Civil law countries (e.g., the property right of ownership), the available property rights to choose from may differ across countries (Akkermans, 2017).
- <sup>11</sup> Ching (1993, p. 2, 9) argues that although “China never produced a Western-type religion, one can find in the Chinese tradition what is functionally equivalent to religion or religions in the West”, she refers to this instead as “Indigenous Chinese traditions.”
- <sup>12</sup> Some argue that Islamic law emerges from the Judeo-Christian and the Greco-Roman traditions (Habachy, 1962); others argue that this is based on “flimsy” evidence and “questionable” arguments (Badr, 1978, p. 192). In Islamic law, Allah is the ultimate owner of “all that is in the heavens and on the earth” (Mariam & Salasal, 1998, p. 285) and the rights people hold are sacred gifts from God and can be temporarily enjoyed by, and in trust for, men and women (Bhala, 2011; Habachy, 1962; Sait & Lim, 2006). Muslim property law allows for the divisibility and separability of private property rights (Jamar, 1992; Sait & Lim, 2006). Property rights are a relationship between a person and a thing.

Muslim law differentiates between property rights with real property interest (e.g., land), personal interest (i.e., tangible and intangible property), and intellectual property (patent, trademark, or copyright) (Bhala, 2011; Sait & Lim, 2006). The basic right is the right of full ownership which can be transferred through sale or gift (Debs, 2010), but can also be used by another without transfer of complete ownership (e.g., through lease, pledge, or loan) (Debs, 2010; Jamar, 1992). These property rights can be held as distinct property rights by different actors, and are subject to succession (law of inheritance) and can be left to designated heirs by will (Debs, 2010).

- <sup>13</sup> The exception is the Maliki school which allows individuals “firm rights of ownership and with them, the right to refuse the use of water” to others (Naff, 2009, p. 43); water can be sold, but has to be provided to avoid a person's death.

## REFERENCES

- Aguilar, D. (2011). Groundwater reform in India: An equity and sustainability dilemma. *Texas International Law Journal*, 46(3), 623–653. <https://heinonline.org/HOL/P?h=hein.journals/tlj46&i=629>
- Ajai, O. (2012). Law, water and sustainable development: Framework of Nigerian law country legislation. *Law, Environment and Development Journal*, 8(1), [xiii]–115 OP-115. <https://heinonline.org/HOL/P?h=hein.journals/leadjo8&i=101>
- Akkermans, B. (2014). Property law. In J. Hage & B. Akkermans (Eds.), *Introduction to law* (pp. 71–99). Springer International Publishing. [https://doi.org/10.1007/978-3-319-06910-4\\_5](https://doi.org/10.1007/978-3-319-06910-4_5)
- Akkermans, B. (2017). The numerus clausus of property rights. In M. Graziadei & L. Smith (Eds.), *Comparative property law: Global perspectives* (pp. 100–120). Edward Elgar. <https://doi.org/10.4337/9781785369162.00013>
- Akuffo, K. (2009). The conception of land ownership in African customary law and its implications for development. *African Journal of International and Comparative Law*, 17(1), 57–78. <https://heinonline.org/HOL/P?h=hein.journals/afjincol17&i=57>
- Al-Awar, F., Abdulrazzak, M. J., & Al-Weshah, R. (2010). Water ethics perspectives in the Arab region. In P. G. Brown & J. J. Schmidt (Eds.), *Water ethics: Foundational readings for students and professionals* (pp. 29–38). Island Press.
- Anaya, S. J., & Williams, R. A. J. (2001). The protection of indigenous peoples' rights over lands and natural resources under the inter-American human rights system. *Harvard Human Rights Journal*, 14, 33–86. <https://heinonline.org/HOL/P?h=hein.journals/hhrj14&i=39>
- Aponte Miranda, L. (2008). Uploading the local: Assessing the contemporary relationship between indigenous Peoples' land tenure systems and international human rights law regarding the allocation of traditional lands and resources in Latin America multiscale civil society: Legal P. *Oregon Review of International Law*, 10(2), 419–452. <https://heinonline.org/HOL/P?h=hein.journals/porril10&i=423>
- Ariño Ortiz, G. A. O., & Sastre Beceiro, M. (2009). Water sector regulation and liberalization. In A. Garrido & M. Ramón Llamas (Eds.), *Water policy in Spain* (pp. 117–128). CRC Press. <https://doi.org/10.1201/9780203866023-20>
- Arksey, H., & O'Malley, L. (2005). Scoping studies: Towards a methodological framework. *International Journal of Social Research Methodology: Theory and Practice*, 8(1), 19–32. <https://doi.org/10.1080/1364557032000119616>
- Australian Law Reform Commission. (2015). *Definitions of property*. [https://www.alrc.gov.au/publication/definitions-of-property/#\\_ftn22](https://www.alrc.gov.au/publication/definitions-of-property/#_ftn22)
- Badr, G. M. (1978). Islamic law: Its relation to other legal systems modern Islamic law. *American Journal of Comparative Law*, 26(2), 187–198. <https://heinonline.org/HOL/P?h=hein.journals/amcomp26&i=199>
- Balganesh, S. (2012). Quasi-property: Like, but not quite property. *University of Pennsylvania Law Review*, 160(7), 1889–1925. <https://heinonline.org/HOL/P?h=hein.journals/pnlr160&i=1903>
- Banner, S. (2005). Why Terra nullius? Anthropology and property law in early Australia. *Law and History Review*, 23(1), 95–131. <https://doi.org/10.1017/S0738248000000067>
- Bannon, C. (2017). Fresh water in Roman law: Rights and policy. *Journal of Roman Studies*, 107, 60–89. <https://doi.org/10.1017/S007543581700079X>
- Barton, B. (2010). Property rights created under statute in common law legal systems. In A. McHarg, B. Barton, A. Bradbrook, & L. Godden (Eds.), *Property and the law in energy and natural resources*. Oxford University Press.
