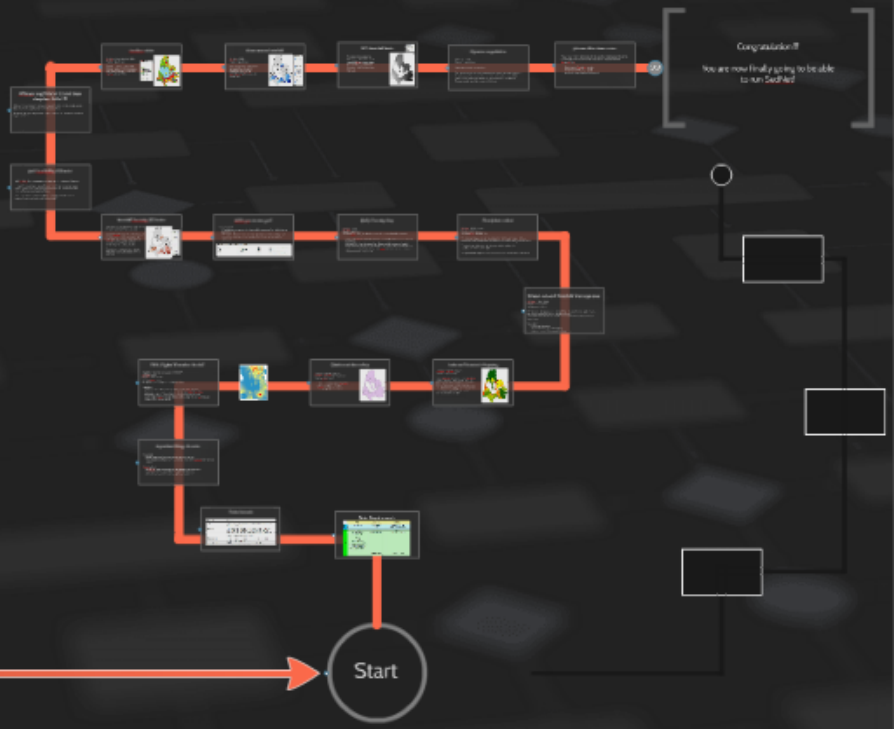
Need more help? ×



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The SedNet Model

Input data processing

Data Requirements

	Grids	Shapefiles	Informational
Configuration / Stream	DEM Floodplain Extent	Catchment Boundary* Reservoirs Lakes	Projection File* Drainage Area Threshold Minimum First Order Link Length Link Channel Width Parameters
Spatial Data	Gully Density Riparian Vegetation Mean Annual Rainfall PET_Rainfall Ratio Landuse R Factor K Factor L Factor S Factor Soil Clay Percentage Nitrogen in Surface Soil (g/kg) Phosphorous in Surface Soil (g/kg) Mean Air Temperature Dissolved Inorganic Nitrogen Dissolved Organic Nitrogen Dissolved Inorganic Phosphorus Filterable Reactive Phosphorus	Catchment Boundary* Phosphorus Point Sources Nitrogen Point Sources	Projection File* Bankfull Recurrence Interval
Flow		Regulated Gauges Unregulated Gauges	Flow Daily Time Series

Data formats

Data type	Format
Grids	Grids must be stored Arc/INFO® ASCII format with .asc filename extension.
Shapefile	Shapefiles are the standard storage format for all vector data (point, line, polygon) used in SedNet. SedNet shapefiles are Arc/INFO® shapefiles. Most GIS software can export into shapefile format.
Flow timeseries	The timeseries must be of .csv format. Required format of contents is in Section 6.16.1.
Informational	Most are numeric values entered via interface.

