



INSTITUTE FOR AGRICULTURE AND TRADE POLICY

Water Governance in the 21st Century

Lessons from Water Trading in
the U.S. and Australia

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Institute for Agriculture and Trade Policy

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Introduction

Droughts and related crop failures are big news all over the world. In Asia (e.g., India, Pakistan), Africa (e.g., Lesotho, Zimbabwe), Europe (e.g., Russia, Spain and Portugal) and the Americas (e.g., Brazil, Argentina, United States), farmers and consumers are confronting the devastating effects of prolonged water shortages, along with the very real possibility that this kind of situation could be the new normal as the climate changes. This unfolding disaster has led to renewed efforts to find solutions to the water crisis, both in terms of increasing supply and decreasing demand.

In addition to technical interventions such as desalination, there has been increasing emphasis on demand-based approaches as a means to address water scarcity. For the most part, these efforts have emphasized market mechanisms, including “water banking” and water trading, to allocate water among competing demands and facilitate the transfer of water from low-valued to higher-valued uses.

Market based mechanisms to address water scarcity

Water trading and water banking are amongst the market-based mechanisms that help transfer water from one use to another, or from one user to another, and are seen as a way to address water scarcity.

Water trading is the process of buying and selling water rights (which are permanent access entitlements), or water allocation entitlements (which are seasonal and temporary). Both involve transfer of water from one agricultural water user to another, or from agricultural sector to other higher valued sectors and uses—including meeting the needs of industry, tourism and urban growth.

The term “water banking” is normally used in two senses. First, and in more recent times, it describes a number of water-management strategies that include multi-party agreements where one party stores or “banks” water for themselves or for third parties, for a payment, using recharge basins or injection wells.¹ This is distinct from the other sense in which it has been used, where the water bank is an intermediary (or broker) bringing together buyers and sellers, acting simply as an institutional mechanism that facilitates the legal transfer and market exchange of various types of surface, groundwater and storage entitlements.² In this latter role, the purpose of a water bank is “to facilitate the transfer of water from low-valued to higher-valued uses by bringing buyers and sellers together.”³

This approach is gaining ground as climate uncertainties grow and scarcity conditions give rise to the idea of water primarily as an economic good. For example, it is the basis for proposals led by the Water Resources Group 2030, a potentially powerful actor seeking to influence water policy with the support of the World Economic Forum and the World Bank’s International Finance Corporation, as is clear from *Charting our water futures*, a report prepared by McKinsey & Company for Water Resources Group 2030.⁴ In this framework, it is presumed

that market pricing of freshwater would help reduce waste and pollution and reallocate its use to the most productive and efficient users. However, in developing countries such advocacy often results in national water sector reforms that favor the transfer of water away from subsistence livelihood activities, either to higher priced commodity crops or to other higher-valued uses—including meeting the needs of industry, tourism and urban growth.

Global Water governance, McKinsey & Company and Water Resources group 2030

Water Resources Group 2030 was launched in 2008 by World Economic Forum’s water initiative, a consortium led by businesses such as Nestle. It is also funded by a handful of governments such as Switzerland (home to Nestle), and the World Bank Group.⁵

The 21st century has seen the clear emergence of a corporate-driven global governance regime that drives the investment decisions in a number of areas hitherto considered state responsibility, including food, water and agriculture. It has been pointed out elsewhere that a “few powerful and well-connected consultancy firms such as McKinsey & Company serve as ‘brokers’ for this regime by facilitating consensus about the contours of the new development paradigm and then promoting it across the globe.”⁶ In October 2011, the World Bank Group’s International Finance Corporation (IFC), reported that it was “undertaking the effort to establish a new WRG entity with an initial mandate to drive country water sector transformation programs over a five-year horizon supported by an estimated US\$75-100 million trust fund facility.”⁷ In early 2012, WRG 2030 moved to its new home at IFC.⁸ Over the last few years it has influenced water policy in at least five countries: India, Jordan, Mexico, Mongolia and South Africa through sectoral reforms that promote transfer of water from low-value to high-value uses.⁹

While market-based water transfers have been taking place since the early 1980s, over the last decade, the number (and volume) of water transfers either in the same sector—agriculture—or from irrigation to other sectors such as urban use, have increased. In fact water transfers are expected to increase manifold in the future, along with the anticipated associated negative impacts.¹⁰ In examining the relevance of water trading as a primary policy option for addressing water scarcity as it impacts people and ecosystems, it is important to consider not only the optimistic promises of market planners, but the concrete evidence on the effectiveness of water governance regimes. There are important lessons from the experiences in the western United States and southeastern Australia, both regions in which sophisticated institutional frameworks have been developed that recognize water as a limited resource and an economic good, and which facilitate the reallocation of water through market mechanisms such as water trading (see side bar) to “so-called” economically efficient uses.

Most research that focuses on water trading continues to accept the logic of maximizing economic gains by increasing water use efficiency through trading especially in times of scarcity, and explores how to increase the benefits of water trading while reducing the negative impacts.¹¹ Water trading is perceived as a means of addressing failures in water governance.

While it is true that under conditions of scarcity water trading can benefit those participating in the transactions, such trading often results in third-party effects—adverse impacts on other groups such as indigenous groups and those directly dependent on the environment for non-commercial benefits—that would not happen in the absence of trading. Third-party effects also include reductions in water needed for ecosystem sustenance, also known as environmental flows, increased salinity and pollution levels, as well as resultant negative effects on floral and faunal biodiversity.

The arguments made in this paper build on research which suggests that while market mechanisms, when situated in an appropriate institutional context, “may help reallocate water to ecosystem protection and priority uses” they “do not solve problems such as poor management, existing over-allocation, or failing water governance.”¹² These include fundamental problems such as not recognizing the direct hydrologic connectivity between groundwater and surface waters and the resultant legal divide. Here an attempt is made to suggest that water markets often exacerbate the failures in water governance. Third-party effects are only the most evident symptom of this problem.

Moreover, examining the benefits for only two parties to a transaction ignores the reality that in most jurisdictions, water has been considered a commons or public good for centuries. It is contrary to this legal heritage to not examine all benefits and effects or impacts. For example, in the United States, certain bodies of navigable water are subject to the public trust doctrine, or, they are held in trust as is the case in Canada to protect the public uses for which nature intended them.¹³ Over the last few decades, public trust doctrine has been extended to non-navigable waters, as well as other public resources.¹⁴

This paper is based on a holistic framework that considers water as a commons (see side bar). The “Public Trust Doctrine” provides a legal framework for understanding and applying this notion of the commons as resources belonging to the public realm. “Similar to any legal trust, the public trust doctrine has three primary components: the trustee, the trust principal, and the beneficiaries of the trust. In the public trust framework, the state is the trustee, which manages specific *natural resources*—the trust principal—for the benefit of the *current and future generations*—the beneficiaries.”¹⁷ The public trust doctrine can be understood as constitutive of protecting

Water commons and public trust doctrine

The concept of water commons is used here in the sense that, as a resource that is essential for life itself and as a resource for which there is no substitute, water is an inheritance shared by all living beings. This concept of commons informs the Justinian law of things in sixth century. It said “the following things are by natural law common to all—the air, running water, the sea and consequently the sea shore.”¹⁵

Public Trust Doctrine has its origins in this Justinian law and English Common law. It has “three primary components: the trustee, the trust principal, and the beneficiaries of the trust. In the public trust framework, *the state* is the trustee, which manages specific *natural resources*—the trust principal—for the benefit of the *current and future generations*—the beneficiaries.”¹⁶ The public trust doctrine can be understood as constitutive of protecting both *the public use* and the *public interest*.

both the *public use* and the *public interest*: the former in the context of having access to the commons for *current generations*, while the latter in the context of conserving the commons in the interest of *current and future generations* [of all beings]. The challenge we have in this 21st century is finding the balance: to ensuring that *public use* is not at the cost of the *public interest* or for that matter vice versa; neither of these should result in violation of basic human rights.

