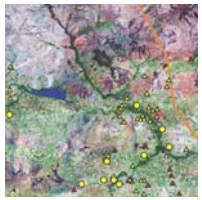
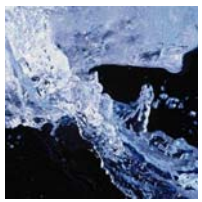


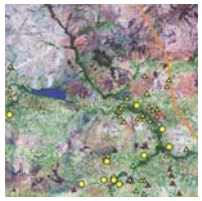


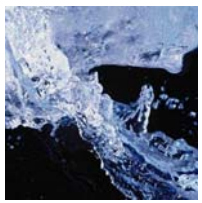

Current and Future Plans

R. Srinivasan

Contents



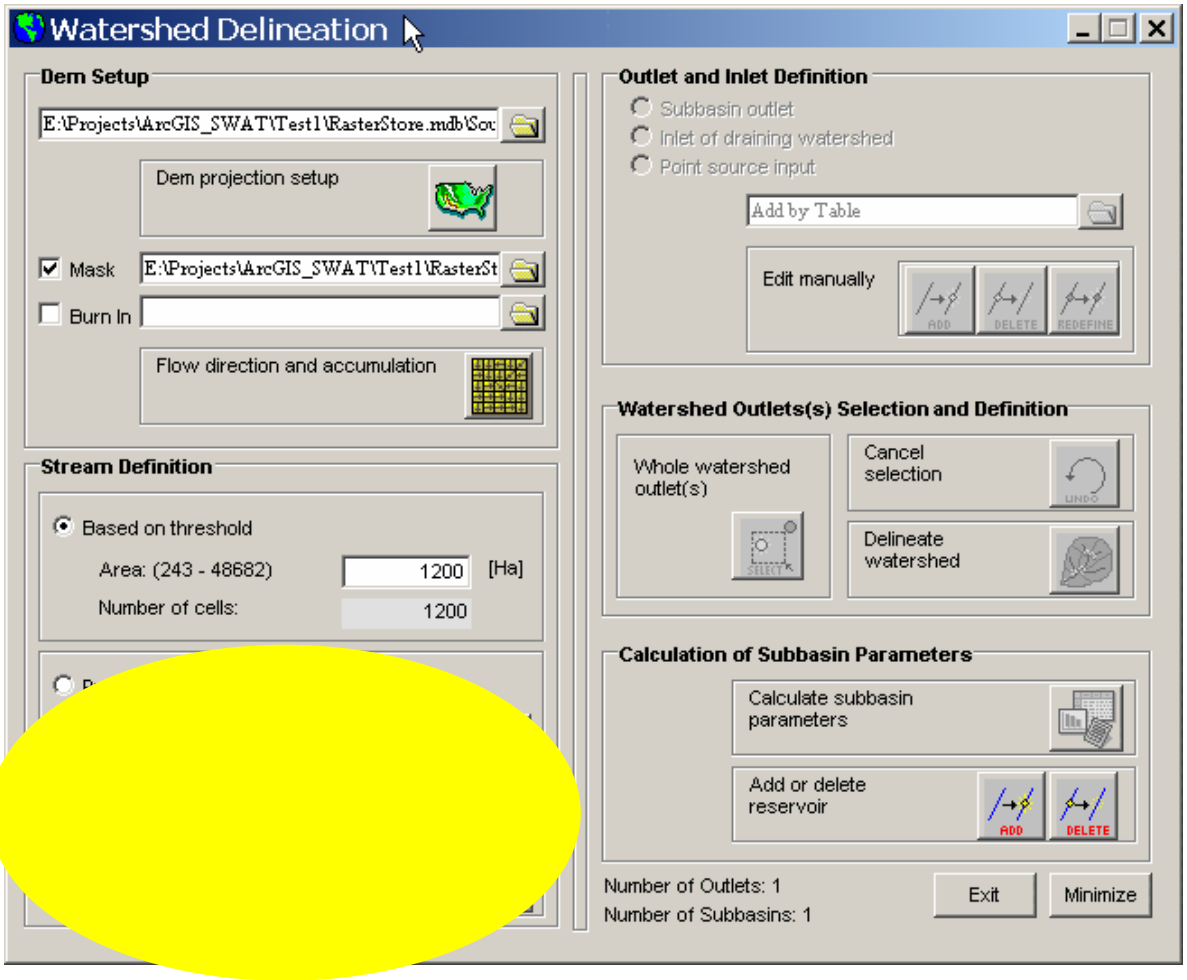


The ArcSWAT Interface

- ArcSWAT is an ArcGIS extension that contains a sophisticated watershed delineation module, a land use and soils analysis module, and SWAT model input file generator and editor.
- ArcSWAT was developed by Texas A&M University and Stone Environmental and is available for free download.
- Current version is available for ArcGIS 9.1; Working towards releasing ArcGIS 9.2 version of ArcSWAT in the fall ’07

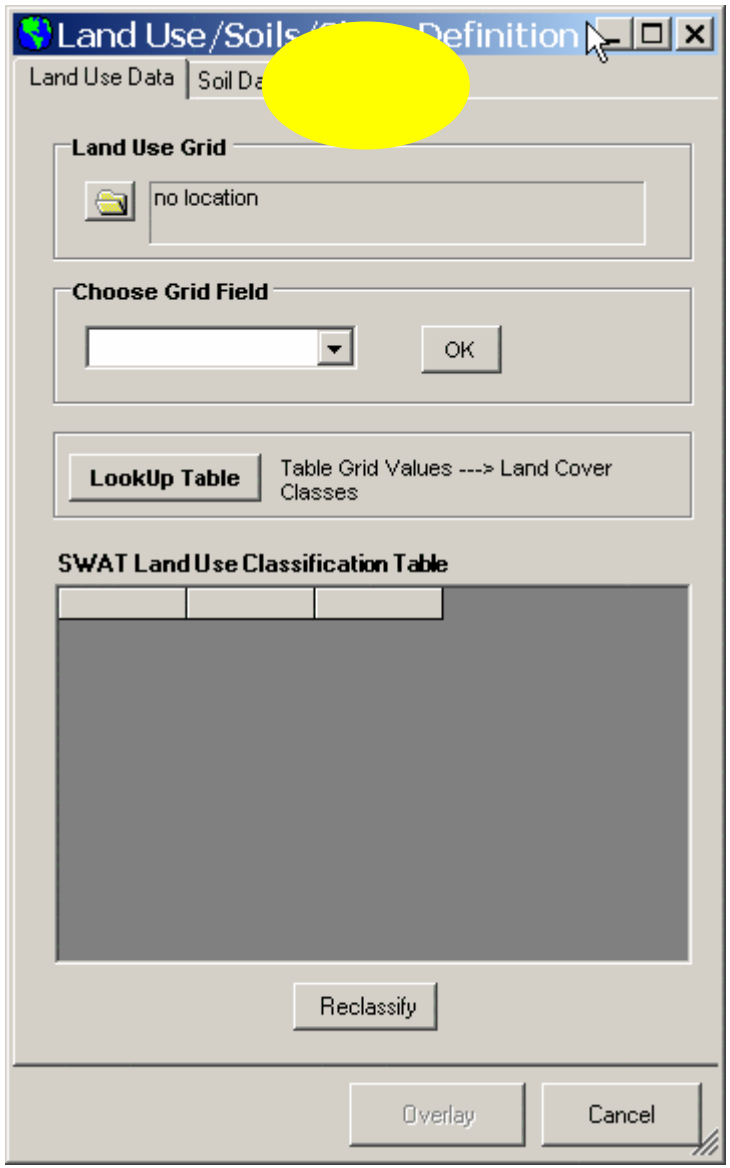
ArcSWAT: Watershed Delineation

- DEMs at any resolution, XY or Z units
- Analysis masking
- Optional stream-burning
- DEM-based or pre-defined watersheds
- User-defined subbasin size
- Manual editing of subbasin locations
- Calculation of watershed and stream physical parameters



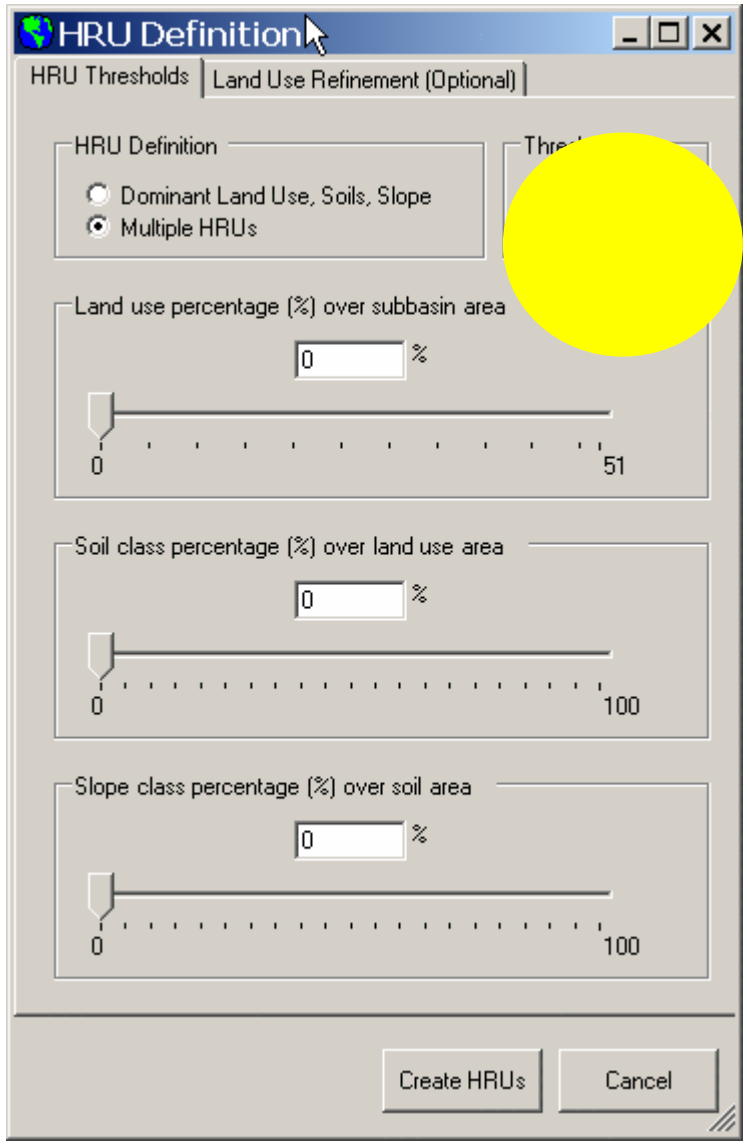
ArcSWAT: Landscape Analysis

- Purpose: To understand the distribution and co-occurrence of land use, soils, and slope at the subbasin level.
- Land use: Allows raster or vector datasets. Built in NLCD and USGS LULC lookup tables.
- Soils: Allows raster or vector datasets. Integrated with nationwide US STATSGO.
- Slope: Slope calculated directly from DEM. Allows user-defined slope classes.

