

## SahysMod Case Studies

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SahysMod is a spatial agro-hydro-salinity model incorporating irrigation and drainage practices and groundwater flow to assess problems and remedies of waterlogging and soil salinity. The model can be downloaded from: <http://www.waterlog.info/sahysmod.htm> and is totally free.

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Other cases may be added later.

## 1. ICMALD EXERCISE

This exercise can be found in the SahysMod manual, downloadable from:  
<http://www.waterlog.info/pdf/sahysmod.pdf>

The downloaded SahysMod model contains Icmald input and output files in the folder “ICMALD”.

The exercise will be updated here in the coming months.

## 2. HANSI CASE STUDY

This case study can be found in the SahysMod manual, downloadable from:  
<http://www.waterlog.info/pdf/sahysmod.pdf>

The downloaded SahysMod model contains Hansi input and output files in the folder “HANSI”.

The case study will be updated here in the coming months.

## 3. GARMSAR CASE

This case study concerns the Garmsar alluvial fan, Iran.

A description of the hydrological, agricultural, irrigation, drainage and soil conditions can be found in <http://www.waterlog.info/pdf/garmsar.pdf>

The downloaded SahysMod model contains Garmsar input and output files in the folder “GARMSAR”.

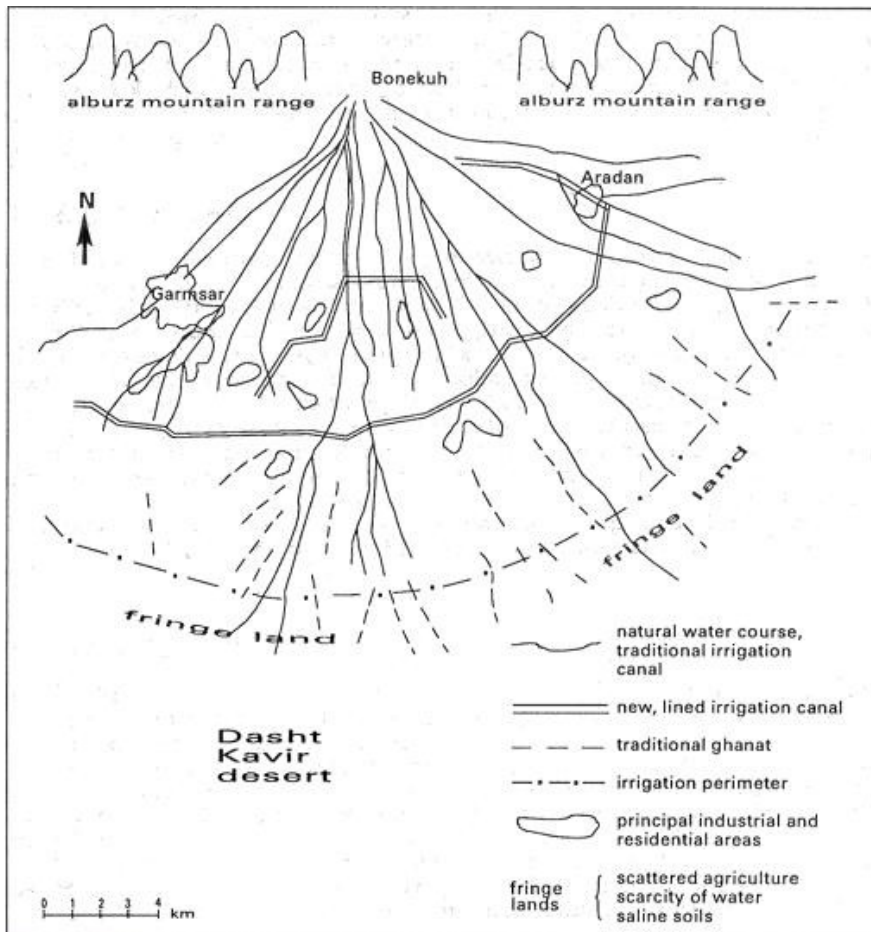
In the following, the Garmsar case is briefly discussed.

