CAM
COASTAL AQUIFER MANAGEMENT

go-CAM
Implementing strategic development goals in Coastal Aquifer Management

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Decision support and dialogue between stakeholders Online-platform go-CAM (Coastal Aquifer Management)

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Introduction

The achievement of water supply security is one outstanding aim of the Sustainable Development Goals (SDGs) of the UN Sustainable Agenda for 2030. Affected by climate change, saltwater intrusion and human impacts freshwater supply especially in coastal regions is nowadays still threatened in many countries worldwide (further rapid urbanization). To achieve the ambitious aim of SDG target 6 it requires

- **scientific expertise:** a full understanding of the complex water resource system under consideration of resource sustainability and quality protection
- **target of current & future challenges:** a profound knowledge of important driving forces e.g. demographic change, climate change, governance structures or economic state of a region
- **societal needs:** transparency and objectivity of decision-making processes and therefore a open dialogue among stakeholders in the water sector of coastal regions.

The development of an **online-platform called go-CAM** (Coastal Aquifer Management) as key result of the project addresses this targets and helps to fill the still existing gap between science, practice and policy.

Methods

The CAM-tool provides a bundled and easy to grasp representation of the current state of water management and allows the visualization and evaluation of future changes. These changes can be made visible with the help of CAM and will be to stakeholders serving them as a basis for evaluation and discussion. In this way it is possible to develop integrated adaptation strategies and to reassess new model calculations in the CAM. The CAM platform is online and open for access for different users like water agencies, water supply companies, and universities worldwide. This makes the CAM a valuable tool to transfer the scientific understanding of water resources in the modern practice-orientated water management and governance structures. Therefore we are able to inform policy about the development of coastal aquifer systems. The CAM tool basically consists of four levels (see Figures 1 – 3).

First & Second Level

The online-platform go-CAM enables processing the outputs of highly complex hydro(geo)logical models (e.g. PANTA RHEI, d³f++, FEFLOW) using multi-criteria decision analysis techniques (MCDA) and evaluating/analyzing the processing results.
The first level is used to load indicators in raster format and further relevant data into the platform. A preprocessing tool and direct interface called CAMup software was developed to address the challenging task of transferring modeling results of different models into homogeneous data formats and upload the data via cloud.

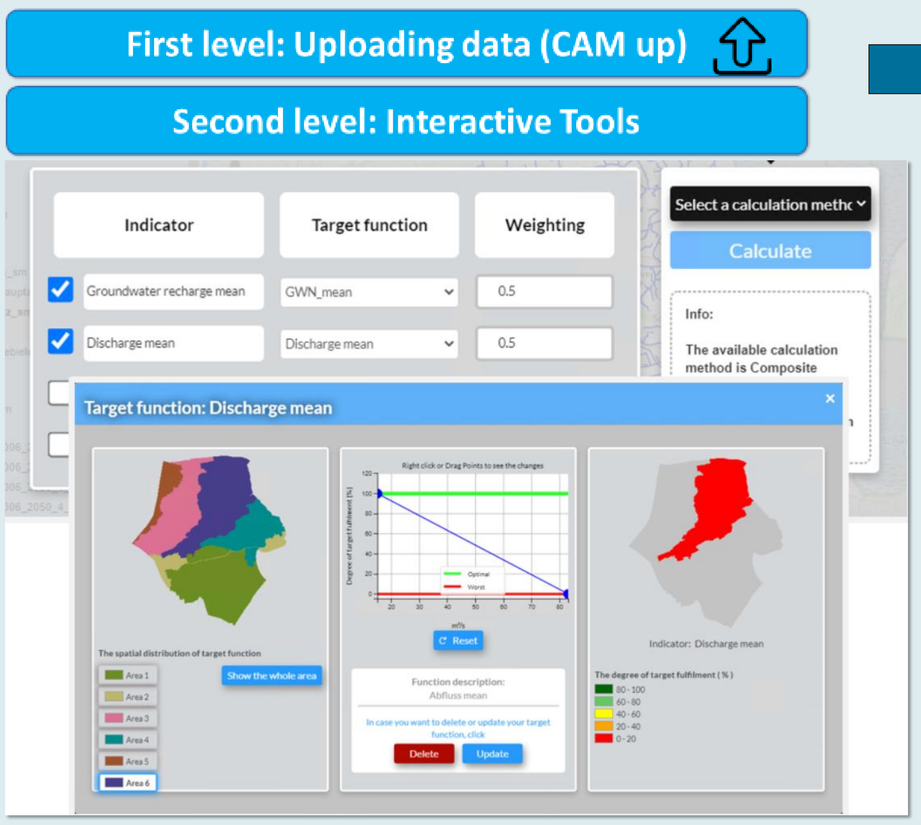

Figure 1: Data upload and interactive tools in go-CAM

The second level is used for an interactive selection of water management options (scenarios, target functions and weighting factors). The main challenge was to integrate the interactive tools, which uses MCDA techniques, e.g. composite programming to evaluate data and scenarios. One target function can be assigned to each selected indicator. The target functions in the platform are customizable and can be displayed, changed, and saved interactively in a diagram or by entering parameters. Besides, those target functions could be also regionally distributed. The weighting of the indicators as well as the objective functions for the evaluation can be influenced by the user (see Figure 1).

