Palestinian National Authority
Palestinian Water Authority

السلطة الوطنية الفلسطينية
سلطة المياه الفلسطينية

Sustainable Management of the West Bank and Gaza Aquifers

UNIVERSITY OF NEWCASTLE

NERC British Geological Survey

Department for International Development
DFID

Hydrological Service

Yarkon – Taninim – Beer Sheva Basin

Update of the Model

By

H. Zukerman

Tel Aviv
October 1999
6759/700/133
TAHAL

Final Report
SUSMAQ-MOD # 27V 0.1

This is a Direct Translation from Hebrew to English of the above Report

Translated by:

SUSMAQ TEAM

July 2003

Disclaimer

This report is an output from the Flow Modelling and Hydrogeology Component, part of susmaq project.

The findings, interpretations and conclusions expressed are those of the authors (the team) and should not be attributed to other collaborators on the susmaq project.

The project does not guarantee the accuracy of the data included in this publication. Boundaries, colours, denominations and other information shown in maps, figures, tables and the text does not imply any judgment on legal status of territory or the endorsement of boundaries. The typescript of this report has not been prepared in accordance with procedures appropriate to formal printed texts, and the partners and funding agency accept no responsibility for errors.

Contact Details

Professor Enda O'Connell
Project Director
University of Newcastle upon Tyne
Tel: 0191 222 6405
Fax: 0191 222 6669
Email: P.E.O'Connell@ncl.ac.uk

Engineer Fadle Kawash
Deputy Chairman
Palestinian Water Authority
Ramallah, Palestine
Tel:02 295 9022 Fax 02 2981341
Email: fkawash@pwa-pna.org

Dr. Amjad Aliewi
Operations and Technical Manager
Team Leader, Hydrogeology and Flow Modelling

Sunrise Building
Al-Irsal Road
Al-Bireh/Ramallah, Palestine
Tel. 02 298 89 40 Fax. 02 298 89 41
e-mail: a.s.aliewi@susmaq.org

The SUSMAQ Project

The aim of the project is to increase understanding of the sustainable yield of the West Bank and Gaza aquifers under a range of future economic, demographic and land use scenarios, and evaluate alternative groundwater management options. The project is interdisciplinary, bringing together hydrogeologists and groundwater modellers with economists and policy experts. In this way, hydrogeological understanding can inform, and be informed by, insights from the social sciences. The results of the study will provide support to decision-making at all levels in relation to the sustainable yield of the West Bank and Gaza aquifers.
The project runs from November 1999 to October 2004, and is a partnership between the Palestinian Water Authority, University of Newcastle and the British Geological Survey. The project is funded by the United Kingdom's Department for International Development (DFID).

The Flow Modelling and Hydrogeology Component is part of the SUSMAQ project

The Flow Modelling and Hydrogeology study focuses on the geology and hydrogeology of the Western Aquifer Basin (WAB), its inflows (recharge) and outflows (spring and well abstraction)
This is a direct Translation and Reproduction From Hebrew to English of the 1999 Tahal Report prepared by H. Zukerman.

Bibliographical Reference

Yarkon-Tanninim-Beer Sheva Basin: Update of the Model. Report No.: SUSMAQ-MOD#27V0.1. Sustainable Management for the West Bank and Gaza Aquifers, Palestinian Water Authority (Palestine) and University of Newcastle upon Tyne (UK).

This is a direct Translation From Hebrew to English of the 1999 Tahal Report prepared by H. Zukerman.

Authors:

Translated by **SUSMAQ TEAM**
SUSMAQ acknowledges the efforts of Eng. Raslan Yasin, Mr. Basman Yasin, Dr. Karen Assaf and Ms. Faten Oweis for translating and re-generating this report.

Feedback

The SUSMAQ and PWA teams will appreciate any feedback on this report. Feedback should be sent to the above contacts.