### **Garmsar Alluvial fan**

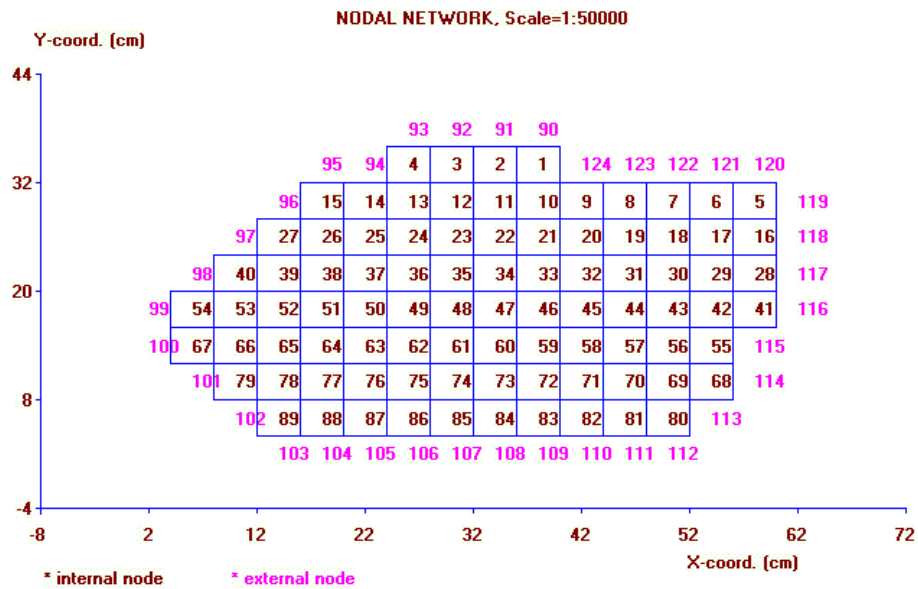
Google Earth shows the alluvial fan of Garmsar as follows:



A sketch of the area looks as follows:



Over the alluvial fan, the following polygonal (nodal) network was laid:



After opening the Garmsar input file, the general input screen looks as follows:

SahysMod, Spatial Agro-Hydro-Salinity Model

File Edit

Intro | Figure | General input | Polygonal input | Seasonal input | Output | Graphics

File: C:\SahysMod\Garmsar\Garmsar.inp

Title1: Garmsar 79 project

Title2: In abvarzan co.

Explanation of item: Scale of coordinates used in the polygonal map, 1 cm on the map equals "Scale" cm in the field

General data

Total number of polygons: 124

Number to be added: 0

Number to be removed: 0

Scale of polygonal map 1: 50000

Number of years: 3

Number of seasons/year: 3

Index for annual calculations: 0

Output time step (years): 1

Accuracy level: 2

Season durations

Season 1: 6

Season 2: 2

Season 3: 4

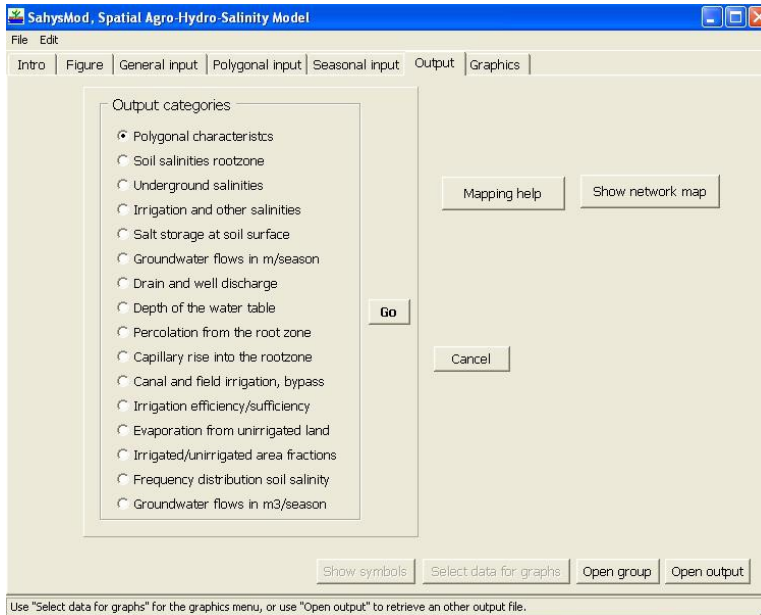
Restart Show symbols Save all/calculate Open input

Enter data, then use "Save data" and proceed to other data tabsheets, or use "Save/calculate".

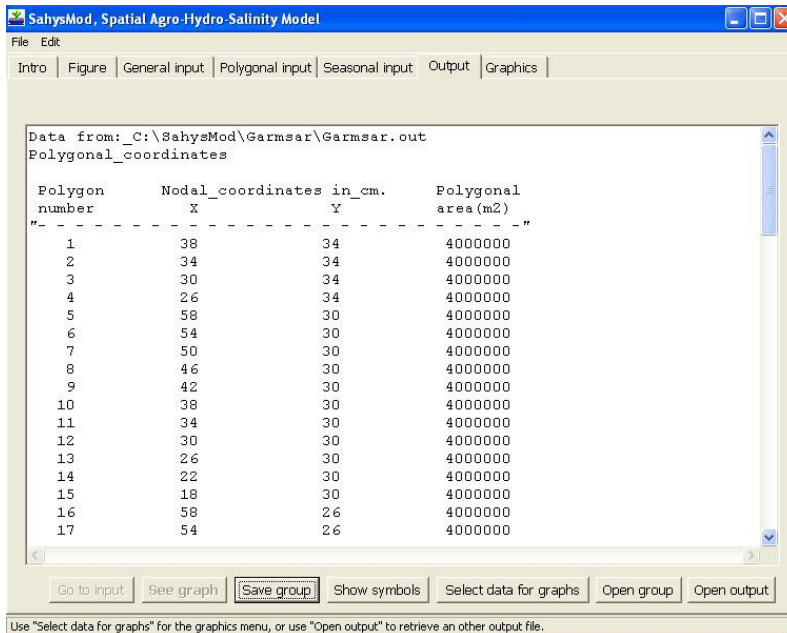
There are 124 polygons. For each polygon, the polygonal input data and the seasonal input data were entered in the respective tabsheets.