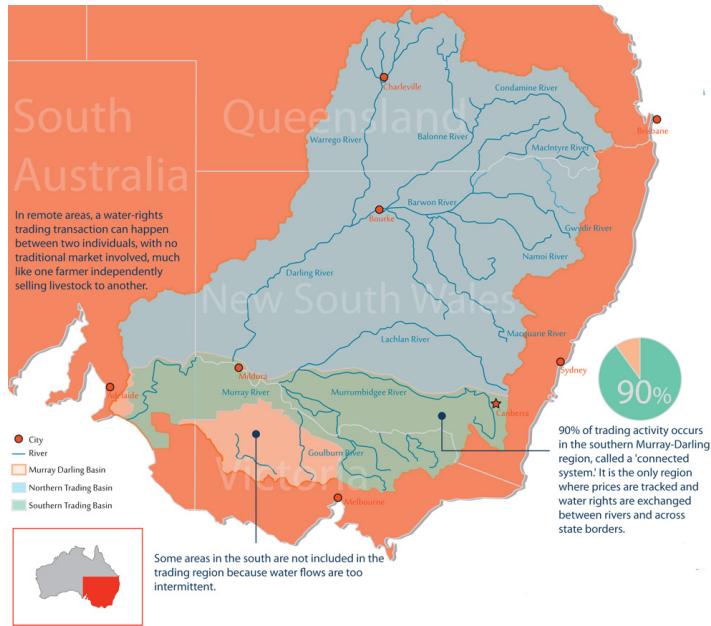
Professor Joseph Sax, who with his path-breaking work proposed public trust doctrine as a key component of environmental law, suggested that the “central idea of the public trust is preventing the destabilizing disappointment of expectations held in common but without formal recognition.”¹⁸ In that sense, a public trust doctrine—or public trust principles—might be an important tool in developing solutions to the water governance concerns that have been plaguing us for awhile.¹⁹

The paper concludes by suggesting that the national water sector reforms underway in many countries consider the hidden costs of existing market-based approaches and instead advance the notion of water as a commons, available first and foremost for public purposes (including the realization of right to water and right to food) so that allocation of water is not based on commodification and economic efficiency alone.

Water Trading in southeastern Australia's Murray–Darling Basin

As of 2005–2006, the Murray–Darling Basin (MDB), which drains about 14 percent of Australian land mass, accounted for about 65 percent of Australia's irrigated land and about 66 percent of its agricultural water use.²⁰ Following the Water Reform Framework (1994), which created a national-level

legal framework, based on the view of water as a commodity and accompanied by institutional reform, a flourishing water market developed in the region.



Source: Cody Yeager/Circle of Blue (www.circleofblue.org).

As in many other British colonies, through the first half of 20th century, water was governed in most parts of Australia under riparian law, which has its origin in English common law. Riparian doctrine allows any landholder access to any adjacent water source for reasonable water use (as long as it does not impact the reasonable water use of another adjacent riparian landholder). Under this law, the riparian landholders could use water for all ordinary and domestic purposes, provided the quality of water downstream was not negatively impacted. However, as a dry continent which faces highly variable rainfall patterns and fluctuating river flows, the new colony had to initiate infrastructure development projects as well as introduce several institutional changes, especially in the south-eastern states of Australia where the MDB lies. As early as 1896, the state of New South Wales (NSW) limited riparian rights by vesting all aspects of terrestrial flow of water in the crown.²¹

In the years following World War II, water consumption increased steadily and extensive investment in infrastructure development made the MDB one of the most important agricultural regions of the country. The problems associated with intensive irrigation for commodity crop production, especially in an arid and saline environment, became acute during the severe drought in 1967–68. Salinity increases not only resulted in reduced crop yields and a damaged aquatic environment but also in corrosion of equipment used in industries.

By this period, Australian states had developed an administrative arrangement whose key features included statutory riparian rights for certain uses, allocated water rights for regulated water sources and licenses/permits for withdrawing water from unregulated water sources. Together these were sometimes referred to as "water entitlements."²² While states adopted highly varied policies regarding water entitlements and water allocations, in all states water was considered a public good. Allocations were made on the basis of a licensing system: potential water users applied to state agencies for licenses (issued on the basis of irrigable land, crops cultivated) for irrigating the land, which were tied to the land on which water was used.²³ Until the 1960s, these entitlements were mostly free.²⁴

Much of this water was used for export-oriented industrial agriculture, with its accompanying externalities such as water pollution. The early 1980s saw a number of amendments that somewhat increased the environmental responsibilities of the Murray River Commission, but other changes in early 1990s transformed the nature of water rights in Australia, and paved the way for its water market.

Around the same time in the early 1990s, the Council of Australian Governments (COAG), through its National Competition Policy (NCP), introduced market-based reforms in almost all parts of Australian economy, including the water sector.²⁵ The Water Reform Framework (WRF) of 1994 was certainly influenced by the continent's arid water economy, but more importantly it was influenced by the global trend to search for market based solutions.

The WRF introduced a number of institutional changes, including the creation of tradable water licenses (clearly defined in terms of quantity, quality, ownership, transferability, etc.) separate from land titles. This was done in an attempt to increase the efficiency of water markets that were already operational in some regions. The licenses were further separated in terms of entitlements (a permanent share in the water system) and allocation (seasonally/annually determined share) for improving the efficiency of water trade.

The WRF was followed by Australia's current strategy for national water reform: the National Water Initiative (NWI), an Intergovernmental Agreement, signed on to by most states in 2004.²⁷ The strategy goes beyond the separation of water access right from land title. It includes further unbundling of the water rights that "may contain a combination of water access entitlements; water supply works rights and water use rights."²⁸ Once these water access rights are fully unbundled into separate property rights and instruments for each component of the water access right, a water user needs to establish a number of specific water rights (such as "water

