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Conjunctive Use Policy Options

by William Miller, Extension Economist

Background

The hydrologic cycle controls water available for use. Rainfall, evaporation, runoff, percolation, and transpiration combine to influence the water available at a specific location at a particular point in time. The speed at which water moves among stages in the hydrologic cycle and the amount of time it spends in storage at any stage affects water availability to users. The conjunctive use issue refers to the portion of the hydrologic cycle where groundwater and surface water interface and influence each other.

Users who couldn't depend on an irregular flow of water over time developed systems that modify the variable nature of the hydrologic cycle to change the time water is available for use. This occurs through reservoir storage, land management, groundwater storage, weather modification, and desalination.

Current Situation and Forces for Change

The conjunctive use issue is now under discussion in Nebraska primarily because water demand by all the users exceeds the supply available. This conflict over who gets to use the limited supply of water is at the root of the current discussion.

Current Nebraska law does not allow for the management of groundwater withdrawals to maintain surface water flows. States adjacent to Nebraska indicate that Nebraska's failure to manage groundwater adversely affects the surface water flows to their states. The compact between Kansas and Nebraska on the Republican River and the memorandum of agreement among Nebraska, Colorado, Wyoming, and the Department of Interior for the Platte River are two examples of forums where the issue of groundwater use in Nebraska is raised by the other parties. It is possible that legal or political action against Nebraska by any of the parties could result in Nebraska being forced to manage groundwater relative to stream flow.

Issues

There are several issues that need to be resolved if Nebraska chooses to adopt legislation relative to conjunctive use. The physical linkages that actually exist between groundwater and surface water in the various river basins of the state will need to be determined. How might these linkages change throughout the year as rainfall and the volume of flow in the streams varies? Are the linkages only in

areas close to the streams or do they extend miles away due to the slow movement of groundwater over many years? How should the water that is available be allocated between surface water and groundwater users? How should it be allocated among agricultural, environmental, industrial, and urban use?

Economic issues are a major factor in determining how allocation decisions are resolved in the political arena. If action is taken to manage groundwater in conjunctive use situations, who will receive the benefits and who will pay the cost? Will the current users be permitted to continue their activities so only new users are affected? Will all current users be required to modify their use or will only those junior water users with more recent access to the water be affected?

Procedural issues will need to be resolved to establish the administrative arrangements to manage the groundwater resources. Will the Natural Resource Districts and/or the Department of Water Resources decide where management of groundwater may be necessary and who may be restricted when there is a conflict in use? If investments are required for meters to monitor use or for research to determine physical conjunctive relationships who will pay for them?

Policy Options and Consequences

The policy options listed below are not mutually exclusive. More than one of the options may be adopted or parts of several options may be combined. Stating them separately aids in discussing the choices that exist for action in Nebraska on the issue of conjunctive use.

The first two options address the problem as it is currently defined. The remaining three options would solve the problem in a more indirect manner by using different approaches than are presently being considered.

1. One alternative is to do nothing at this time. The likely consequences of doing nothing would be a series of actions by other states or the federal government to force Nebraska to monitor and control groundwater pumping. The focal point of these actions would probably be through court imposed directives which Nebraska would need to implement.

It is possible that Nebraska might win the legal cases raised on groundwater control by the other states. But at some point action by other parties interested in stream flow would likely result in some change in Nebraska's current groundwater policies. Doing nothing now would result in doing something imposed by court settlements later. The use of groundwater will not disappear as a water management question.

2. Another alternative is to adopt legislation in Nebraska that permits groundwater management in areas where groundwater pumping has adversely influenced stream flow. If the legislation adopted is consistent with the proposal discussed in the legislature this year, the authority of Natural Resource Districts would probably be broadened to allow them to manage groundwater where it influences surface water.

