THE RISING TIDE OF WATER MARKETS[1]

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We have come a long way since the 1980s when economists and policy analysts began to recognize that water markets could help solve water allocation problems. Trades between agricultural users and cities are more commonplace, witness the trade between the Imperial Irrigation District and the Municipal Water District in California. Environmentalists are searching for ways to lease agricultural water for instream use such as salmon and steelhead spawning habitat in Oregon. And the U.S. Environmental Protection Agency is experimenting with devolving pollution control to local authorities where polluters can bargain to find the cheapest way to improve water quality as in North Carolina's Tar-Pamlico Sound. Instead of protracted court battles that might eventually net more water for an Indian tribe, but leave it with no capital to develop the water, Indian tribes are negotiating with other water users and the states. The result is that tribes such as the Shoshone-Bannock in Idaho and the Ute in Utah that have settled water rights disputes are leasing their water for handsome returns outside the reservation.

Even at the Bureau of Reclamation, home of massive water projects that have subsidized water use, a task force was established in 1995 to explore the possibilities of privatizing bureau projects. Discussions center around making a profit or cutting losses. What would determine the sale price of a project? Who would honor long-term contracts between the bureau and the water

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1 This paper was adapted from Anderson and Snyder (1997).

users? Would existing agricultural users have the right to sell their water to non-agricultural users? It is hard to believe that these are the types of questions resonating from meeting rooms at the bureau.

And this market revolution has not been confined to the United States. Led by South Australia in 1983 and followed by New South Wales in 1989 and Victoria in 1991, these Australian states have begun allowing permanent transfers of water entitlements through markets. Transferable water rights were a response to increasing scarcity. As is often the case, informal structures were evolving before the government responded with legislation throughout the 1980s that codified water trading. Prior to the legal changes, for example, farmers transferred water entitlements through "duality of ownership" or "license stacking" whereby they purchased two land holdings and transferred the water entitlement from one to the other. Their willingness to undertake the increased transaction costs associated with such transfers suggests the gains that were available from water trades.

Permanent water transfers have grown dramatically along the Murray-Darling River Basin that stretches 2,530 kilometers from the Snowy Mountains of eastern Australia to its mouth in South Australia. Sturgess and Wright (1993, 23-24) report the increase in farm incomes associated with these water transfers.

> In 1988/89 it was estimated that transfers of irrigation-water entitlements increased rural income by $5.6 million. This comprised 280 transfers of 85 000 megalitres in total. . . . In 1990/01 the addition to rural income as a consequence of water transfers had nearly doubled to some $10 million. This comprised 437 transfers of a total of some 120 000 megalitres. However, even more interesting was the drought year of 1987/88 in which 687 transfers occurred, amounting to 340 000 megalitres. These transfers lifted rural income for that year by an incredible $17 million. If benefits of this scale can be obtained by a system of water transfers circumscribed by regional barriers, the benefits that would flow from the redefinition of water property rights to allow the free transfer of water between regions . . . would be greater still.

As markets continue to operate, transaction costs fall, arbitrage increases, brokers enter to connect willing buyers and willing sellers, and even futures markets develop. With all of this, New South Wales and her sister states are leading the way for water marketing in Australia.

Chile, known for its application of market solutions to a variety of social problems, implemented a market-oriented water policy in 1974. The Constitution of Chile passed in 1980 and modified in 1988 reversed the expropriation of the water by the state in 1966 and established secure, transferable water rights. It states that "The rights to private individuals, or enterprises, over water, recognized or established by law, grant their holders the property over them."[i] With these permanent water rights, individuals and organizations can buy or lease water quite readily. The achievements from Chile's market-oriented system are summarized by Schleyer (1994, 76).

