**Integrated Water Resources Management in the Lower Jordan Rift Valley**

**Sustainable Management of Available Water Resources with Innovative Technologies**

**BMBF IWRM R&D Programme**

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# SMART – IWRM

## Deliverable No. 404

## Merging of JAMS attributes in GIS to build up hydrological response units (HRU's)

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## INTRO

The aim is the development of the hydrological model J2000g for the simulation of groundwater recharge in the scale of the transboundary model. The hydrological model J2000g is a fully flexible distributed rainfall runoff model to calculate temporal aggregated and spatial distributed hydrological variables (Krause and Hanisch 2009; Krause et al. 2010). The model uses the hydrological response unit concept.

## MERGING OF JAMS ATTRIBUTES

The mentioned input data for JAMS is spatially organized in hydrological response units (HRU), which leads to a spatially discriminated output. The HRU mesh builds a raster of defined scale, and therefore, it is necessary to up- or downscale the input data, e.g. satellite scenes, aerial photographs and field data (fig. 1).

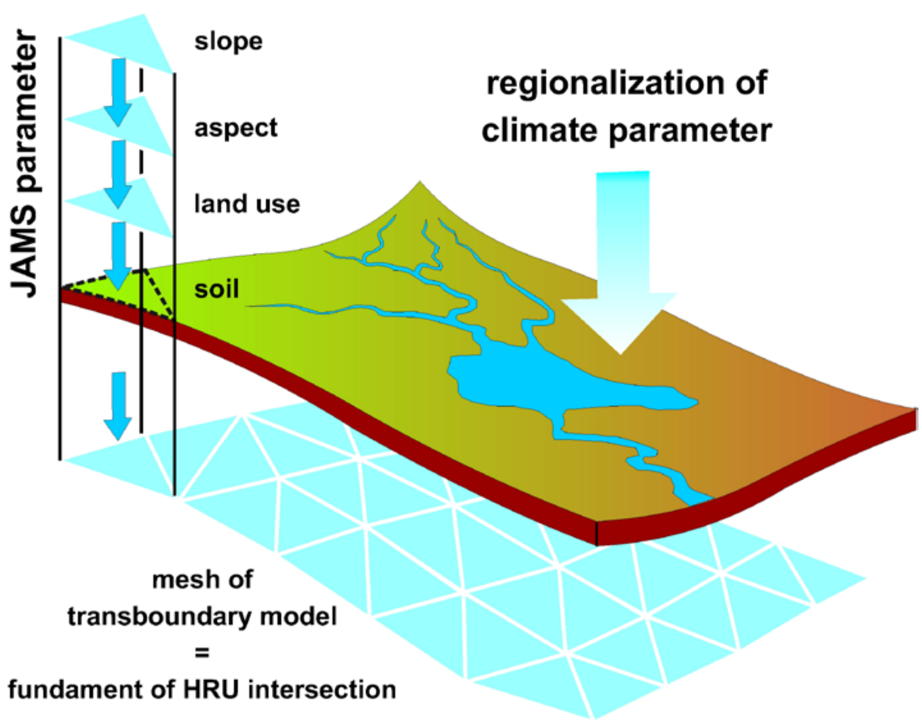
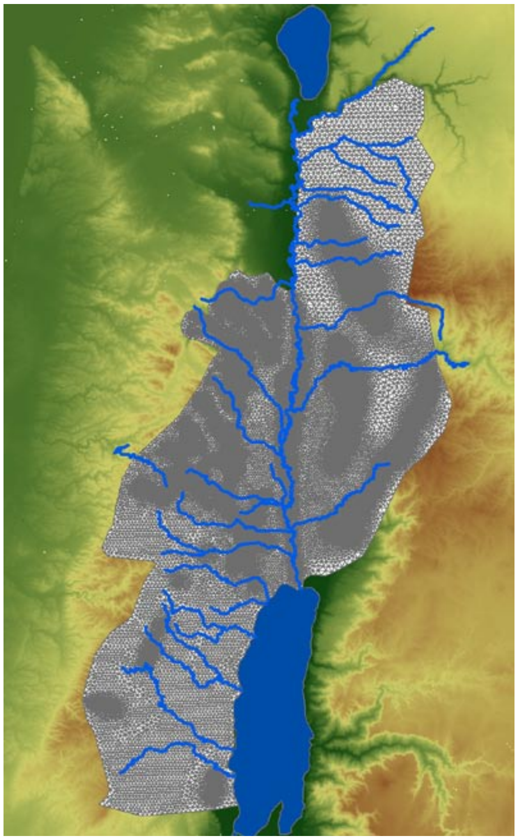