- Benidickson, J. (2018). The evolution of Canadian water law and policy: Securing safe and sustainable abundance. *McGill International Journal of Sustainable Development Law and Policy*, 13(1), 59–104. <https://heinonline.org/HOL/P?h=hein.journals/mcgijosd13&i=60>
- Benjamin, A. H., Marques, C. L., & Tinker, C. (2005). The water Giant awakes: An overview of water law in Brazil. *Texas Law Review*, 83(7), 2185–2244. <https://heinonline.org/HOL/P?h=hein.journals/tlr83&i=2203>
- Bentsi-Enchill, K. (1964). *Ghana land law: An exposition, analysis and critique*. Sweet & Maxwell.
- Berry, K. A., & Jackson, S. (2018). The making of white water citizens in Australia and the Western United States: Racialization as a transnational project of irrigation governance. *Annals of the American Association of Geographers*, 108(5), 1354–1369. <https://doi.org/10.1080/24694452.2017.1420463>
- Bhala, R. (2011). *Property law: Ownership and property*. In *understanding Islamic law: Shari'a*. LexisNexis.
- Bjornlund, H., & McKay, J. (2002). Aspects of water markets for developing countries: Experiences from Australia, Chile, and the US. *Environment and Development Economics*, 7(4), 769–795. <https://doi.org/10.1017/S1355770X02000463>
- Black, H. C. (1991). *Black's dictionary of law*. Lawbook Exchange.
- Black's Law Dictionary. (2021). *What is PRIVATIZATION?* Black's Law Dictionary (Free 2nd Ed.—Online). <https://thelawdictionary.org/privatization/>

- Block, R. W., & Forrest, J. (2005). A gathering storm: Water conflict in Alberta. *Alberta Law Review*, 43, 31–50. <https://doi.org/10.29173/alr476>
- Boretti, A., & Rosa, L. (2019). Reassessing the projections of the world water development report. *Npj Clean Water*, 2(1), 1–6. <https://doi.org/10.1038/s41545-019-0039-9>
- Bosch, H. J., & Gupta, J. (2020). Access to and ownership of water in Anglophone Africa and a case study in South Africa. *Water Alternatives*, 13(2), 205–224. <https://www.water-alternatives.org/index.php/alldoc/articles/volume-13/issue-2/571-a13-2-1>
- Bosch, H. J., & Gupta, J. (2022). Water property rights in investor-state contracts on extractive activities, affects water governance: An empirical assessment of 80 contracts in Africa and Asia. *Review of European, Comparative and International Environmental Law*, 31(2), 295–316. <https://doi.org/10.1111/reel.12436>
- Bosch, H. J., Gupta, J., & Verrest, H. (2021). A water property right inventory of 60 countries. *Review of European, Comparative and International Environmental Law*, 30(2), 263–274. <https://doi.org/10.1111/reel.12397>
- Bradford, L. E. A., Ovsenek, N., & Bharadwaj, L. A. (2017). Indigenizing water governance in Canada. In S. Renzetti & D. P. Dupont (Eds.), *Global issues in water policy* (Vol. 17, pp. 269–298). Springer International Publishing. [https://doi.org/10.1007/978-3-319-42806-2\\_15](https://doi.org/10.1007/978-3-319-42806-2_15)
- Brandes, O. M., & Curran, D. (2017). Changing currents: A case study in the evolution of water law in Western Canada. In S. Renzetti & D. P. Dupont (Eds.), *Water policy and governance in Canada* (pp. 45–67). Springer International Publishing. [https://doi.org/10.1007/978-3-319-42806-2\\_4](https://doi.org/10.1007/978-3-319-42806-2_4)
- Caponera, D. A. (1992). *Principles of water law and administration: National and international*. A.A. Balkema.
- Caponera, D. A. (2007). *Principles of water law and administration: National and international* (2nd ed., revised and updated by Marcella Nanni). Taylor & Francis Group.
- Casado-Perez, V. (2015). Missing water markets: A cautionary tale of governmental failure. *New York University Environmental Law Journal*, 23(2), 16–37. <https://doi.org/10.2139/ssrn.2406726>
- Chaisse, J., & Polo, M. (2015). Globalization of water privatization: Ramifications of investor-state disputes in the blue gold economy. *Boston College International and Comparative Law Review*, 38(1), 1–64. <https://heinonline.org/HOL/P?h=hein.journals/bcic38&i=7>
- Chang, Y. C., & Smith, H. E. (2012). An economic analysis of civil versus common law property. *Notre Dame Law Review*, 88(1), 1–55. <https://heinonline.org/HOL/P?h=hein.journals/tndl88&i=11>
- Ching, J. (1993). *Chinese religions*. Macmillan.
- Clarke, A., & Kohler, P. (2005). *Property law: Commentary and materials*. Cambridge University Press.
- Collins, T., & Esterling, S. (2019). Fluid personality: Indigenous Rights and the Te Awa Tupua (Whanganui River Claims Settlement) Act 2017 in Aotearoa New Zealand. *Melbourne Journal of International Law*, 20(1), 197–220. <https://heinonline.org/HOL/P?h=hein.journals/meljil20&i=210>
- Cook, A., & Sarkin, J. (2009). Who is indigenous: Indigenous rights globally, in Africa, and among the san in Botswana. *Tulane Journal of International & Comparative Law*, 38, 93–130. <https://heinonline.org/HOL/P?h=hein.journals/tulicil18&i=95>
- Cosens, B. (2021). Chapter X.31: Indigenous rights to water. In J. Dellapenna & J. Gupta (Eds.), *Water law: Elgar encyclopedia of environmental law series*. Edward Elgar Publishing. <https://doi.org/10.4337/9781783477005.x.31>
- Cosens, B., & Gunderson, L. H. (2018). *Practical panarchy for adaptive water governance: Linking law to social-ecological resilience*. Springer International Publishing.
- Cotula, L. (2011). *Land deals in Africa: What is in the contracts?* International Institute for Environment and Development (IIED).