> [T]he dramatic increase in agricultural production and employment has been accomplished without the need for new hydraulic infrastructure. The increase has been achieved mostly by shifting land from cultivation of grain, corn, oilseeds, and cattle-raising to the more water-intensive fruit production. The freedom to buy and sell or "rent" water has given farmers greater flexibility to shift crops according to market demand.
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> Efficiency in urban water and sewage services has been greatly increased with no impact on prices . . . . One of the greatest achievements of Chile's water policy is allowing cities to buy water without having to buy land or expropriate water. As a matter of fact, growing cities now buy rights from many farmers, in some cases buying a small portion of each farmer's total rights. There has been no negative effects in the agricultural zones surrounding water-demanding urban areas.

Water marketing in Chile demonstrates that reallocation can take place without all of the acrimony that so often dominates water issues.

The potential for water marketing is also expanding in the Middle East, South Africa, and Pakistan. In the latter case, a recent study concludes that "although constraints remain on the functioning of these markets, water transactions significantly improve the flexibility in managing

water resources without threatening significantly the sustainability of irrigated agriculture" (Strosser 1997, v).

European countries are not as far along with water trading, but they are experimenting with higher water fees as a way of reducing consumption and pollution. For example, in Germany taxes and water charges are being used effectively to induce users to switch from groundwater to surface water supplies. Kraemer (1995, 231) notes that "The successful application of taxes and charges as incentives to reduce water abstraction from the natural water cycle or to change patterns of consumption is one of Germany's best kept secrets." In France's Artois-Picardie River basin, the use of water charges reduced abstraction by 15 percent and industrial abstractions by 55 percent between 1970 and 1989. Charges also significantly reduced water pollution levels. Tuddenham (1995, 213) concludes that "One of the major merits of this system is that the concept of water having an economic value has now become generally accepted." These systems should not be confused with actual water markets where willing buyers and willing sellers exchange water rights, but they are indicative of what a difference prices can make.

Nonetheless, most of the increased use of water markets has been limited to transfers within local areas and among traditional extractive uses, but is slowly expanding to instream flows (see Landry 1998). In Montana, for example, it took nearly a decade for legal institutions to evolve from only allowing the Department of Fish, Wildlife, and Parks to lease water under very strict regulations to allowing any private party to lease, but not purchase outright, water for instream flows. In the case of endangered salmon species in the Columbia River Basin of the Pacific Northwest of the United States, little attention is given to water marketing as a policy solution.

Moving water marketing to the next level will require innovative thinking about non-traditional uses and about transborder and interbasin transfers. This is the challenge for the next generation of water marketing.

Interstate and International Transfers

A major obstacle to water marketing occurs with international water basins that encompass 47 percent of the world's land mass. Currently these basins generate envy, anger, and conflict between nations with differential water availability. The director of the United Nations Environment Programme, Mostafa Tolba, concluded that "national and global security are at stake. Shortages of fresh water worsen economic and political differences among countries and contribute to increasingly unstable perception of national security" (quoted in Clarke 1993, 92). This is especially the case in the Middle East, but water exports between countries such as the United States and Canada and between states within a country also generate controversy. Fortunately, signs of hope are emerging to suggest that transborder market transfers can reduce the potential conflict.

The regional water trading that Sturgess and Wright (1993) have called for is happening in the Murray-Darling Basin.[ii] Fed by three large rivers, the Goulburn, the Lacklan, and the Darling, the Murray-Darling Basin covers 1,058,800 square kilometers. Because the region is arid and river flow is variable and because water is supplied cheaply through governmental projects, demands for water, especially irrigation, grew rapidly in the 1980s. These demands often exceed supply, and extractions are causing water-logging and rising salinity levels.

Spurred by supply and environmental problems, the Murray-Darling Basin Commission that was formed in 1917 to provide a common infrastructure and to regulate river traffic is evolving into a federated agency for promoting water marketing. Like transboundary rivers in the United States such as the Colorado or the Missouri, the Murray-Darling had all the potential for conflicting claims, and with drawing rights unlimited, conflicts were inevitable. Hence in the 1970s, state governments introduced water licenses for those who were drawing water from the river and finally, in 1995 the commission froze the number of licenses. Not surprisingly, land with licenses skyrocketed in price.

