An Annotated Bibliography

of

Selected Groundwater Management

Articles and Publications

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An Annotated Bibliography of Selected Groundwater Management Articles and Publications

Barlow, Paul M., Brian J. Wagner, and Kenneth Belitz. 1996. Pumping Strategies for Management of a Shallow Water Table: The Value of the Simulation-Optimization Approach. *Groundwater* 34, no. 2: 305-317.
The simulation-optimization approach was used to identify groundwater pumping strategies for control of the shallow water table in western San Joaquin Valley where shallow groundwater threatens continued agriculture productivity. Results of the simulation-optimization model indicate that optimal pumping strategies are constrained by the existing distribution of wells between the semi-confined and confined zones of the aquifer, by the distribution of sediment types in the western valley, and by the historical distribution of pumping throughout the western valley.

Bachman, Steven, Hauge, Carl, McGlothlin, Russell, Neese, Kevin, Parker, Timothy K., Saracino, Anthony M., and Slater, Scott S. 2005. California Groundwater Management. Groundwater Resources Association of California, publisher.
The increasing demand for water has focused attention on improving groundwater management in California. But management of groundwater is complex. It involves court decisions, statutory law, overlying landowners' rights to groundwater, complex technical issues, and more than a century of political and institutional development and investment. The California Groundwater Management book covers many aspects of groundwater management, including information foundational to preparing groundwater management plans, groundwater law, technical issues, and basic groundwater concepts.

Basagaoglu, Hakan, and Miguel A. Marino. 1999. Joint Management of Surface and Groundwater Supplies. *Groundwater* 37, no. 2: 214-222.
A management model was developed to determine optimal water allocation policies for hydraulically-connected time-variant surface and groundwater supplies in a hypothetical system. The system involves a multi-purpose reservoir, a hydraulically connected stream and aquifer, agricultural plots, water supply and observation wells, and an artificial recharge zone. The model minimizes deviations from a set of rule curves defined for storage in the reservoir and along the stream course so as to consider possibilities for storage of excess water in wet periods and its distributions in subsequent dry periods.

Brooks, Steve, Paul Plato, and Tim Gorey. 2003. Southeast Salt River Valley Recharge Siting Study – Process and Results. *NGWA's Southwest Focus Conference/Water Supply and Emerging Contaminants*. 21.
In 2001, the Central Arizona Project began a project to identify a location or locations for a spreading basin-type recharge facility in the southeastern portion of the east Salt River Valley. Extensive pumping for irrigation and low rainfall resulted in groundwater declines. An assessment of the study area included both technical and non-technical data

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to ascertain the key site characteristics and associated relative costs. This led to a ranking of possible sites for further analysis.

Burkhalter, Hunter W. 2003. Exporting Groundwater While Protecting Existing and Historic Uses: Senate Bill 2 and the Approach Implemented by the Hudspeth County Underground Water Conservation District. *NGWA's Southwest Focus Conference/Water Supply and Emerging Contaminants*. 143
Texas Senate Bill 2 empowered local groundwater conservation districts to regulate groundwater withdrawals on a long-term, sustainable basis while protecting existing or historic uses. The bill also prohibited these districts from preventing exporting of groundwater to remote places. Hudspeth District is working on a set of rules intended to create permits controlling the exporting of groundwater.

Ellison, Donald L. 2001. Aquifer Storage and Recovery in the Southwest Florida Water Management District. *NGWA's Southeast Focus Groundwater Conference*. 1.
In 1984, the southwest Florida Water Management District co-funded the Lake Manatee potable water aquifer storage and recovery project. At the time of the report's presentation, there were 17 projects in various stages of development. Aquifer storage and recovery systems are used to store excess water during wet season to meet demands during the dry season.

Harley, Brendan M. 2001. Enhancing Management of Aquifer Systems through Internet-based Information Sharing Techniques. *Groundwaterdata.net Groundwater Data: Collection, Reliability, Access and Manipulation of Basic Data*. 94.
Effective management of heavily stressed groundwater basins is facilitated by comprehensive data monitoring networks. Coastal aquifers are often overdeveloped, leading to proactive management approaches. An internet-based common format for groundwater data storage and retrieval would permit many levels of users to readily retrieve and effectively utilize the data.

Horsley, Scott W. 1994. California's New Groundwater Management Law. *Groundwater Monitoring & Remediation* 17, no. 4: 114-115.
State legislation is outlined showing the scope of groundwater management plans which local governments may implement. The legislation also addresses coordination among local, state, and federal agencies.