- Cotula, L. (2012). The international political economy of the global land rush: A critical appraisal of trends, scale, geography and drivers. *The Journal of Peasant Studies*, 39(3–4), 649–680. <https://doi.org/10.1080/03066150.2012.674940>
- Cullet, P. (2014). Groundwater law in India: Towards a framework ensuring equitable access and aquifer protection. *Journal of Environmental Law*, 26(1), 55–81. <https://doi.org/10.1093/jel/eqt031>
- Cullet, P., Bhullar, L., & Koonan, S. (2017). Regulating the interactions between climate change and groundwater: Lessons from India. *Water International*, 42(6), 646–662. <https://doi.org/10.1080/02508060.2017.1351056>
- Cullet, P., & Gupta, J. (2009). India: Evolution of water law and policy. In *The evolution of the law and politics of water* (pp. 157–173). Springer. [https://doi.org/10.1007/978-1-4020-9867-3\\_10](https://doi.org/10.1007/978-1-4020-9867-3_10)
- Cumyn, M. C. (2010). Recent development to the law applicable to water in Quebec. *Vermont Law Review*, 34, 859–868. <https://heinonline.org/HOL/P?h=hein.journals/vlr34&i=867>
- Curley, A. (2019). Unsettling Indian water settlements: The little Colorado River, the San Juan River, and colonial enclosures. *Antipode*, 53(3), 705–723. <https://doi.org/10.1111/anti.12535>
- Curran, D. (2019). Indigenous processes of consent: Repoliticizing water governance through legal pluralism. *Water*, 11(3), 571. <https://doi.org/10.3390/w11030571>
- Daigle, M. (2018). Resurging through Kishichiwani: The spatial politics of indigenous water relations. *Decolonization: Indigeneity, Education & Society*, 7(1), 159–172.
- de Bonviller, S., Wheeler, S. A., & Zuo, A. (2020). The dynamics of groundwater water markets: Price leadership and groundwater demand elasticity in the Murrumbidgee, Australia. *Agricultural Water Management*, 239, 106204. <https://doi.org/10.1016/j.agwat.2020.106204>
- Debs, R. A. (2010). The classical Islamic law of property. In *Islamic law and civil code: The law of property in Egypt* (pp. 7–36). Columbia University Press. <https://doi.org/10.7312/debs15044.9>
- Del Popolo, F., & Reboiras, L. (2014). *Guaranteeing indigenous people's rights in Latin America. Progress in the past decade and remaining challenges. Summary*. United Nations Economic Commission for Latin America and the Caribbean (ECLAC).
- Dellapenna, J. (1990). *Riparian rights in the west*. Okla. L. Rev., 1. <https://heinonline.org/HOL/P?h=hein.journals/oklr43&i=63>

- Dellapenna, J. (2004). Adapting riparian rights to the twenty-first century. *West Virginia Law Review*, 21(539), 2003–2004. <https://heinonline.org/HOL/P?h=hein.journals/wvb106&i=547>
- Dellapenna, J. (2008). The myth of markets for water: Privatization, commodification, and the Washington. In *Expozaragoza 2008, Thematic week: Water economics and financing: Water markets*. Expo Zaragoza.
- Dellapenna, J. (2011). The evolution of Riparianism in the United States. *Marquette Law Review*, 95(1), 53–90. <https://heinonline.org/HOL/P?h=hein.journals/marqlr95&i=55>
- Dellapenna, J. (2012). A primer on groundwater law. *Idaho Law Review*, 49(2), 265–324. <https://heinonline.org/HOL/P?h=hein.journals/idlr49&i=285>
- Dellapenna, J., & Gupta, J. (2008). Toward global law on water. *Global Governance*, 14(4), 437–453. <https://doi.org/10.2307/27800723>
- Dellapenna, J., & Gupta, J. (2013). *The evolution of water law through 4,000 years. Public law and legal theory*. Working Paper No. 2013-3041. <https://ssrn.com/abstract=2265029>
- Dellapenna, J., & Gupta, J. (2021). Fundamental concepts of property in water and the role of Markets in Water Governance. In J. J. Bogardi, T. Tingsanchali, K. D. W. Nandalal, J. Gupta, L. Salamé, R. R. P. van Nooijen, A. G. Kolechkina, N. Kumar, & A. Bhaduri (Eds.), *Handbook of water resources management: Discourses, concepts and examples*. Springer.
- Dellapenna, J. W. (2010). Global climate disruption and water law reform. *Widener Law Review*, 15, 409–541.
- Department of Justice. (2015). *Canada's system of justice*. Department of Justice Canada.
- Dhir, R. K., Cattaneo, U., Ormaza Cabrera, M. V., Coronado, H., & Oelz, M. (2019). *Implementing the ILO Indigenous and Tribal Peoples Convention No. 169: Towards an inclusive, sustainable and just future* (Issue 169). International Labour Organization.
- di Robilant, A. (2013). Property: A bundle of sticks or a tree. *Vanderbilt Law Review*, 66(3), 869–932. <https://heinonline.org/HOL/P?h=hein.journals/vanlr66&i=899>
- Dusollier, S. (2020). Intellectual property and the bundle-of-rights metaphor. In P. Drahos, G. Ghidini, & H. Ullrich (Eds.), *Kritika: Essays on intellectual property* (Vol. 4, pp. 146–179). Edward Elgar Publishing. <https://doi.org/10.4337/9781839101342.00013>
- Easter, K. W., & Huang, Q. (2014). In K. W. Easter & Q. Huang (Eds.), *Water markets for the 21st century: What have we learned?* Springer. <https://doi.org/10.1007/978-94-017-9081-9>
- Engle, K. (2011). On fragile architecture: The un declaration on the rights of indigenous peoples in the context of human rights. *European Journal of International Law*, 22(1), 141–163. <https://doi.org/10.1093/ejil/chr019>
- Frolova, E., Belikova, K., Badaeva, N., Belozerova, I., & Ulianischev, V. (2017). The concept of real right in India and South Africa: Specifics of national regulation and trends of harmonization of law. *Journal of Advanced Research in Law and Economics*, 8(3), 799–812. <https://heinonline.org/HOL/P?h=hein.journals/jarle8&i=789>
- Getzler, J. (2004). *A history of water rights at common law*. Oxford University Press.
- Glazewski, J., & Du Toit, L. (2013). *Environmental law in South Africa*. LexisNexis Butterworths.