With water so scarce, pressures for interbasin transfers have grown, and in 1992 the first temporary transfer occurred. Though transfers have been opposed by irrigation districts on the grounds that they will damage local economies, a common argument in the United States,

interbasin transfers have expanded considerably since 1992. Sturgess (1997) describes the evolution of this interbasin market:

> These water markets were not the outcome of careful forethought or deliberate design but developed incrementally in response to demands from irrigators. Water rights have not been defined fully and consistently, with the result that entrepreneurs have been able to capture unregulated water to the disadvantage of the environment and other irrigators. . . . It is generally acknowledged by state water managers that insufficient consideration has been given to environmental end-use and instream requirements and considerable effort is now being invested in the definition of these needs.

Now the Murray-Darling Basin Commission is moving to correct these imperfectly defined rights and to establish environmental water rights. Hence the commission increasingly is being seen as an "honest broker" and facilitator of improved efficiency. According to Sturgess (1997, 144), "All available evidence would suggest that this inter-governmental agreement will continue to formalise into a regional federation concerned with basin management operating a common market between the states . . . ." Such a federation provides a model for interbasin trading in and between other countries where rivers defy arbitrary political boundaries.

The evolution of transborder trading in the Murray-Darling Basin is the type of "North American water marketing federation" that Huffman (1994, 158) calls for to deal with water issues between the United States and Canada and the United States and Mexico. As he describes it,

> Effective transboundary water markets are dependent upon the development of unified systems of rights. This will be accomplished best by a carefully relinquishment of national or state sovereignty sufficient to create rights enforcement institutions which are free from the distorting influence of nationalism, provincialism and political competition. The federal principle, understood as a division of sovereignty rather than a unification of states, merits consideration.

Such a federation might have been promoted by the North American Free Trade Agreement, but unfortunately, free trade in water is discouraged by federal and provincial governments in Canada. Canadians are concerned that massive subsidized projects will divert their rivers to thirsty California.

> Because of public resistance and governmental opposition to large continental water transfers, it is unlikely that the neighboring countries will gain from water trading opportunities that may be available under the North American Free Trade Agreement. Canadians appear willing to forego possible benefits of such trades in order to ensure the continuing integrity of the current water resource regime of their country. (Fritz and McKinney 1994, 89)

The resistance to transborder transfers between Canada and the United States has little to do with real markets and much to do with governmental intervention. When water transfers are proposed, they are usually for massive projects to deliver water from remote northern regions of Canada to populated southern areas. For example, the infamous North American Water and Power Alliance (NAWAPA) would have diverted as much as 250 million acre-feet of water from northern Canada to southern Canada, the southern United States, and Mexico. In 1964 the construction cost alone of NAWAPA was estimated to be between $80 billion and $100 billion ($300 billion to $380 billion in 1990 dollars). Similarly, the Great Recycling and Northern Development (GRAND) Canal project would have pumped water from James Bay south to the Great Lakes at an estimated cost in 1984 dollars of $100 billion. Such grandiose schemes capture the public's attention and create incorrect perceptions of what water transactions would be like under a free trade regime that included water. A fundamental problem with most proposals for international water transfers is that the people who would benefit would not have to pay the enormous costs of the projects. On the supply side, the citizens of the "selling" country gain little or nothing as individuals if exports are allowed. On the demand side, the "buying" country has an insatiable thirst because the real cost of water consumption is hidden in taxes or other fiscal illusions. If the resistance to transborder trading is to change, it will be because increasing water

scarcity drives up the potential gains from trade and because trades will develop incrementally in response to demands as they did between the Australia states (Sturgess 1997).

