

Operational flood forecasts and warnings in Finland

Miia Kumpumäki

Hydrologist

Finnish Environment Institute

14.12.2023

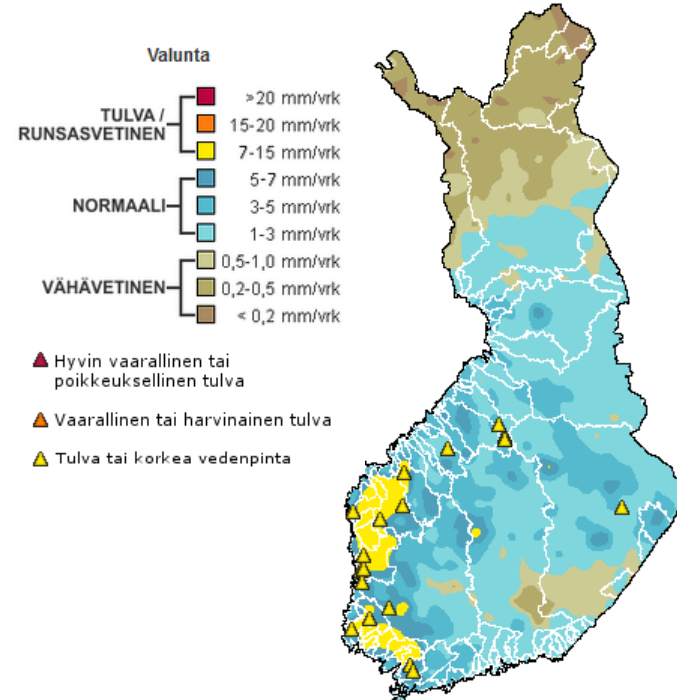
miia.kumpumaki@syke.fi



Suomen ympäristökeskus
Finlands miljöcentral
Finnish Environment Institute

Contents of the presentation

- Finnish Environment Institute
- Hydrological forecasting services
 - Hydrological monitoring
 - Watershed Simulation and Forecasting System WSFS
- Flood centre
 - Operational work
 - Products
- Flood forecasts and warnings
- Drought situation and warnings



“Environmental research and development centre under Finland’s Ministry of the Environment”

“Also carries out tasks related to the use and management of water resources under the Ministry of Agriculture and Forestry”

Source: Act on the Finnish Environment Institute (1069/2009)

Finnish Environment Institute (SYKE)

- State research institute
- Managed by the Ministry of the Environment and the Ministry of Agriculture and Forestry
- Provides research, information, and expert services for issues related to the environment and natural resources
- Collaborates with universities, other research institutes, companies, and public organisations
- Is in charge of national coordination of hydrological monitoring and the official flood forecasting model in Finland
- Provides versatile water expertise in Finland and around the world

Hydrological forecasting services

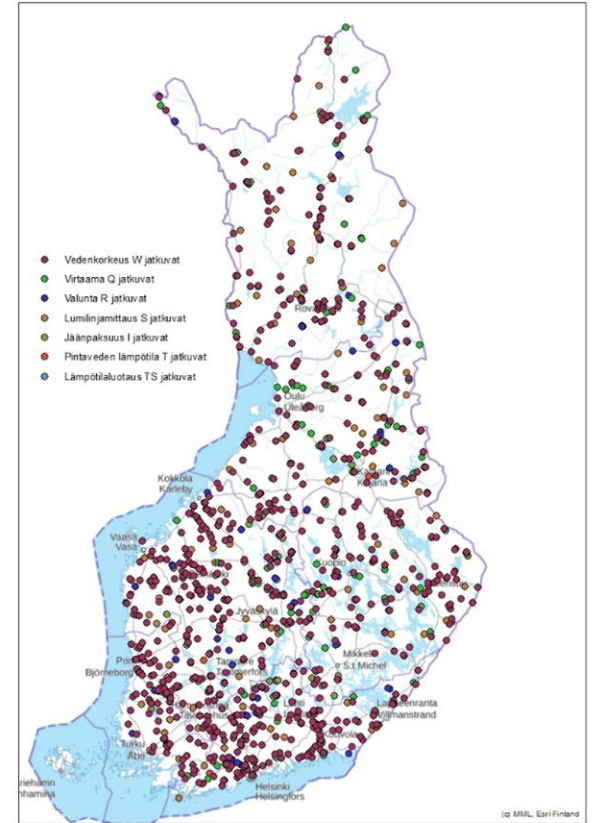
- We provide operational services for flood forecasting and support local authorities in case of severe flood events
- We study climate and water related issues
- We are able to answer these questions:
 - What are the water and flood conditions today plus forecast?
 - How will climate change influence water levels and floods?
 - How can we adapt to and prevent the adverse impacts of climate change?
 - How are harmful substances transported in rivers and lakes?



