1. Aspinall, R., & Pearson, D. (2000). Integrated geographical assessment of environmental condition in water catchments: Linking landscape ecology environmental modeling and GIS. Journal of Environmental Manager 59, 299-319.

Geographic Information Systems (GIS) are used in this article to study the health of water catchments. Simple measurements that detail the conditions of the catchments called indicators are used as key components in the GIS framework of a hydrologic modeling system. Model outputs provide input to land use managers or other researchers about what land use is sustainable for specific water catchments. Spatial integration is very important in modeling these water catchments because the indicators need to be assigned within a specific geographic context and incorporated with environmental variability descriptions across the geographic area. The models being implemented in the GIS framework allow for these indicators to represent the ecological and hydrological functioning of the water catchments. For a GIS user, integrating these models with the GIS interface makes it easy to access modeling functions. Using hydrologic modeling and GIS for researching water catchments produces successful results and supports the decision making process.

2. Adamat, R.A., & Baban, S.M.J. (2004). Mapping Groundwater Level and Depth in the Azraq Basin in Jordan Using GIS. Surveying and Land Information Science, 64, 2, 97-105.

The authors of this article discuss the over-extraction problem of one of their largest basins called the Azraq Basin. Groundwater is considered their only major water resource and the problem of over-extraction makes developmental planning very challenging. The authors also ague that in order to support industrialization, agricultural expansion, and a growing population, more effective water management strategies need to be utilized so that possible future difficulties may be predicted. In order to accomplish an effective water management strategy the authors use GIS to evaluate and map groundwater resources so that planners could obtain better information about groundwater levels over time. The authors also state that because of the spatial nature of groundwater it is possible to use GIS to evaluate relationships between land topography and groundwater level. Therefore, the relation between groundwater level and depth based on topography of the land can be modeled or mapped.

3. Fernandez, J.Q., McCool, D.K., & Stockle, C.O. (2003). Estimating water erosion and sediment yield with GIS, RUSLE, SEDD. Journal of Soil and Water Conservation, 58, 3, 128(9). Retrieved October 29, 2004, from Infotrac database.

The author of this article uses erosion models and sediment delivery concepts that can be integrated into GIS in order to estimate water erosion and sediment yields at the watershed scale. This method was applied to the Lawyers Creek Watershed in the Idaho panhandle. This watershed lies in predominately cultivated cropland that is also prone to increasing erosion and flooding problems. In order to model erosion and sediment delivery concepts, the author spatially examines the spatial distribution of these two parameters, combined them with potential conservation practices, and integrated them in to the RUSLE and SEDD models to find estimates. This method allows for the identification of primary sediment source areas, the spatially varying sediment transport capacity, and the sediment yield for each area. The author argues this method as opposed to the traditional “black-box” for an entire watershed. He also believes that the integration of GIS to modeling this element of hydrology is fast and effective and can serve as a useful tool in natural resource management and planning.

4. Zacharias, I., Dimitriou, E. & Koussouris, T. (2003). Developing sustainable water management scenarios by using thorough hydrologic analysis and environmental criteria. Journal of Environmental Management, 69, 4, 401-412. Retrieved September 9, 2004, from ScienceDirect database.

This article discussed the significant degradation of wetlands, specifically the Trichonis lake of Western Greece, and what can be done to develop a sustainable water management alternative for both economic activities and environmental health using GIS, remote sensing and hydrologic modeling. The author states that “wetlands are multifunctional and dynamic systems that incorporate very specific hydrologic and ecological conditions” (p.#) Therefore, if sustainable water management plans are not met, destabilization of the hydrologic balance will occur. The authors of this article presented an array of methods to support the preservation and protection of wetlands. Some of these methods include GIS, remote sensing, and hydrologic analysis to quantify the existing water resources and to formulate a sustainable management plan by considering both anthropogenic water uses and environmental protection. In conclusion, by using a set of environmental criteria and hydrologic estimations the researchers were able to provide management alternatives that best accommodated the ecosystem of the basin.

5. Lee, S., Park, E., Cho, M., Lee, D. (n.d.). Developing the Groundwater Modeling Technique for Groundwater Pollution Assessment Using GIS. Retrieved November 17, 2004, from the ESRI web site. http://gis.esri.com/library/userconf/proc99/proceed/papers/pap247.htm

The authors of this article research the development of the groundwater modeling technique for groundwater pollution through simulation of groundwater flow using GIS. The authors use the parameters of groundwater flow, topography, geology, soil, land use and a well database and applied them to the study area. Then the results were used as input data of the DRASTIC system for groundwater pollution assessment. Using this model, the authors were able to assign various values to hydrogeologic parameters easily and quickly. This way of modeling the various conditions would also be fast and effective. In conclusion, the authors stated that certain stresses to susceptibility change can be predicted dynamically using the integration of GIS and the groundwater modeling program.