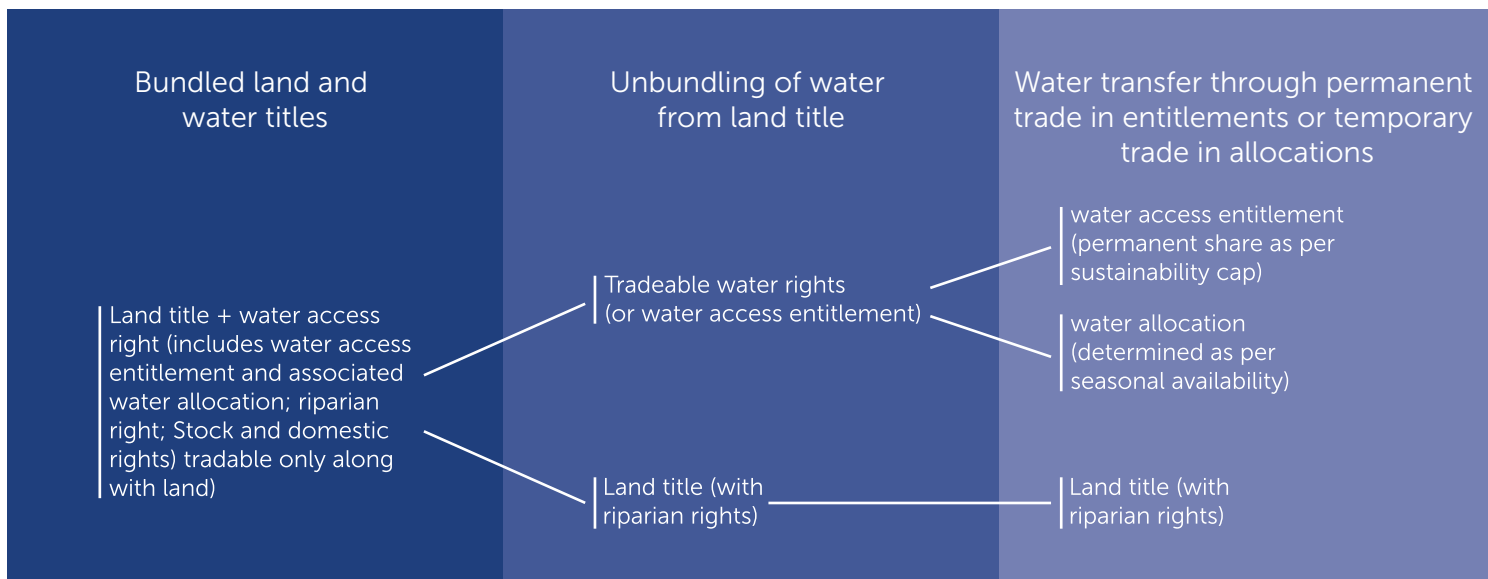


Chart 1: Australian water governance regime²⁶

Note: Water access entitlement, when in the bundled form, exists along with land property title and other individual water rights such as water allocation right, water use right, delivery right (which is tradable within the delivery network); irrigation right (which is tradable within the irrigation network and which can be transformed into a tradable water access entitlement) and works approval right. Not shown here is the Native title, granted to a specific person or group for domestic, non-commercial purpose for designated location/ locations; non-tradable; access license, water use approval etc. not required.

works approval" and "water use right" to create an infrastructure) to access water. The costs of full implementation, including titling costs of these property rights and instruments (for each component of the water access right) are not yet clear.²⁹ The future implications of these developments, such as possible speculation from outside investors, are not clear either, as these are still being operationalized.

Most of the water trading (that currently involves trading in water access entitlement, water allocation right and associated water transfers) takes place in and around the Murray-Darling Basin. The southern MDB, comprising 13 distinct water trading zones accounts for 90 percent of water trading in Australia.³⁰ As a result of the institutional reforms under the WRF (1994), water allocation trading in the southern MDB grew from 537442 ML to 763894 ML, an increase of 42 percent (though with large seasonal fluctuations) in the period between 1998–99 and 2007–08.³¹ The increase in volume of water traded was even more dramatic. In 1998–99 only 6 percent of the total water available for consumptive use was traded; it increased to 24 percent by 2007–08.³² By 2007–08, a quarter of the total water available for consumptive use in the southern MDB was traded.

The water in the northern MDB as well as in areas outside the MDB in the states of Victoria, New South Wales (NSW) and Queensland account for a small share of water trading; water markets are least developed in the states outside MDB (Northern Territory, Western Australia and Tasmania). To a

great extent this has been ascribed to the higher hydrologic connectivity in the southern MDB. Such transactional costs associated with water trading are often ignored in the efficiency calculations that are put forward by advocates of water trading. Despite the presence of a nationally organized water trading regime, in the absence of infrastructure connecting these locations, water trading cannot take place.

The experiences of water trading in Australia, and in particular in New South Wales (southern MDB) have been studied extensively by scholars. Many have identified water trading as an effective mechanism in encouraging water conservation, especially in times of scarcity. Moreover, several reports recognize that water trading helped allocate the water for economically productive activities during the drought period in the last decade. However, they are not as convinced about its usefulness as a management tool when there is no water constraint.

Moreover, in the Australian context where allocation is not accompanied by mandatory return flows to the environment, water saving measures often have negative environmental implications. The water conservation techniques are undertaken not to help ensure environmental flows though, but to create an asset for the market. In fact, reports last year suggest that the "flawed water trading systems are choking [Australia's] mighty rivers to death."³³

In the western states, a different water law evolved in response to the needs of the new settlers. Developments such as mining and commodity crop production required secure water-rights in an arid economy, even when the settlers did not have access to a water source adjacent to their mining/farm operations. As in the case of the mining rights prevalent there, prior appropriation law (first in time, first in right) evolved to recognize the water rights of the first person (“senior appropriator”) to claim the water, provided it is put for ‘beneficial use’ (a clause that primarily covered commercial, agricultural, domestic, industrial use). Several states in the west use a combination of these two in managing their surface waters. In many states, groundwater too is governed by prior appropriation law.⁴²

From a policy perspective, it may be helpful for us to identify the main difference between riparian rights on the one hand and prior appropriation rights on the other in terms of the sub-rights within each. Schlager and Ostrom (1992) have identified five property rights as most relevant for conceptualizing the use of common-pool resources. These are: the rights of access (the right to enter a defined physical area and enjoy non-subtractive benefits), withdrawal (the right to obtain resource units or products of a resource system), management (the right to regulate internal use patterns and transform the resource by making improvements), exclusion (the right to determine who will have access rights and withdrawal rights, and how those rights may be transferred) and alienation (the right to sell or lease management and exclusion rights).⁴³ While riparian law involves the rights of access, withdrawal, use and management, the prior appropriation law involves two additional rights: that of exclusion and alienation. This allows the prior appropriation right-holders to treat water, a common, as a private property and a commodity. This may be why water trading developed more easily in the western United States.

Prior appropriation law establishes not only the quantity of water but the purpose for which it may be used, the location for accessing the water, etc., amongst others. These rights are protected as long as they are used for the same purpose and under the same conditions. No future priority (environmental or economic) can be accorded priority over this right. Under prior appropriation law, in case of a water scarcity as the result of a drought or other reasons, the senior appropriator’s water rights do not diminish and they are able to use water up to their full allocation, as long as there is water in the water source. Prior appropriation rights continued to be the norm even when the new federally funded projects were put in place to bring water for the massive agricultural development in western states.

Under prior appropriation doctrine, unlike riparian law (where the water right is generally attached to a land right and is conditional on transfer of land), the water right can either be transferred along with the land or it can be sold or leased separately if the transfer does not impinge upon the rights of other appropriators.⁴⁴ This decoupling of water right from land right was a necessary condition and basis for the development of a market for water trading in the western United States. In addition, a similar “de-coupling” has been seen in riparian law states, where a specific “use,” like extracting and selling or diverting water out of a watershed, might allow water to be severed from land so long as it is reasonable when balanced against other in watershed uses.⁴⁵

In places such as southern Colorado, prior appropriation doctrine challenged and displaced community managed, equitable water sharing systems such as *Acequias*. The founding irony of prior appropriation doctrine was it rested on denying the right to water of Native Americans. While their prior appropriation rights were recognized in early 20th century, often there are conflicts as the water allocations had previously been given away to non-native Americans. Native American efforts to reclaim their water right have resulted in long drawn out litigation,⁴⁶ and these days they often end up going for negotiated settlement.

