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DROUGHT, STRIFE, AND INSTITUTIONAL CHANGE

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Introduction

Crises in the supply of natural resources are often stimulants for beneficial change in the institutions. In a recent paper on the evolution of federal and state water policy in the West, Getches (2001) concludes that "It takes a crisis" to initiate water policy reform in the West. Currently, many western states are in the grips of very severe drought. The National Oceanic and Atmospheric Administration (NOAA) weather statistics show that in the past year, two states (Arizona and Colorado) suffered a rainfall that is the lowest ever recorded. Five neighboring states (Utah, New Mexico, Wyoming, Kansas and Nebraska) are equal to, or lower than, the lowest 10% ever recorded. This drought, coupled with an unprecedented total demand for water clearly constitutes a crisis. However, it is unlikely that the current western drought will result in beneficial change to western water institutions. In what follows we discuss the reasons why some crises are useful stimulants, but also why the current drought will probably not stimulate useful change and merely increase the level of strife among western water users.

The Costs of Changing Institutions

Resource institutions are in the public domain because the supply of institutions usually requires discrete changes whose costs are dominated by fixed and irreversible costs. These fixed costs are both financial and political. This cost structure, coupled with the exorbitantly high costs of reversing a change in institutions once the rents from a resource have been renegotiated, makes institutional change essentially irreversible. In addition, there are the inevitable interest groups, such as agricultural irrigation districts and crop processing cooperatives, whose water rents are maximized under the status quo.

The application of standard capital theory to this situation results in theoretical conditions that require that the net returns to change have to exceed a hurdle rate for change to occur. For resources with a naturally fluctuating scarcity value, the fiscal hurdle rate condition results in discrete periods when hurdle rates are exceeded (Howitt 1995). Any change in institutions will result in a shift in the rents that are accrued from the institutions. This shift in rents gives rise to a political hurdle rate that can only be overcome by sense of urgency for change within the electorate. This sense of urgency is not present in times of normal scarcity for the resource, but emerges in times of supply reduction due to drought, or rapid shifts in the demand for resources that may be triggered by an environmental event.

The Returns from Changing Institutions

The property rights to use water in the western US vary between states, but were largely allocated on the two principles of prior appropriation, and rural development stimulated by the provision of federally subsidized water supplies. Clearly the private and social value of this initial water allocation depends on the continuation of the markets and technologies that underpin the predominantly agricultural value of water. The changes in the demands for agricultural products over the past fifty years, coupled with large changes in crop and irrigation technologies have changed the relative value of water between locations and uses in the west. In addition, the pressure for western development that drove western water projects in the early twentieth century, has now reversed itself with many environmental groups opposing water development as a method of restricting growth.

Several studies show that there are potential gains in social and economic efficiency from the reallocation of some western water (references to be added). However, the current property rights are

dominated by concerns for equity and attuned to the transaction costs of water allocation that were prevalent when the water was developed.

Given the inelastic demand for urban and environmental water, the efficiency gains from reallocation are dominated by the cyclical dry and drought years when the marginal values of water in these growing uses are very high. This means that the returns to the fixed political and fiscal costs of changing water rights is a stochastic variable that depends on an inevitable, but uncertain, series of weather events.

The increase in the expected value of changing institutions during droughts is based on three reasons, two financial and one political. The first financial reason is that there is the prospect of an immediate payoff during the current drought year, and the second reason is that the conditional probability of payoffs in the immediate future is higher. This second effect is not because drought years are auto correlated, there is no convincing evidence for this for western watersheds, but because under drought conditions, the reservoirs have been drawn down. Thus, although the rainfall probabilities do not change, the probability of below normal supplies of water being available is higher. In addition to the increase in the expected returns from institutional change, the political inertia preventing change is reduced by the sense of urgency for drought related action.

However, there are always some parties who will lose short run revenues from an institutional change. Any successful change must satisfy "n" person game theory core conditions to elicit cooperation from the majority of parties involved. The three conditions can be summarized as: (i) For individual players, the cooperative solution is preferred to the non-cooperative case. (ii) The allocation to any combination of players under the cooperative case is preferred to an allocation in any sub-coalition that they can establish, and (iii) The benefits from the cooperative allocation equal or exceed the cost of forming the cooperative solution.

Bardham (1993) points out that the pessimistic view of cooperation and trading that results from the traditional prisoner's dilemma game may not be appropriate for water institutions. The most important difference is that the game is repeated many times under different scarcity conditions. Thus, while there may be a strong incentive to defect from a cooperative solution in a single game, for repeated games where the reputation of individuals or agencies is based on previous actions, the incentives to cooperate are much greater. The difference in the scarcity values of water between years can also provide an incentive for cooperation. If the use of water by urban and agricultural users is in equilibrium when supplies are at an average level, then in years of drought or high supply a theoretical water market will swing between situations of excess demand and supply. Extremes of water supply occur more often than average years in most western river catchments. While the dominant advantage is to water sellers in dry and drought years, there are advantages for buyers in other years. A solution to this situation of uncertain future market conditions is the contingent water contract that makes the trade conditional on the realized level of water scarcity such as a river flow index.

