MedWater

Sustainable management of politically and economically highly relevant water resources in hydraulically, climatically and ecologically highly dynamic carbonate groundwater aquifers of the Mediterranean

Web based Decision Support System (Beta Version)



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Objectives

 \rightarrow Groundwater resources in highly dynamic Mediterranean carbonate aquifers are recently limited and might decrease in the future.

 \rightarrow What we need are

sophisticated and high resolution models to consider the complexity of the aquifers, but at the same time user-friendly and applied tools to put the results into practice.

Therefore we are developing a Decision Support System (DSS) that is programmed by VisDat GmbH and supplied with model data, algorithms and the expertise by the partners.

→Focus on the Western Mountain Aquifer in Israel and the Palestinian territories

 \rightarrow Data from 1951 to 2070, considering climate change and land use change.



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What can we achieve with the DSS?

 \rightarrow Automated readout of data from a numerical MODFLOW modeling of TU Berlin with the FloPy library.

 \rightarrow Visualization and statistical evaluation of input data and modeling results.

→Results of the MODFLOW modeling can be combined with a live-processing tool to calculate drawdowns of new wells, based on an analytical approach (THEIS-well function, provided by TU Berlin).

 \rightarrow Spatial and time-specific data download (shape, raster, csv, xlsx) as an input for water resources management systems of the stakeholders.

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Login workgroup						







A short insight

After login the Base data module opens, in which e.g. land use ...



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... climate data ...



Groundwater modelling

Information

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... or the results of numerical modeling with the model MODFLOW can be requested as interactive maps ...



... or delta maps (for different years).



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These data can be further analyzed in the Statistics module, e.g. land use specific...



... or comparative for several parameters or scenarios, e.g. on the compliance with the fixed red lines for the groundwater level.



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In the Groundwater modeling module, the user can then call up the results of the MODFLOW modeling and carry out his own analytical processing on the basis of the implemented Theis-well function.

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To do this, he has to call up a project at the project control level and a map with the already existing well sockets appears. Now the user can create new wells and define pumping rates.

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After the wells have been created, the recalculation can be started and the results of the MODFLOW model are now overwritten by the analytical calculation in the area of the well drawdown.

MedWater DSS	Groundwater modelling	Contact Impress Language - Logout		
test1 new well	BA_test possibilities of new wells	Demo new wells		
2020-06-21 Download Edit Show results Delete	2020-09-12 Download Edit Show results Delete	2020-09-16 Download Edit Show results Delete Cancel		
		calculate storage coefficient		
Calculation finished	Nothing hasa been calculated yet	Calculation in progress		
Add new project				

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The recalculated depression cones of the wells can be seen here.



Base data

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This is the groundwater level given by the MODFLOW model at result time without considering the drawdown by the new wells ...



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... and this is the result of the groundwater level given by the MODFLOW model, combined with the analytical calculation in the area of the well drawdown.



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The results are also output as a table for each grid cell and can be completely downloaded as an input for water resources management systems of the stakeholders.



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State of work

 \rightarrow The application is technically implemented and runs with a good performance.

- \rightarrow An extended MODFLOW run has been integrated in October 2020.
- \rightarrow Plausibility checks are currently being carried out in close cooperation with the partner TU Berlin.
- \rightarrow The next step is to discuss the system and the model limitations with partners and stakeholders and to decide about final adaptations.
- \rightarrow An upload of the final MODFLOW model should take place in April 2021.
- \rightarrow Finalization of the DSS and Hands-on training is planned by May/June 2021.





Conclusions and Outlook

 \rightarrow The innovation and exploitation potential can be seen in particular in the fact that numerical modeling is coupled with a user-friendly analytical live-processing tool.

 \rightarrow However, it must also be pointed out that the results obtained do not have the depth of a complete numerical modeling; model limits must be considered when using the tool.

 \rightarrow Future adjustments and extensions of the system as well as transfers to other regions are possible if respective data is available.





More information: <u>www.grow-medwater.de</u> <u>www.grow-medwater.de/dss</u>

Partner information

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<u>German Partners</u>: TU Berlin, University of Göttingen, University of Bayreuth, University of Würzburg, VisDat GmbH, BAH Berlin

International Partners: Bureau de Recherches Géologieques et Minières (FR), Montpellier Méditerranée

Métropole (FR), Università degli Studi di Napoli Frederico II (IT), Centro Euro-Mediterraneo sui Cambiamenti

Climatici (IT), Israel Hydrological Service (IL), Mekorot Water Company Ltd. (IL), Ben-Gurion University of the

Negev (IL), Hebrew University of Jerusalem (IL), Ariel University / Eastern R&D Center (IL), Palestinian Water

Authority (PS)

Countries of case studies: France, Italy, Israel, Palestinian territories

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