

WSFS user interface

- Probability forecasts for discharge and water with references
- Hydrological maps in real time and as forecasts
- Simulated daily hydrological data for 20 hydrological characteristics
- Interactive hydrological maps: selected time, basin and characteristic
- Lake regulation
 - Interactive regulation rules
 - Regulation simulation
 - Regulation optimisation
- Forecast accuracy follow up system
- Nutrient load simulation
 - Phosphorus, nitrogen, solids



References

- Centres for Economic Development, Transport and the Environment
- Water power companies: Fortum, Vattenfall, PVO-POOL
- Watershed regulation companies
- Water protection associations
- Municipal waterworks
- Cities and counties
- The general public
- Consultant companies: Pöyry, Ramboll
- Ministries: Agriculture and Forestry, Environment, Internal affairs
- Rescue services
- Military

www.environment.fi/waterforecast



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Images: Tapio Heikkilä (Cover) and Plugfi.

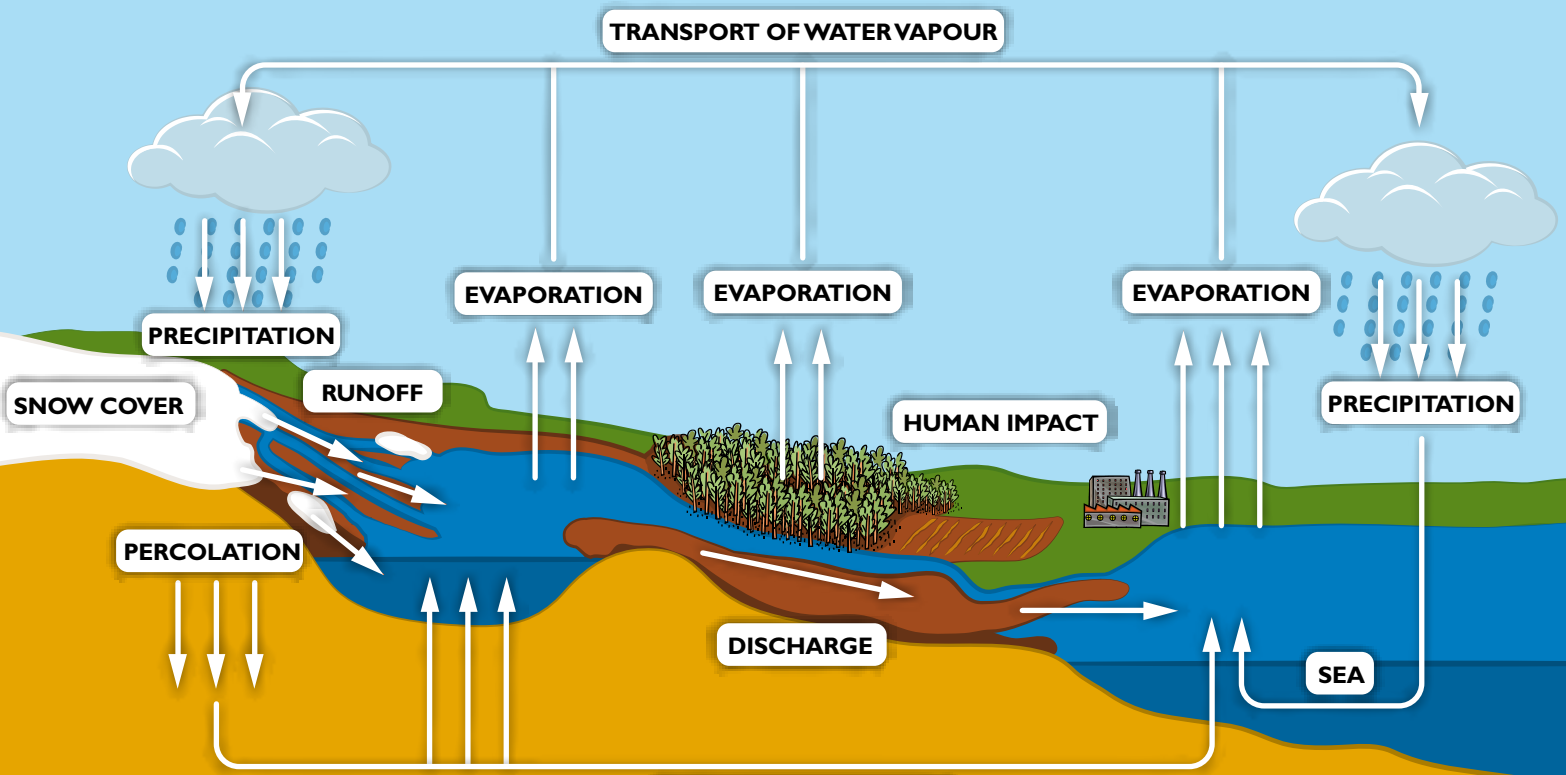
Layout: Erika Várkonyi, SYKE

Printing: Erweko Oy, Helsinki 2013

Pdf version: www.environment.fi/syke/publications > Brochures

Watershed simulation and forecasting system (WSFS)

The Finnish Environment Institute has a hydrological watershed model system (WSFS). WSFS is used for flood forecasting, realtime monitoring, nutrient load simulation and climate change research. Hydrological water balance maps are created in real time. Forecasts are made on a daily basis for over 500 discharge and water level observation points. Forecasts are used for lake regulation planning, flood damage prevention and as information for the public and authorities.