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Important things to note:

Grid cell size

- Usually, no grid will have a smaller cell size than the DEM
- keep grids at the cell size they were obtained in and don't resample them to small cell sizes

Dataset extent

- all datasets must have an extent at least covering that of the DEM
- use a clipping theme larger than the catchment boundary
- buffering the catchment boundary (500 m is sufficient)

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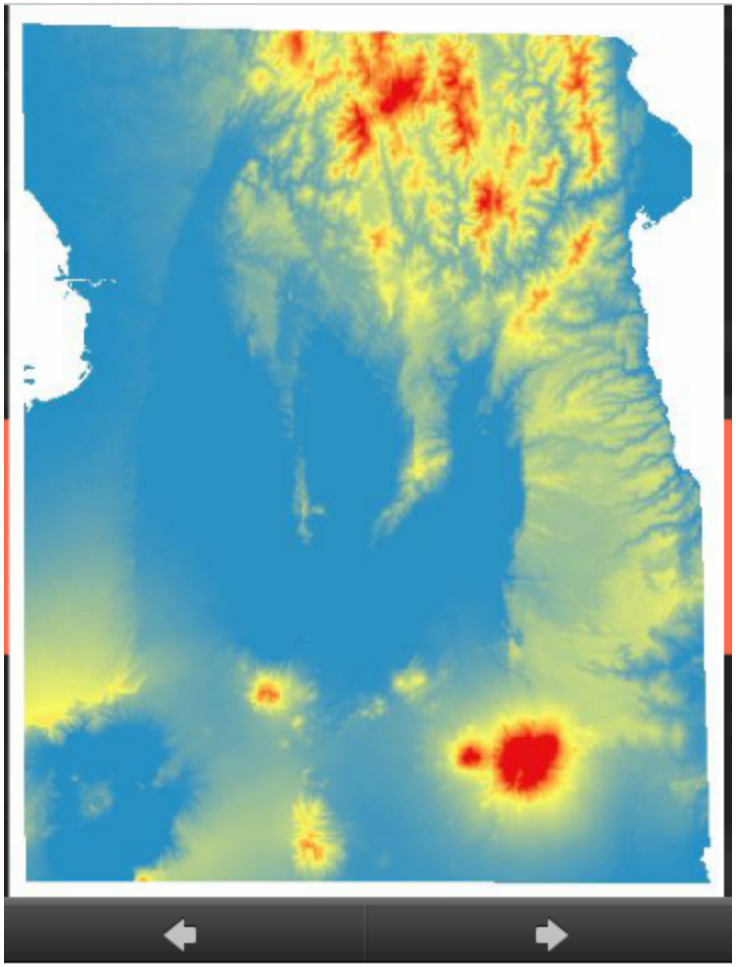
DEM (Digital Elevation Model)

Resolution - 90 meter (3arc second) SRTM DEM
Datatype - GRID
Module - Stream Define
Default dataset - none
The DEM is used to derive the stream link network.

Preparation:

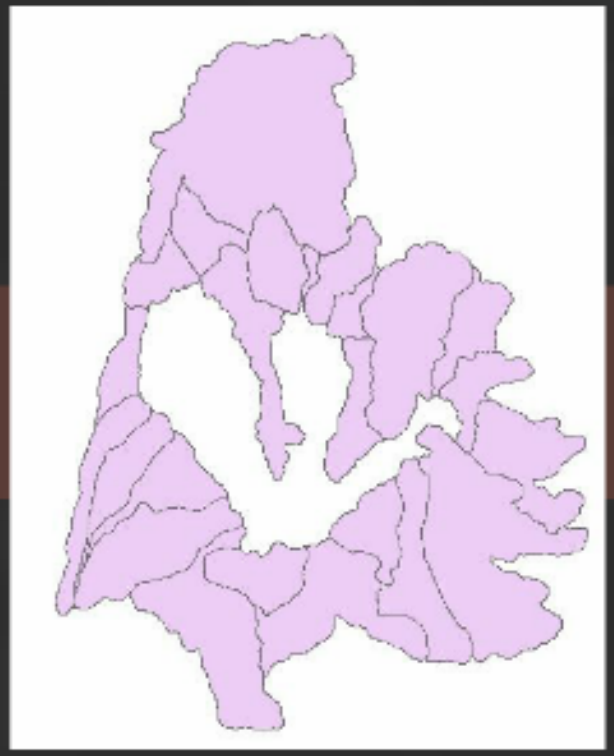
- Clipping a larger DEM to size or merging smaller DEMs together
- Projecting to the coordinate system to be used for SedNet modelling
- Eliminating any holes of "NO DATA", especially along drainage lines.
- Converting to ArcInfo ASCII grid format and ensuring it has the .asc extension
- Filling sinks (also known as pits).