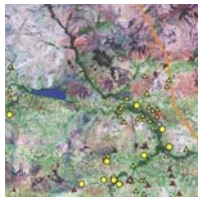


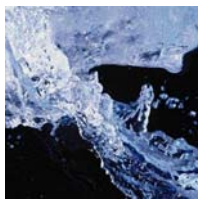
ArcSWAT: HRU Definition

- Purpose: To extract the dominant and critical landscape units for each subbasin.
- Land use, soil, and slope thresholds: Define minimum area for inclusion.
- Land use splitting: Allows users to represent GIS classification (e.g., “Row Crop”) as a combination of multiple classes (e.g., “corn” and “soybean”).
- Land use threshold exemptions: Keeps critical land classes regardless of thresholds.







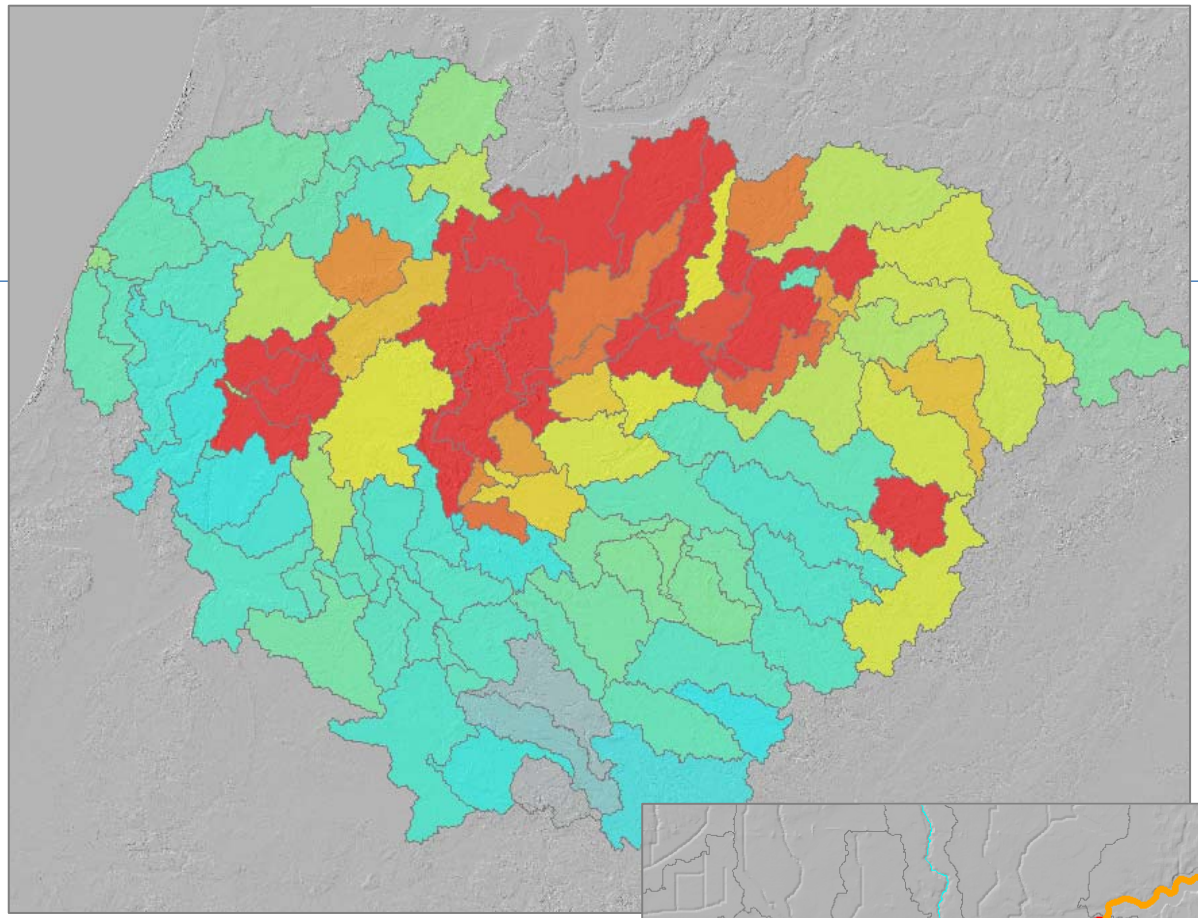



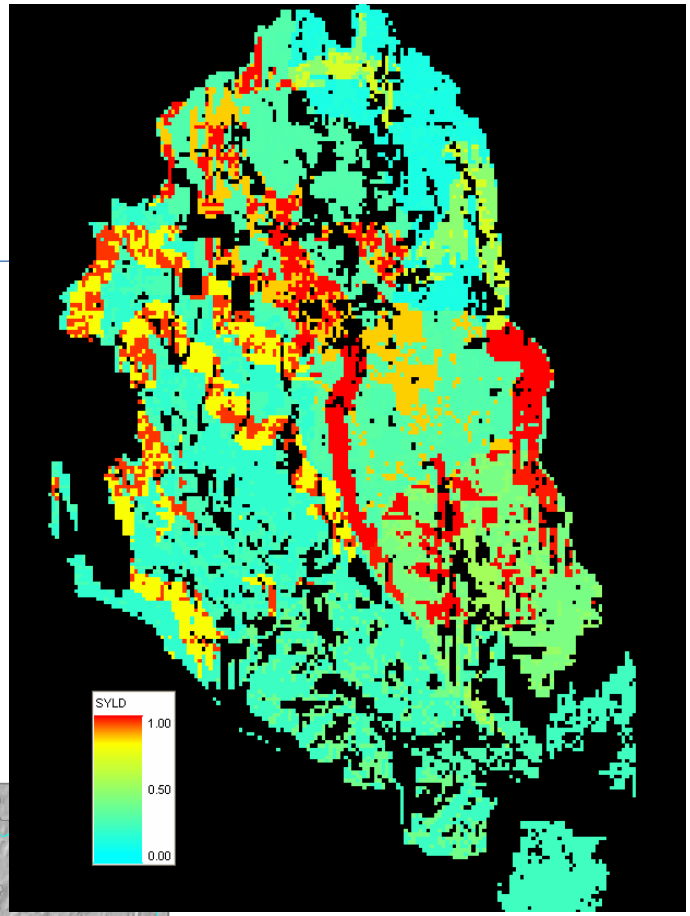
VIZSWAT: Visualization and Analysis of SWAT Model Results

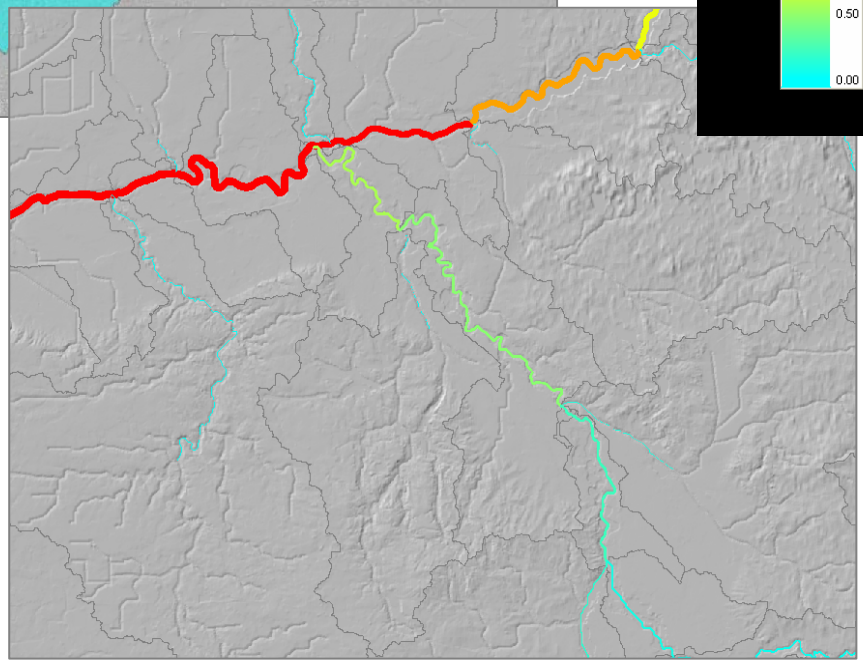
http://vizswat.tamu.edu

Custom Capabilities

- View results by subbasin, reach or HRU
- View input and observed timeseries
- Analysis tools:
  - Timeseries aggregation, statistics, baseflow separation and more
- View multiple model domains and/or scenarios simultaneously