Third Level

The CAM evaluation is based on indicators that are subject to combined evaluation. The indicators are water management variables or rating including the influence of climate and socio-economic changes. In the course of a participation process current eight indicators were identified and implemented in CAM:

- Chloride concentration [mg/l]
- Groundwater recharge [mm/yr]
- Groundwater head [m a.s.l.]
- Freshwater volume [Mio m3]
- Drought Index [-]
- Water budget [mm/yr]
- Discharge [m³/s]
- Nitrate concentration [mg/l]

The third level provides an output (calculation result) after using the input indicators from level 1 and the selected options from level 2. The calculation result can be previewed and saved for later analysis (see Figure 2).

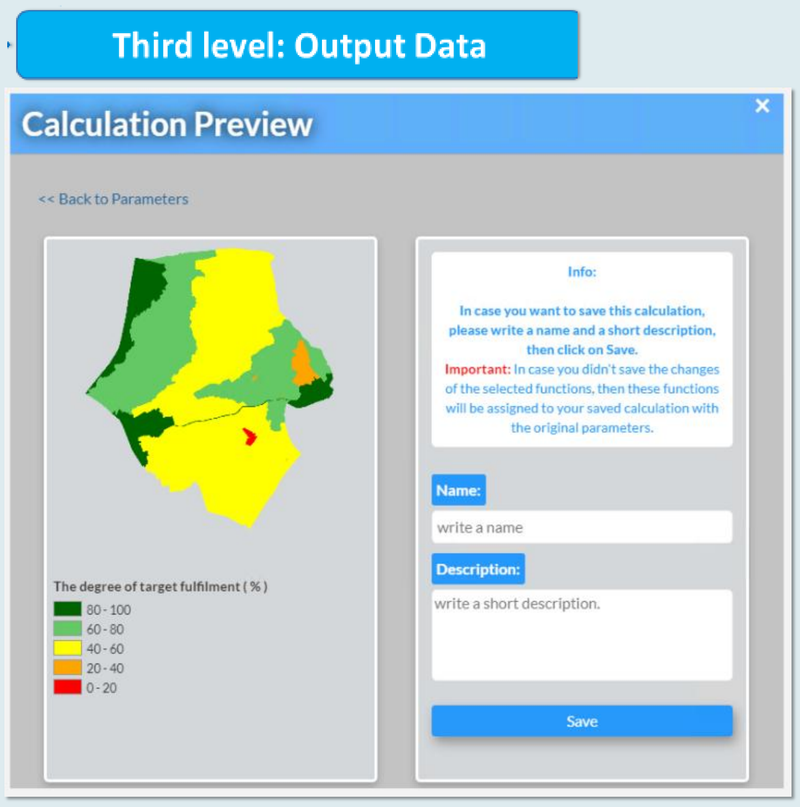

Figure 2: Calculation preview for single indicators derived from different scenario selections using target functions

Fourth Level

The fourth level, on which the stored results of the evaluation calculations from level 3 can be displayed side by side by two users in a Web-GIS viewer separated with a swipe tool. This allows the analysis and comparison of the data, which in this form supports the dialogue between different interest groups (Figure 3). Due to the open data structure of the CAM, it can be supplemented by further indicators and maps (also based on other SDG 6 goals) and is transferable to other regions.

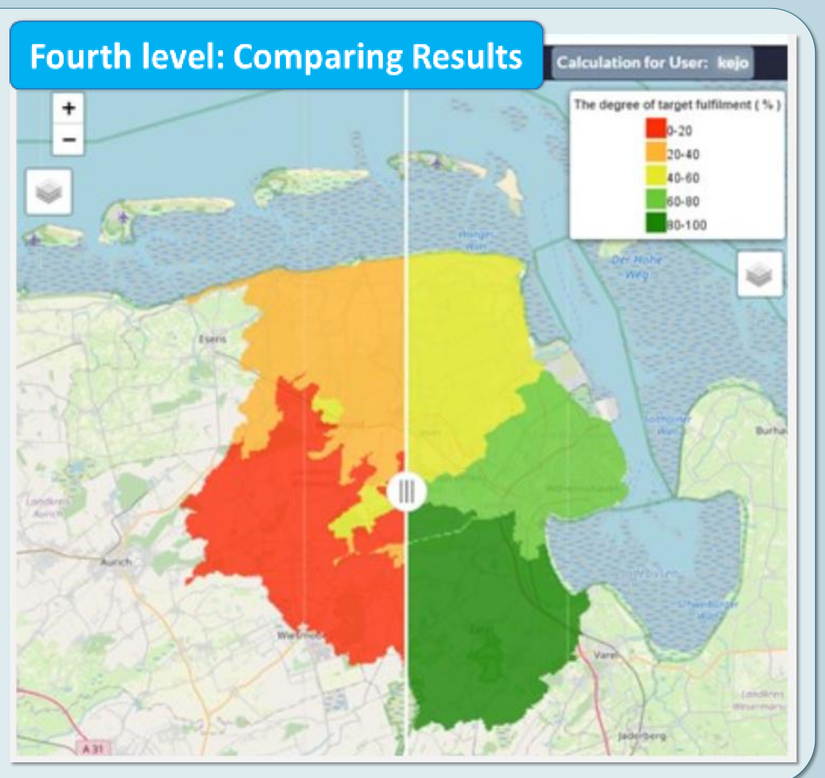

Figure 3: Comparison of two different combinations of scenarios (climate change or management options), target functions or weighting factors

Further Information

www.tu-braunschweig.de/lwi/hywa/forschung-projekte/gocam/index.html

www.gocam.giscon.de

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