In order to facilitate farming and other developments, the U.S. Bureau of Reclamation constructed a large number of dams on many rivers, converting the arid desert to extensive irrigable farmlands. This was done with a large infusion of federal funding, and this supply oriented approach served western states well, as federally subsidized power, water and the offer of cheap land encouraged massive in-migration to the arid west contributing to the economic development of the region. In the post- World War II period, the region became the bread basket of the world, and industrial monoculture farms continued to pollute and deplete the water at unsustainable levels over the next decades.

But by the 1970s all viable options for additional water supply had been exhausted. The re-allocation of water now became a necessity, but given the prior-appropriation law the water rights were vested in senior appropriators. This gave rise to the emergence of voluntary market-based mechanisms such as water banking, leasing or trading as one of the new means for meeting the expanding water needs.

While water transactions (and related transfers) were minimal in the earlier period, in the two decades between 1987 and 2009 there were 4,407 recorded water transactions in the 12 Western States (Arizona, California, Colorado, Idaho, Montana, New Mexico, Nevada, Oregon, Texas, Utah, Washington and Wyoming).⁴⁷ Many of these actually represent two

or more transactions bundled together as one (on the basis of a shared buyer/seller/state/basin). They include a transfer of water between agricultural, recreational, environmental and urban (municipal and industrial) water supplies.⁴⁸

Even though farmers and agribusiness are not violating any law in selling their water rights, in the long run, such transfers could have a detrimental effect on the local economy and environment.⁴⁹ One direct effect of transferring water away from agriculture can be the reduced capability for food production, which is especially significant if the production is targeted for local consumption. Diversion of water away from agriculture can also impact rural employment. The job impacts of these water transfers are not easy to measure, but most labor-intensive crops tend to be water-intensive as well, and transferring water away from water-intensive crops can result in job losses that particularly affect the lives of poorer work forces like migrant laborers who are engaged in such farm tasks.⁵⁰ Such third-party impacts are often not counted while doing a cost-benefit analysis of water trading.

Where the third-party impacts have been mitigated, these have not been because of water trading per se, but because of the state intervention making such water allocations a priority. NGOs have sometimes used the market to purchase water for environmental protection.⁵¹ In addition there have been non-market state initiatives that increase the water allocation for environmental flows.⁵² While an acute awareness regarding environmental flows is emerging in the western states, as is in the case of Australia, the water rights of native Americans remains a most important issue that still needs broader recognition and resolution.

These concerns are especially urgent because the water crisis in the western U.S. is likely to get worse. The arid west has been facing new demands from growing populations and urban growth. In 2006, a paper by the Congressional Budget Office (CBO) identified the four developments that will further increase future pressures: “the settlement of Indian tribes’ claims on water rights currently held by others; environmental laws that require greater amounts of water be retained in natural courses; growing populations in arid states; and the recurring impacts of droughts, which may increase in frequency and intensity as a result of shifts in precipitation patterns.”⁵³

In the western U.S., there are already existing institutional alternatives that may provide the basis for creating a commons-based water governance system that is ecologically sustainable, even as it allocates water for socio-culturally and economically beneficial uses.

First is the *reserved rights doctrine* of the early 20th century. This doctrine of water rights favored Indian tribes and “guaranteed tribes the right to use water to fulfill the purposes for which their reservations were established. The right could be exercised anytime in the future, even if non-Indians had used the water first and had been granted rights under state law.”⁵⁴

This law was used in 1963 to establish water rights for parks, forests and for similar public uses. However, it has also been argued that “Over the years, the reserved rights doctrine has promised more than it has delivered.” Even when they are able to realize their water rights, the tribes in western U.S. have limited rights to sell or lease their water to non-Indians outside their reservations. While there are some positive developments there is a long way to go.

The other existing institutional alternative is the public trust doctrine, (which differs from state to state, while sharing certain characteristics that stem from following prior appropriation doctrine in the western United States). As environmental attorney and Chair of *FLOW for Water*, a well-known Michigan based citizen advocacy organization Jim Olson points out, “in almost all prior appropriation states, state or public owns the water. Most of the Western states recognize the public trust doctrine in those surface waters that are navigable, and in some states these extend to those waters that are tributary or non-navigable, such as groundwater or smaller streams, (the use or diversion of which would adversely impact the public trust uses, in the navigable downstream waters).”⁵⁵

In some states the public trust doctrine in water has been extended to environmental protection, leading to a doctrine of “ecological public trust.”⁵⁶ According to a 1983 Supreme Court decision in what is known as the Lake Mono Case, California requires that principles of public trust doctrine be applied and its implications are taken into consideration by water suppliers and regulators while taking decisions on water allocations from rivers for drinking water supply or wild life conservation.⁵⁷ Following the landmark Lake Mono case, several states have since then applied public trust doctrine to varying extent to protect their public resources.⁵⁸ While public trust doctrine has broad basis in federal law, states have the flexibility to apply it in response to their needs and local specificities, and this has been helpful to initiate actions at the local level.

These developments over time, combined with an acute awareness of the environmental crisis—including the water and the climate crises—have resulted in the emergence of two public trust doctrine-related trends in western United States. The first is “the extension of public rights based on states’ ownership of the water itself” and the second is “an

increasing, and still cutting-edge, expansion of public trust concepts into ecological public trust doctrines that are increasingly protecting species, ecosystems and the public values that they provide.”⁵⁹

Together these have the potential to become the foundation for a commons based water governance regime which ensures that water is available first and foremost for public purposes (including for the realization of right to water and help realize the right to food, and long term protection and preservation of ecosystem functions), that allocation in water is not based on economic efficiency alone, that maintains hydrological integrity, and that respects its intrinsic value. Yet, it has been argued that “the doctrine’s” application to American water rights has failed to achieve the full potential suggested by the California Supreme Court’s *National Audubon* decision three decades ago in the Lake Mono Case.⁶⁰

For example, this new regime has the potential to limit corporate control of public water. While water markets and public trust can co-exist side by side, the possibility of extending public rights based on states’ ownership of the water itself, opens the possibility for large scale use and control of water that is not consonant with commons principle and public trust doctrine. Jim Olson argues that “water markets and trading should not be allowed unless and until it is made subject to overriding commons and the public trust doctrine principles.”⁶¹ This would be especially important if this regime is developed alongside existing water markets. Legal mechanisms must be developed to ensure that public rights based on states’ ownership of water do not simply promote large scale use and control of water that is not consonant with commons principle and public trust doctrine.