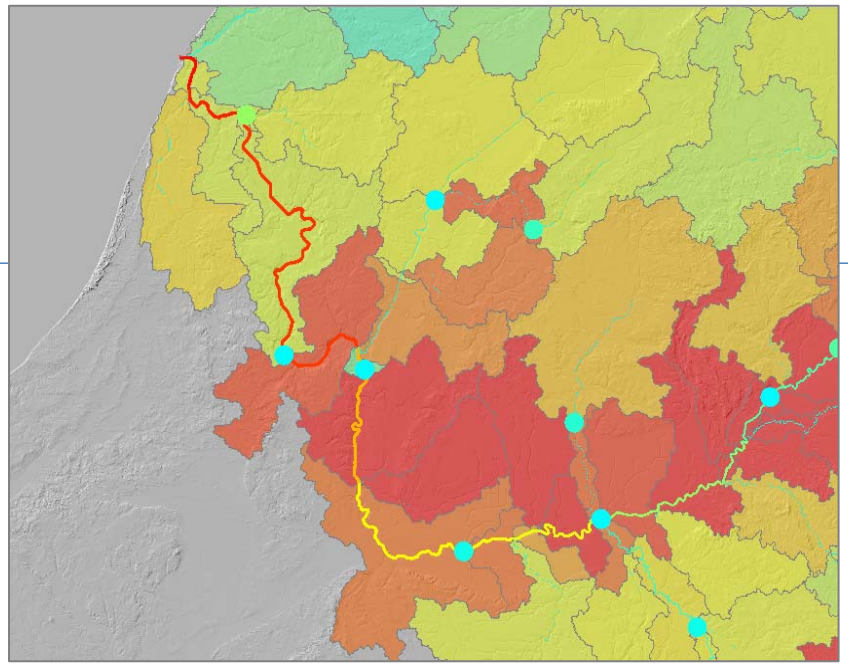






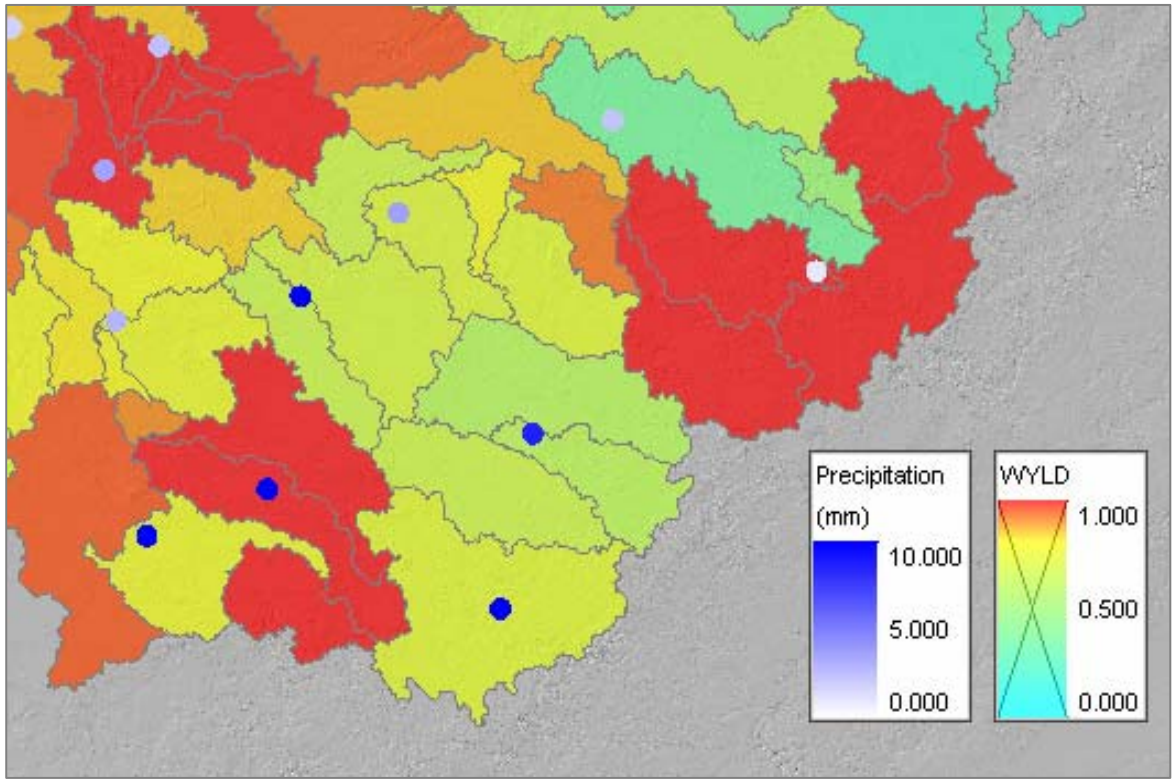
View results
by
subbasin, reach
and HRU

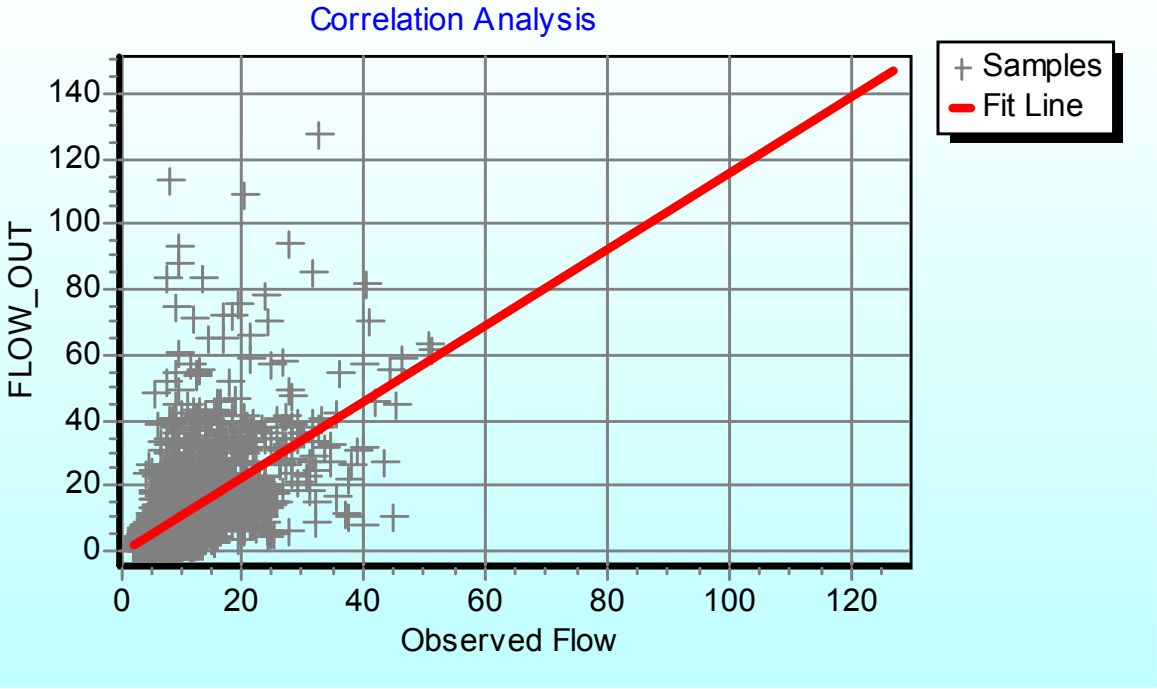
View inputs and outputs



Reservoirs

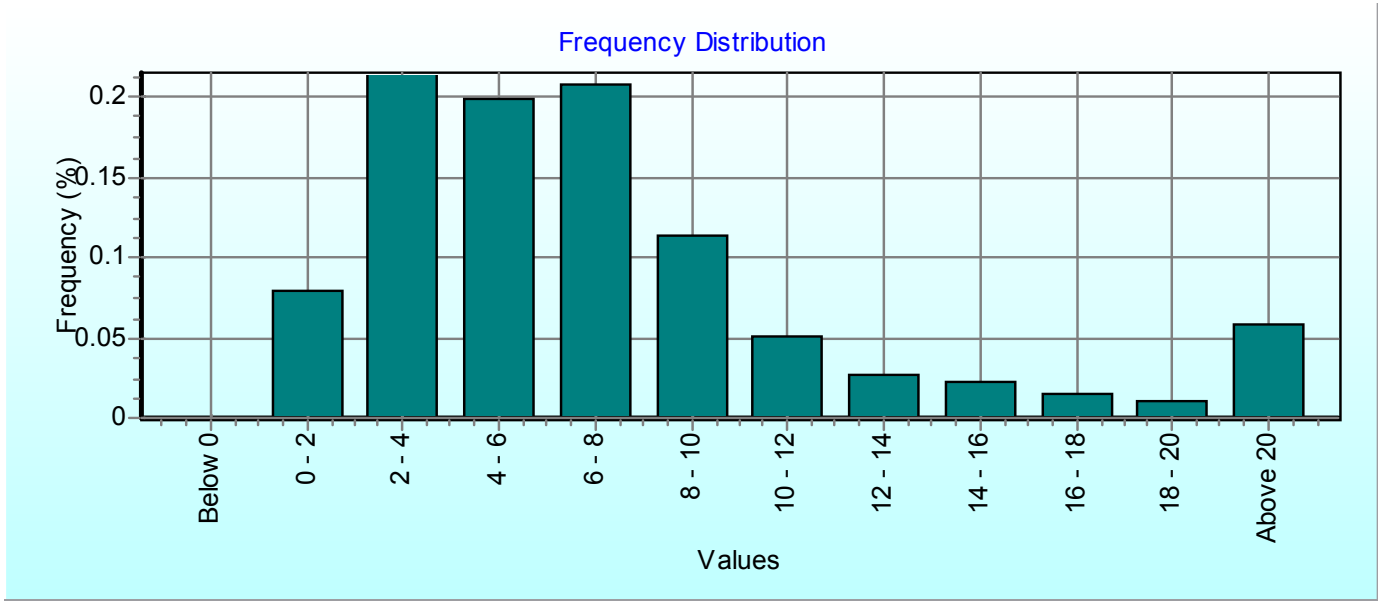
Precipitation stations

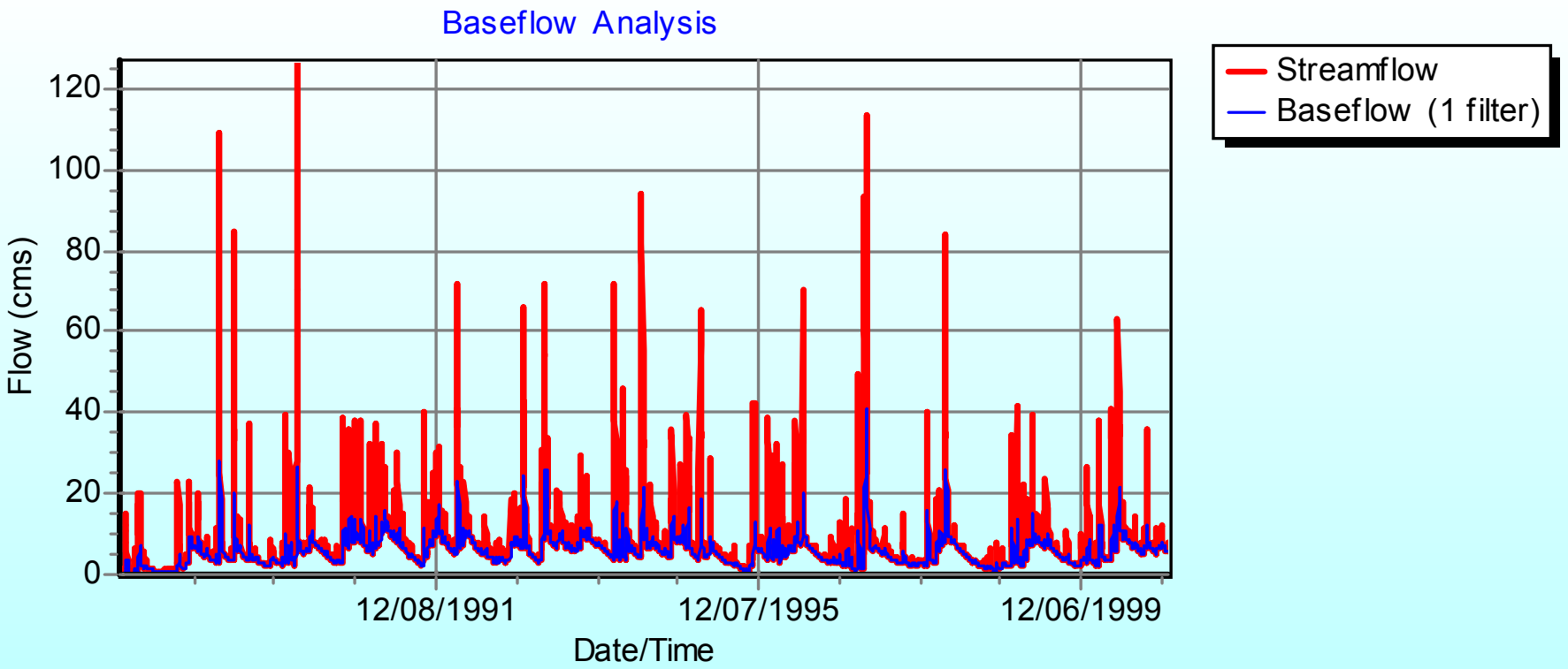




Results

Count: 17092
Valid Count: 4748
Fit Line: Y = -0.84970589617
R = 0.642098551752308
R2 = 0.412290550162411
E = -0.957744624902041





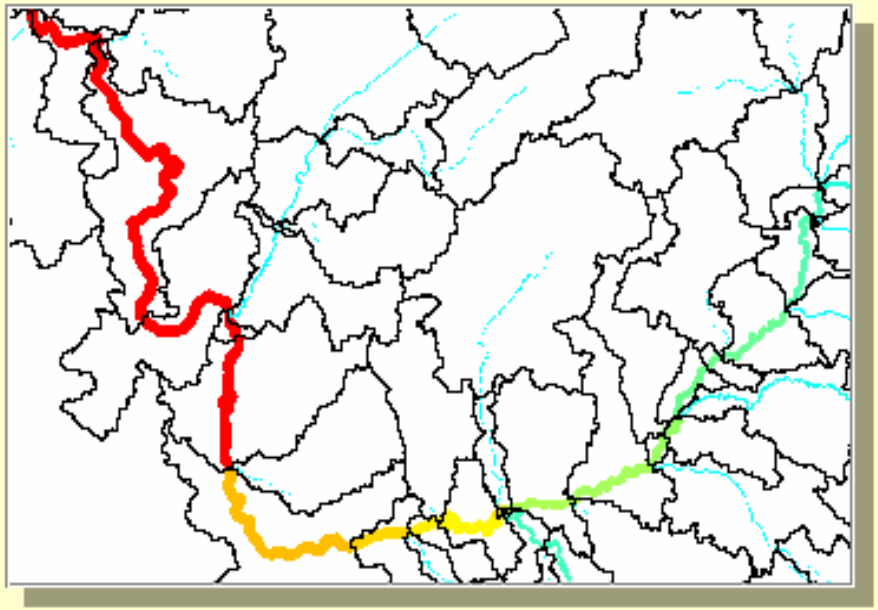
Statistic Parameters	Values
Average	8.02054591277716
Minimum	0
Maximum	127.099998474121
Date/Time at Minimum	1/2/1988