This legislation would allow the districts to develop appropriate management procedures for the unique situations in each district. Certainly, any actions undertaken by the districts would require prior analysis to determine where groundwater and surface water sources are inter-related and where they are not. Over time, the districts could put into place management policies to deal with groundwater pumping in the areas where depletion of interrelated surface water supplies may occur. Similarly, surface water use which impacts groundwater might be part of the conjunctive use management plan.

The economic impact of this alternative would vary depending on the extent of linkage between groundwater and surface water sources. It is possible that in areas of the state where little linkage occurs there would be essentially no economic impact for the adoption of this new legislation. Alternatively, in areas where the linkage is significant and surface water supplies are being seriously reduced by groundwater withdrawals, major changes in the volume of water pumped from groundwater may be required. In the case where agriculture is the primary user of the groundwater, crop rotations, the crops grown, and the crop management practices might need to be altered. Any of these actions could significantly impact farm income.

The distribution of the economic impact among irrigators would depend on whether policies are adopted to control use on new wells, old wells, or both. It would depend also on whether the date of well development became a factor in deciding who must reduce groundwater use.

The total cost of the policies adopted depends on what level of reimbursement, if any, would be required to be paid to those bearing the cost of whatever new policy is developed. The issue of property rights and the taking of the right to use property by government seems to be an area of increasing legislative and judicial activity in recent years.

3. A third alternative is to develop broader authority for the transfer of water rights within the state. This could permit the purchase and sale of water rights throughout the state among all water users.

This policy would permit the mitigation of the economic impact of a management policy relative to groundwater and surface water use. Groundwater users might buy surface water rights to continue pumping at current rates while maintaining some specified level of stream flow or visa versa. Water use would move over time to the highest valued use and the lowest valued use would be fully compensated for giving up the right by the purchase price paid for that right.

4. Another policy alternative could involve state legislation permitting physical augmentation of water supplies wherever that alternative is a viable option. This alternative could involve pumping groundwater into a surface water system or surface water into a groundwater system.

This policy would reduce the conflicts among the water users. This alternative works best by correcting the differences in time that exist relative to both the supply and demand for water. Groundwater could be replenished by pumping from surface water sources during the time of the year when the hydrologic cycle provides more water than is needed for stream flow. Groundwater supplies could be replenished through natural surface percolation from lakes, reservoirs, ponds, streams, and canals throughout the year. Similarly, groundwater users might replenish surface water supplies by pumping into streams or reservoirs during the winter or early spring when the groundwater is not needed for other uses.

The challenge is to find those situations where the cost of augmentation could be reimbursed by the ultimate user in a way that is still profitable to that user.

5. A final policy option is a broader, more holistic approach to conjunctive use. This policy involves a change in current state and federal law to permit management of water use in urban areas, modification of soil conservation practices, and new measures for environmental enhancement.

Framing the problem more broadly will alter the current focus on managing groundwater supplies alone. As the problem is currently narrowly framed, groundwater users will bear the major cost of achieving a solution to any problem of inadequate stream flows.

But in fact many factors influence the availability of surface water at any location and at any point in time. Three examples illustrate this holistic relationship.

The increased use of minimum tillage systems in agriculture has influenced runoff to streams and hence the supply of surface water. If federal farm policies relative to these agricultural practices were changed, then surface water flows would be altered.

Arid states control urban water applications for lawns, golf courses, and parks. If Nebraska adopted similar policies, surface water and groundwater supplies would be affected.

The federal Endangered Species Act provides the basis for establishing flow requirements in streams. If a modified Endangered Species Act was adopted which approached the maintenance of biological diversity in a different manner, surface water and groundwater availability would be changed.

Framing the policy problem in this broader manner makes more legislative activity necessary. Because both state and federal legislative activity is required, it is more difficult to solve the problem quickly. But it can result in a superior solution because it brings all those groups which influence surface water supplies together to solve the problem. It avoids the possibility that control of groundwater pumping for agricultural purposes would not alter the stream flow because other water users simply increased their consumptive use of water.

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