StormTac - Product specification

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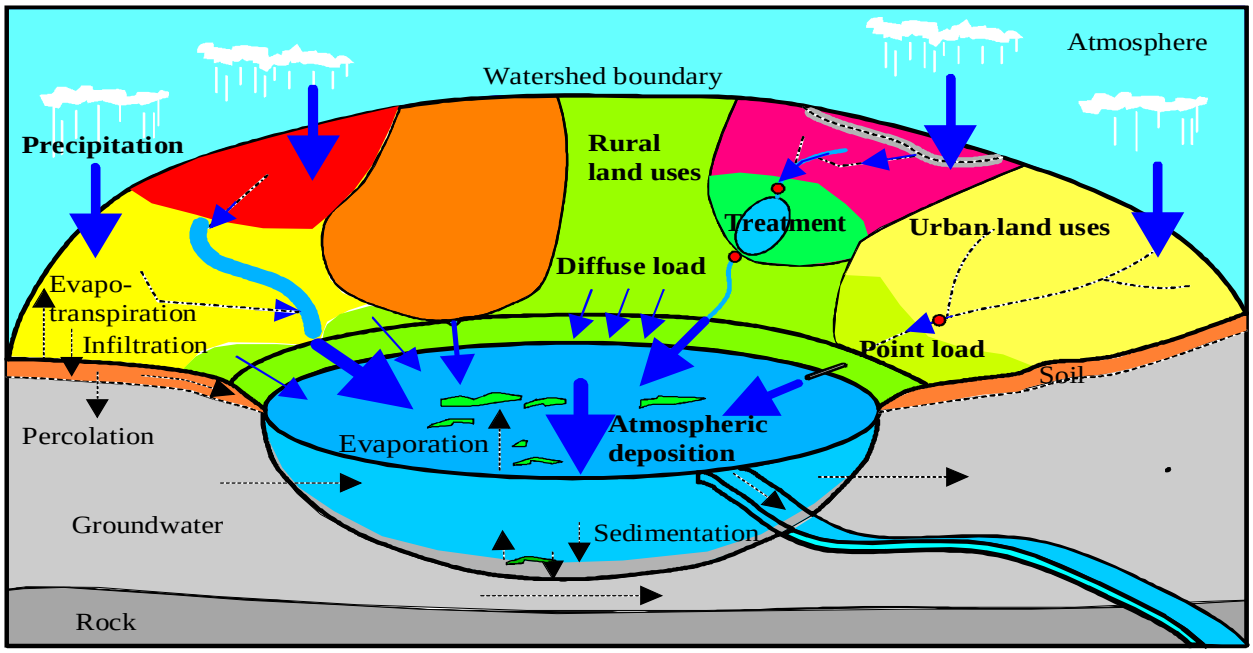
StormTac is a watershed management model for the quantification of pollutant loads and for the design of stormwater treatment and detention facilities



System requirements and user information

- Microsoft Excel 2000 or later is required.
- English is the model language.
- The number format in Windows must be points and decimals in the model must be written in points.

Background

Metals and nutrients are examples of pollutants in stormwater which may cause toxic and eutrophic effects in the receiving waters. Furthermore, large intense stormwater flows may cause floodings in urban areas. StormTac is the planning tool that can help You towards a more sustainable stormwater management.

Areas of implementation

StormTac can help you to:

- calculate stormwater runoff volumes, pollutant concentrations and loads in the discharge points and from different land uses.
- compare measured/sampled data to calculated values
- identify the largest pollutant sources and discharge locations to a recipient.
- set up water and mass balances for receiving waters.
- estimate the allowable (limit/acceptable/maximum) recipient loads and the needed load reduction.
- identify and decide where to implement Stormwater Treatment Facilities (STFs) and detention facilities, such as wet ponds, filterstrips, constructed wetlands ditches/swales and detention basins.
- choose and design (area and volume) STFs and detention facilities.
- estimate the effectiveness of the designed STF.

Some unique properties

- simple to use (Excel format).
- requires little input data.
- considers both point and diffuse loadings, baseflow/groundwater and atmospheric deposition.
- integrates watershed and runoff properties with treatment/detention facilities and impacts on receiving waters.

The model results are presented in a flowchart (see next page), in tables and diagrams. They can also be and have been linked to other databases and GIS.

Databases

StormTac includes databases with precipitation data, runoff coefficients, concentration data and reduction efficiencies.

Required input data

The model requires little input data. Watershed area (ha) per land use (e.g. houses, roads and forests) is the only obligatory input data. The traffic intensity (vehicles/day) is needed if studying the loads from larger roads within the catchment area. The area and volume of the receiving water are needed for estimating allowable loads. The included databases help to make more accurate analyses by letting you change other input data such as precipitation (mm/month or mm/year), runoff coefficients and water depths.

The model parameters can be justified to measured data to ensure site specific conditions being considered. In such cases further input data consist of measured flow (m^3/year or m^3/month), precipitation (mm/year or mm/month) and sampled concentration (mg/l or µg/l).

Calculation methods

The main methodology has been reviewed internationally through scientific papers and a doctoral thesis. The spreadsheet model has been developed to

automate the calculations by using land use specific standard values. It is best suited for long-term predictions. Runoff water flow is calculated from precipitation data and land use specific runoff coefficients and areas. Pollutant load rate (kg/year) is quantified from calculated flow and from standard concentrations. The standard concentrations are estimated empirically from a large set of flow proportional field sampling data, which contributes to their general applicability.

The following pollutants are calculated: phosphorus (P), nitrogen (N), lead (Pb), zinc (Zn), copper (Cu), cadmium (Cd), chromium (Cr), nickel (Ni), mercury (Hg), unpolar aliphatic hydrocarbons (oil), suspended solids (SS; particles), polycyclic aromatic hydrocarbons (PAH) and Bens(a)phyrene (BaP; a PAH).

StormTac includes a large amount of sub models and equations for the design of different stormwater facilities. The user can choose between a relatively detailed and a quick, simple design. The resulted dimensions by using different methods and by changing parameter values can easily be reviewed and compared. Examples of included design parameters are runoff coefficients, land use areas, facility permanent water depth, water depth of detention volume, slope, rain depth, outflow, emptying time and reduction efficiency.

The design methods have been employed for a large number of case studies from pre studies to final detailed construction drawings.

Case studies

StormTac has been used for example in the following case studies, where * indicates that calibration or comparison to measured data has been performed:

Nybohov*, Stockholm (residential)
Essingeleden*, Stockholm (road)
Sätra*, Stockholm (residential)
Lake Flaten*, Salem (residential)
Flemingsbergsviken*, Huddinge (mixed)
Lidingö municipality* (mixed)
Tyresö municipality (mixed)
Upplands Väsby municipality (mixed)
Lake Edsviken, Sollentuna (mixed)
Lake Norrviken, Sollentuna (mixed)
Fittja, Botkyrka (residential)
Reykjavik, Iceland (residential)
Kaliningrad, Russia (road)
Lake Titicaca, Peru and Bolivia (mixed)

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