Catchment Boundary

Datatype – shapefile, polygon
Module – Stream Define, Spatial Data
Default dataset – none.

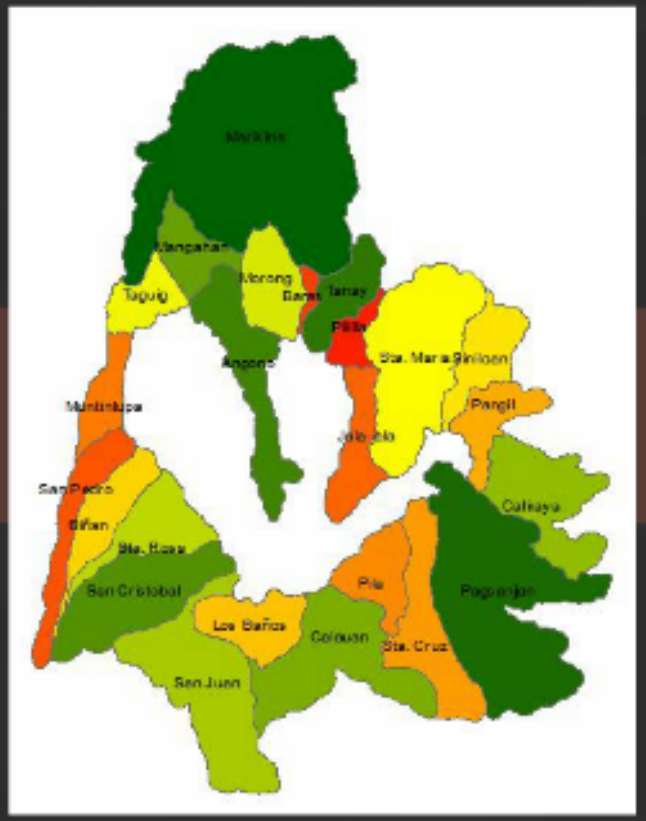
- Used to clip out grids and shapefiles
- ArcGIS or other GIS software.
- Same geographic coordinates



Lake and Reservoir Mapping

Datatype – shapefile, polygon
Module – Stream Define

These shapefiles are used to create specialised "lake" and "reservoir" links within the stream link network so that the deposition processes can be represented. The intersection points of the outline of each polygon are used to define the start and end points of each lake or reservoir link in stream define.



Stream network threshold drainage area

Datatype – informational
Module – Stream Define
Default values – None

The threshold drainage area sets the catchment area at which first-order streams begin being defined; the area at their upstream end.
The smaller the threshold, the more links there are, and the smaller are the sub-catchments.

Quick guide:

- 50 km2 for 250m DEM
- • 20 km2 for 25m DEM; 30,000 km2
- • 10 km2 for 10m DEM; 6,000 km2 (5 km2)

Floodplain extent

Datatype –GRID (0's and 1's)
Module – Spatial Data
Default dataset – NLWRA Data

Floodplain width is used in the calculation of floodplain deposition. It helps to calculate the flow velocity across the floodplain, and hence settling out of sediment

To derive these width values, the floodplain grid should have 1 for floodplain and 0 for not floodplain.

The grid should be clipped to a maximum width of 5 km each side of a stream link

Gully Density Map

Datatype – GRID
Module – Spatial Data
Default dataset – zero gully density is assumed for natural condition scenarios.

- A gully is a landform created by running water, eroding sharply into soil, typically on a hillside.
- Gully density is the estimation of the influence of gully erosion on the total suspended sediment budget gully density must be estimated. In the absence of any measured data, Gully density at the Laguna Lake Basin has been estimated to be 5% of the drainage density.

Hillslope erosion grid

Cover Factor (C)

- C represents a comparison of soil loss with that expected from freshly tilled or bare soil (C = 1).
- The values of C for each land use were taken from the estimated crop cover coefficients, or C values for the common cover conditions of Philippine catchments

Estimated cover or C-factors for the land use classification in the study area.