Date/Time at Maximum	3/12/1990

VizSWAT – Visualization Tool for SWAT

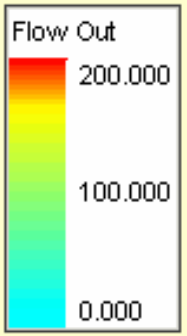
St. Joseph Watershed

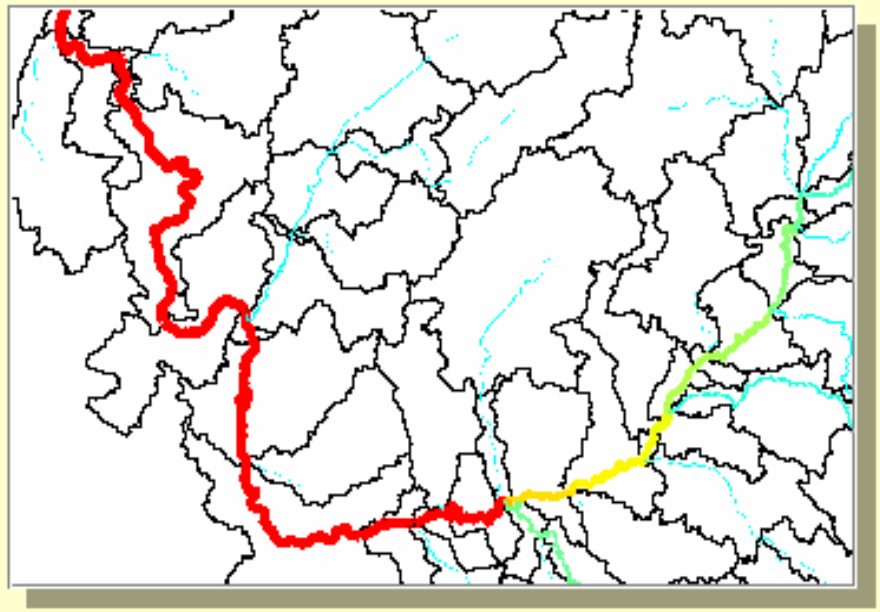
Michigan, USA

SWAT Model Results



Existing Conditions with Dams





Scenario no Dams

2/8/91

Multiple scenarios

User Online Support

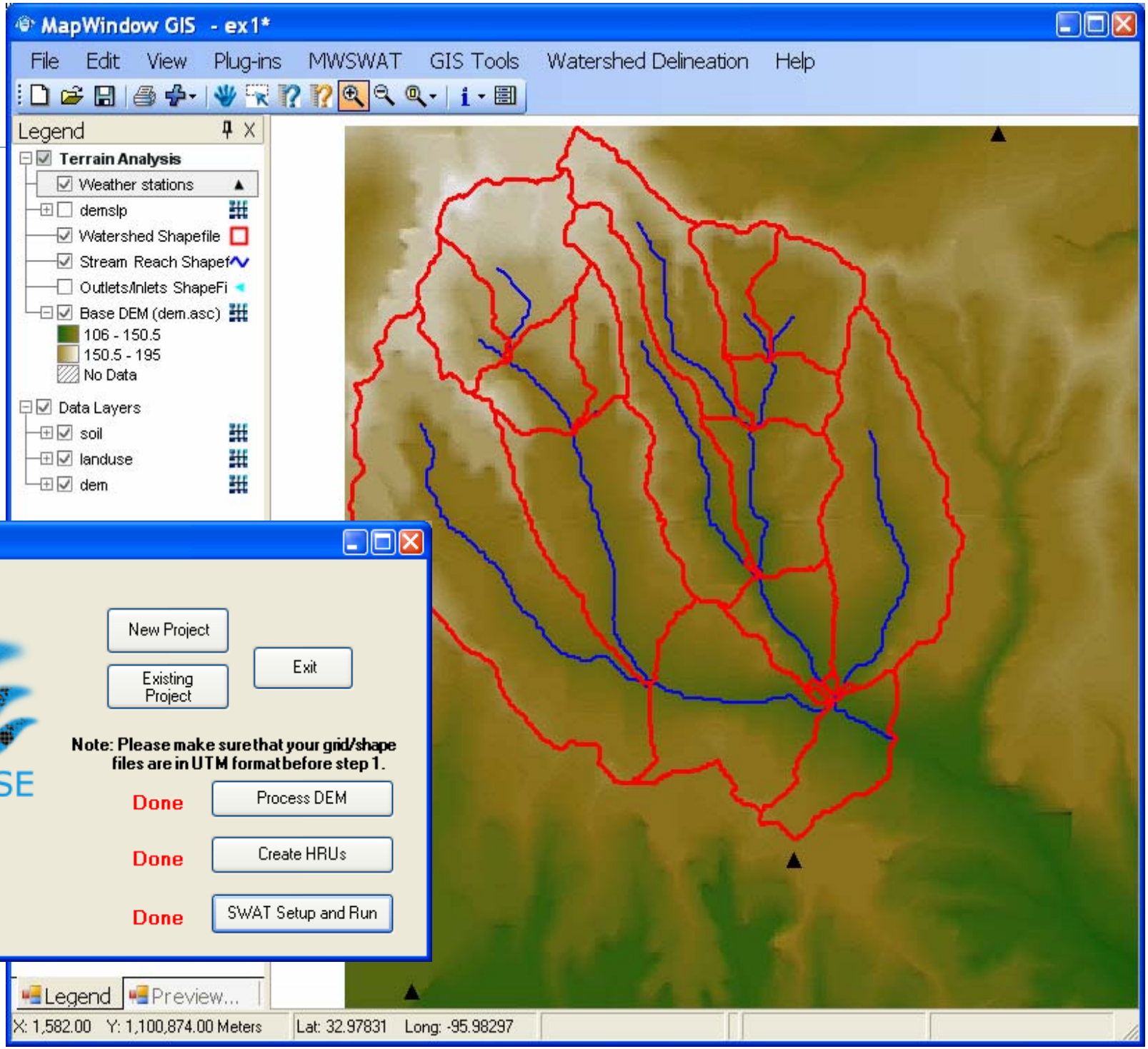
- Established 3 user groups
  - SWAT User – 218 users with 448 discussion messages
  - ArcSWAT – 94 users with 178 messages
  - VizSWAT – 10 users with 6 messages
  - http://groups.google.com/group/swatuser
  - http://groups.google.com/group/arcswat
  - http://groups.google.com/group/vizswat