Drought crises have triggered advances in water institutions in the past. In 1991 California was facing the worst drought in thirty years, and it was clear that some water uses would have to be cut. Faced with the threat of reallocation by government mandate, water users and agencies agreed on a restricted water market. The Emergency Drought Water Bank operated in 1991, 1992, 1994, and was prepared for 1995. It is generally agreed that, despite some rigidities, the water bank equated water supply and demand under extreme shortage and by doing so generated substantial social benefits for the California economy.

Given the advantages of forming types of market institutions during drought shortages, why are these outcomes not happening during the current western drought? The reason is that the current drought occurred rapidly, and is very severe. Under these conditions two factors undermine the potential for cooperative trading solutions. First, the severity of the drought has already eliminated agricultural water uses that have an elastic demand for water and moderate marginal value products. Many agricultural water users are in survival mode where their remaining water sources are slated for the maintenance of a basic breeding herd, or high value

irrigated crops that are forward contracted. In short, the water supply curve for a potential market has shifted sharply upward. The second reason is that this drought situation is unlikely to be repeated for most users, and thus they perceive the game as a single instance in which the advantages are not to participate, rather than a repeated game.

The relationship between the probability of a cooperative market solution and the scarcity of the resource can be thought of as an inverted “U” curve. Imagine that water scarcity values are measured on the horizontal axis, and the probability of institutional change on the vertical axis. At low scarcity values, the fixed costs of institutional change mean that its probability is very low. As scarcity values increase so does the probability of change. There is some scarcity value after which the probability of change starts to be reduced, and at extreme scarcity values it returns to zero. It is likely that water scarcity values in the central western states have passed the critical point.

The Current Situation with Western Water

Water rights in the west are largely vested in the states. Paradoxically, local action or the federal government has initiated most of the institutional innovation over the past twenty years. The federal role results from the large proportion of western water that has been developed by Bureau of Reclamation and Corps of Engineers projects. Most of these projects were designed to meet fixed demands, using excess capacity to dampen the effect of droughts and floods on supply. The central paradigm of modern western water management is to make the demand for water more responsive to the changing supply situation by some type of market mechanism.

NOAA reports that there have been twelve different drought events since 1980 that resulted in damages and costs exceeding \$1 billion each. Compared hurricanes, floods, and tornadoes, droughts are slow in developing. Because of this, damage to economic interests can be substantially reduced if a socially acceptable reallocation mechanism is in place before the drought gains momentum. However, despite many calls for unified drought response strategy, water law and policy is largely based on the priorities of the first half of the last century.

Getches (2001) provides a comprehensive review of western water rights in which he examines the recent metamorphosis of western water policy and examines the role of federal and locally initiated water policy versus the slow and halting shifts that the western states have taken to modify their water rights.

Evidence of the inability of states to implement institutional change is shown by the resolution from the Western Governors Conference Park City workshops, and the more recent Enlibra policy statement. Getches summarizes that:

“The components of Enlibra include collaboration, use of local solutions to meet national standards, recognition that solutions cannot be limited by political boundaries, and use of markets instead of mandates”.

Despite these laudable principles, the response to the current drought seems to be one of lurching through with stop-gap responses and calls for supply augmentation, but no major change in institutions to increase the flexibility of water allocation. The western states need to implement non-structural methods of improving demand flexibility that have the same effect as supply augmentation, but at a lower cost.

In response to the severe drought in the southwest in 1996 the governors of western states adopted a Drought Response Action Plan in November 1996. Further calls for action were forthcoming in 1997 and 1999. The Western Drought Coordination Council developed an effective drought response policy plan that is still waiting for implementation. The western governors backed the National Drought Preparedness Act of 2002

but, as of October, the act is still waiting passage although some commentators feel that Congress is now poised to act on the recommendations in the bill.

This interminable cycle of short run panic and long run inertia has been termed the “hydro-illogical cycle” by members of the National Drought Mitigation Center. This phenomenon is not new to the west. John Steinbeck, who grew up in the Salinas valley, described the reaction of California water users in East of Eden as:

“I have spoken of the rich years when rainfall was plentiful. But there were dry years too, and they put a terror on the valley. There would be five or six wet and wonderful years when there might be nineteen or twenty-five inches of rain and the land would shout with grass. And then the dry years would come, and sometimes there would be only seven or eight inches of rain. The land cracked and the springs dried up and the cattle listlessly nibbled dry twigs. And it never failed that during the dry years people forgot about the rich years, and during the wet years they lost all memory of the dry years. It was always that way.”

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