- Glenn, H. P. (2001). Are legal traditions incommensurable. *American Journal of Comparative Law*, 49(1), 133–146. <https://heinonline.org/HOL/P?h=hein.journals/amcomp49&i=149>
- Granstrand, O. (2009). Innovation and intellectual property rights. In J. Fagerberg & D. C. Mowery (Eds.), *The Oxford handbook of innovation*. Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780199286805.003.0010>
- Grant, D. L. (2005). Two models of public interest review of water allocation in the west. *University of Denver Water Law Review*, 9(2), 485–518. <https://heinonline.org/HOL/P?h=hein.journals/udenwr9&i=503>
- Gray, J., & Lee, L. (2018). Water entitlements as property: A work in progress or watertight now? In C. Holley & D. Sinclair (Eds.), *Reforming water law and governance* (pp. 101–122). Springer Singapore. [https://doi.org/10.1007/978-981-10-8977-0\\_5](https://doi.org/10.1007/978-981-10-8977-0_5)
- Grinlinton, D. (2011). Evolution, adaptation, and invention: Property rights in natural resources in a changing world. In P. Taylor & D. Grinlinton (Eds.), *Property rights and sustainability: The evolution of property rights to meet ecological challenges*. Brill | Nijhoff.
- Gupta, J., & Bosch, H. J. (2021). Changing ‘ownership’ in water law: Comparative experiences in the developing world. In J. Dellapenna & J. Gupta (Eds.), *Elgar encyclopedia of environmental law series: Water law*. Edward Elgar.
- Gupta, J., & Dellapenna, J. (2009). The challenges for the twenty-first century: A critical approach. In J. W. Dellapenna & J. Gupta (Eds.), *The evolution of the law and politics of water* (pp. 391–410). Springer Netherlands. [https://doi.org/10.1007/978-1-4020-9867-3\\_23](https://doi.org/10.1007/978-1-4020-9867-3_23)
- Gupta, J., & Dellapenna, J. (2021). Water law and rights. In J. J. Bogardi, T. Tingsanchali, K. D. W. Nandalal, J. Gupta, L. Salamé, R. R. P. van Nooijen, A. G. Kolechkina, N. Kumar, & A. Bhaduri (Eds.), *Handbook of water resources management: Discourses, concepts and examples*. Springer.
- Gupta, J., & Lebel, L. (2010). Access and allocation in earth system governance: Water and climate change compared. *International Environmental Agreements: Politics, Law and Economics*, 10(4), 377–395. <https://doi.org/10.1007/s10784-010-9139-1>
- Gupta, J., Pahl-Wostl, C., & Zondervan, R. (2013). “Glocal” water governance: A multi-level challenge in the anthropocene. *Current Opinion in Environmental Sustainability*, 5(6), 573–580. <https://doi.org/10.1016/j.cosust.2013.09.003>
- Gupta, R. K. (2004). Water governance in Gujarat state, India. *International Journal of Water Resources Development*, 20(2), 131–147. <https://doi.org/10.1080/0790062042000206165>
- Habachy, S. (1962). Property, right, and contract in Muslim law. *Columbia Law Review*, 62(3), 450. <https://doi.org/10.2307/1120053>
- Hardberger, A. (2013). Water is a girl's best friend: Examining the water valuation dilemma. *University of Kansas Law Review*, 62(4), 893–942. <https://heinonline.org/HOL/P?h=hein.journals/ukalr62&i=941>
- Hernandez, A. (2003). Water law in the republic of Mexico. *United States-Mexico Law Journal*, 11, 15–28. <https://heinonline.org/HOL/P?h=hein.journals/usmexjl11&i=21>

- Hicks, T. (2011). An interpretation of the internal revenue code and treasury regulations supporting the tax deductibility of the voluntary charitable contribution in perpetuity of a partial interest in an appropriative or riparian water right transferred instream for cons. *Hasstings West-Northwest Journal of Environmental Law & Policy*, 17(2), 93–162. <https://heinonline.org/HOL/P?h=hein.journals/haswnw17&i=97>
- Hodgson, D. L. (2009). Becoming indigenous in Africa. *African Studies Review*, 52(3), 1–32. <https://doi.org/10.1353/arw.0.0302>
- Hodgson, S. (2006). *FAO legislative study 92: Modern water rights—Theory and practice*. <http://www.fao.org/3/a-a0864e.pdf>
- Hodgson, S. (2016). *Exploring the concept of water tenure*. Food and Agriculture Organization of the United Nations (FAO). <http://www.fao.org/3/a-i5435e.pdf>
- Hohfeld, W. N. (1913). Some fundamental legal conceptions as applied in judicial reasoning. *Yale Law Journal*, 23(1), 16–59. <https://heinonline.org/HOL/P?h=hein.journals/ylr23&i=24>
- Honoré, A. M. (1961). Ownership. *Oxford Essays in Jurisprudence*, 107, 107–147.
- Hurlbert, M. A. (2018). Case study Alberta, Canada. In M. A. Hurlbert (Ed.), *Adaptive governance of disaster: Drought and flood in rural areas* (pp. 119–141). Springer International Publishing. [https://doi.org/10.1007/978-3-319-57801-9\\_6](https://doi.org/10.1007/978-3-319-57801-9_6)
- Hurlbert, M. A., & Diaz, H. (2013). Water governance in Chile and Canada: A comparison of adaptive characteristics. *Ecology and Society*, 18(4), 61–76. <http://dx.doi.org/10.5751/ES-06148-180461>
- ICWE. (1992). *The Dublin statement on water and sustainable development*. <http://www.un-documents.net/h2o-dub.htm>
- IPCC. (2022). *Climate change 2022 impacts, adaptation and vulnerability working group II contribution to the sixth assessment report of the intergovernmental panel on climate change. Summary for policymakers*. Intergovernmental Panel on Climate Change.