After running the program (doing the calculations), the output data file “Garmsar.out” is made. The output will be shown automatically, but if the output file already exists, it can be opened directly using the “open output” button on the “output” tabsheet.

Using the “select data for graphs” button, the following selection form is shown:



The option “polygonal characteristics” shows the nodal coordinates and the size of the polygonal areas.



Using the “save group” button, these data can be saved as as a text file (\*.prn) for use in a spreadsheet program like Excel

Similarly all other data groups (e.g. depth of watertable and soil salinity) can be selected, saved, and imported into a spreadsheet program.

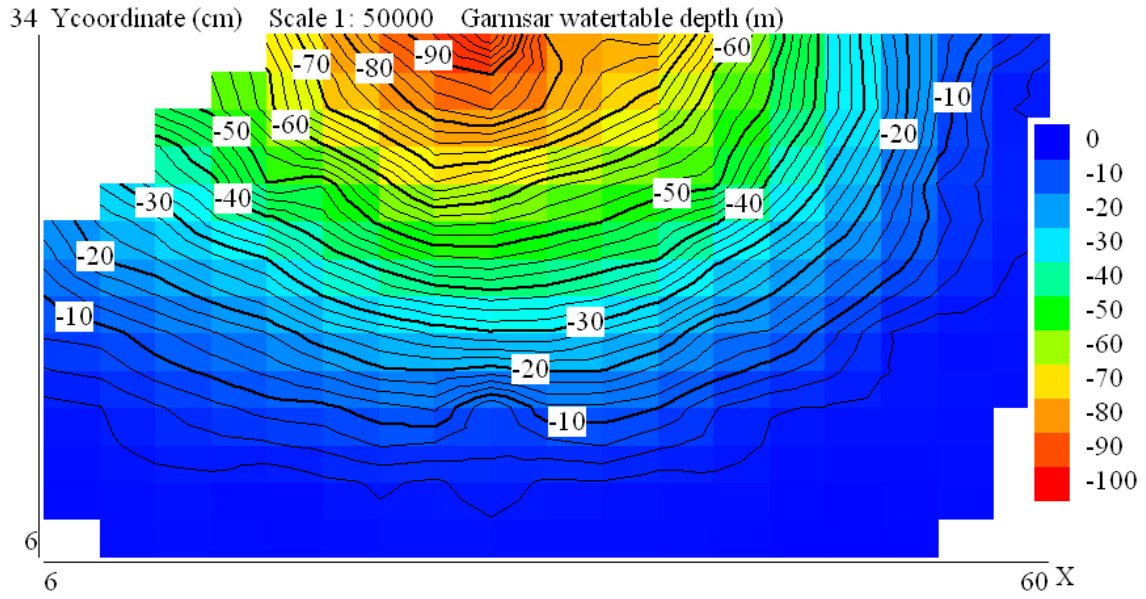
In the spreadsheet program, the X and Y coordinate data and the group data can be re-arranged into consecutive columns. The following Excel sheet shows an example with depth of watertable (Dw) and the soil salinity of the root zone in lands with full crop rotation (Cr4), while the watertable data are being selected.

	A	B	C	D	E	F	G	H
1	X	Y	Dw		X	Y	Cr4	
2	-----	-----	-----"		-----	-----	-----	
3		38	34	-81.2		38	34	4.77
4		34	34	-77.2		34	34	9.98
5		30	34	-103		30	34	16
6		26	34	-93		26	34	4.89
7		58	30	-1.3		58	30	6.43
8		54	30	-12.4		54	30	7.81
9		50	30	-29.4		50	30	6.08
10		46	30	-49.6		46	30	5.65
11		42	30	-56.4		42	30	4.58
12		38	30	-69		38	30	4.74
13		34	30	-80.5		34	30	4.71
14		30	30	-85.2		30	30	4.94
15		26	30	-83.4		26	30	5.39
16		22	30	-73		22	30	5.14
17		18	30	-58.7		18	30	5.7
18		58	26	-3.09		58	26	5.46
19		54	26	-7.35		54	26	4.79
20		50	26	-21.4		50	26	5.77