MwSWAT

- Help developing countries improve their capacity in IWRM
  - Free, open source tools and other resources
  - Network of users and resource developers
- Project of the United Nations University
- First tool MWSWAT (MapWindow + SWAT)

http://www.waterbase.org

waterbase.contact@waterbase.org

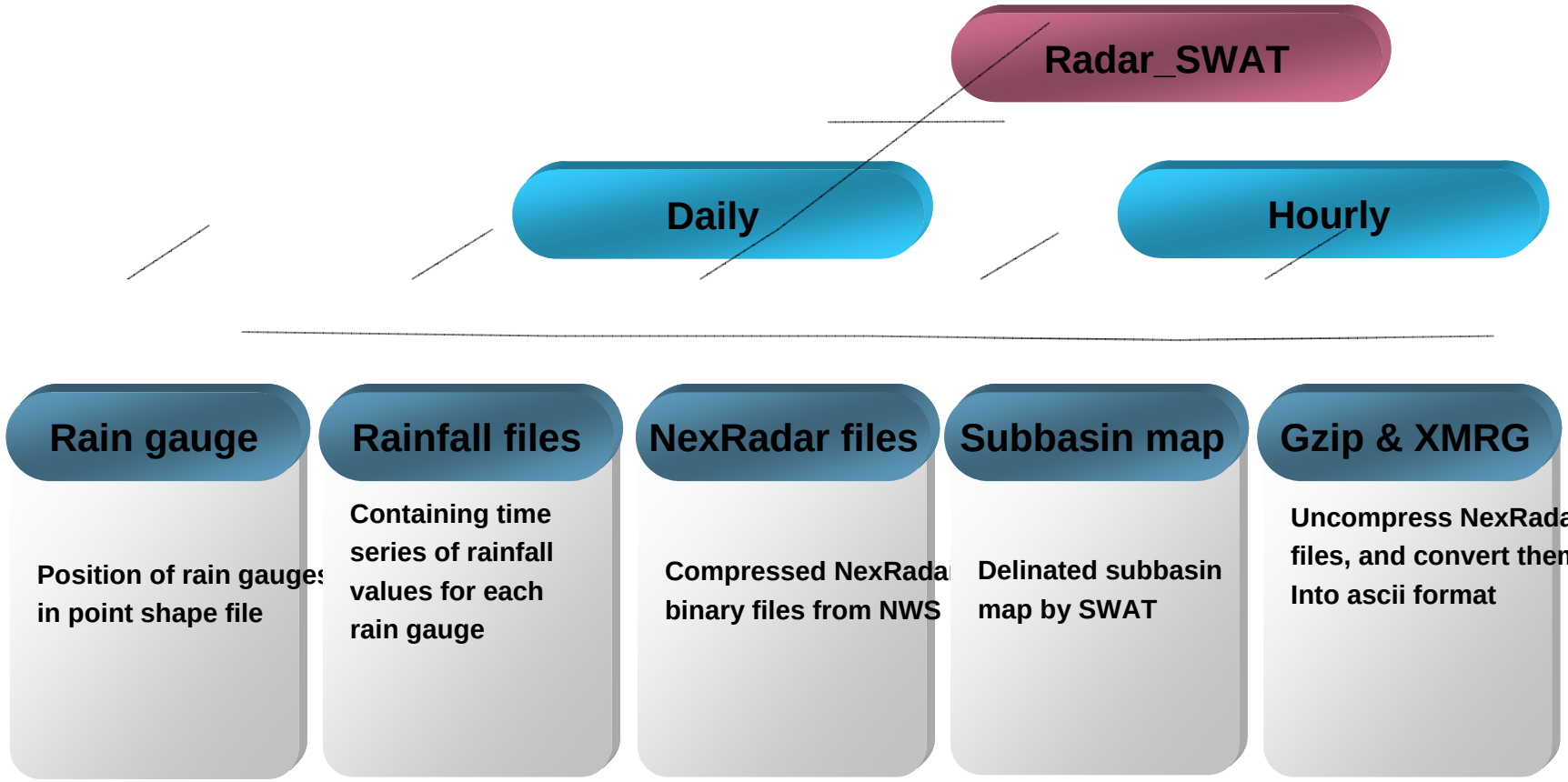

MapWindow GIS - ex1*
File Edit View Plug-ins MWSWAT GIS Tools Watershed Delineation Help
Legend
Terrain Analysis
Weather stations
demslp
Watershed Shapefile
Stream Reach Shapef
Outlets/Inlets ShapeFi
Base DEM (dem.asc)
106 - 150.5
150.5 - 195
No Data
Data Layers
soil
landuse
dem
MWSWAT
New Project
Existing Project
Exit
WATERBASE
Note: Please make sure that your grid/shape files are in UTM format before step 1.
Done
Process DEM
Done
Create HRUs
Done
SWAT Setup and Run
Legend
Preview...
X: 1,582.00 Y: 1,100,874.00 Meters
Lat: 32.97831 Long: -95.98297

ArcGIS SWAT/APEX interface

- Users will be able to run either the
  - SWAT model
  - APEX model (small watershed scale version with lot detailed BMPs option)
  - Combination of SWAT and APEX
  - All through one interface

Radar Rainfall preprocessor

The “Radar_SWAT” is a GIS tool for processing NexRadar data for SWAT application. The major function of this tool is to calculate the spatial average mean rainfall values observed by NexRadar for each subbasin that will be used as rainfall inputs for SWAT.



Radar_SWAT

Radar extraction and correction tool for SWAT

NexRadar data folder: C:\VBApro\Radar\R07612\R9901 .....

Rain gauge file: Not Activated .....

Test Rain gauge file: Not Activated .....

Rainfall inputfiles folder: Not Activated .....

Output file folder: C:\VBApro\Radar\test\PCP0 .....

Set the format of radar data

For example, "xmrg0101200402z.Z" will be

Prefix: xmrg Middle: 0109800

Suffix: z Extension: Z

Set Nexradar time series

Time step: hourly / daily

YearS	1999	MonthS	2	DayS	1	HourS	0
YearE	2001	MonthE	4	DayE	30	HourE	23

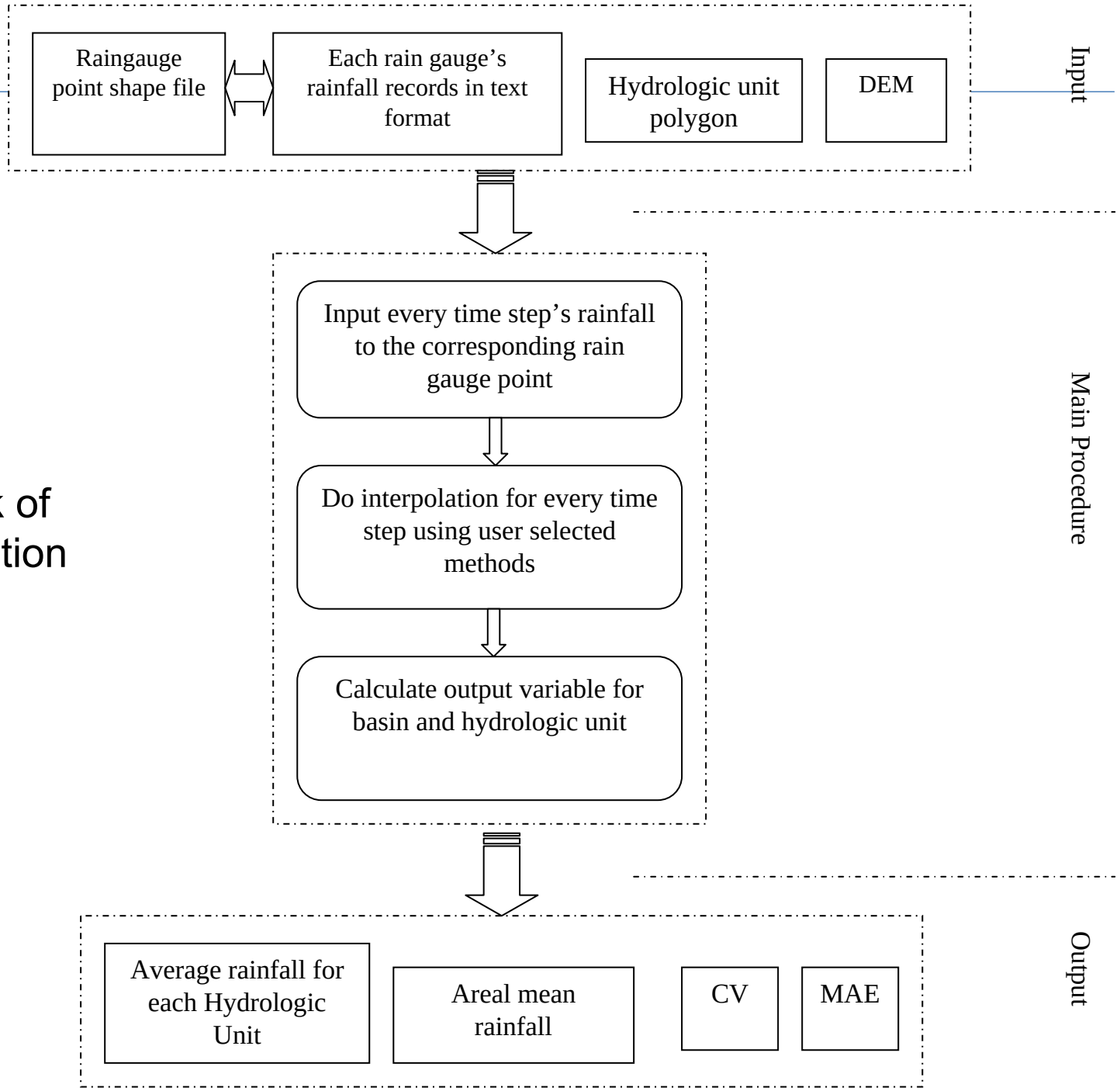
Before selecting the zonal map, please clean the file first! Clean shapefile