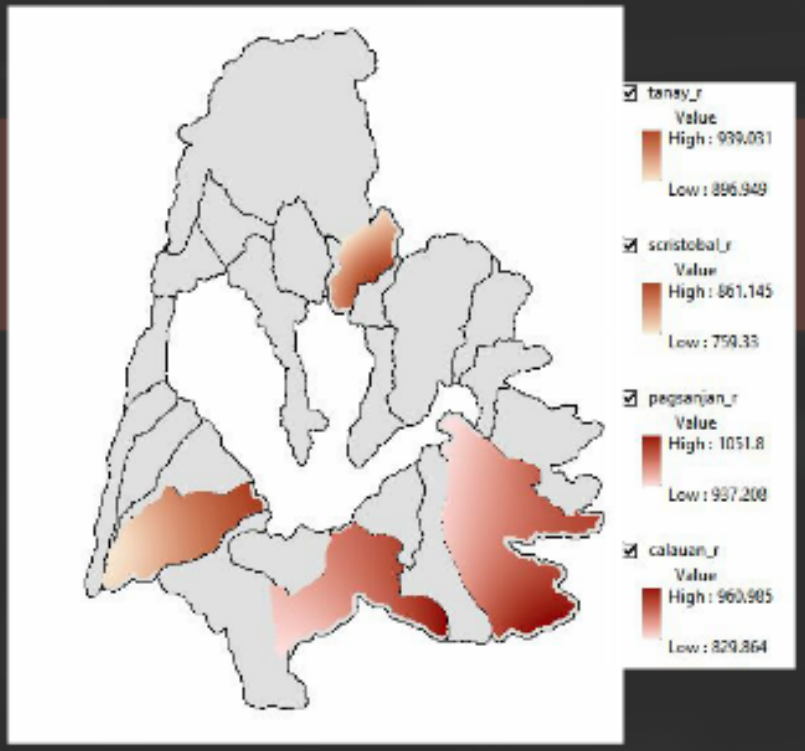
Percent of catchment area	Land use classification	C-factor	Remarks
55.44%	Plantation	0.100	Coconuts with tree, annual crops for intercrops
2.90%	Marshy/Water Bodies	0.500	River wash
29.04%	Grassland/brushland	0.300	Moderately grazed and occasionally burned
8.86%	Arable	0.400	Representative of annual cash crops
1.50%	Built-up	0.200	Built-up rural areas, with home gardens
2.27%	Forest	0.003	Second growth forest with good undergrowth

Rainfall Erosivity (R) factor

The R factor is a measure of the erosive power of rainfall in units of MJ.mm/(ha.h.yr)

Rainfall erosivity measures the erosive power of rainfall. It was calculated using rainfall isohyetal grid containing a 15 year average annual rainfall measurements from surrounding meteorological stations.

The equation used was R = 38.5 + 0.35P, where P is the annual precipitation in the catchment



Soil Erodibility (K) Factor

Soil Erodibility Factor measures the resistance of soil to sheet and rill erosion.

K may be estimated from data on the soil's particle size distribution, organic matter content, surface structure and permeability. Or it may be estimated from surface texture and organic content.

The K factor was estimated using data from soil physical and chemical properties (Soil Classification provided by BSWM).

Hillslope length factor (L) and slope steepness factor (S)

Hill length factor represents the increasing runoff volume (and thus eroding power) down slope as the length of soil, subject to water erosion

Meanwhile, the slope steepness factor (S) is the ratio of soil loss from the field slope length to that lost