Pressure for such interstate trades is beginning to emerge on the Colorado River where California and Nevada face shortages and high costs for alternative supplies and where Arizona is awash in subsidized water from the Central Arizona Project (CAP).[iii] Despite its desert environment, Arizona has more water than it can currently use, and this despite the fact that water prices are heavily subsidized. Politicians have always played on the notion that the arid West requires government reclamation projects, the most recent of which is the Central Arizona Project (CAP). This project, begun in 1968 and declared substantially complete in 1993, includes dams, pumps, and a 336 mile aqueduct system capable of delivering water from the Colorado River to Tucson, nearly 3,000 feet above the source. The project delivers water to agricultural users in a three-tiered pricing scheme with prices of $17, $27, and $41 per acre foot, well below the actual cost of the water but above the cost of alternative sources, chiefly groundwater. Though this pricing scheme has increased the demand for CAP water, the system still is not being used to capacity. In 1994, CAP delivered 809,117 acre feet of water to Arizona users, less than 55 percent of the 1.5 million acre feet that is available to the state from the Colorado River Compact. Moreover, the project operates at a net loss of over $24 million per year.

While Arizona is awash in water, California and Nevada use all of their allocation under the Colorado River Compact and then some. They currently benefit from Arizona's underuse because water left in the river is free for the taking. However, this source is not secure because any increase in use by Arizona necessarily reduces Colorado River water available to California and Nevada. Not surprisingly, those two states are continually on the lookout for more secure supplies to meet growing population demands.

A solution to this problem would allow Arizona to market its excess water to the other states. A price of $140 per acre foot would enable CAP to cover its losses. This price is substantially below what California and Nevada are currently having to pay for additional water supplies. Alterative prices range from $150 per acre foot from irrigation districts to $1,600 per

acre foot from desalination (see Fuller 1997). These vast differences in prices suggest substantial potential gains from interstate water trading.

Such potential gains from trade have led the Arizona Department of Water Resources (1992, 1) to issue a report specifically addressing "the concept of short-term leasing to California or Nevada of a portion of Arizona's Colorado River entitlement." This Arizona report contends that a court decree regarding apportionment of Colorado River water among the states allows a state not fully utilizing its share of the Colorado to enter into agreements to deliver that unused water to other states. In short, fiscal losses from CAP and water scarcity in California and Nevada are bringing pressure to allow interstate marketing. This pressure may not presently be sufficient to overcome the politics of Colorado River water allocation, but it is following the pattern in Australia that has manifested itself in real transborder trades.

Expanding Markets for Instream Flows

Incrementally we are moving in the direction of using markets to enhance the quantity and quality of stream flows. As discussed in earlier chapters environmental groups such as the Environmental Defense Fund, the Nature Conservancy, and the Oregon Water Trust are brokering water deals for instream purposes. But most of these have been limited to small quantities on small streams.

The challenge is to expand the market approach to a larger scale. For example, consider the disruption to salmon spawning in the Pacific Northwest caused by dams on the mainstem and tributaries of the Columbia River. As so often is the case with water projects, the governmental planning process did not account for the impact of dams on salmon. Initially there were not even fish ladders to allow anadromous fish migrating upstream a passage around the massive concrete barriers, let alone concern for how the smelt would find their way back to the ocean without assistance from a stream current. These considerations were of little consequence because the eight federal dams on the Columbia were designed to deliver water to farmers trying to subsist in a desert and to produce cheap hydroelectric power to industries that would bring economic growth to the region.

Now it is widely recognized that salmon and steelhead stocks using the Columbia are threatened or endangered because the smelt are trapped in the pools of relatively warm water stored behind eight major federal dams. Finding a solution to the problem at this point, however, is expensive or controversial or both. One solution, for example, is to barge returning salmon through or truck them around the reservoirs, but there is disagreement among biologist over how much this actually reduces mortality to say nothing of the enormous cost. Another proposal is to draw down the reservoirs by spilling over the dams to reduce the size of pools through which the returning smelt must negotiate in order to find their way to saltwater. Because the drawdown reduces recreation, wastes water that could be used for hydroelectric production at other times, and raises pumping costs for irrigators, however, annual costs for this approach are estimated at approximately $125 million. Based on a high-end estimate of 280,000 fish saved by drawdown, the costs amount to $440 per fish per year! Because many of these fish die in the ocean, the estimated cost of this approach for each fish that is actually caught is $950. Either estimate shows that the cost of saving salmon on the Columbia is outrageously high.[iv] Finally, flow augmentation is proposed to get the fish through the reservoirs. In order to increase the river's flow, upstream users must curtail consumption, not something they are likely to want to do.