In their submission to the International Joint Commission requesting “to protect and save the Great Lakes, their Boundary Waters, and ecosystem for generations to come through express recognition of the Commons and the Public Trust” two citizens advocacy groups from The U.S. and Canada—namely Michigan Based *FLOW for water* and Ottawa based *Council of Canadians*—extended the combined use of commons framework (“Our Great Lakes Commons: A Peoples’ Plan to Save the Great Lakes Forever”) and public trust principles (“Principles of the Public Trust Doctrine for the Great Lakes Boundary Waters”) to trans-boundary water resources.⁶²

However, up to now the extension of public trust doctrine has rarely been about maintaining the integrity of the ecosystems, or recognizing the intrinsic value of aquatic biodiversity, or about limiting corporate control of water; most of the time it is about human uses, including aesthetics. Yet given that “the public trust doctrine provides one well-grounded legal mechanism for re-balancing private and public rights in the

environment,” “the legal recognition of a ‘public trust’ provides both a rhetorically resonant articulation of the larger public interests in intact and functional ecosystems and a means of imposing broad duties on governments to act for the long-term preservation of ecosystems and other environmental values”—what is described as the ecological public trust.⁶³

Water trading in the United States and Australia: Some lessons

Both in southern MDB and in the western United States, water trading helps the transfer of water to meet the priority needs principally of those groups and sectors that can pay for it (the exceptions are those sectors for which the state makes allocations). It is argued that such trading helps the country or region weather out the water scarcity, and helps the economy. This emphasis on water transfer to economically productive uses is appealing to developing country governments, as they struggle to catch up with developed countries such as the United States and Australia in terms of indicators such as GNP. This is why it is especially important to consider three hidden costs of water trading in the southern MDB and western United States. These costs would be even heavier if the water trading model were to be transferred to the South.

First and foremost there is the economic cost of conveyance. Water trading requires functioning conveyance facilities in place so that water can be transferred from one place to another. In the case of MDB, a single basin, it has been pointed out that the cost of conveyance is borne by the public while the profit goes to the rights-holder. In the U.S, water trading takes place in multiple basins. The extensive federally funded water infrastructure in the western United States hides the conveyance cost that is especially high in the cases of inter-basin transfers.

Similarly, the cost and energy use in water transactions especially when it involves water banking—storing ground water in lieu of shortage in future surface water shortage—can be high: first for conveying and storing the water, and then, for taking it out and conveying it back.

In emerging economies, such as India and China, massive infrastructure development projects (for example, the National River Linking Project (NRLP) in India, or the South to North Transfer project in China) are being undertaken in an attempt to address water scarcity in arid regions.⁶⁴ The economic costs of these projects are massive: NRLP is estimated to cost about \$140 billion while South to North Transfer Project is estimated to cost about \$80 billion.⁶⁵

Second, there are the social costs associated with these infrastructure projects, such as the historical third party effects of creating the conveyance systems including trans-boundary issues.⁶⁶ When undertaken in highly populated regions, the third party impacts begin with displacement of large communities and destruction of riverine ecosystems. While these issues were totally ignored by the colonizers both in Australia and the United States, when they are undertaken in the 21st century by the state on behalf of its water guzzlers, it is guilty of failing in its responsibility to protect the interest of all its citizens. These projects also convey water away from vulnerable and less economically productive regions (rural), activities (peasant agriculture) and users (pastoralists, indigenous communities).⁶⁷

When such market instruments are adopted as public policy options in the context of scarcity, they do not provide protection to the most vulnerable communities—such as pastoralists and subsistence agriculturists, who form the bulk of small holder agriculturists—against the vagaries of nature such as drought, nor against the tide of water related investments (such as in the case of land grabbing). This may become even pronounced in developing country contexts.

In short, the third-party effects in western U.S. and southern MDB are symptoms of unresolved problems of water governance, which were often exacerbated by water commodification. In developing countries, with a larger percentage of people already disadvantaged and lacking access to water, market-based water trading will increase inequities and environmental impacts. While water trading may be able to help reallocate water to economically productive sectors and groups, it will not help address the water crisis in an inclusive, fair or sustainable manner.

Who benefits from these transactions that involve water commons? When we dream of unbundling water rights to create multitude of sub-water-instruments (as is the case in Australia) are we building castles in the air, of water bubbles (similar to the dot-com bubble of 90s and the housing market bubble of the naughts)?

The combined use of the commons principles with public trust doctrine or its principles provides a way forward to resolve the problems raised above. In the international contexts where the commodification of water is being proposed as the primary policy option for addressing water scarcity, food security and climate related challenges, it is time that policy makers give closer attention to the alternatives that offer a basket of choices. This basket could include even water transfers (as long as they are in consonance with commons principles and public trust doctrine).

In fact according to a recent study, “in the last two decades, several countries in Asia (India, Pakistan, Philippines), Africa (Uganda, Kenya, Nigeria, South Africa), and the Western Hemisphere (Brazil, Ecuador, Canada) have discovered that the public trust doctrine is fundamental to their jurisprudence, due to natural law or to constitutional or statutory interpretation. In these countries, the doctrine is likely to supply environmental protection for all natural resources, not just public access to navigable waters. This international public trust case law also incorporates principles of precaution, sustainable development, and intergenerational equity; accords plaintiffs liberalized public standing; and reflects a judicial willingness to oversee complex remedies.”⁶⁸ In most of these countries “commons” is a living principle in the customary resource use. There is potential to marry the two, to bring about a water governance regime that is based on commons framework and public trust principles.

Faced with proposals such as the ones being promoted by WRG 2030, which urge commodification of water as the way forward, countries where national water sector reforms are being undertaken, now have an option. They should ensure that their water policies are grounded in commons principle and public trust doctrine. This can help provide ecologically and socioculturally appropriate public policy responses (from all affected sectors) to the water crisis and water scarce situations in particular. In doing this we are moving away from solutions based simply on economic rationality and competition for resources to one based on cooperation and mutual trust.

This would be in the spirit of Eleonore Ostrom’s thoughts on public policy that she expressed during her Nobel Prize acceptance speech, “Designing institutions to force (or nudge) entirely self-interested individuals to achieve better outcomes has been the major goal posited by policy analysts [...] for much of the past half century. Extensive empirical research leads me to argue that instead, a core goal of public policy should be to facilitate the development of institutions that bring out the best in humans. [...] the innovativeness, learning, adapting, trustworthiness, levels of cooperation of participants, and the achievement of more effective, equitable and sustainable outcomes at multiple scales.”⁶⁹ In sum, public policy rooted in cooperation and mutual responsibility, instead of competition, would help address the ongoing crisis in shared commons such as water.