Zonal map (Subbasin map): C:\VBApro\Radar\R07612\nexup\nexup_Pro .....

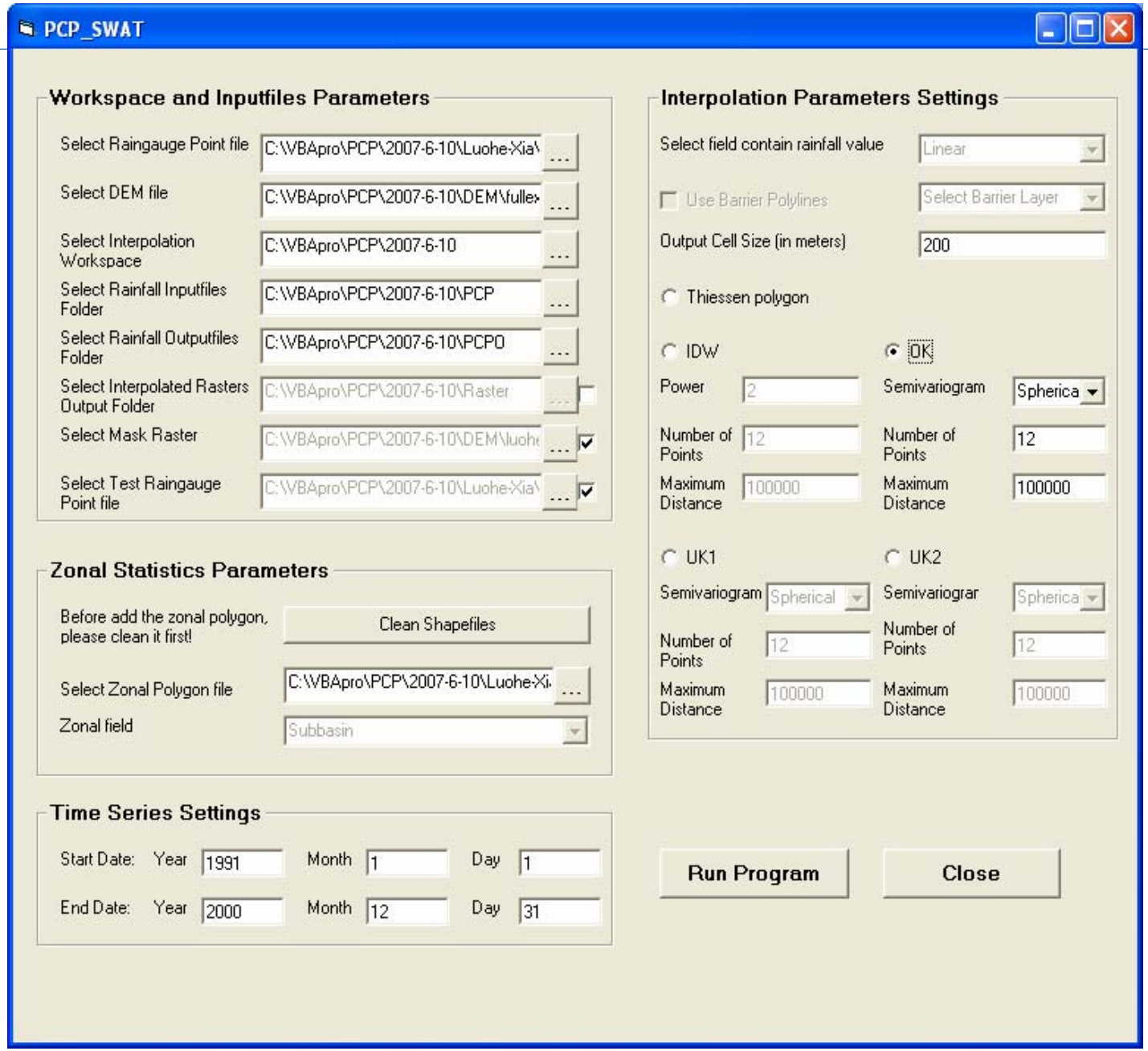
Run hourly | Run daily | Close program

Structure of the Rain Guage interpolation tool

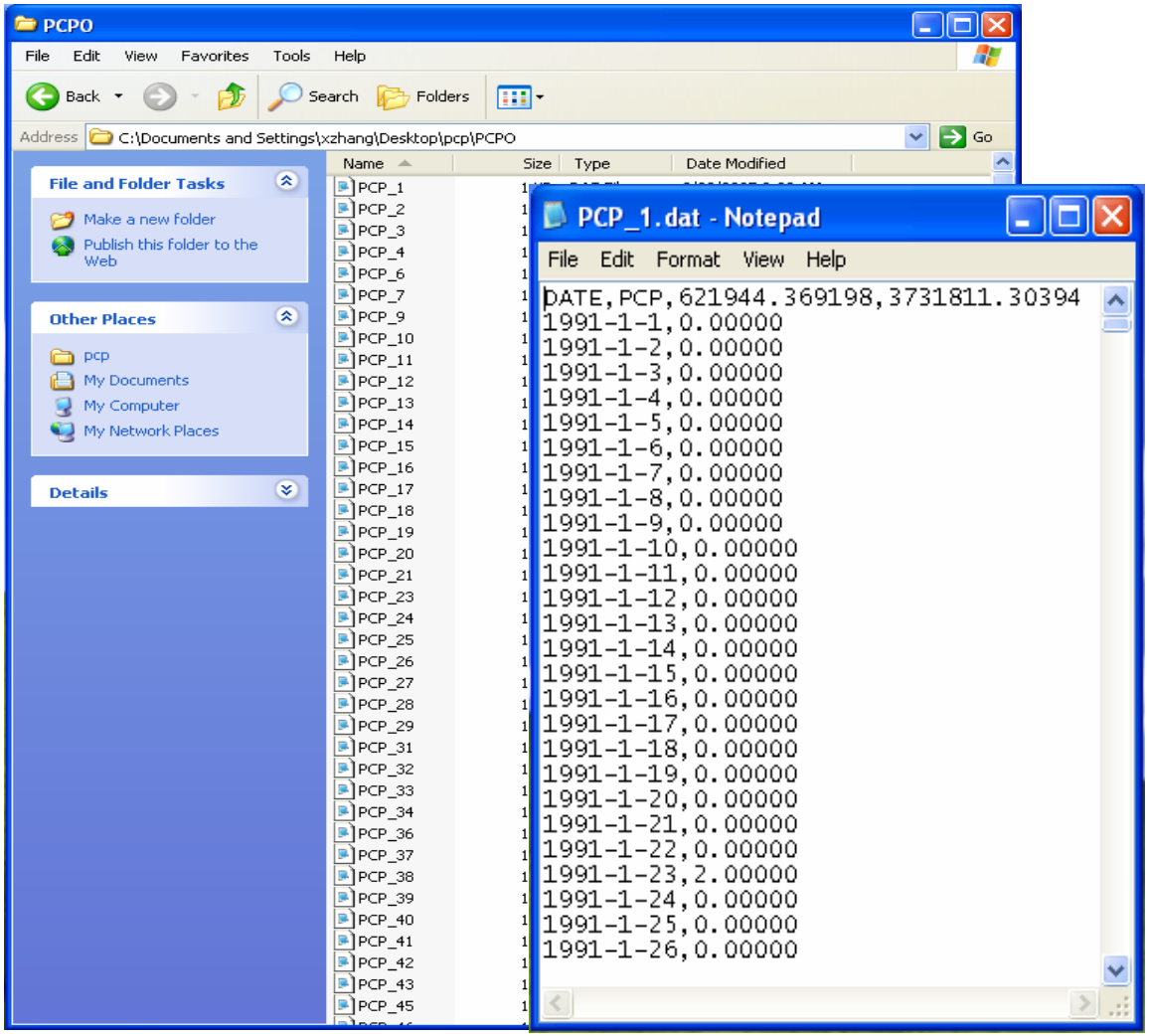
General framework of GIS based interpolation program