Watershed simulation and forecasting system WSFS

WSFS is a hydrological model simulating the water cycle in catchment areas. WSFS covers Finland and border catchment areas.

Minimum data requirements:

Meteorology

- daily air temperature, precipitation and potential evaporation
- weather forecast for daily air temperature and precipitation in forecasting mode

Hydrology

- daily river discharge, water levels and outflow from regulated lakes
- minimum length of time series 1-5 years

Aerial data

- basin area, elevation map, river network map, land use map

Tailored applications and products:

Models and systems

- Watershed models
- Watershed simulations and forecasts

Real time simulation

- Real time precipitation, snow, evaporation, soil moisture, ground water storage, runoff, discharge, lake level, ice depth
- Real time reservoir storage and inflow
- Real time hydrological water balance maps

Forecasts

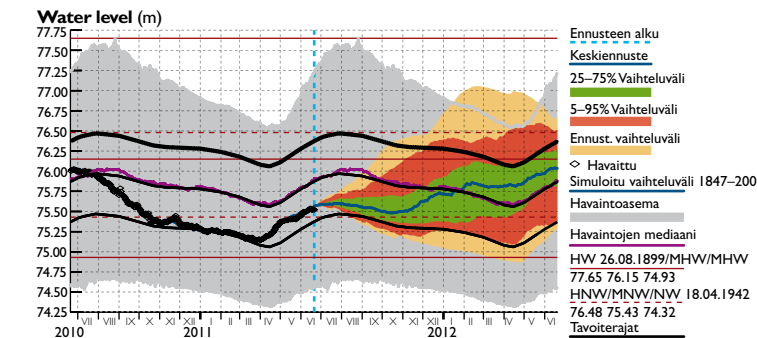
- Hydrological probability forecasts based on ensemble weather forecasts
- Groundwater level forecasts
- Ice-breakup forecasts

Real time planning

- Real time lake regulation planning via internet- user interface
- Lake regulation simulation and planning

Warnings

- Flood warning by e-mail, SMS, on the internet
- Snow load warnings for roofs by e-mail and on the internet
- Aerial precipitation warnings based on weather radar



Nutrient load

- Nutrient load simulation and forecasts (P,N,C solids)
- Assessment of nutrient load mitigation measures

Data production

- Filling in gaps of missing water level and discharge observations
- River discharge simulation at any point of catchment area
- Ice corrections for discharge