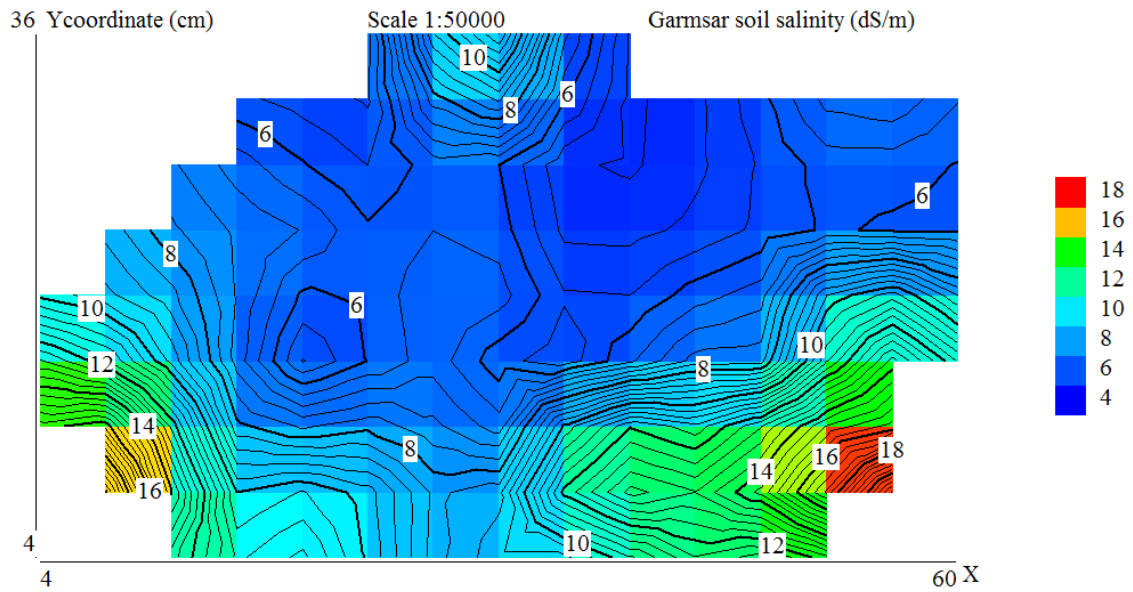
The selected data can now be imported into a GIS program for mapping. When such a program is not available, one can download a simple free mapping program like QuikGrid together with Microsoft NotePad.

The use of QuikGrid to make a map with the selected data is described in <http://www.waterlog.info/pdf/QuikGridHelp.pdf>

The depth to water table map will look like this:



And the soil salinity map like:



It can be seen that, in the fringe lands, the water table is shallow and the salinity is high.

A summary of the procedure follows.

## SUMMARY

Mapping of SahysMod output data with QuikGrid and NotePad.

1. In SahysMod open the output file
2. Use "Select data for graphs"
3. Check "Polygonal characteristics"
4. Use "Save group", give a group name (say Coordinates.prn) for the X,Y coordinates, and save
5. Use again "Select data for graphs"
6. Select the data group you wish to make a map of (say depth of watertable) and click "Go"
7. Select "Polygonal data per season", click "Go" and define year and season
8. Use again "Save group", give a group name (ZData.prn), and save
9. Open MsExcel
10. Under tab "Data" use "Import data from text file"
11. Open Coord.prn, use space delimited and paste it
12. Open ZData.prn, use space delimited and paste it to the right of Coordinates.prn
13. Copy the column with X coordinates and paste it below the imported data
14. Do the same for Y coordinates and paste right next to the X coordinate column
15. Select the column from ZData you wish to map, copy it and paste it next to the Y coordinate column
16. Select the last 3 columns
17. Open MsNotePad
18. Paste the 3 columns
19. Save the notepad file (say MapData.txt)
20. Open QuikGrid
21. Under "File" select:"Scattered data points" and then select: "input in metric units"
22. Open the file MapData.txt
23. Use the "Edit" and "View" tabs to configure the map to your wishes  
(e.g. under "View" use "with hidden color grid" and under "Edit" use "color intervals and labels", "Title", and "edit number of gridlines making them equal to the number used in SahysMod)
24. After satisfaction, use "Window" and "Copy to clipboard"
25. Open MsPaint
26. Use "Edit" and "Paste"
27. Edit the map to your wishes and add more titles if desired
26. Save the map as \*.bmp, \*.jpg, \*.png or any other optional format, say for example EndMap.tif
27. Ready