- Irujo, A. E. (2003). Water law in Spain after 1985. *Water International*, 28(3), 290–294. <https://doi.org/10.1080/02508060308691701>
- Jalali, S., & Wohlin, C. (2012). Systematic literature studies: Database searches vs. backward snowballing. In *International symposium on empirical software engineering and measurement* (pp. 29–38). Association for Computing Machinery. <https://doi.org/10.1145/2372251.2372257>
- Jamar, S. D. (1992). The protection of intellectual property under Islamic law. *Capital University Law Review*, 21(4), 1079–1106. <https://heinonline.org/HOL/P?h=hein.journals/capulr21&i=1095>
- Johnson, N. L. (2007a). Property without possession. *Yale Journal on Regulation*, 24(2), 205. <https://heinonline.org/HOL/Page?handle=hein.journals/yjor24&id=209&div=10&collection=journals>
- Johnson, D. R. (2007b). Reflections on the bundle of rights. *Vermont Law Review*, 32(2), 247–272. <https://heinonline.org/HOL/Page?handle=hein.journals/vlr32&id=255&div=14&collection=journals>
- Johnson, H., South, N., & Walters, R. (2016). The commodification and exploitation of fresh water: Property, human rights and green criminology. *International Journal of Law, Crime and Justice*, 44, 146–162. <https://doi.org/10.1016/j.ijlcrj.2015.07.003>
- Johnston, A. (2018). Murky waters: The recognition of Maori rights and interests in freshwater Ko Nga take Ture Maori. *Auckland University Law Review*, 24, 39–65. <https://heinonline.org/HOL/P?h=hein.journals/auck24&i=39>
- Johnson, M. (2020). Indigenizing self-determination at the United Nations: Reparative progress in the declaration on the rights of indigenous peoples. *Journal of the History of International Law/Revue d'histoire Du Droit International*, 23(1), 206–228. <https://doi.org/10.1163/15718050-12340164>
- Joutsen, M. (2019). Major legal Systems of the World. In M. Natarajan (Ed.), *International and transnational crime and justice* (2nd ed., pp. 254–258). Cambridge University Press. <https://doi.org/10.1017/9781108597296.042>
- Joy, K. J., Kulkarni, S., Roth, D., & Zwartveen, M. (2014). Re-politicising water governance: Exploring water re-allocations in terms of justice. *Local Environment*, 19(9), 954–973. <https://doi.org/10.1080/13549839.2013.870542>
- Kaiser, R. A. (1996). Texas water marketing in the next millennium: A conceptual and legal analysis. *Texas Tech Law Review*, 27(1), 181–261. <https://heinonline.org/HOL/P?h=hein.journals/text27&i=197>
- Kalinoe, L. (1998). *Water law and the nature of customary water rights in Papua New Guinea*. University of Wollongong Thesis Collection 1954–2016. <https://ro.uow.edu.au/theses/1862>
- Kanazawa, M. T. (1998). Efficiency in western water law: The development of the California doctrine, 1850–1911. *The Journal of Legal Studies*, 27(1), 159–184. <https://doi.org/10.1086/468017>
- Kho, J., & Agsaoay-Saño, E. (2006). *Country study on customary water laws and practices—Philippines* (pp. 1–26). FAO.
- Kidd, M. (2009). South Africa: The development of water law. In *The evolution of the law and politics of water* (pp. 87–104). Springer Netherlands. [https://doi.org/10.1007/978-1-4020-9867-3\\_6](https://doi.org/10.1007/978-1-4020-9867-3_6)
- Kidd, M. (2016). Compulsory licensing under South Africa's National Water Act. *Water International*, 41(6), 916–927. <https://doi.org/10.1080/02508060.2016.1214776>
- King, C. W., Stillwell, A. S., Twomey, K. M., Webber, M. E., & Ph, D. (2010). Coherence between water and energy policies table of contents. *Natural Resources Journal*, 53(512), 117–215. <https://heinonline.org/HOL/P?h=hein.journals/narj53&i=125>
- Koonan, S. (2010). Ground water—Legal aspects of the Plachimada dispute. In A. Gowlland-Gualtieri, P. Cullet, R. Madhav, & U. Ramanathan (Eds.), *Water governance in motion: Towards socially and environmentally sustainable water laws* (pp. 159–198). Foundation Books. <https://doi.org/10.1017/UPO9788175968578.008>
- Kotov, V. (2009). Russia: Historical dimensions of water management. In J. W. Dellapenna & J. Gupta (Eds.), *The evolution of the law and politics of water* (pp. 139–155). Springer Netherlands.
- Kwasniak, A. J. (2012). Inflating and deflating: Courts and state/crown ownership and management of water. *Public Land & Resources Law Review*, 33, 95–142. <https://heinonline.org/HOL/P?h=hein.journals/publan33&i=103>
- Lankford, A. (2018). Agua Caliente band of Cahuilla Indians V. Coachella Valley Water District: A tribe's successful fight for federally reserved water rights. *American Indian Law Review*, 43(1), 203–221. <https://www.jstor.org/stable/26632877>

- Larson, R. (2017). Inter-state water law in the United States of America. *Brill Research Perspectives in International Water Law*, 2(3), 1–82. <https://doi.org/10.1163/23529369-12340007>
- Larson, R. (2018). New water for water dispute resolution. *Texas A&M Journal of Property Law*, 4(3), 193–216. <https://heinonline.org/HOL/P?h=hein.journals/txamrpl4&i=210>
- Larson, R. (2019). Global climate change and the reallocation of water. In D. McQueen (Ed.), *Oxford research encyclopedia of environmental science*. Oxford University Press. <https://doi.org/10.1093/acrefore/9780199389414.013.643>
- Laster, R., Aronovsky, R. D., & Livney, D. (2009). Water in the jewish legal tradition. In *The evolution of the law and politics of water* (pp. 53–66). Springer Netherlands. [https://doi.org/10.1007/978-1-4020-9867-3\\_4](https://doi.org/10.1007/978-1-4020-9867-3_4)
- Lee, J. (2015). Contemporary land grabbing: Research sources and bibliography. *Law Library Journal*, 107(2), 259–285. <https://heinonline.org/HOL/P?h=hein.journals/lj107&i=255>
- Mahama, C., & Baffour, O. (2009). Management of stool land revenue in Ghana: A study of the Nkawie and toase stools of the Atwima Nwabiagya District of the Ashanti region. *Journal of Science and Technology (Ghana)*, 29(1), 28–38. <https://doi.org/10.4314/just.v29i1.46426>
- Mariam, S., & Salasal, M. S. (1998). The concept of land ownership: Islamic perspective. *Buletin Geoinformasi Jld*, 2(2), 285–304. <https://eprints.utm.my/id/eprint/4950/1/concept.pdf>