Can water marketing help? Zach Willey of the Environmental Defense Fund thinks so, and that is why he is negotiating willing seller-willing buyer water contracts that will enhance stream flows. His approach is to use revenues from increased hydroelectric production to pay irrigators to reduce their consumptive use and return it to the system. Estimates of the gains from transferring water from agriculture to instream flows vary. Hamilton and Wanderschneider (1989), assuming the market would maximize the value of Columbia Basin water for hydroelectric power production, estimate that water used to produce electricity may be ten times higher than in agriculture. Hamilton and Whittlesey (1992), assuming that the value of salmon would be maximized in a market, find that the value of water used for hydroelectric power production may only be twice as much as in agriculture. In either case, gains from trade from water marketing are waiting to be realized.

Building on his experience with water marketing in California, Willey worked with the Bonneville Power Administration (BPA), the federal power market agency in the Pacific Northwest, to consummate a deal that will provide between 25,000 and 50,000 acre feet of additional instream flows on the Snake River. This is the single largest water transfer from out-of-stream to instream flows in the region. The flows result from a three-year lease between the BPA and Skyline Farms of Malheur County, Oregon. Skyline Farms, with water rights to divert substantial flows from the Snake and Malheur Rivers, was willing to relinquish its diversion rights in return for payments from electricity producers. Power companies and the BPA will hold the water behind dams for release at times when it is need by the salmon and when it can produce valuable electricity. According to Randy Hardy, BPA administrator,

> The Skyline pilot effort, negotiated between a willing seller and buyer, can demonstrate the energy, environmental, and economic benefits associated with transfers from out-of-stream to instream flows in the Columbia Basin. We're hopeful that the long-term power generation benefits will help us provide more cost-effective fish flow augmentation. To BPA, that makes good economic and environmental sense. The pilot project will also provide an opportunity to work with the local community to mitigate any impact associated with the water transfer.[v]

This water deal lays the ground work for similar trades throughout the Pacific Northwest. Willey and his colleague, Adam Diamant, have proposed a water leasing program that could enhance stream flows for anadromous fish by providing financial incentives for farmers to fallow land or convert irrigated acres to dryland farming. In exchange for the conserved water, irrigators would be paid an option price for the lease separate from the actual price of water. Not only would this leasing proposal reduce consumptive use in normal years, it would provide the option of increasing water during dry years. Willey and Diamant estimate that increasing flows by 600 to 1,500 cubic feet per second on the Yakima River would cost between $500,000 and $2 million per year. Funding for their proposal would come from a variety of sources including state and

federal funding, user fees, and hydroelectric generation. Costly as this might seem, it is a far cry from the costs of other proposals cited above.

Where to Next?

Postel, Daily, and Erlich (1996) contend that we are running up against the Earth's water carrying capacity. They begin by adjusting global runoff downward to obtain a measure of that water which is available to humans. Comparing this to human consumption that has been growing exponentially, Postel, Daily and Erlich (1996, 785) conclude that humans are consuming 54 percent of accessible runoff and that "If average per capita water demand remains the same in 2025 as at present (which is conservative, because withdrawals per capita increased nearly 50% between 1950 and 1990), global water demand ca. 2025 would total -- 6400 km^3/year." This would amount to more than 70 percent of estimated accessible runoff.

Typical of "gloom and doom" predictions for other resources, they believe that water will be the limiting factor on human population growth and therefore that we must amend our ways if we are to avoid Malthusian consequences. But other predictions of resource shortages do not hold up against the data, and predictions about water are likely to be the same.[vi] Despite continued assertions that the "sky is falling," famine, pestilence, droughts, pollution, and resource shortages have not occurred.