Dam Safety

- Dam safety simulation and planning
- Design floods for dams

Climate change

- Climate change simulations and assessment for hydrology and nutrient load

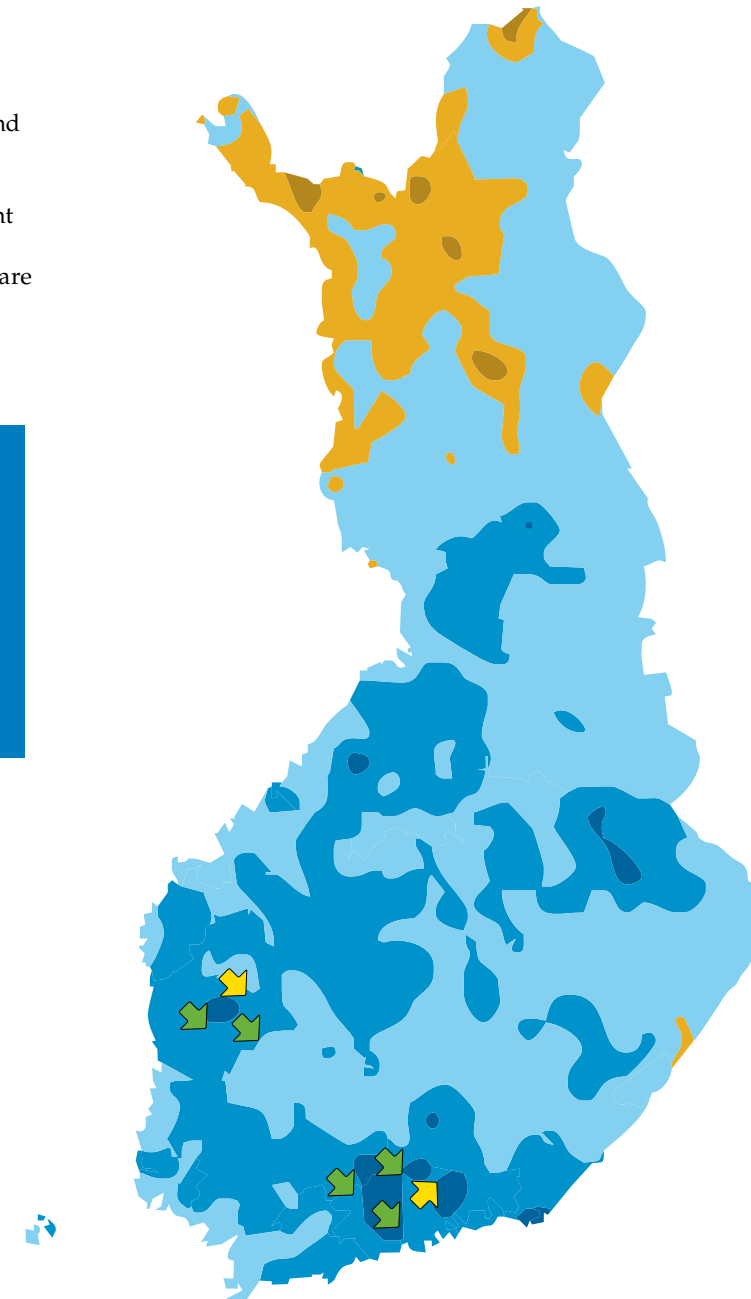
Application in Finland

- Area and land use data for 58 000 lake catchment areas in Finland
- Over 40 years of simulated hydrological data from 6,000 catchment areas in Finland
- Over 20 years of nutrient loads data from over 6,000 catchment areas in Finland
- Nutrient load simulation (smallest simulation unit is a 1- hectare lake and its catchment area)
- The WSFS simulates nutrient load from 55,000 lakes and 1 million field plots down to the Baltic Sea

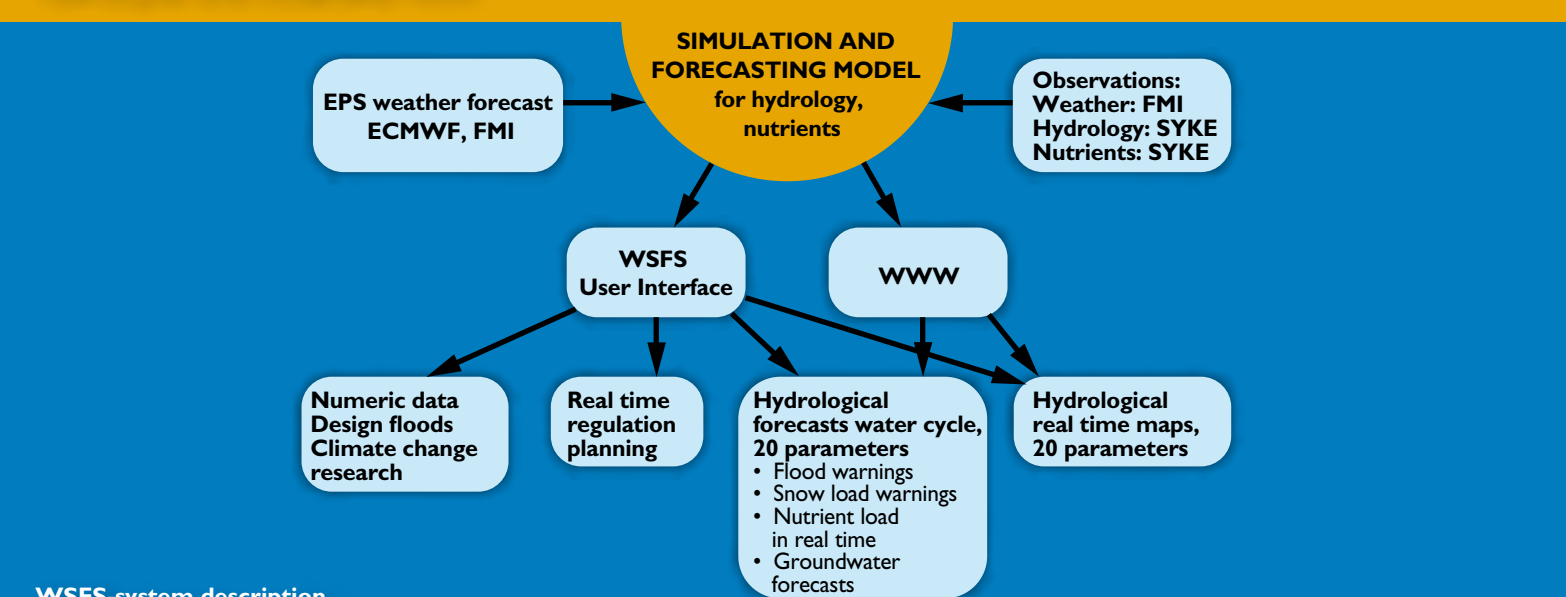


WSFS on the Internet

- Hydrological forecasts covering the whole of Finland www.environment.fi/waterforecast
- Warnings: flood, water level, precipitation and snow load for roofs
- Groundwater forecasts
- Nutrient load from Finland to the Baltic Sea
- Hydrological water balance maps



Hydrological cycle simulated by WSFS



WSFS-system description

Hydrological maps: Runoff