- Marston, L., & Cai, X. (2016). An overview of water reallocation and the barriers to its implementation. *WIREs Water*, 3(5), 658–677. <https://doi.org/10.1002/wat2.1159>
- Mascher, S., & Curran, D. (2017). The role of private property rights in Australia's and Canada's modern water allocation regimes. In E. J. Hollo (Ed.), *Water resource management and the law* (pp. 196–212). Edward Elgar Publishing. <https://doi.org/10.4337/9781785369834.00015>
- Matthews Glenn, J. (2011). Crown ownership of water in situ in common law Canada: Public trusts, classical trusts and fiduciary duties. *Les Cahiers de Droit*, 51(3–4), 493–519. <https://doi.org/10.7202/045721ar>
- Mckay, J. (2005). Water institutional reforms in Australia. *Water policy*, 7, 35–52. <https://doi.org/10.2166/wp.2005.0003>
- McKenzie, M. (2009). Water rights in NSW: Properly property? *Sydney Law Review*, 31(3), 443. <https://heinonline.org/HOL/P?h=hein.journals/sydney31&i=443>
- McNallen, B. (2005). Fixing the leaks in Brazil's water law: Encouraging sound private sector participation through legal and regulatory reform. *Gonzaga Journal of International Law*, 9, 147–199. <https://heinonline.org/HOL/P?h=hein.journals/gjil9&i=147>
- Memon, A., & Skelton, P. (2007). Institutional arrangements and planning practices to allocate freshwater resources in New Zealand: A way forward. *New Zealand Journal of Environmental Law*, 11(1), 241–277. <https://heinonline.org/HOL/P?h=hein.journals/nzjell11&i=245>
- Menski, W. (2009). *Hindu law: Beyond tradition and modernity*. Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780195699210.001.0001>
- Menski, W. (2010). Hindu law. *Law & Justice—The Christian Law Review*, 164, 45–62. <https://heinonline.org/HOL/P?h=hein.journals/ljusclr164&i=45>
- Merrill, T. W. (1998). Property and the right to exclude. *Nebraska Law Review*, 77(4), 730–755. <https://heinonline.org/HOL/P?h=hein.journals/nebklr77&i=740>
- Merrill, T. W., & Smith, H. E. (2001). What happened to property in law and economics? *The Yale Law Journal*, 111(2(Nov 2001)), 357–398. <https://heinonline.org/HOL/P?h=hein.journals/ylr111&i=375>
- Minow, M. (2003). Public and private partnerships: Accounting for the new religion symposium: Public values in an era of privatization. *Harvard Law Review*, 116(5), 1229–1270. <https://heinonline.org/HOL/P?h=hein.journals/hlr116&i=1257>
- Miranda, N. (2007). Concession agreements: From private contract to public policy note. *Yale Law Journal*, 117(3), 510–549. <https://heinonline.org/HOL/P?h=hein.journals/ylr117&i=515>
- Misiedjan, D., & Gupta, J. (2014). Indigenous communities: Analyzing their right to water under different international legal regimes. *Utrecht Law Review*, 10(2), 77–90. <https://doi.org/10.18352/ulr.270>
- Moyo, K. (2011). Privatisation of the commons: Water as a right; water as a commodity. *Stellenbosch Law Review*, 22(3), 804–822. <https://heinonline.org/HOL/P?h=hein.journals/stelblr22&i=814>
- Murthy, S. L. (2013). The human right(s) to water and sanitation: History, meaning, and the controversy over-privatization. *Berkeley Journal of International Law*, 31(1), 89–149. <https://heinonline.org/HOL/P?h=hein.journals/berkjintl31&i=93>
- Naff, T. (2009). Islamic law and the politics of water. In *The evolution of the law and politics of water* (pp. 37–52). Springer Netherlands. [https://doi.org/10.1007/978-1-4020-9867-3\\_3](https://doi.org/10.1007/978-1-4020-9867-3_3)
- Ndulo. (2011). African customary law, customs, and women's rights. *Indiana Journal of Global Legal Studies*, 18(1), 87. <https://doi.org/10.2979/indjglolegstu.18.1.87>
- Nikolakis, W. (2011). Providing for social equity in water markets: The case for an indigenous reserve in northern Australia. In R. Quentin Grafton & K. Hussey (Eds.), *Water resources planning and management* (Vol. 9780521762, pp. 629–646). Cambridge University Press. <https://doi.org/10.1017/CBO9780511974304.032>
- Nkonya, L. K. (2006). Customary Laws for access to and Management of Drinking Water in Tanzania. *Law, Environment and Development Journal*, 2(1), [ix]-66 OP-66. <https://heinonline.org/HOL/P?h=hein.journals/leadjo2&i=58>
- Odgers, W. B., & Odgers, W. B. (1920). Disturbance of easements and other rights over land and water. In *The common law of England* (2nd ed., pp. 565–597). Sweet and Maxwell.
- Ogendi, G. M., & Ong'oa, I. M. (2009). Water policy accessibility and water ethics in Kenya. *Santa Clara Journal of International Law*, 1(1), 177–196. <https://heinonline.org/HOL/P?h=hein.journals/scjil7&i=179>

- Olagunju, A., Thondhlana, G., Chilima, J. S., Sène-Harper, A., Compaoré, W. R. N., & Ohiozebau, E. (2019). Water governance research in Africa: Progress, challenges and an agenda for research and action. *Water International*, 44(4), 382–407. <https://doi.org/10.1080/02508060.2019.1594576>
- Owen, D. (2013). Taking groundwater. *Washington University Law Review*, 91(2), 253–307. <https://heinonline.org/HOL/P?h=hein.journals/walq91&i=266>
- Pahl-Westl, C. (2007). Transitions towards adaptive management of water facing climate and global change. *Water Resources Management*, 21(1), 49–62. <https://doi.org/10.1007/s11269-006-9040-4>
- Penner, J. E. (1996). The bundle of rights picture of property. *UCLA Law Review*, 43(3), 711–820. <https://heinonline.org/HOL/P?h=hein.journals/uclalr43&i=725>
- Percy, D. R. (1988). *The framework of water rights legislation in Canada*. Canadian Institute of Resources Law.
- Percy, D. R. (1996). Seventy-five years of Alberta water law: Maturity, demise & (and) rebirth. *Alberta Law Review*, 35(1), 221. <https://doi.org/10.29173/alr1069>
- Percy, D. R. (2005). Responding to water scarcity in western Canada. *Texas Law Review*, 83(7), 2091–2107. <https://doi.org/10.7939/R3222RM41>
- Petrova, V. (2006). At the frontiers of the rush for blue gold: Water privatization and the human right to water. *Brooklyn Journal of International Law*, 31(2), 577–614. <https://heinonline.org/HOL/P?h=hein.journals/bjil31&i=577>
- Phare, M.-A. (2009). *Denying the source: The crisis of first nations water rights*. Rocky Mountain Books.