Hydrological monitoring network

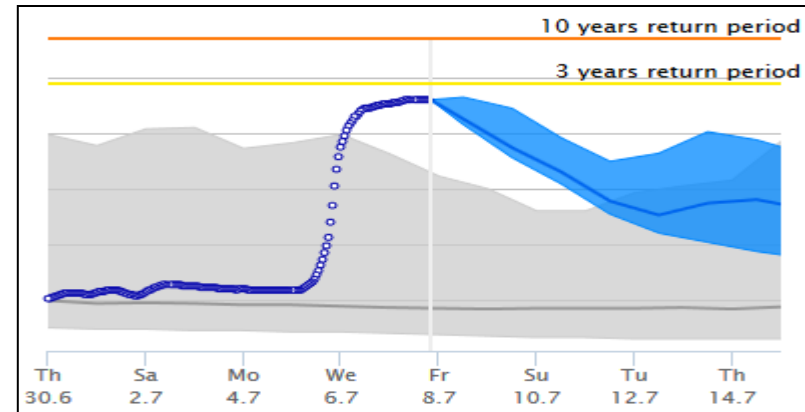
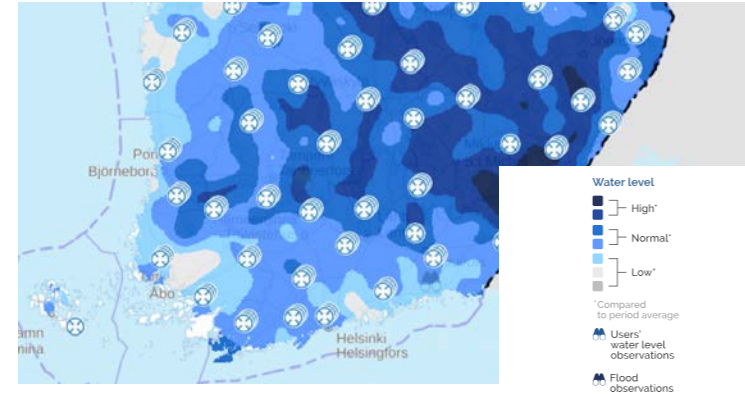
- Water level in rivers and lakes (770 stations)
- Discharge in rivers and hydropower plants (380 stations)
- Snow thickness and weight (Snow water equivalent, 145 stations)
- Runoff from small areas (41 stations)
- Water temperature in rivers and lakes (34 + 9 stations)
- Ice thickness in rivers and lakes (47 stations)
- Groundwater level (72 stations)
- Soil frost (37 stations)

➤ Quality controlled data available 24/7, services assured in critical situations