*Fig. 1. The concept of HRU derivation*



The process of merging of JAMS attributes is in the right time frame. To simplify the linkage between the transboundary groundwater model and the hydrological model JAMS, the used HRU mesh is derived from the finite element grid of the groundwater model (fig. 1 and 2). This mesh defines the resolution for all input parameter of J2000g. Because the mentioned input data of J2000g, particularly the characteristics of the relief, the specific soil and the vegetation parameters are spatially organised in hydrological response units (HRU). In the presented case the hydrological response units are conform to the elements of the transboundary model. The description of the used JAMS attributes was given in the statement of deliverable 401.

*Fig. 2: The dimension of the transboundary model along the Lower Jordan Valley*

The following intersections of the input parameters were handled in GIS. In the first step the originally mesh of the transboundary mesh was complemented along the main Wadi courses. This step is necessary, because the Wadi geometry control mainly the infiltration processes in the study area. The Wadi's were defined by width and length (fig. 3). Afterwards the Wadi geometry was intersecting with the mesh of the transboundary model and a ground mesh of the hydrological response units was created (fig. 2).

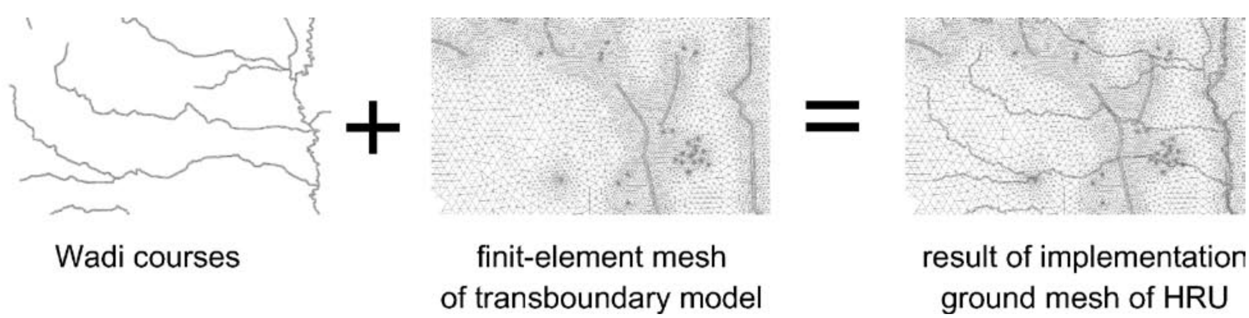



*Fig. 3: Implementation of Wadi courses in finite-element mesh of the transboundary model. The result is the basic HRU mesh for the further intersection processes.*

The intersections of the additionally JAMS attributes (slope, altitude, aspect, land uses, soil) are related to this mesh. The land use intersection is shown in figure 4 as an example for the intersection processes of each parameter. On the base of the HRU ground mesh an oversimplification is given on same position after the intersection but the context of the input parameter is conserved.