Endnotes

1. Rebecca Nelson, "Uncommon Innovation: Developments in Groundwater Management Planning in California" Water in the West Working Paper 1, March 2011, Woods Institute for the Environment, The Bill Lane Center for the American West, Stanford University <http://woods.stanford.edu/sites/default/files/files/UncommonInnovation.pdf> (accessed February 14, 2013).
2. State of Washington [U.S.] Department of Ecology, "Analysis of Water Banks in the Western States", July 2004 (Publication No. 04-11-011), <https://fortress.wa.gov/ecy/publications/publications/0411011.pdf> (accessed February 14, 2013).
3. Ibid.
4. 2030 Water Resources Group "Charting our water futures: Economic frameworks to inform decision-making" November 2009 http://www.mckinsey.com/client_service/sustainability/latest_thinking/charting_our_water_future (accessed February 14, 2013).
5. <https://members.weforum.org/pdf/water/WaterInitiativeGlance.pdf>.
6. Nancy Alexander and Lili Fuhr, "Privatizing the Governance of "Green Growth"", Heinrich Boell Stiftung, Washington, DC 2012, November 2012, http://www.boell.org/downloads/Alexander_Privatizing_Governance_of_Green_Growth_Version_2.pdf (accessed February 14, 2013).
7. International Finance Corporation (IFC), "Submission by the International Finance Corporation (IFC) to Australian Multilateral Assessment (AMA)", Executive Summary, October 2011. <http://www.docstoc.com/docs/127365570/International-Finance-Corporation-IFC-kb-AusAID> (accessed February 14, 2013).
8. Ramya Krishnaswamy, "Water Resources Group: A new model for water sector transformation", Jan 27th 2012, <http://forumblog.org/2012/01/water-resources-group-a-new-model-for-water-sector-transformation/> (accessed February 14, 2013).
9. Shiney Varghese, "Corporatizing Water: India's Draft National Water Policy", February 2012, http://www.iatp.org/files/2012_02_28_IndiaNWP_SV_0.pdf (accessed February 14, 2013).
10. Colorado Water Conservation Board, "Colorado's Water Supply Future: Alternative Agricultural Water Transfer Methods Grant Program Summary", p.44, May 2011, <http://cwbwebblink.state.co.us/WebLink/ElectronicFile.aspx?docid=150555&searchid=9918b278-0e2f-4c0e-acff-280192b81b95f6&dbid=0> (accessed February 14, 2013).
11. Miria Lange, David Wood and Ann Winstanley, "Water Trading in New Zealand: Grappling with the Issues" <http://www.esr.cri.nz/SiteCollectionDocuments/ESR/PDF/SocialScience/WaterTradinginNZGrapplingIssues.pdf> (accessed February 14, 2013).
12. Examples of this amongst others are: Gary D. Libecap, R. Quentin Grafton, Eric C. Edwards, R. J. O'Brien, and Clay Landry, "A Comparative Assessment of Water Markets: Insights from the Murray-Darling Basin of Australia and the Western US", June 2011, ICER Working Paper No. 8/2011, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1858723 and Lana Jones and Bonnie G. Colby, "Measuring, Monitoring, and Enforcing Temporary Water Transfers: Considerations, Case Examples, Innovations and Costs", June 2012, http://ag.arizona.edu/arec/pubs/facultypubs/MME_6-25-12.pdf (accessed February 14, 2013).
13. Oliver M. Brandes, Linda Nowlan, and Katie Paris, "Going With the Flow? Evolving Water Allocations and the Potential and Limits of Water Markets in Canada," The conference Board of Canada, December 2008, http://poliswaterproject.org/sites/default/files/09_going_w_flow_1.pdf (accessed February 14, 2013).
14. James M. Olson, "Request for Great Lakes Commons and Public Trust Principles for the International Joint Commission," Report to the International Joint Commission, p. 27, November 2011, <http://flowforwater.org/wp-content/uploads/2013/02/Edited-12-01-11-Report-to-IJC-on-Public-Trust-Principles-w-cover-pg.pdf> (accessed February 14, 2013). I wish to acknowledge the work of Jim Olson, (and others) in the water justice community for their effective use of public trust doctrine in water campaigns in the U.S.; I also wish to thank Jim Olson for commenting on this paper, especially on my attempt to use of the public trust doctrine in addressing the concerns around water trading.
15. Paul A. Barresi, "Mobilizing the Public Trust Doctrine in Support of Publicly Owned Forests as Carbon Dioxide Sinks in India and the United States," Colorado Journal of International Environmental Law and Policy, Volume 23, Number 1 Winter 2012, pp. 53-63, <http://www.colorado.edu/law/sites/default/files/Vol.23.1.pdf> (accessed February 14, 2013).
16. Caesar Flavius Justinian, (translated by J.B. Moyle), Project Gutenberg's The Institutes of Justinian, 2.1.1 Titles of the Different Kind of Things; AD 533 Release Date: April 11, 2009 [EBook #5983], Fifth Edition, Clarendon Press, Oxford, England, 1913. Available at http://www.gutenberg.org/files/5983/5983-h/5983-h.htm#link2H_4_0029.
17. Alexandra B. Klass and Ling-Yee Huang, *Restoring the Trust: Water Resources and the Public Trust Doctrine, A Manual for Advocates*, Center for Progressive Reform White Paper #908, September 2009, http://www.progressivereform.org/articles/CPR_Public_Trust_Doctrine_Manual.pdf (accessed February 14, 2013).
18. Joseph L. Sax, *Liberating the Public Trust Doctrine from its Historical Shackles*, 14U.C. Davis L. Rev. 185 (1980), p.188, <http://scholarship.law.berkeley.edu/facpubs/186/> (accessed February 14, 2013).
19. For example it has been suggested that the public trust doctrine has the potential to bridge the legal gap between surface water and groundwater rights systems in basins where combined surface and groundwater withdrawals harm water rights holders or the environment. Jordan Browning, "Unearthing Subterranean Water Rights: The Environmental Law Foundation's Efforts to Extend California's Public Trust Doctrine" *ENVIRONS, Environmental Law and Policy Journal*, University of California Davis School of Law, Vol. 34:2, May 2011, pp. 240-241 <http://environs.law.ucdavis.edu/issues/34/2/browning.pdf> (accessed February 14, 2013). Also See Lake Beulah Mgmt. Dist. v. State of Wisconsin Dep't of Natural Res., 799 N.W.2d 73, 76 (Wis. 2011) cited in James M. Olson: *Report to the International Joint Commission on the Principles of the Public Trust Doctrine for the Great Lakes Boundary Waters* (Flow for Water, Nov. 30, 2011) <http://flowforwater.org/wp-content/uploads/2013/02/Edited-12-01-11-Report-to-IJC-on-Public-Trust-Principles-w-cover-pg.pdf> (accessed February 14, 2013).
20. National Water Commission, Water markets in Australia: a short history, NWC, Canberra. Govt. of Australia, December 2011, http://www.nwc.gov.au/__data/assets/pdf_file/0004/18958/Water-markets-in-Australia-a-short-history.pdf (accessed February 14, 2013).
21. Michael McKenzie, Water Rights in NSW: Properly Property?, Sidney Law Review, Faculty of Law, University of Sydney, Vol.31: 443, 2009, 445, http://sydney.edu.au/law/slr/slr31/slr31_3/McKen.pdf (accessed February 14, 2013).
22. Poh-Ling Tan, "Legal Issues Relating to Water Use", Issues Paper No 1, Murray-Darling Basin Commission Project MP2004: Agriculture and Natural Resource Management in the Murray-Darling Basin: A Policy History and Analysis, Institute for Rural Futures, University of New England, April 2002, 9-16 http://thelivingmurray2.mdbc.gov.au/__data/page/1482/Poh-ling_Tan_final_report1.pdf (accessed February 14, 2013).
23. Michael Woolston, "Registration of Water Titles: Key issues in developing systems to underpin market development", ACIL Tasman Pty Ltd, Melbourne, August 2004 http://www.ipa.org.au/library/0804paper_woolston.pdf (accessed February 14, 2013).
24. Amy Sennett, Emma Chastain, Sarah Farrell, Tom Gole, Jasdeep Randhawa, and Chengyan Zhang, "Murray-Darling Basin Background Paper", Prepared on behalf of the Harvard Law School Environmental Program, the Water Security Initiative at Harvard University and the Radcliffe Institute for Advanced Study Water Federalism Conference, April 19-21, 2012, <http://watersecurityinitiative.seas.harvard.edu/sites/default/files/Harvard%20Water%20Federalism%20-%20Murray-Darling%20Basin%20Background%20Paper.pdf> (accessed February 14, 2013).
25. Australian Government Productivity Commission, *Review of National Competition Policy Reforms*, Report no. 33. Canberra, February 2005, http://www.pc.gov.au/__data/assets/pdf_file/0016/46033/ncp.pdf (accessed February 14, 2013).
26. For a detailed understanding of various water rights in Australia see Australian Government National Water Market, *Water rights*, <http://www.nationalwatermarket.gov.au/site-information/copyright.html> (accessed February 14, 2013).
27. Australian Government National Water Commission, *National Water Initiative*, <http://nwc.gov.au/nwi> (accessed February 14, 2013).
28. Australian Government National Water Market, *About the Water Market*, <http://www.nationalwatermarket.gov.au/about/index.html#reform> (accessed February 14, 2013).
29. Michael Woolston, "Registration of Water Titles: Key issues in developing systems to underpin market development", ACIL Tasman Pty Ltd, Melbourne, August 2004 http://www.ipa.org.au/library/0804paper_woolston.pdf (accessed February 14, 2013).
30. National Water Commission, Water markets in Australia: a short history, NWC, Canberra. Govt. of Australia, December 2011, http://www.nwc.gov.au/__data/assets/pdf_file/0004/18958/Water-markets-in-Australia-a-short-history.pdf (accessed February 14, 2013).