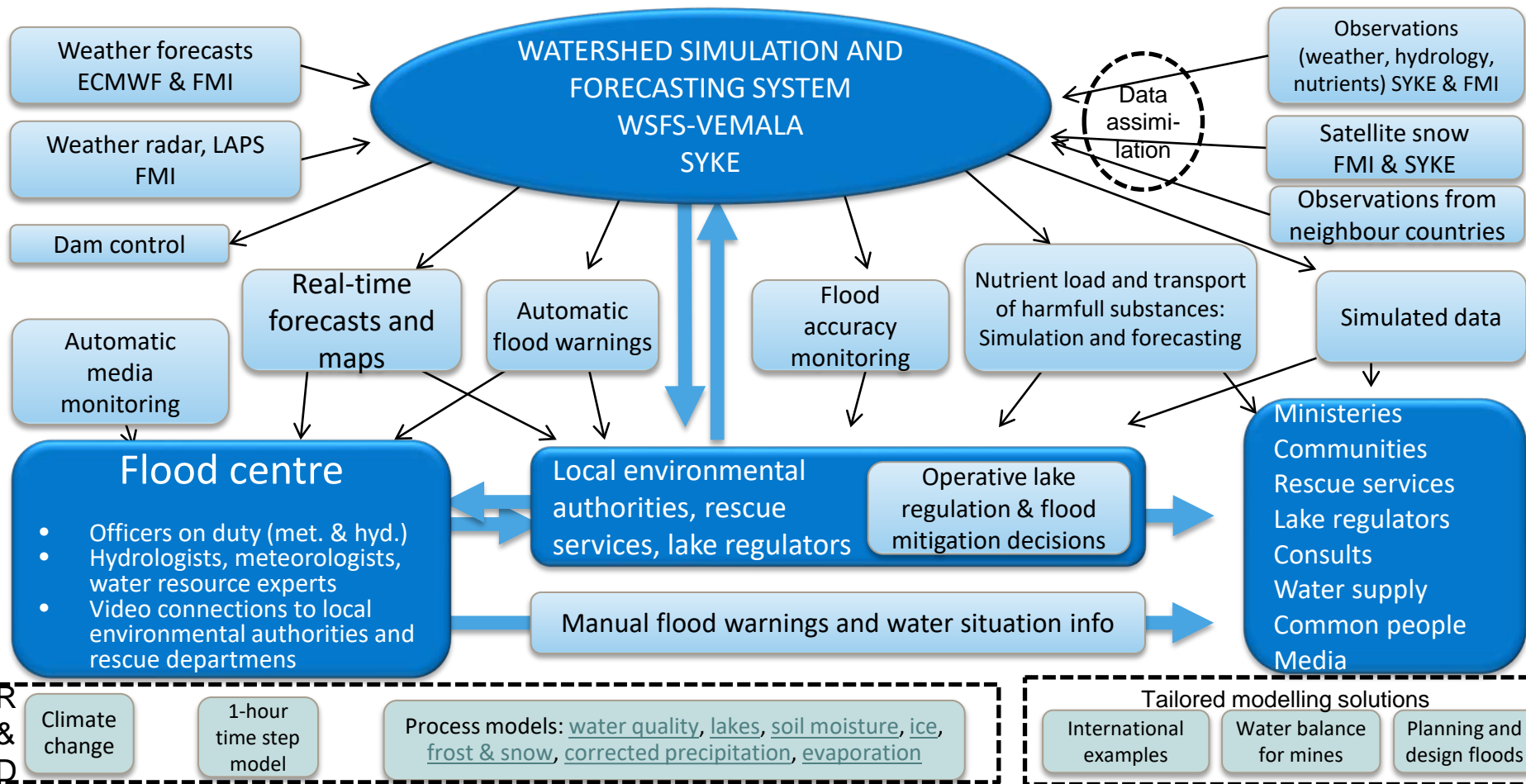


Watershed Simulation and Forecasting System WSFS

- Model covers entire Finland and transboundary watersheds
- Model forecasts hydrological situation using meteorological data as input
- Forecasts are reliable up to 3-5 days, large rivers and lakes even longer
 - Limiting factor is weather forecast
- Forecasts are used to
 - Evaluate and make warnings of flood risks
 - Hydropower planning
 - Monitoring water supply
 - Operational lake regulation
 - Providing information to media and public



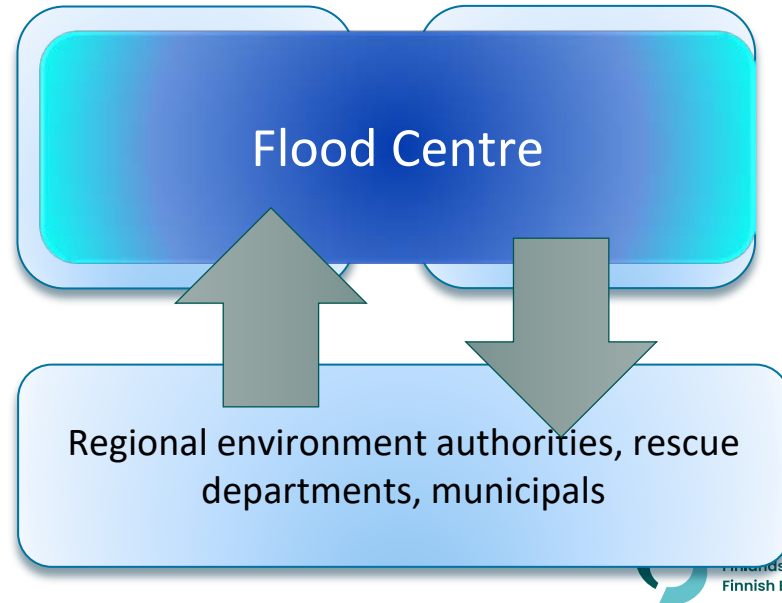
WSFS and hydrological services in Finland