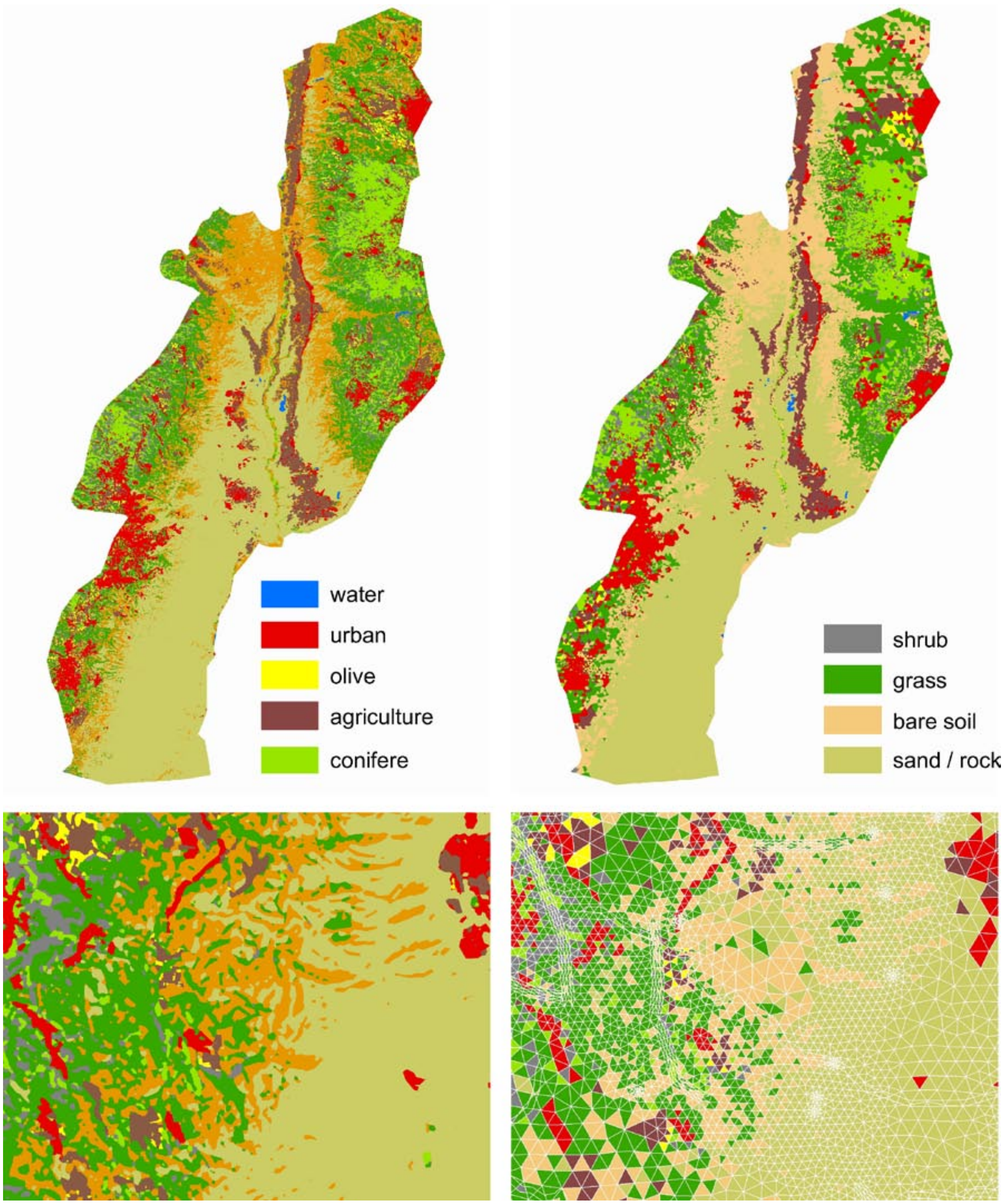



*Fig. 3: The finished intersection between HRU ground mesh and the land use parameter (left site original data, right site intersected data).*

6 tipping buckets was installed in the area of West bank and the area of Ajloun and Fuheis in Jordan in December 2011. The tipping buckets are automatic connect to the webpage of fieldclimate (Fig. 4). The installation of other 5 tipping buckets (red dots) is projected in Israel and Jordan in springtime 2012.