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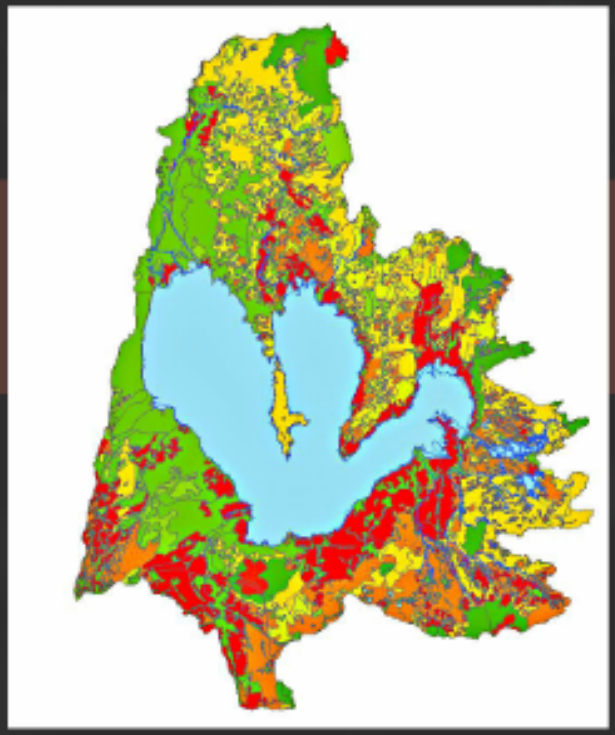
Landuse data

Datatype – Informational or GRID
Module – Spatial Data

The land cover map for the study area was obtained from the classified 2010 SPOT5 imagery of the whole Laguna Lake catchment.



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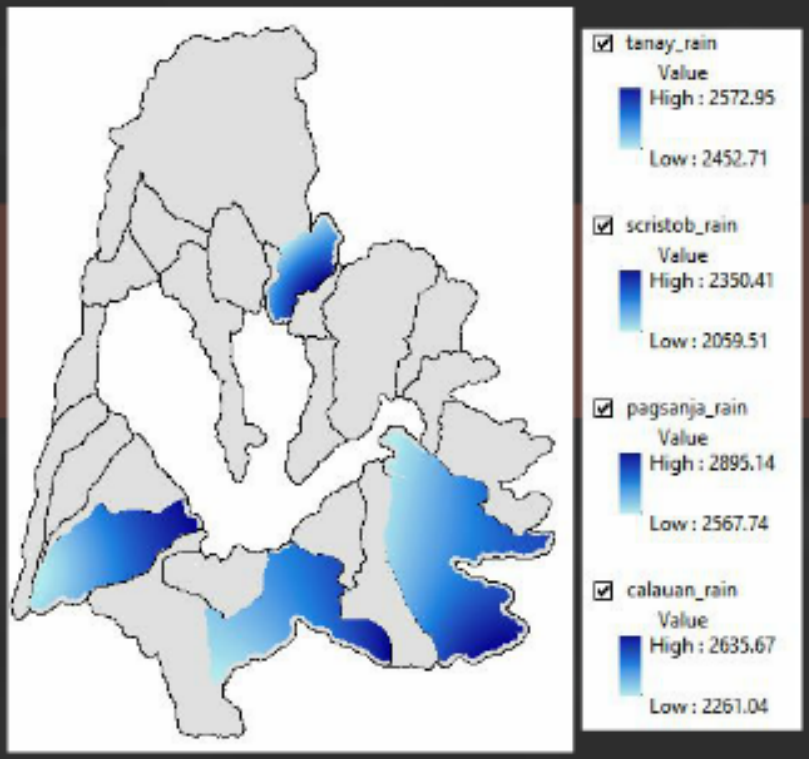
Mean annual rainfall

Datatype – GRID
Module – Spatial Data

Mean annual rainfall is used within the Spatial Data module in developing the hydrologic regionalisation and in calculating stream flow



PET-Rainfall Ratio

This grid can be created by dividing a grid of mean annual potential evapo-transpiration (PET; mm) by a grid of mean annual rainfall (mm) in a raster calculator.

Riparian vegetation

Data type – Grid
Module – Spatial Data

Vegetation along the stream link.

The riparian vegetation cover proportion was determined by assigning a value based on land use within a set distance from the stream link. A buffer of 128 meters from both sides of river/streams was chosen through overlaying of land cover with C factor.

Stream-flow time-series

Time-series analysis of historical discharge data and characteristics of the catchment upstream of each stream gauge are required for flow regionalization

- Daily flow in Megalitres per day.
- A minimum of 15 years record
- Must have an unregulated catchment

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Congratulation!!!

You are now finally going to be able to run SedNet!