6. Mohammad, K., Kerachian, R. & Zahraie, B.(2004). Monthly Water Resources and Irrigation Planning: Case Study of Conjunctive Use of Surface and Groundwater Resources. Journal of Irrigation and Drainage Engineering, 130, 5, 391-402.

This article deals with developing an application that can be the most effective means of using simulation models and a mathematical model for predicting water fluctuations in the Tehran and Fashafooyeh aquifers. The authors state that the main source of groundwater recharge is the return flow from domestic consumption. Therefore, the need for this systematic approach is important to modeling the complex system of surface and groundwater resources. In conclusion, the authors found that there are huge impacts on the water distribution in agricultural zones, and the role of drainage wells is also important to controlling the water table. This research illustrates the value of having an integrated system for allocating surface and groundwater resources.

7. Maidment, D. (1996). GIS and Hydrologic Modeling - an Assessment of Progress. Paper presented at the Third International Conference on GIS and Environmental Modeling, Santa Fe, New Mexico. Retrieved December 12, 2004 from University of Texas, Center for Research in Water Resources. <http://www.ce.utexas.edu/prof/maidment/gishydro/meetings/santafe/santafe.htm>

In 1993 David Maidment presented a survey on the status of GIS and hydrologic modeling as it then existed. In this article he evaluates the progress of hydrologic modeling since the first conference. His goal was to present a framework within GIS in which hydrology can be used as an integrated subject. He also examined how spatial hydrologic models can be produced for time averaged and time varying systems. Dr. Maidment states in the article that low cost or free data via the web have encouraged the development of an integrated system that can process the data into useful forms for hydrology. He also said that the production of a number of integrated systems that can be connected to existing hydrologic models has also promoted spatial databases that are available in GIS format these modeling tools include SWAT (Soil Water Assessment Tool) and MMS (Modular Modeling System). Dr. Maidment concluded that since 1993, there has been much progress in spatial hydrology, and the challenges he had cited in his earlier papers have now been accomplished.

8. Kopp, S. (1998). Developing a Hydrology Extension for ArcView Spatial Analyst. ESRI ArcUser Magazine, April-June 1998. Retrieved on December 12, 2004 from ESRI web site. <http://www.esri.com/news/arcuser/arcuser498/hydrology.html>

The author of this article discusses the development of a hydrologic extension and its objectives or goals that can be utilized through ArcView Spatial Analyst. He uses flood mapping as an example of how this extension works. Flood mapping includes both hydrology and hydraulics and therefore needs two types of models – one for rainfall-runoff modeling and the other for hydraulic modeling. After calculating the potential runoff and water depth, the information is stored in a file for hydrologic modeling that would then be represented in ArcView Spatial Analyst as areas that will flood. The authors also stated that the new object-oriented models have been created by the Corps of Engineers Hydrologic Engineering Center (COE-HEC). They include the Hydrologic Modeling System (HMS) and the River Analysis System (RAS).

9. Cone, D., Carrillo, M., Vaughn P., Rhoades, J. (1998). Evaluation of a GIS-Based Model of Salt Loading to Groundwater. Retrieved on-line December 2, 2004 from ESRI web site. http://gis.esri.com/library/userconf/proc98/PROCEED/TO200/PAP154/154.HTM

This article describes a study that evaluates the Trace Element Transport model (TETrans) for its ability to predict salt loading to groundwater. TETrans is a one dimensional functional, GIS based, transport model introduced in 1990 by Corwin and Waggoner. In this study, the model was used to predict salt loading beyond the root zone. The objectives of the study were to rely almost entirely on measured data as input to simulate the loading of salt beyond the root zone and to evaluate the correspondence between measured and simulated results from the functional solute transport model for several thousand hectares of irrigated, agricultural land.

10. Tucker, G., Gasparini, N., Bras, R., Rybarczyk, S. & Lancaster, S. (n.d.). An object-oriented framework for distributed hydrologic and geomorphic modeling using triangulated irregular networks. Retrieved on-line December 12, 2004 from GeoComputation 99 web site. <http://www.geovista.psu.edu/sites/geocomp99/Gc99/042/gc_042.htm>

This article discusses a spatially distributed model prototype that evaluates land surface processes, in this case long-term landscape evolution and short-term flood forecasting. The goal of the research is to provide some type of application that can independently model routines and also allow for space and time structures without affecting the processes or variables. The system that is illustrated in the article utilizes the triangulated irregular network (TIN) to represent the landscape. The authors argue that this type of system is useful and effective for examining long-term landscape evolution and short-term flood forecasting.