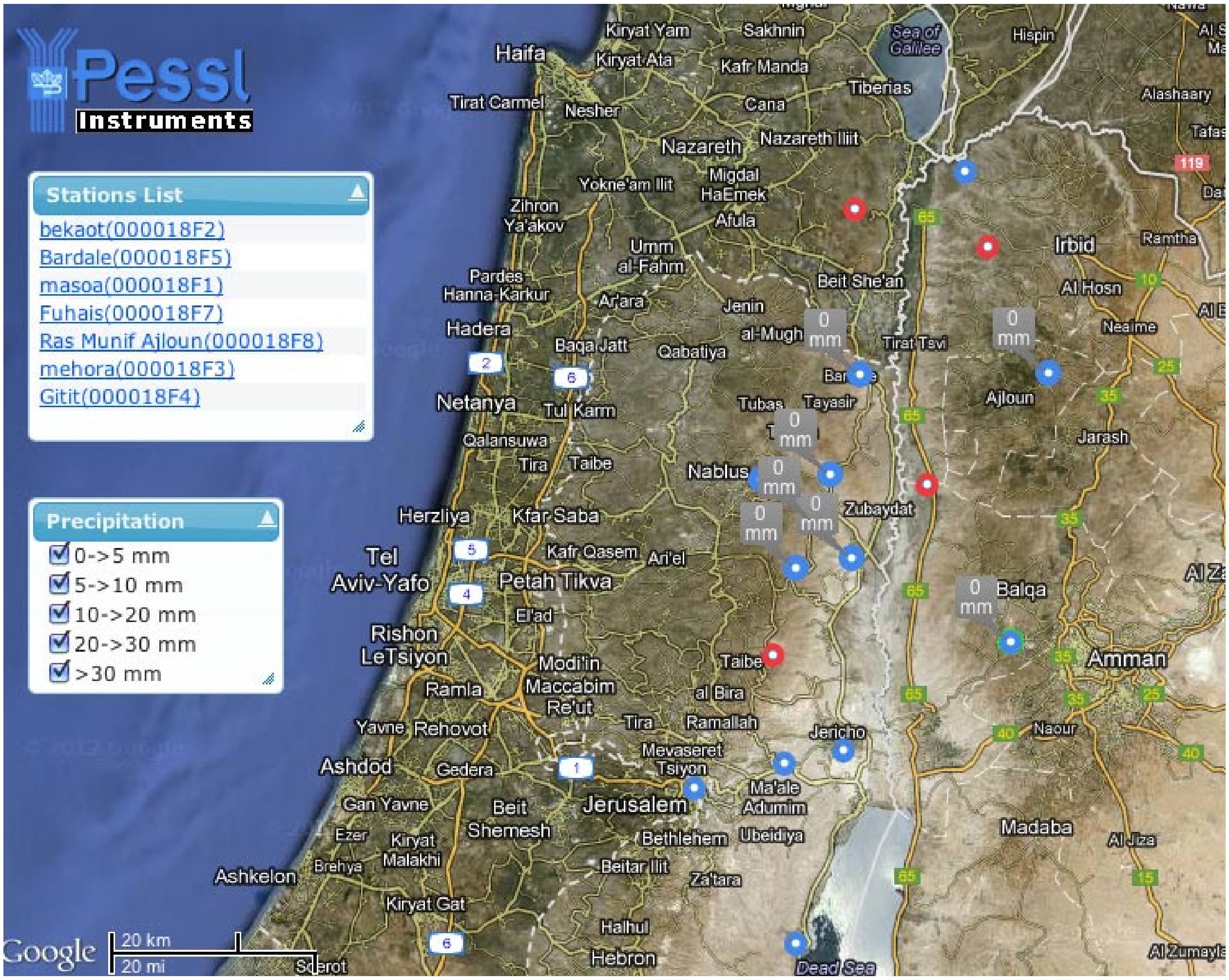



*Fig. 4: Network of tipping buckets of the UFZ (blue dots existing rain and climate stations; red dots future station (installation spring 2012)).*

The installation of the tipping buckets was done by cooperation between MEKOROT Company, Hydrological Survey of Israel and the UFZ. The possibility of cooperation allows us a sharing of the data. The result is a better climate data pool in the project area of SMART. The combination of all existing rain and climate station in the region provides good information of distribution of precipitation along the western and eastern part of the Lower Jordan Valley (fig. 5).