Jacksteit, Rebecca A., Robert S. Clarkson, Ajit K. Masand, and Lucien S. Lyness. 2001. An Aquifer Management Plan for the Town of Edson, Alberta. *NGWA's Sixth Canadian/American Conference on Hydrogeology*. 19.
Water supplies for Edson and surrounding areas are presently obtained from groundwater sources. Increasing development pressures have prompted concerns over the long-term sustainability of the town's groundwater supply. A thorough hydrogeologic review and assessment were performed. An aquifer management plan for the next 10 years was developed.

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Johnson, Theodore A. and Wanjiru M. Njuguna. 2003. Available Aquifer Storage Determinations Using MODFLOW and GIS, Central and West Coast Groundwater Basins, Los Angeles County, California. In proceedings of *NGWA's Southwest Focus Conference/Water Supply and Emerging Contaminants*, 101-109

As part of the district's conjunctive use planning, it, along with the U.S. Geological Survey, has developed a four-layer MODFLOW model of the groundwater basins. To determine the theoretical amount of available storage capacity remaining in these aquifers, the district imported MODFLOW data on aquifer elevations, storage coefficients, and groundwater levels into its geographic information system (GIS). The GIS tools arcview and spatial analyst were used to perform the storage volume calculations. The analysis provided a layer by layer, cell by cell determination of aquifer available storage capacities.

Kendy, Eloise. 2003. The False Promise of Sustainable Pumping Rates. *Groundwater* 41, no. 1: 2-4.

The article discusses the importance of understanding water consumption in identifying water management options. While water use is sometimes cited, the author proposes that water consumption is the more difficult figure to obtain but one with greater significance to sustainable pumping from shallow, unconfined aquifers, regardless of the rate at which that water is pumped.

Kent, Bob, Craig Stewart, and Gino Bianchi-Mosquera. 2000. Water Rights and Water Management: A Case Study of Three Cities in Different Continents. In proceedings of *Groundwater: A Transboundary, Strategic, and Geopolitical Resource.* 127-128.

The water rights and water management issues of three cities are compared: Agadir, Morocco; Lima, Peru; and Los Angeles, California. The issues considered include each city's approach to integrated water management, groundwater sustainability, alternative sources of water, and water management authority.

Kolm, Kenneth, and Kent Glover. 2000. Ecosystem Sustainability in Regions of Diverse Water Management Goals: Challenges and Progress in the Upper Roaring Fork Watershed, Colorado, USA. In proceedings of *Groundwater: A Transboundary, Strategic, and Geopolitical Resource* 73-74.

The paper presents the challenge, goals, and general approach for quantifying and measuring ecosystem sustainability, including human components, from a hydrologic system perspective. The approach attempts to integrate individual factors and provide a scientifically credible model that is accessible for community planners and water managers.

Llewellyn, Dagmar. 2003. Applications of and Pitfalls to the Use of Groundwater in a Sustainable Water Plan—Examples from New Mexico. In proceedings of *NGWA's Southwest Focus Conference/Water Supply and Emerging Contaminants*, 145-146

Groundwater can be an important component of a sustainable conjunctive water use plan in arid regions. It can be used to balance supplies between wet and dry years and provide a mechanism for storage of water. Effective use of groundwater systems requires a thorough understanding of the existing hydrologic system. This includes recognizing the

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relationship between groundwater flow and river flow plus other relationships. A system of legal restraints in New Mexico recognizes these relationships. The escalating pressure of population growth and other increased uses is causing problems with continuing sustainable plans.

Mack, Thomas J., and David R. Wunsch. 2002. Sustainability of Groundwater Resources in the Piscataqua River and Coastal Watersheds, Southeastern New Hampshire. In proceedings of *2002 NGWA Northeast Focus Groundwater Conference,* 71.
This investigation consists of several major components including geohydrologic data collection, compilation, and monitoring; water use data collection and assessment; and regional water resource analysis. A regional groundwater flow model will be developed and applied on a subregion in New Hampshire's seacoast area to provide an integrated analysis of geologic information, new and historical hydrologic data, and complex regional water uses. This information will be available to agencies to help identify problems and evaluate future water use or availability in the study area.

Odermatt, J.R. 1997. Effective Implementation of the Watershed Management Approach for Adjudicated Groundwater Basins in California, *Groundwater Monitoring & Remediation* 17, no. 2: 73-76.
Water rights which are recognized in California are summarized. Issues of water quality and quantity which have affected adjudicated basins in southern California are outlined. Watershed management options are proposed which could be applied to protect groundwater in adjudicated basins.