31. Australian Government National Water Commission, *The impacts of water trading in the southern Murray–Darling Basin: an economic, social and environmental assessment*, Ch. 3. *Impacts on individuals and irrigation industries*, NWC, Canberra http://www.nwc.gov.au/_data/assets/pdf_file/0019/10783/681-NWC_ImpactsofTrade_web.pdf (accessed February 14, 2013).
32. *Ibid.*
33. Mike Young, "Australia's rivers traded into trouble", *Australian Geographic*, April 2012, <http://www.australiangeographic.com.au/journal/australias-rivers-traded-into-trouble.htm> (accessed February 14, 2013).
34. Neil Bartholomaeus (of Jardee), *Submission / Feedback on a Draft Blueprint for Water Reform in Western Australia*, expressing concerns at the potential negative impact of the proposed reforms on landholders in the Shire of Manjimup and on the Manjimup regional economy, September 2006 and Press Release on *Water Licence Fees Scandal: Family farmers pay for massive subsidies to irrigation cooperatives at Ord river and Harvey*, August 2007, http://www.watertaxgrab.com/past_campaign.htm (accessed February 14, 2013).
35. Virginia Falk, *Beyond Native Title: The 'rights' response to social justice and the conceptual problem of resource development*, 2010 p.9. <http://www.aiatsis.gov.au/ntru/documents/VirginiaFalkBeyondNativeTitleAbstract.pdf> (accessed February 14, 2013).
36. *Ibid.*
37. Kenneth M. Murchison, *Environmental Law in Australia and the United States: A Comparative Overview* — Part 2, 11 ENVTL. & PLAN. L.J. 289, 297–99 (1994) and Tim Bonyhady, *A Usable Past: The Public Trust in Australia*, 12 ENVTL. & PLAN. L.J. 329, 330, 331–37 (1995), quoted in Barresi, Paul A. *Mobilizing the Public Trust Doctrine in Support of Publicly Owned Forests as Carbon Dioxide Sinks in India and the United States*, *Colorado Journal of International Environmental Law and Policy*, Volume 23, Number 1 Winter 2012, 48–49, <http://www.colorado.edu/law/sites/default/files/Vol.23.1.pdf>.
38. The Congress of the United States, *How Federal Policies Affect the Allocation of Water*, A Congressional Budget Office Paper, August 2006, <http://www.cbo.gov/sites/default/files/cbofiles/ftpdocs/74xx/doc7471/08-07-waterallocation.pdf> (accessed February 14, 2013).
39. *Ibid.* In the United States 40 percent of the water withdrawals are for agriculture, while another 40 percent of water withdrawals are for thermoelectric power. The remaining 20 percent is used for meeting the water needs of industries, cities and for domestic consumption.
40. The National Agricultural Law Center, *Water Law—An Overview*, <http://nationalaglawcenter.org/assets/overviews/waterlaw.html> (accessed November 10, 2013).
41. The Congress of the United States, *How Federal Policies Affect the Allocation of Water*, A Congressional Budget Office Paper, August 2006, <http://www.cbo.gov/sites/default/files/cbofiles/ftpdocs/74xx/doc7471/08-07-waterallocation.pdf> (accessed February 14, 2013).
42. The National Agricultural Law Center, *Water Law- An Overview*, <http://nationalaglawcenter.org/assets/overviews/waterlaw.html> (accessed November 10, 2013).
43. Ostrom, Elinor, and Hess, Charlotte. 2008, "Private and Common Property Rights," *Encyclopedia of Law & Economics*, Northampton, MA: Edward Elgar, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=130469.
44. Under prior appropriation law, simply acquiring land is not enough to assure water right; it is prudent to verify the validity of the water right through a separate, independent process to ensure that the water right (that had been associated with the land) is intact.
45. Miller, John Louis, *A Critical Look at Michigan Citizens for Water Conservation v. Nestle Waters North America & the Michigan Supreme Court's Recent Jurisprudence* (2008), Student Scholarship Paper 118, <http://digitalcommons.law.msu.edu/king/118>; *Michigan Citizens for Water Conservation v. Nestle Waters North America*: <http://www.savemewater.org/mcwcvsnestle/> and http://justice4michigan.org/files/hfp_nestle_case.pdf (accessed March 8, 2013);
- Also see James M. Olson, *Navigating the Great Lakes Compact: Water, Public Trust, and International Trade Agreements*, (Article based on a presentation at the Great Lakes Water Basin: International Law and Policy Crossroads, the Second Annual Conference on Trade and Investment in the Americas, Michigan State University College of Law, Dec. 1-2, 2006. T 2006 Michigan State Law Review. 1103 <http://commonslearningalliance.org/sites/default/files/Olson.pdf> (accessed March 8, 2013).
46. U.N. General Assembly, Report of the Special Rapporteur on the rights of indigenous peoples, James Anaya, The situation of indigenous peoples in the United States of America, submitted to the UN Human Rights Council, Twenty first Session, 30 August 2012 A/HRC/21/47/Add.1 (accessed February 28, 2012).
47. The five remaining western states (Kansas, Nebraska, North Dakota, Oklahoma, and South Dakota), with handful of transactions are not included in this list. Water Transfer Data Base, (funded by the National Science Foundation and the California Water Resources Research Center) offers a comprehensive accounting of the water transfers between 1987 and 2009 in the 12 Western States that was reported in *Water Strategist. Water Transfer Data* (Excel Spread Sheet) http://www.bren.ucsb.edu/news/water_transfers.htm (accessed on October 12).
48. *Ibid.*
49. Kavita Jain-Cocks, "California's Water Rights Controversy: Should Farmers Be Allowed to Transfer Water to Developers?" State of the Planet, Blogs from the Earth Institute, Columbia University, November 2010 <http://blogs.ei.columbia.edu/2010/11/30/california%E2%80%99s-water-rights-controversy-should-farmers-be-allowed-to-transfer-water-to-developers/>; Associated Press, "Farmers cash in on water, but is that fair?" NBC News, June 2008, http://www.msnbc.msn.com/id/25305541/ns/us_news-environment/#/ULeYGibQj1U (accessed February 14, 2013).
50. Rural Migration News, July 2003, Vol 9 Number 3, *Water and Farm Workers*, http://migration.ucdavis.edu/rmn/more.php?id=736_0_3_0 (accessed on November 19, 2012).
51. Clay Landry, *Market transfers of water for environmental protection in the western United States*, *Water Policy* 1 (1998) 457–469, <http://www.waterexchange.com/UserFiles/File/dataroom/Markettransfersofwaterforenvironmentalprotection.pdf> (accessed on February 28).
52. This was facilitated by the Water Resources Development Act of 1986 that emphasized the role of federal agencies as water resources management, with special emphasis on environmental conservation and restoration. U.S. Army Corps of Engineers, *Water in the U.S. American West: 150 years of Adaptive Strategies*, Policy Report for the 6th World Water Forum, March 2012, <http://www.building-collaboration-for-water.org/Documents/WWFH20AmWest%20FULL2.28LR.pdf> (accessed February 14, 2013).
53. The Congress of the United States, *How Federal Policies Affect the Allocation of Water*, A Congressional Budget Office Paper, August 2006, <http://www.cbo.gov/sites/default/files/cbofiles/ftpdocs/74xx/doc7471/08-07-waterallocation.pdf> (accessed February 14, 2013).
54. David H. Getches, Sarah B. Van de Wetering etc. "Protecting Indigenous Rights and Interests in Water" in Kenney, Douglas S (ed.) *In Search of Sustainable Water Management: International Lessons for the American West and Beyond*, 2006 http://www.colorado.edu/geography/geomorph/envs_5810/getches_04.pdf (accessed February 14, 2013).
55. James M Olson, (FLOW): Personal Correspondence, in his comments on this paper; January 2013. [Based on *Mona Lake Case*, Calif. Constit. *Montana PPL v Montana*, (US S Ct, Feb. 2012)]; Also see James M Olson, *All Aboard: Public Trust as Unifying Principle for Water in 21st Century*, *Vermont Environmental Law Journal* (forthcoming, 2013) and James M. Olson: *Report to the International Joint Commission on the Principles of the Public Trust Doctrine for the Great Lakes Boundary Waters* (Flow for Water, Nov. 30, 2011) <http://flowforwater.org/wp-content/uploads/2013/02/Edited-12-01-11-Report-to-IJC-on-Public-Trust-Principles-w-cover-pg.pdf> (accessed March 8, 2013).
56. Craig, Robin Kundis, "A Comparative Guide to the Western States' Public Trust Doctrines: Public Values, Private Rights, and the Evolution Toward an Ecological Public Trust" (March 8, 2010). FSU College of Law, Public Law Research Paper No. 369; *Ecology Law Quarterly*, Vol. 37, No. 1, 53–197, March 2010; FSU College of Law, Public Law Research Paper No. 369. Available at SSRN: <http://ssrn.com/abstract=1405822>.
57. Mono Basin Clearinghouse, *The Public Trust Doctrine at Mono Lake*, <http://www.monobasinresearch.org/timelines/publictrust.htm> (accessed February 14, 2013).
58. *Ibid.*
59. Craig, Robin Kundis, "A Comparative Guide to the Western States' Public Trust Doctrines: Public Values, Private Rights, and the Evolution Toward an Ecological Public Trust" (March 8, 2010). FSU College of Law, Public Law Research Paper No. 369; *Ecology Law Quarterly*, Vol. 37, No. 1, pp. 53–197, March 2010; FSU College of Law, Public Law Research Paper No. 369. Available at SSRN: <http://ssrn.com/abstract=1405822>.
60. Richard Frank, "The Public Trust Doctrine Revisited" *Legal Planet*, the environmental law and Policy Blog from UCLA, APRIL 18, 2012, <http://legalplanet.wordpress.com/2012/04/18/the-public-trust-doctrine-revisited/>, discussing the annual symposium at U.C. Davis, devoted to the Public Trust Doctrine. (accessed February 14, 2013).
- 61.. Olson, Jim (FLOW): Personal Correspondence, in his comments on this paper; January 2013.