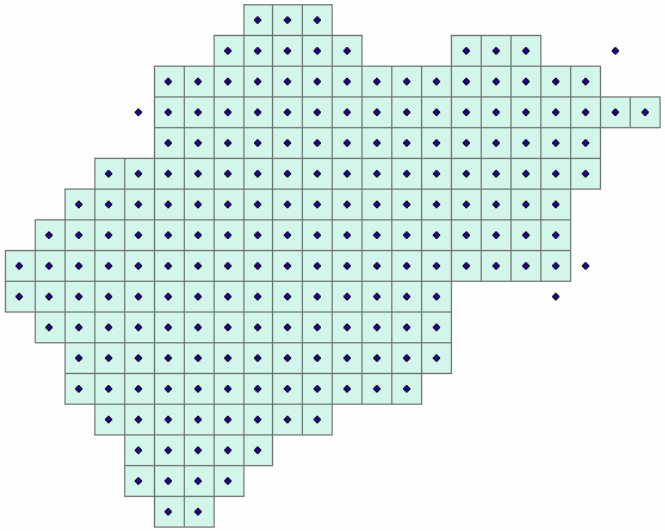


GIS Interface

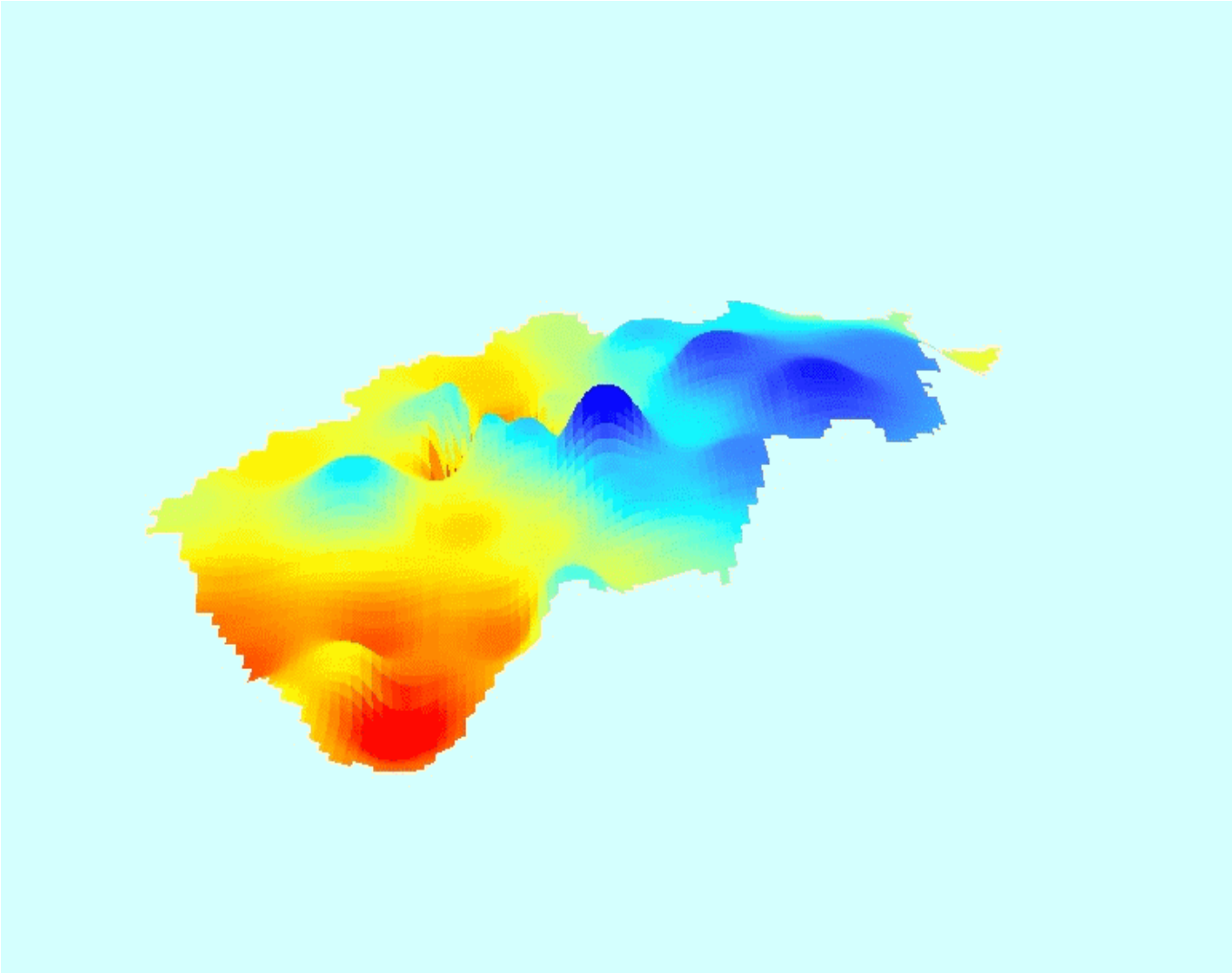


Output – precipitation of each zonal unit





Output - spatial distribution of rainfall in grid format



CUP – Calibration and Uncertainty Programs for SWAT

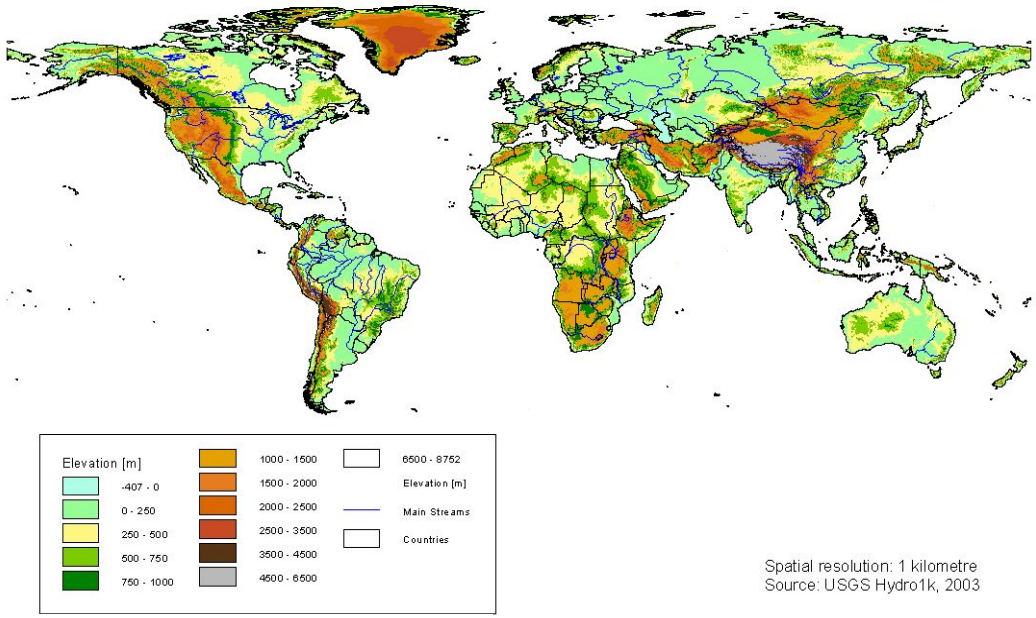
- Dr. Karim Abbaspour is developing several Calibration and Uncertainty tools like PEST, Parasol and Sufi
- The tool will be available Spring 08

World GIS data for SWAT modeling

- Working with EAWAG, Dr. Karim Abbaspour to make the landuse and soils along with its attributes available for the entire world to model with SWAT
- 1KM DEM and 90m DEM for the world

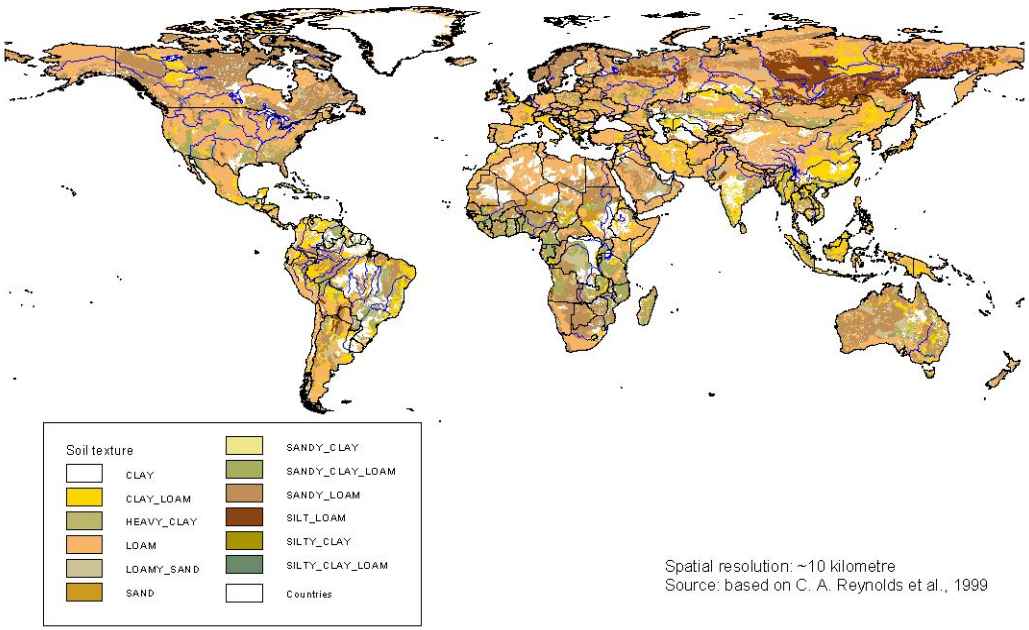
Global data sets (1)