Hydrology Section

Yarkon – Tanninim – Beer Sheva' Basin
Update of the Model

By

H. Tsukerman

Tel Aviv
October 1999
6759-700.133
TAHAL

Tami – Consultant Engineers (Ltd)

Avin Givrol – P.O.Box 11170, Tel Aviv 61111 Tel. 6924622 Fax 6924608

E-mail: simon-e@tahal.co.il

Water Unit – Hydrology Section

Date : 13.1.2000
ES99 – 380b

To:
Mr. Avi Migami
Head of Water Pumps Section
Mekeroth
Tel Aviv

Subject: Yarkon Tanninim – Beer Sheva' Basin Updating

According to our suggestion-dated 23.5.99 that was introduced after the dry winter of 1999 that sunk with very high pumpage, here in we introduce the updated flow model of the YARKON-TANNINIM basin. The work was done by Mr. H. Tsukerman with the help of Mr. A. Shankai. This updated work was approved with the consultancy of Z. Golani and Y. Guttman. The flow model for YARKON-TANNINIM basin that was formulated and calibrated at Tahal in 1995 (that deals with for the hydrological conditions for 1992/93), wasn't promising at first to indicate sharp changes, but actually it presents values similar to previous calibration results (337.1 mcm/yr for steady state and 351.2 mcm/yr natural recharge on an average).

The real problem was discovered through simulation that achieved as requested. According to some conditions, that at first was not probable to indicate a positive event but at least estimation "for time scale" the damages. This was simply because the simulation was done for more pumpage of about 50% more than the average recharge. It's right for completing the recent calibration. Under a series of low rainfalls, increases the percentage of water deficit.

Moreover, initial conditions in water level fluctuations in the observation wells as shown in Fig.20 are close to the red line, from the year 2000 until now, water levels sunk clearly. According to the simulation results, the predicted water level drawdown was about 30m, and the water level in Beer Sheva' observation well reached 11 masl. It can be concluded from the simulation results that these results bring attention to the risk of exceeding pumpage over the recharge for even for short time of the simulation. Moreover, the aquifer system could be damaged by salt-water intrusion phenomena that is until now not clear enough.

There are threats to the aquifer and recently is the risk of damaging parts of the aquifer after the probable spreading of leaked sea salt-water into the aquifer "Jewish proverb from the Tanakh : From the north come the disaster"

As a result, it is not recommended to exceed the red line or to take any managerial decisions like this or like that if unless the decision is taken after research results.
This report is to clarify the system of the spring salinity properly. Research development should mark clearly and basically the water quality problems all over the basin.

On the other hand, for the purpose of simulation model improvement, depending on the conceptual model, it is necessary to think about the formulation and calibration of multi-layers flow model again. The model will be set-up according to the conceptual model, and it includes points of data synthesis if needed. In order to have as realistic a picture as possible, for the water table, cones of depression of the pumpage to the 2 aquifers (the upper and the lower) of Judea Group were included. This model will be combined with the solution transport model (SUTRA or RT3D, MT3D) that will predict the sources and risks of salinity, especially in the northern area of the basin. Using the model velocities in this model, many different Scenarios will be evaluated. Moreover, it could be possible to determine the most preferable or critical locations of the observation wells. This will improve the entire basin management of pumpage under critical conditions.

Plesses
Dr. Ihuod Simon

Copy
Dr. D. Hamburg
H. Tsukerman
A. Shankai
Y. Guttman
Z. Golani

Table of contents

List of tables

List of Figures

Appendix

Modflow files

1. General Background

The Yarkon-Tanninim-Beer Sheva' basin is one of the 3 basic water resources (together with the coastal and Tiberias basins) of the water network over the state.

The importance of this basin comes from it being considered and used as a water resource for drinking and agricultural usage. In addition, it is used as a natural underground transmitter of water (because of the high conductivity properties of the aquifer). This was proven over the past years. In different works, the risk of water levels drawdown and salinity problems all over the basin was raised.

The first flow model for the Yarkon Tanninim was formulated in 1980 (Goldshtof and Shankai 1980). Aetter setup and calibrated model of bi-layers flow and salinity was done in 1988 for steady state only (Guttman et. al. 1988). The model was done using AQSIM for steady state conditions only.

The recent model (using MODLFLOW) was set-up first on the same basis of the previous model calibrated for dynamic state for 1991. After the rainy winter of 1991/92, the model was adjusted for the abnormal rainfalls for the same winter (Guttman and Tsukerman, 1995). Instead, a detailed model was developed for the Akhi-Semakh area (Guttman et. al. 1992).

After the latest dry years, especially the dry year of 1998/99, it was clear that there is a need for model update. In this work, the model was developed and calibrated for the 1993-1998 years.

Full report/document is not available online