

Hydrogeologic Databases in Areas of Israeli, Jordanian, and Palestinian Interest

Middle East Water Data Banks Project

An Activity of the Multilateral Water Working Group, Middle East Peace Process

The co-sponsors of the Middle East peace process, the United States and Russia, established Multilateral working groups in January 1992 to bring regional parties together to work on issues of common interest and importance to the region. One of these groups, the Working Group on Water Resources, endorsed the Water Data Banks Project in November 1994. The Water Data Banks project consists of a series of specific technical activities undertaken by participating Jordanian, Israeli, and Palestinian colleagues (the Core Parties). These actions are designed to foster the adoption of common, standardized data collection and storage techniques among the Core Parties, to improve the quality of water-resources data collected in the region, and to improve communication among the scientific communities in the region.

The Water Data Banks Project is managed by an Executive Action Team (EXACT; <http://exact-me.org>) that includes water experts from Palestinian, Jordanian, and Israeli water resources management agencies. Over the years, Data Banks project activities have been supported by a number of donors, including the United States, the European Union, France, the Netherlands, the United Kingdom, and Canada.

The Hydrogeologic Databases project activity discussed herein was supported by the United States and was conducted with regional participants from the following Core Party agencies:

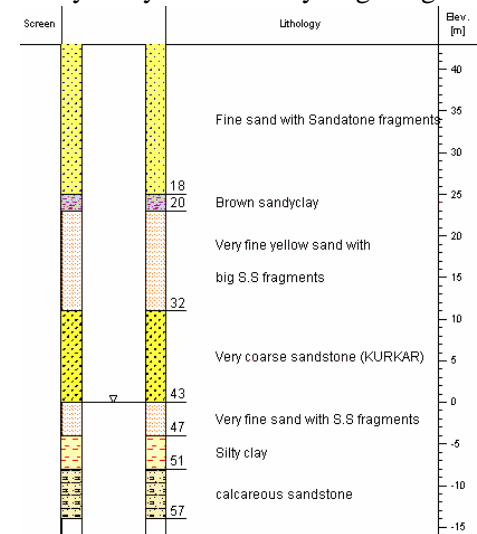
- Israeli Hydrological Service
- Jordanian Ministry of Water and Irrigation
- Palestinian Water Authority

Scientists of the U.S. Geological Survey (USGS) served as technical experts, trainers, and facilitators of the Hydrogeologic Databases project activities.



Information Exchange, Capacity Building, Design and Development

The Core Parties designed this activity to improve their abilities to collect, store, quality assure, analyze, and exchange hydrogeological information. Improved capabilities to quantitatively analyze and use hydrogeologic data contribute to sustainable management of scarce and fragile ground-water resources in the region. Such databases can contribute not only to traditional hydrogeologic activities, such as well siting, but also to advanced models of large-scale ground-water flow and transport.



The Core Parties maintain enterprise databases for information on water resources including water levels in wells, aquifer hydraulic test results, and chemical quality in ground water. However, other hydrogeologic information is not organized in a digital system. Such information includes lithology of boreholes, which shows the depths of various lithologic units at the location of the borehole. In some cases geologic formations, or aquifer hydro-stratigraphy, can be constructed from borehole and outcrop information, in combination with regional geology. This information can be used in turn to locate new wells or construct models of ground-water flow.

A variety of software is being used in the region for geographic information systems (GIS) and water databases. During this activity, the Core Parties exchanged information about current approaches and discussed future plans for these applications. Consensus decisions, reached jointly by the Core Parties, identified common software needs that the project addressed through purchase, installation, maintenance and training.

GIS Software

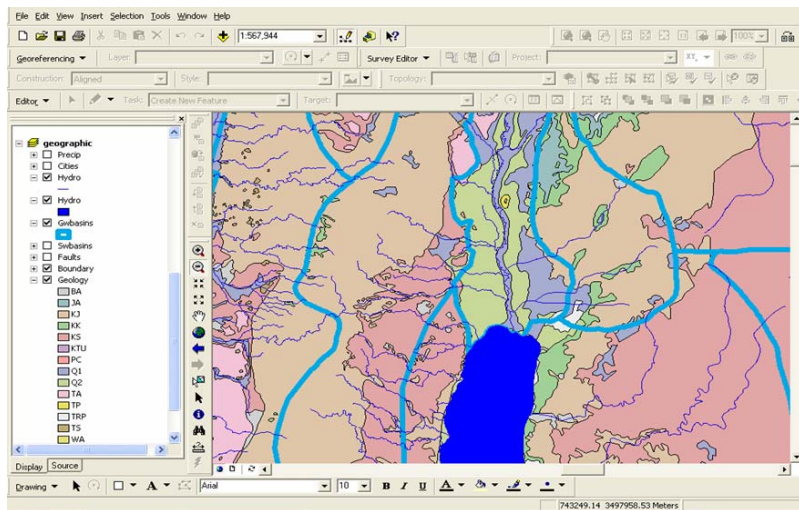
The Core Parties received GIS software systems to improve their capacity for development, management, and use of hydrogeologic databases in studies of ground-water resources in the region. Software provided to the Core Parties included:

- Enterprise GIS software, full license with support
- Spatial grid analysis module
- Geostatistical analysis module
- Three-dimensional grid analysis module

Participants selected appropriate software based on each Core Parties' existing software environments and capabilities.

'Overview' Water Resources GIS

A previous EXACT project activity developed a prototype GIS and maps from this GIS were published by EXACT (1998). The Core Parties worked together to update the conventions used in the database to conform to current standards. In addition, a joint team developed geospatial coordinates and cross-referenced different projection grids used in the region. All digital GIS coverages and databases developed during this activity were shared among all the Core Parties.



Workshops

Prague, 2003 — GIS needs and commonalities

The inception workshop for the project focused on exchange of information on existing hydrogeologic data and databases. Technical experts presented examples of alternative approaches used in studies ranging from three-dimensional ground-water flow and transport modeling for waste isolation, to public presentations of well-log information. The Core Parties also exchanged information about existing hydrogeologic databases and GIS tools in use in the region.

Nicosia, 2004 — Enterprise GIS training and prototype database design

Licensed instructors from Tel Aviv and Bethlehem provided 4 days of GIS software training. The Core Parties also worked together on the construction of a prototype geodatabase containing geologic map, base map, and well lithology and stratigraphy information. The participants identified geospatial coordinate transformations and regional data projected to a common grid system. The trainers demonstrated a preliminary XML (extensible markup language) software system for viewing geologic logs, and the Core Parties evaluated its utility for their purposes.



Tiberias, 2005 — Spatial grid analysis training and borehole database tools

USGS experts presented four days of training on a spatial grid analysis module for GIS. Core Party presentations focused on alternative technologies for database linkages between GIS and borehole information. A subsequent review process resulted in the joint identification of software suitable for project implementation, and the Core Parties' Agencies received the software. This industry-standard software allowed construction, maintenance of, and advanced analysis with, a borehole hydrogeologic database within the enterprise GIS.

Continued Cooperation

The Hydrogeologic Databases project activity improved the abilities of the Core Parties to exchange hydrogeologic information, and to store, quality assure, retrieve and use this information in a GIS geodatabase. In addition to improving the technical capabilities of the Core Parties, the technical cooperation demonstrated by the regional participants suggests that continued cooperation and collaboration among the Core Parties will aid in the sustainable management of the scarce water resources of the region.

Reference Cited

EXACT (Executive Action Team, Middle East Water Data Banks Project), 1998, Overview of Middle East water resources—Water resources of Palestinian, Jordanian, and Israeli interest: 44 p.

For More Information: <http://exact-me.org/HGDB/>