Global digital elevation map



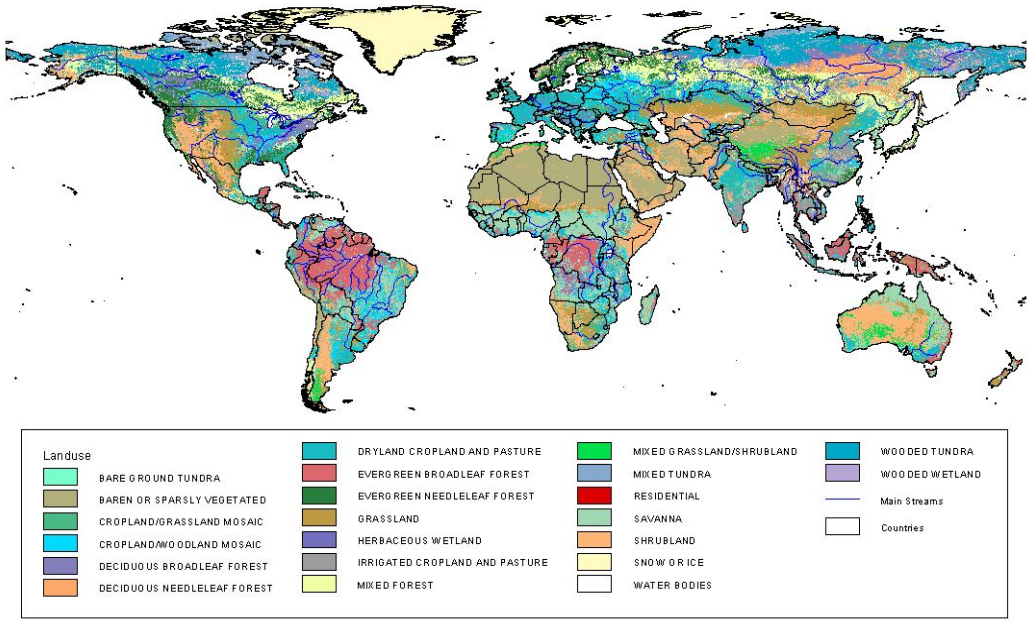
Spatial resolution: 1 kilometre
Source: USGS Hydro1k, 2003

Soil texture



Spatial resolution: ~10 kilometre
Source: based on C. A. Reynolds et al., 1999

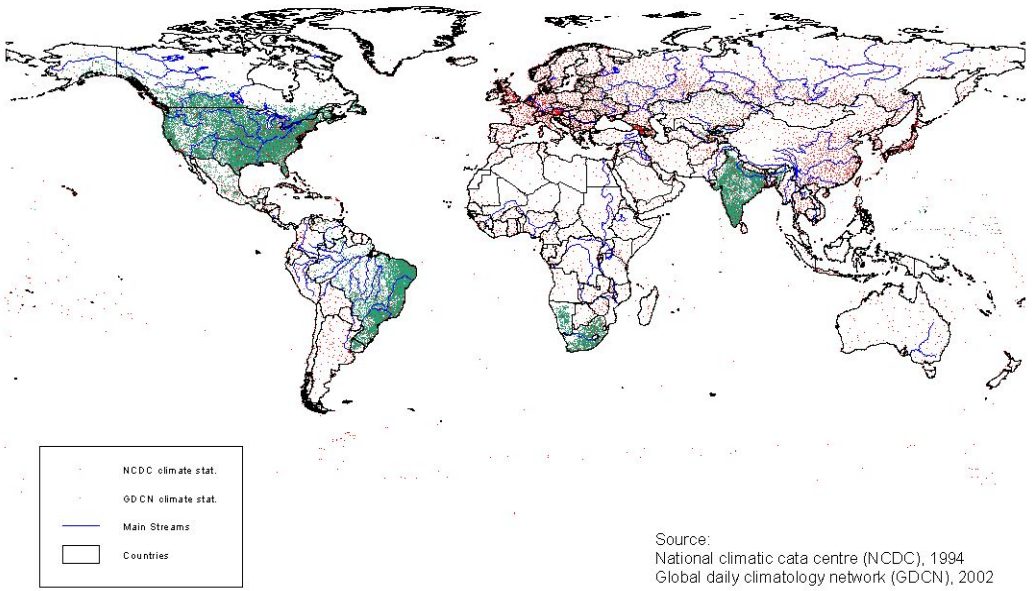
Global landuse



Spatial resolution: 1 kilometre; Source: USGS, 2004

Global data sets (2)

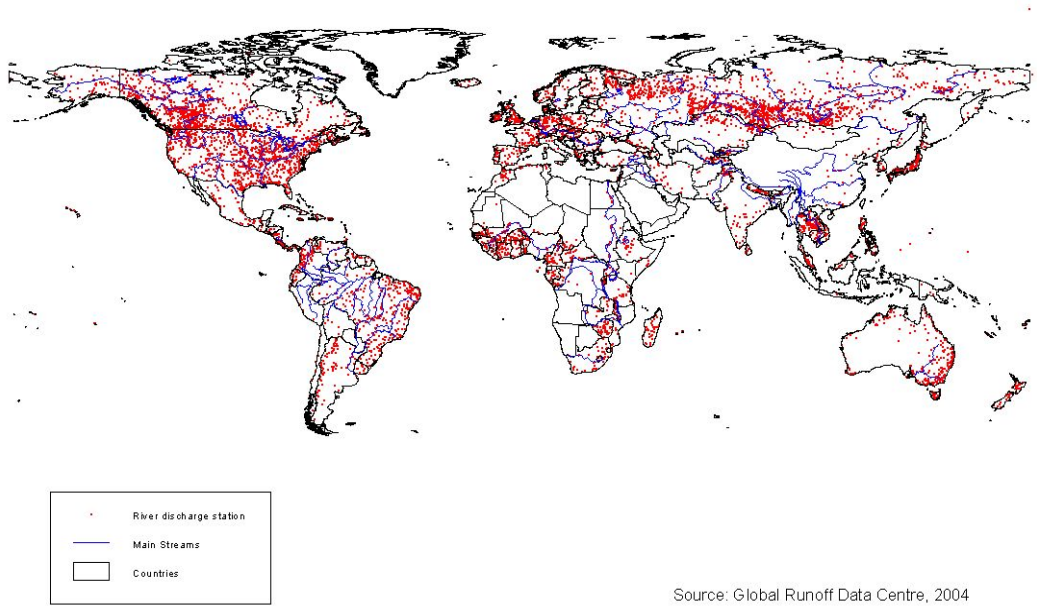
Global climate stations



Source:
National climatic cata centre (NCDC), 1994
Global daily climatology network (GDCN), 2002

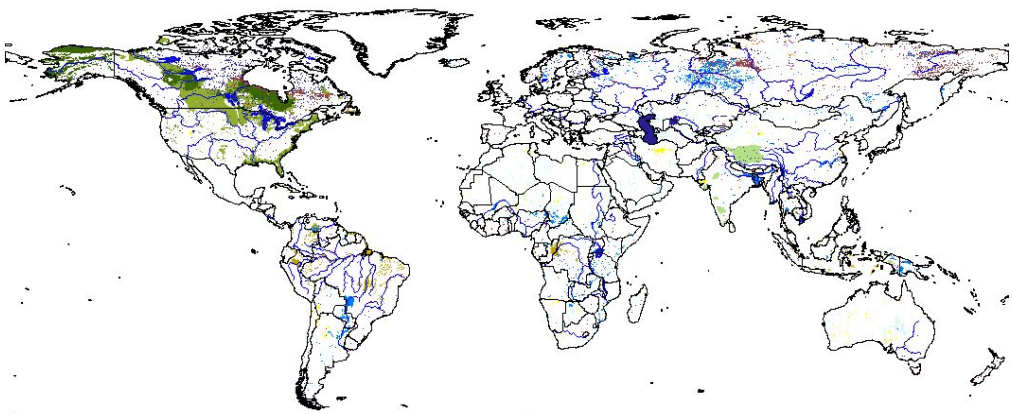
→

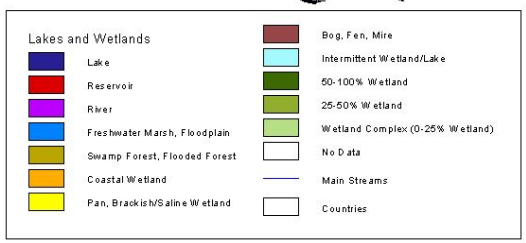
Global river discharge stations



Source: Global Runoff Data Centre, 2004

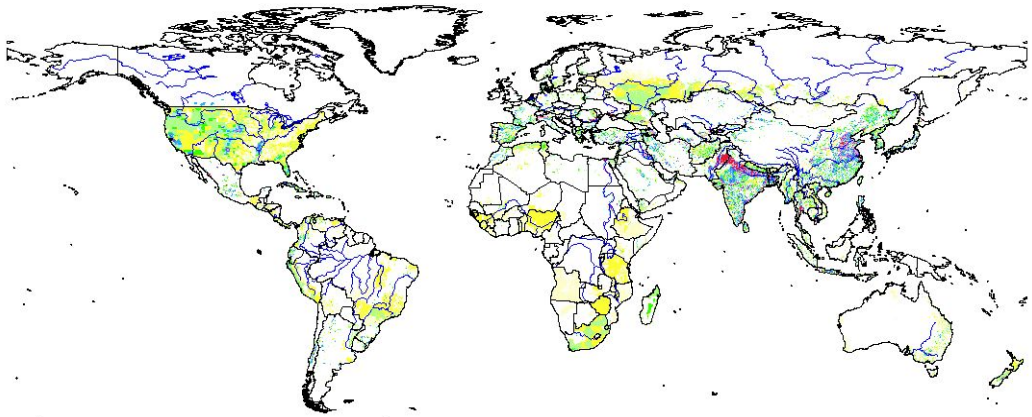
Global lakes and wetlands

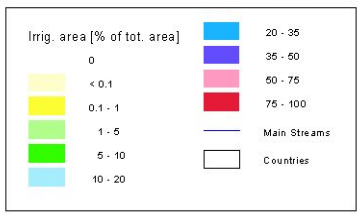




Spatial resolution: ~1 kilometre
Source: B. Lehner and P. Döll, 2004

Global map of irrigated areas





Spatial resolution: ~10 kilometre
Source: S.Siebert et al., 2005

Acknowledgements

- ArcSWAT was developed with cooperation with Stone Envirnonmental Inc.
- VizSWAT was developed with cooperation of W.F. Baird & Associates
- MwSWAT is being developed with cooperation of UN University, Macau and Idaho State University
- CUP and World datasets – EAWAG, Switzerland
- Weather related tools – Blackland Research Center, SSL, TAES