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Ground Water Banking and Conjunctive Management of Ground Water and Surface Water

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Conjunctive management of ground water and surface water in the western United States acknowledges the hydraulic connections that exist in many hydrologic basins and the propagation of effects of ground water withdrawal or recharge into surface water bodies. Technical tools (Cosgrove 2003, Jenkins 1968, Reilly et al 1987) allow quantification of the magnitude, timing, and location of the surface-water effects associated with ground-water activities. Administrative agencies are beginning to incorporate these technical tools into decision making processes, such as calculation of mitigation requirements for aquifer water-right transfers (Idaho Department of Water Resources 2002).

Managed aquifer recharge and aquifer storage and recovery activities create aquifer storage that is dynamic; effects propagate through time and space and diminish over time. In the process of addressing injury at one location, mitigation plans for aquifer water-right transfers can create secondary benefits at other locations. The lack of a system to quantify and assign ownership of these benefits can limit the incentive to perform managed recharge and aquifer storage, and increase the cost of water-right transfers. To an economist, these limitations can be seen as market barriers that prevent resources from moving towards uses that society deems valuable. A ground-water banking system can facilitate and encourage beneficial conjunctive management activities and allow allocation of resources to new uses such as providing water for environmental needs. Allowing water to move to environmental uses within a market structure may reduce conflict and litigation.

The essential functions of a ground-water banking system are:

1. Quantify the time, place, and form of benefits that result from an aquifer activity such as managed recharge or mitigation for water-right transfers.
2. Assign ownership to the benefits of aquifer activities.
3. Administer and facilitate exchange of benefits to other uses and owners.

Constructing a ground-water banking system is a multi-disciplinary process that includes consideration of hydrologic, economic, policy, and operational issues. Hydrologically, tools must allow for the quantification of spatial and temporal migration of an aquifer activity. The

hydrologic evaluation includes consideration of numerical modeling and analytical methods, and the appropriateness of their application to the physical system at hand. Economic evaluation must include consideration of transaction costs and consideration of potential market failures such as externalities and unintended behaviors induced by the policy. Public interest questions such as environmental impacts and main-street impacts are part of the policy evaluation, as are consideration of water-law issues such as change in nature of use, forfeiture issues, and the appropriation-doctrine definitions of "beneficial use." Creation of a ground-water banking system must also address operational questions. An organizational structure and operating authority must be established; accounting units, methods, and pricing procedures must be adopted; and such issues as preferential classes of water use must be addressed.

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