- Pilz, R. D. (2010). Lessons in water policy innovation from the world's driest inhabited continent: Using water allocation plans and water markets to manage water scarcity. *Denver Water Law Review*, 14, 97–130. <https://heinonline.org/HOL/P?h=hein.journals/udenwr14&i=99>
- Poelina, A., Taylor, K. S., & Perdrisat, I. (2019). Martuwarra Fitzroy River council: An indigenous cultural approach to collaborative water governance. *Australasian Journal of Environmental Management*, 26(3), 236–254. <https://doi.org/10.1080/14486563.2019.1651226>
- Puthucherril, T. G. (2014). Riparianism in Indian water jurisprudence. In R. R. Iyer (Ed.), *Water and the laws in India* (pp. 97–133). SAGE Publications. <https://doi.org/10.4135/9788132104247.n5>
- Quintavalla, A. (2020). *Water: Conceptualisations, regulatory approaches and scrutinising EU water law* [Erasmus University Rotterdam]. <http://hdl.handle.net/1765/134534>
- Radosovich, G. E. (1976). Global water law systems and water control. *Denver Journal of International Law and Policy*, 6(Special Issue), 263–282. <https://heinonline.org/HOL/P?h=hein.journals/denilp6&i=277>
- Ramazotti, M. (2008). *Customary water rights and contemporary water legislation: Mapping out the interface*. Online (FAO Legal, Issue December). FAO.
- Richardson, J. J. (2017). Postcolonial evolution of water rights in India and the United States. In S. Pellissery, B. Davy, & H. M. Jacobs (Eds.), *Land policies in India: Promises, practices and challenges* (pp. 51–70). Springer Singapore. [https://doi.org/10.1007/978-981-10-4208-9\\_3](https://doi.org/10.1007/978-981-10-4208-9_3)
- Richter, B. D., Mathews, R., Harrison, D. L., & Wigington, R. (2003). Ecologically sustainable water management: Managing river flows for ecological integrity. *Ecological Applications*, 13(1), 206–224. [https://doi.org/10.1890/1051-0761\(2003\)013\[0206:ESWMMR\]2.0.CO;2](https://doi.org/10.1890/1051-0761(2003)013[0206:ESWMMR]2.0.CO;2)
- Rivera, D., Godoy-Faúndez, A., Lillo, M., Alvez, A., Delgado, V., Gonzalo-Martín, C., Menasalvas, E., Costumero, R., & García-Pedrero, Á. (2016). Legal disputes as a proxy for regional conflicts over water rights in Chile. *Journal of Hydrology*, 535, 36–45. <https://doi.org/10.1016/j.jhydrol.2016.01.057>
- Robbie, J., & van der Sijde, E. (2020). Assembling a sustainable system: Exploring the systemic constitutional approach to property in the context of sustainability. *Loyola Law Review*, 66(2), 533–616. <https://heinonline.org/HOL/P?h=hein.journals/loyolr66&i=575>
- Rochford, F. (2011). Limits on the human right to water—The politics of social displacement. *Australian Journal of Human Rights*, 16(2), 109–133. <https://doi.org/10.1080/1323238X.2011.11910890>
- Roehrich, J. K., Lewis, M. A., & George, G. (2014). Are public–private partnerships a healthy option? A systematic literature review. *Social Science & Medicine*, 113, 110–119. <https://doi.org/10.1016/J.SOCSCIMED.2014.03.037>
- Roldán Ortega, R. (2004). *Models for recognizing Indigenous land rights in Latin America* (Biodiversity series, No. 99). The World Bank Environment Department.
- Sait, S., & Lim, H. (2006). *Land, law and Islam property and human rights in the Muslim world*. Zed Books.
- Sarpong, G. A. (n.d.). *Customary water law and practices: Ghana*. FAO.
- Sarwat, J., & Mahmud, A. S. (2017). What is capitalism? In J. L. Rowe, M. Primorac, L. Li, & L. Morales (Eds.), *Back to basics: Economic concepts explained* (pp. 2–3). International Monetary Fund.
- Sax, J. L. (2003). We don't do groundwater: A morsel of California legal history. *University of Denver Water Law Review*, 6(2), 269–317. <https://heinonline.org/HOL/P?h=hein.journals/udenwr6&i=285>
- Saxer, S. R. (2010). The fluid nature of property rights in water. *Duke Environmental Law & Policy Forum*, 21(1), 29–112. <https://heinonline.org/HOL/P?h=hein.journals/delp21&i=51>
- Schaffer, R. G. (2010). Davis v. Agua Sierra resources: Bringing some clarity to groundwater rights in Arizona. *Arizona Journal of Environmental Law & Policy*, 1(1), 25–46. <https://heinonline.org/HOL/P?h=hein.journals/arijel1&i=27>
- Schiller, S. (2009). Avoiding the problem of the commons in a communist society: The role of water rights in the enforcement of environmental law in China note. *Washington University Journal of Law & Policy*, 29(1), 349–374. <https://heinonline.org/HOL/P?h=hein.journals/wajlp29&i=351>
- Schonthal, B. (2021). Buddhist rules about rules: Procedure and process in the (Theravāda) Buddhist legal system. *The American Journal of Comparative Law*, 69(3), 539–573. <https://doi.org/10.1093/ajcl/avab025>
- Schorr, D. B. (2005). Appropriation as agrarianism: Distributive justice in the creation of property rights. *Ecology Law Quarterly*, 32(1), 3–71. <https://heinonline.org/HOL/P?h=hein.journals/eclawq32&i=13>

- Schorr, D. B. (2011). Private rights in publicly-owned water: The pathology of Israeli water law. In S. Boddanovic (Ed.), *Water policy and law in the Mediterranean: An evolving nexus* (pp. 60–78). University of Novi Sad/University Business Academy in Novi Sad.