Oliver, James M. 2003. Defining Aquifer Sustainability in an Agricultural Water Transfer—The Dell City, Texas Experience. *NGWA's Southwest Focus Conference/Water Supply and Emerging Contaminants,*144.
A water supply being considered by El Paso, Texas, is importing water from the Dell City Agricultural District. The problem of determining the sustainable yield of this karst aquifer system is being studied. The new trend in aquifer management policy uses a combination of sound hydrologic principles and monitored aquifer conditions to ensure the sustainability of the groundwater resource.

Querner, E. P. 2000. The Effects of Human Intervention in the Water Regime. *Groundwater* 38, no. 2: 167-171.
Water tables in the Netherlands have fallen due to human intervention in the water regime. Factors responsible for this hydrological degradation are increased agricultural crop production, changes in land use, increased drainage, lowering of the drainage base, and increased groundwater abstractions. The physically-based groundwater and surface water model, SIMGRO, was used to predict the effect of these human interventions. The analysis was carried out in three different regions of the Netherlands and various scenarios were defined to represent the man-induced changes over the last 50 years. Variations in meteorological conditions over the last 50 years have a pronounced effect on the natural recharge, and the effect is greater than the changes caused by any of the human influences. The lowering of the drainage base causes the greatest change in groundwater tables.

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Rains, Mark Cablek and Jeffrey F. Mount. 2002. Origin of Shallow Groundwater in an Alluvial Aquifer as Determined by Isotopic and Chemical Procedures. *Groundwater* 40, no. 5: 552-563.

This study identifies the origin of shallow groundwater that supports regionally unique plant and wildlife habitats in a riparian and reservoir-fringe system using isotopic and chemical procedures. Results show that stream flow is the more prominent source of local shallow groundwater during the wet season, but that regional groundwater is the more prominent source during the dry seasons. The variation in the source and dynamics of shallow groundwater recharge must be considered if the management of shallow groundwater and associated plant and wildlife habitat is to be successful.

Reynolds, Jeffrey W., and Richard K. Spruill. 1995. Groundwater Flow Simulation for Management of a Regulated Aquifer System: A Case Study in the North Carolina Coastal Plain. *Groundwater* 33, no. 5: 741-748.

North Carolina designated an area of the coastal plain as a regulated aquifer requiring permits for withdrawals. MODFLOW was used to model a 1300 square mile area to estimate effects of a mine advance and a proposed wellfield. Regional scale groundwater flow models provide information on potential effects on the aquifer and assess impacts as required in the permitting process.

Sophocleous, Marios. 1997. Managing Water Resources Systems: Why "Safe Yield" Is Not Sustainable. *Groundwater* 35, no. 4: 561.

Discussion of why safe yield is not sustainable yield and should not be used in setting water policy. Discharge from groundwater systems is ignored when looking at safe yield as it is traditionally defined.

Wilson, Steven D., et al. 1998. Hydrogeology and Ground-Water Availability in Southwest McLean and Southeast Tazewell Counties Part 2: Aquifer Modeling and Final Report.

An assessment was made of the aquifer characteristics and groundwater availability of the Sankoty-Mahomet Sand aquifer in Illinois. A model simulated hypothetical well fields at four locations to identify impacts and the ability to sustain withdrawals at a specified capacity.

Wood, Warren W. 2003. A Fresh Water Odyssey: Some Observations on the Global Resource. *Groundwater* 41 no. 3: 300-305

Current water use, projected demands, and issues to consider are recapped. Potential developments that could affect or impact the future are outlined. The role for scientists and engineers in public policy debate on water is discussed.

Wood, Warren W. 2001. Water Sustainability – Science or Management? *Groundwater* 39, no. 5: 641.

Instead of scientists attempting to work with the concept of sustainability of water resources, the suggested concept should be renewability. This is defined by the author as the natural average amount of water that enters a watershed each year.

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The National Ground Water Association is a not-for-profit professional society and trade association for the groundwater industry. Our members from all 50 states include some of the country's leading public and private sector groundwater scientists, engineers, water well contractors, manufacturers, and suppliers of groundwater related products and services. The Association's vision is to be the leading groundwater association that advocates the responsible development, management, and use of water.

For additional information contact NGWA Government Affairs Director Christine Reimer at 800 551.7379, ext. 560, creimer@ngwa.org.

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