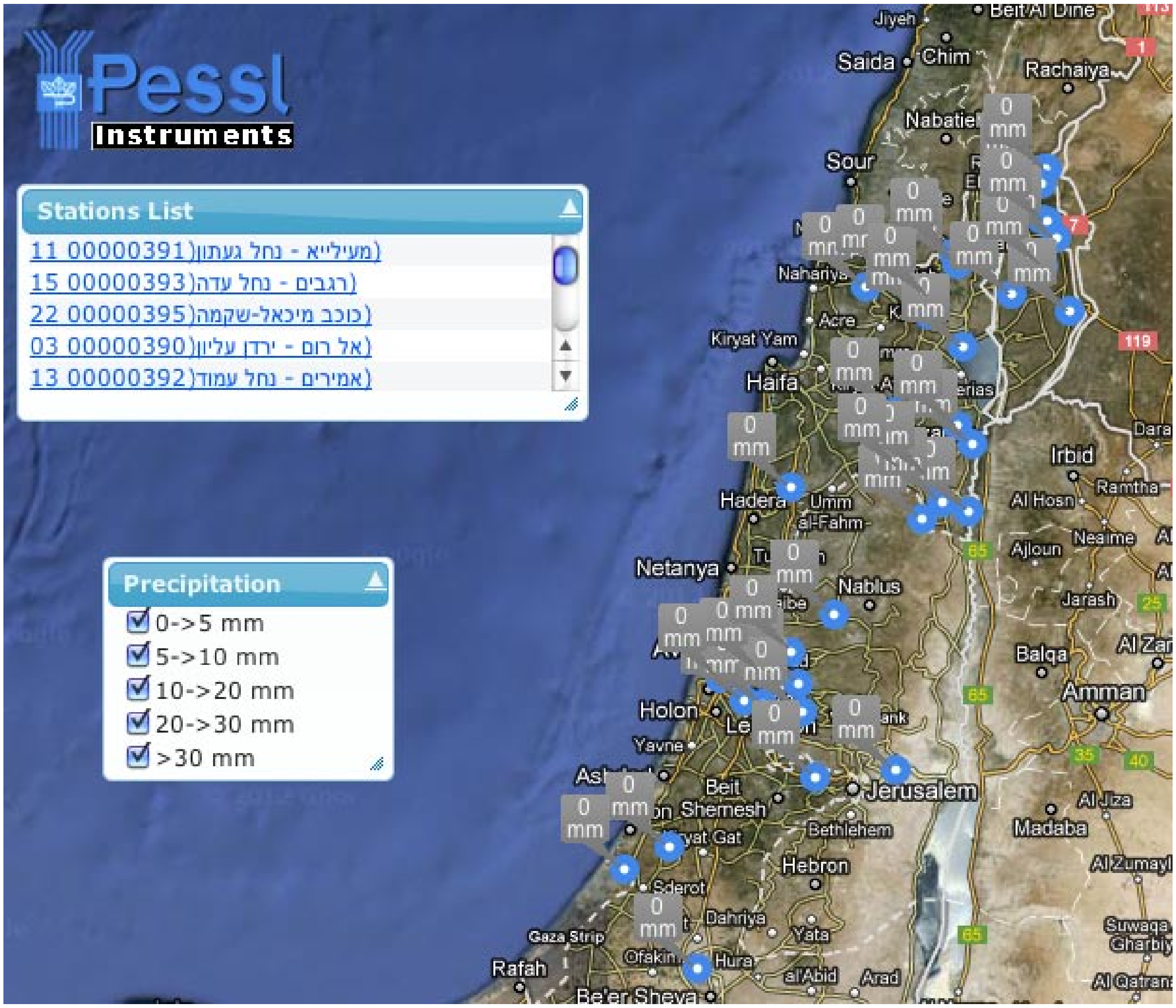



*Fig. 5: Network of tipping buckets of the cooperation partners MEKOROT and Hydrological Survey Israel*

Because of calibration and validation of the model the installations of hydrological station were started in the flume of Jericho in the spring season 2011.

## REFERENCES

Krause, P. & Hanisch, S., 2009. Simulation and analysis of the impact of projected climate change on the spatially distributed waterbalance in Thuringia, Germany, Advances in Geosciences, 21, 33-48

Krause, P., Biskop, S., Helmschrot, J., Flügel, W.-A., Kang, S. and Gao, T., 2010. Hydrological System Analysis and Modelling of the Nam Co Basin in Tibet, Advances in Geosciences, Advances in Geosciences, 2010, 27, 29-36