The reason these predictions are consistently wrong is they ignore the impact that market forces have on both the supply and demand sides of resource use. Higher prices induce suppliers to find new sources of raw materials, including non-renewable energy sources, and to find alternative raw materials when scarcity appears to be binding. Witness the impact of higher copper prices on the switch to silicone for fiber optics and satellite technology to eliminate communications via wires. On the demand side, higher resource prices induce conservation and a search for substitutes as with energy in the 1970s when growing scarcity seemed inevitable.

The big question regarding the Postel, Daily. and Erlich (1996) predictions for water is: To what extent will Adam Smith's invisible hand be unshackled to work its magic on water allocation?. If governments insist on sending the wrong signals to suppliers and demanders by

subsidizing water storage and delivery, exponential growth in consumption will inevitably run into environmental and fiscal constraints. On the other hand, if the progress toward increased reliance on markets described in this book continues, supplies of accessible water will be increased where it is economical to do so, current users will conserve and sell their water to higher valued uses, especially environmental uses such as pollution dilution and instream amenities, and the growth in consumption will be tamed.

Several factors justify optimism. First, conservationists and fiscal conservatives are forming coalitions that can limit the political subsidies that encourage increased water consumption. Thomas J. Graff, general counsel for the Environmental Defense Fund in California, raised a prophetic question after the 1982 defeat of an environmentally and fiscally unsound proposal to divert water from northern to southern California when he asked, "Has all future water-project development been choked off by the new conservationist-conservative alliance . . . ?" He went on to say that "The moral premises of conservationists, as they joined liberals and conservatives to sink Proposition 9 [the Peripheral Canal Project], were not inconsistent with the new conservative doctrine. Conservationists believe that the water-development sector can shrink without harming anyone, weak or powerful, and that more efficiency would benefit the environment as well" (Graff 1982, V-2).

Indeed, over the past decade environmentalists have increasingly recognized the efficacy of free market environmentalism, and water allocation has been a driving force behind this recognition. The huge dam projects from the New Deal era were never economically feasible. When the harmful environmental consequences, including aesthetic damage, siltation, pollution, and, most recently, disruption of salmon spawning, became apparent, it was easy to point the finger at subsidized destruction of the environment.

Gaining faith in the market to allocate existing supplies more efficiently for all uses including the environment has taken more time, but the environmental movement is being won over. The work of the Environmental Defense Fund, led by Tom Graff and Zach Willey, to promote water markets in California was instrumental. The Nature Conservancy has branched off

from its efforts to protect land through private ownership and conservation easements to establish easements for instream flows. And most recently the efforts of the Oregon Water Trust to lease water from agricultural users to increase stream flows for spawning salmon and steelhead mark a milestone in the use of water markets to enhance environmental amenities.

Fiscal pragmatism is a second reason for optimism that markets will play a larger role in promoting water-use efficiency. At the same time that environmentalists have begun recognizing that subsidized destruction of the environment results from governmental management of water, fiscal constraints have been forcing politicians and bureaucrats to change their ways. Beginning with President Carter's hit list in the late 1970s and continuing today with talks of privatizing Bureau of Reclamation projects, the rhetoric in Washington, D.C., has changed. The Omnibus Water Act passed in 1992 gave water marketing a toehold in California's massive federal storage and distribution system by upping the price of federal project water and allowing transfers. Concrete and steel solutions such as the Central Arizona Project, hopefully the last of the federal dam follies (or should it be the damn federal follies), survive only in the dreams of engineers and dam builders in the Bureau of Reclamation or the Corps of Engineers. Though these projects were supposed to pay for themselves, they have left taxpayers with a huge bill. Hence we can thank the governmental deficits for bringing pressure for changing the way we allocate water.