- Schorr, D. B. (2017). Water rights. In M. Graziadei & L. Smith (Eds.), *Comparative property law: Global perspectives* (pp. 280–289). Edward Elgar Publishing. <https://doi.org/10.4337/9781785369162.00021>
- Scott, A., & Coustalin, G. (1995). The evolution of water rights. *Natural Resources Journal*, 35(4), 821–979. <https://heinonline.org/HOL/P?h=hein.journals/narj35&i=843>
- Snyder, C. W. I. I., & Utley, N. R. (2009). Acknowledging a Georgia farmer's property interest in water comment. *John Marshall Law Journal*, 2(1), 183–207. <https://heinonline.org/HOL/P?h=hein.journals/jmlwj2&i=185>
- Solanes, M. (1999). Institutional and legal issues relevant to the implementation of water markets. In S. M. A. Salman (Ed.), *Groundwater: Legal and policy perspectives* (pp. 69–90). The World Bank. <https://doi.org/10.1596/0-8213-4613-X>
- Solanes, M. (2010). Water, water services and international investment agreements. In C. Ringler, A. K. Biswas, & S. Cline (Eds.), *Global change: Impacts on water and food security* (pp. 209–234). Springer Berlin Heidelberg. [https://doi.org/10.1007/978-3-642-04615-5\\_11](https://doi.org/10.1007/978-3-642-04615-5_11)
- Soltau, F. (1999). Environmental justice, water rights and property. 1999 *Acta Juridica*, 229–256. <https://heinonline.org/HOL/P?h=hein.journals/actj1999&i=241>
- Szelényi, I., & Mihályi, P. (2019). *Varieties of post-communist capitalism*. Brill.
- Tamanaha, B. Z. (2018). Understanding legal pluralism: Past to present, local to global. In D. Maksymilian & M. Giudice (Eds.), *Legal theory and the social sciences* (Vol. 30, pp. 447–483). Routledge. <https://doi.org/10.4324/9781315091891-17>
- Tarlock, A. D. (2000). Prior appropriation: Rule, principle, or rhetoric. *North Dakota Law Review*, 76(4), 881–910. <https://heinonline.org/HOL/P?h=hein.journals/nordak76&i=893>
- Taylor, K. S., Longboat, S., & Grafton, R. Q. (2019). Whose rules? A water justice critique of the OECD's 12 principles on water governance. *Water (Switzerland)*, 11(4), 809. <https://doi.org/10.3390/w11040809>
- Thirlway, H. W. A. (2019). *The sources of international law*. Oxford University Press.
- Thorson, J. E., Kropf, R. L., Gerlak, A., & Crammond, D. (2005). Dividing western waters: A century of adjudicating rivers and streams. *University of Denver Water Law Review*, 8(2), 1–219. <https://heinonline.org/HOL/P?h=hein.journals/udenwr8&i=363>
- Trelease, F. J. (1961). Federal limitations on state water law. *Buffalo Law Review*, 10(1), 399–426. <https://heinonline.org/HOL/P?h=hein.journals/buflr10&i=405>
- UNCTAD. (2021). *International investment agreements navigator: Terminology*. <https://investmentpolicy.unctad.org/international-investment-agreements>
- United Nations Conference on Trade and Development (UNCTAD). (2004). *State contracts: UNCTAD series on issues in international investment agreements*. [https://unctad.org/system/files/official-document/iteiit200411\\_en.pdf](https://unctad.org/system/files/official-document/iteiit200411_en.pdf)
- United Nations Economic Commission for Europe (UNECE). (2021). *Handbook on water allocation in a transboundary context*. United Nations. <https://unece.org/environment-policy/publications/handbook-water-allocation-transboundary-context>
- United Nations Water. (2021). *Valuing water—The United Nations world water development report 2021*. UNESCO. <https://unesdoc.unesco.org/ark:/48223/pf0000375724.locale=en>
- van Erp, S. (2003). A numerus quasi-clausus of property rights as a constitutive element of a future European property law? *Electronic Journal of Comparative Law*, 7(2), 1–12.
- van Koppen, B., Schreiner, B., & Mukuyu, P. (2021). Redressing legal pluralism in South Africa's water law. *The Journal of Legal Pluralism and Unofficial Law*, 53(3), 383–396. <https://doi.org/10.1080/07329113.2021.2016266>
- van Koppen, B., van der Zaag, P., Manzungu, E., & Tapela, B. (2014). Roman water law in rural Africa: The unfinished business of colonial dispossession. *Water International*, 39(1), 49–62. <https://doi.org/10.1080/02508060.2013.863636>
- Vergara, A., & Rivera, D. (2018). Legal and institutional framework of water resources. In G. Donoso (Ed.) *Water policy in Chile. Global issues in water policy* (Vol. 21, pp. 67–85). Springer. [https://doi.org/10.1007/978-3-319-76702-4\\_5](https://doi.org/10.1007/978-3-319-76702-4_5)
- Waldron, J. (1985). What is private property. *Oxford Journal of Legal Studies*, 5, 313–349. <https://heinonline.org/HOL/P?h=hein.journals/oxfjls5&i=319>
- Waldron, J. (1988). *The right to private property*. Clarendon Press.
- Winter, T. C., Harvey, J. W., Franke, O. L., & Alley, W. M. (1998). *Ground water and surface water—A single resource (U.S. Geological Survey Circular 1139)*. USGS Publications, Circular 1, 79. <https://doi.org/10.3133/CIR1139>
- Yackee, J. W. (2010). Do bilateral investment treaties promote foreign direct investment—Some hints from alternative evidence. *Virginia Journal of International Law*, 51(2), 397–442. <https://heinonline.org/HOL/P?h=hein.journals/vajint51&i=401>
- Zellmer, S. B., & Harder, J. (2008). Unbundling property in water. *Alabama Law Review*, 59(3), 679–745. <https://heinonline.org/HOL/P?h=hein.journals/bamalr59&i=691>
- Zhang, L. (2021). China: Water law in transition. In J. Dellepenna & J. Gupta (Eds.), *Elgar encyclopedia of environmental law series: Water law* (pp. 367–376). Edward Elgar.

**How to cite this article:** Bosch, H. J., & Gupta, J. (2023). The tension between state ownership and private quasi-property rights in water. *WIREs Water*, 10(1), e1621. <https://doi.org/10.1002/wat2.1621>