Geophysical Research Abstracts, Vol. 9, 03596, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-03596


# Integrated Assessment of Groundwater Resources in the Ouémé Basin, Benin, West Africa

**R. Barthel** (1), J. Jagelke (1), T. Gaiser (2), B. Sonneveld (3), A. Printz (4) and G. Götzinger (1)

(1) Institute of Hydraulic Engineering, Universitaet Stuttgart, Germany (roland.barthel@iws.uni-stuttgart.de), (2) Institute of Soil Science, Universitaet of Hohenheim, Germany, (3) Centre for World Food Studies, Amsterdam, The Netherlands, (4) Institute of Landscape planning and Ecology, University of Stuttgart, Germany

The objective of the EU-Research project RIVERTWIN (www.rivertwin.org) is the comparative development of integrated water and land use management tools. Three river basins with contrasting ecological, social and economic conditions were selected: 1. Neckar basin (Germany, Central Europe); 2. Ouémé basin (Benin, West Africa); 3. Chirchik basin (Uzbekistan, Central Asia). In each of the basins groundwater plays an important role. This contribution will however focus on the groundwater resources of the Ouémé basin only. In Benin groundwater resources and subsequently groundwater use are distributed unevenly due to contrasting hydrogeological conditions. In the south, in the sedimentary coastal basin, the aquifers are of medium to good quality. Hence, the rural areas and in the big cities of the south the majority of the population is supplied with drinking water from groundwater resources. Relatively high yields are possible. In the north, in the crystalline part of the basin, the hydrogeological conditions are less favourable. Here the yields are usually low and variable. The goal of the study presented here was firstly to determine appropriate measures (models, monitoring systems etc.) needed for a better understanding of the actual state and for predicting the future of groundwater resources in Benin. A second goal was the provision of groundwater base data to the Centre of World Food Studies, where an analysis of groundwater development costs and future agricultural development options was carried out within the framework of the RIVERTWIN project. Thirdly, the investigation aimed at better understanding some basic groundwater related processes in the Ouémé basin, namely the nature and the role of groundwater recharge

and groundwater surface water interactions. In order to reach these objectives two approaches where used: a) the development of a regional groundwater flow model and b) a GIS based analysis of well data from a country wide well database. Here only the results of the data base analysis are presented. With respect to the groundwater flow model that was developed it should only be mentioned that the conditions in Benin are not favourable for the development of a regional groundwater flow model both because of the geological conditions and due to the lack of reliable data for model set up and calibration. However the groundwater modelling exercise revealed the major unknown processes of the surface-subsurface hydrological system of Benin. The BDI data base (banque de données intégrée) provided by the Direction Générale de l'Hydraulique (DGH), Benin contains data on about 5000 drilled wells in the Ouémé catchment. There are data on geology, well design (depth, diameter, filtered sections etc.) and important characteristics such as hydraulic conductivity, aquifer type, yield and details on the pumps installed. The data is partly not accurate mainly because the exact coordinates of the wells are often not exactly known and partly incomplete. The spatial distribution of the wells is highly irregular making it difficult to interpolate or regionalize the data. To create raster maps covering the whole country as needed by the RIVERTWIN partners, the data was interpolated on a 3 * 3 km grid using a relatively simple interpolation method. A geostatistical or regionalisation approach using secondary data (namely on geology) would definitely yield more meaningful results but is currently not feasible since the required (digital) data does only exist for parts of the country. The resulting grids show in a very rough and generalized way the spatial distribution of important groundwater related variables as a result of an interpolation on a 3 * 3 km grid. A combination of these maps allows for a first estimate on how much groundwater might be extracted in a region and a certain aquifer. Additionally important for the cost assessment is e.g. the required drilling depth. It is important to note that the BDI does not contain any transient data (no time series). Therefore changes to the groundwater system as a consequence of climatic changes and extractions from wells can not be evaluated on the basis of this data. It is also difficult to make any predictions for the future. To arrive at a better and more reliable result, the data contained in the BDI have to be evaluated using more sophisticated means of regionalization. The most important step in the future is, however, to discuss the results with the experts and stakeholders in the country! Here we present an ensemble of results from the hydrogeological analysis along with results from the subsequent cost analysis as well as some overall results of the RIVERTWIN research project.