Finally, when the gains from trade get large enough, it is hard to keep a good market down. When water from a governmental project such as the Central Utah Project is delivered to farmers at $8 per acre foot to produce crops where its value added is $30 per acre foot at a cost to the taxpayer of $300 per acre foot, obviously something is wrong. When Santa Barbara, California, builds a desalination plant to produce potable water at a cost of $1,600 per acre foot while farmers are using water to irrigate crops where it is worth less than $100 per acre foot, the potential for mutually beneficial trades cannot be ignored. With an order of magnitude difference in value, both sides of a water market transaction can gain substantially. When environmental groups realize that the transaction costs associated with using the regulatory process are so high that amenity values are lost while lobbyists and politicians play games, water markets in which

environmental consumers pay other users to reduce consumption become expedient. Transaction costs are much lower when willing buyers and willing sellers are seeking common ground for mutually beneficial trades. Such trade moves us farther along a water market path from which it will be difficult to reverse.

Lest we get too complacent about the success of water markets, we should realize that history is on the side of political control. The United States has experienced nearly a century of federal dominance in water policy centered around massive projects to control flooding and navigation in the East and to "make the desert bloom like a rose" in the West. First-world nations from Australia to Norway depend on governments for storage and delivery systems rationalized on the basis of economic development with almost no consideration given to fiscal or environmental impacts. Private individuals who have captured the benefits of water subsidies will not simply push themselves away from the table where they get a free lunch, and politicians and bureaucrats who have enjoyed the power that accompanies command-and-control will not readily relinquish that power. Moreover, proponents of governmental support for dams and ditches undoubtedly will find support among the citizens of less developed countries who feel they deserve the same benefits enjoyed by their rich neighbors. The Three Gorges Dam in China is further evidence that massive water projects with huge environmental costs are still alive and well thanks to massive international subsidies. When the World Bank or other development agencies propose to dam the Zambezi River or to subsidize irrigation projects in the Middle East, fiscal and environmental arguments are unlikely to carry the day for market approaches. In short, where the political power to subsidize water projects exists, political support will follow.

Dire predictions by Postel, Daily, and Erlich (1996) that the blue planet will face global water shortages are unlikely to unfold, but this does not mean that water crises are a thing of the past. Growing demands for consumption, pollution dilution, and environmental amenities will put pressure on limited water resources. But these pressures need not create crises if individuals are allowed to respond through market processes. Perhaps more than with other natural resources, water allocation has been distorted by politics under the notion that "water is different." Some

would say that water cannot be entrusted to markets because it is a necessity of life. To the contrary, because it is a necessity of life, it is so precious that it must be entrusted to the discipline of markets that encourage conservation and innovation. Unless distortions created by governmental intervention are corrected, water shortages will become more acute and crises will be inevitable. When this happens, it will be difficult to suppress market forces. It would be better, however, if we would get legal impediments out of the way of markets before necessity becomes the mother of invention.

Notes

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[i] Constitución Política de la República de Dhile, Chapter III, Article 24, final paragraph: "*Los derechos de los particulares sobre las aguas, reconocidos o constituidos en conformidad a la ley, otorgarán a sus titulares la propiedad sobre ellos.*"

[ii] For a thorough discussion, see Sturgess (1997).

[iii] For a complete discussion, see Fuller (1997).

[iv] For a discussion of the options being considered and their costs, see Herr (1994).

[v] Quoted in Environmental Defense Fund press release, "EDF, Federal Energy Agency Announce Water Project," dated 13 July 1994.

[vi] For critiques of this approach, see Simon (1995).

The. RISING TIDE A New Look at Water and Gender. Maitreyi Bordia Das. with Gaia Hatzfeldt.Â 5. The nonmonetary, noneconomic values of water are important for policy and Âpractice. That is because they influence the behavior of individuals and groups, Â-particularly their response to water-related reforms or interventions. 6. Interventions that balance gender relations in water-related domains can have a strong influence in furthering gender equality more broadly. 7. Policies and programs can influence change. They are particularly effective when they improve the ability, opportunity, and dignity of those likely to be left out.