62. James M. Olson: *Report to the International Joint Commission on the Principles of the Public Trust Doctrine for the Great Lakes Boundary Waters* (Flow for Water, Nov. 30, 2011) <http://flowforwater.org/wp-content/uploads/2013/02/Edited-12-01-11-Report-to-IJC-on-Public-Trust-Principles-w-cover-pg.pdf>; Maude Barlow, "Our Great Lakes Commons: A People's Plan to Protect the Great Lakes Forever" <http://www.blueplanetproject.net/resources/reports/GreatLakes-0311.pdf>; Joint Presentation of the Council of Canadians and Flow for Water in support of Declaration of Commons and Public Trust for the Great Lakes Boundary Waters, (Presentation to IJC, December 13, 2011) <http://canadians.org/water/documents/greatlakes/12-17-11-IJC-presentation.pdf> (accessed February 14, 2013).

63. Craig, Robin Kundis, *A Comparative Guide to the Western States' Public Trust Doctrines: Public Values, Private Rights, and the Evolution Toward an Ecological Public Trust* (March 8, 2010). FSU College of Law, Public Law Research Paper No. 369; *Ecology Law Quarterly*, Vol. 37, No. 1, pp. 53-197, March 2010; FSU College of Law, Public Law Research Paper No. 369. Available at SSRN: <http://ssrn.com/abstract=1405822>.

64. Jeremy Berkoff *China: The South-North Water Transfer Project— is it justified?* *Water Policy* 5 (2003) 1–28, © IWA Publishing 2003 <http://faculty.washington.edu/stevehar/chinenv-berkoff.pdf>, (accessed January 9, 2013); Jayanta Bandyopadhyay and Shama Perveen: *The Interlinking of Indian Rivers: Questions on the Scientific, Economic and Environmental Dimensions of the Proposal*, 2011 <http://water.columbia.edu/files/2011/11/Perveen2008Interlinking.pdf> (accessed January 9, 2013).

65. Ravi S Jha, *India's river-linking project mired in cost squabbles and politics*, *The Guardian*, February 2013 <http://www.guardian.co.uk/environment/2013/feb/05/india-river-link-plan-progress-slow> and Ananth Krishnan, *Massive water diversion project nears completion in China*, *The Hindu*, February 2012, <http://www.thehindu.com/news/international/article2866492.ece> (accessed February 14, 2013).

66. Navin Singh Khadka, *Concerns Over India Rivers order*, *BBC News*, March 2012, <http://www.bbc.co.uk/news/science-environment-17555918> (accessed February 14, 2013).

67. Edward Wong, "Plan for China's Water crisis spurs concerns" *The New York Times*, June 2011, <http://www.nytimes.com/2011/06/02/world/asia/02water.html?pagewanted=all> (accessed February 14, 2013).

68. Michael C. Blumm and Rachel D. Guthrie, *Internationalizing the Public Trust Doctrine: Natural Law and Constitutional and Statutory Approaches to Fulfilling the Saxion Vision*, *University of California Davis Law Review*, 741–808, July 2012 http://lawreview.law.ucdavis.edu/issues/45/3/Topic/45-3_Blumm.pdf; Paul A. Barresi, "Mobilizing the Public Trust Doctrine in Support of Publicly Owned Forests as Carbon Dioxide Sinks in India and the United States," *Colorado Journal of International Environmental Law and Policy*, Volume 23, Number 1 Winter 2012, 53–63.

69. Elinor Ostrom, *Beyond Markets and states: Polycentric Governance of complex Economic Systems*, Nobel Prize lecture, December 8, 2009, http://www.nobelprize.org/nobel_prizes/economics/laureates/2009/ostrom_lecture.pdf (accessed February 14, 2013).