Flood centre

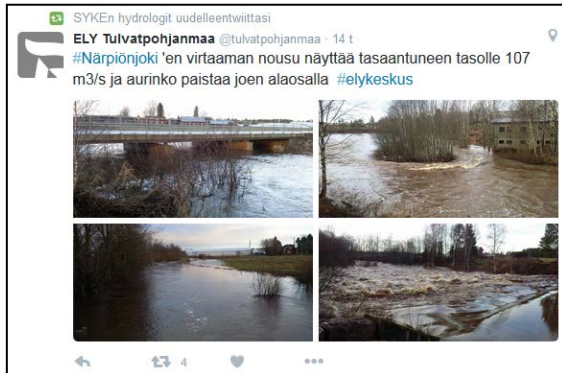
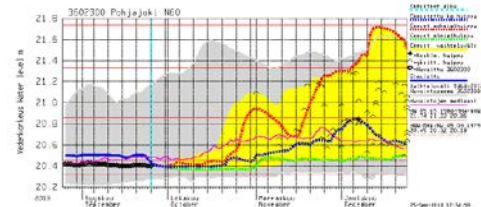
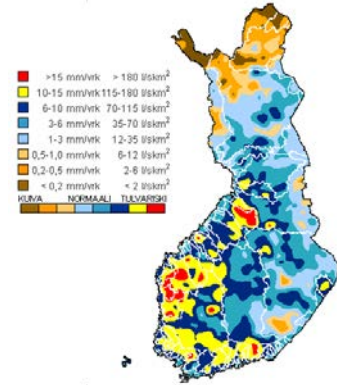


- Joint flood service of Finnish Environment Institute (SYKE) and Finnish Meteorological Institute (FMI)
- National water situation and flood information, forecasts and warnings 24/7
- All types of flooding:
 - Watershed
 - Sea coast
 - Urban
- Solid co-operation with regional flood management authorities

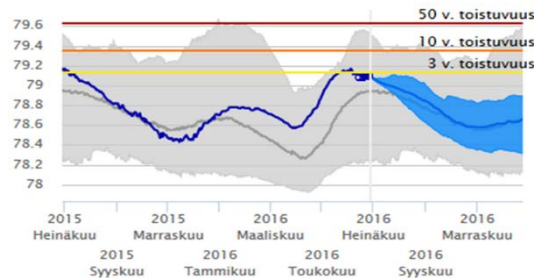


Flood centre main products

- Water situation information
- Flood warnings to authorities and public
- LUOVA (National natural disaster warning and information system) warnings to authorities
- Flood damage and effect forecasts and maps
- Flood exceptionality statements to insurance companies



Päijänne Kalkkinen vedenkorkeus



ucus
 stitute

Flood Centre operations model

Level of preparedness	Flood service extra actions
Special situation	<p>In addition to raised level actions Flood Centre forms a Special Situation Expert Team</p> <ul style="list-style-type: none">• Status meetings with local flood authorities via video conference whenever needed• On 24/7 alert to help local flood authorities by all means available (e.g. custom made flood risk maps, forecasts and estimates)• Gathers and distributes national flood situation picture• Crisis communications
Raised	<p>In addition to normal level actions:</p> <ul style="list-style-type: none">• Strengthened duty services• Strengthened communications• Secured essential product services• Getting prepared for special situation
Normal	<p>Normal actions:</p> <ul style="list-style-type: none">• Situation monitoring and forecasting• Warnings• Officers on duty co-operation• Daily / bi-weekly status meetings

Operational flood warnings through various channels

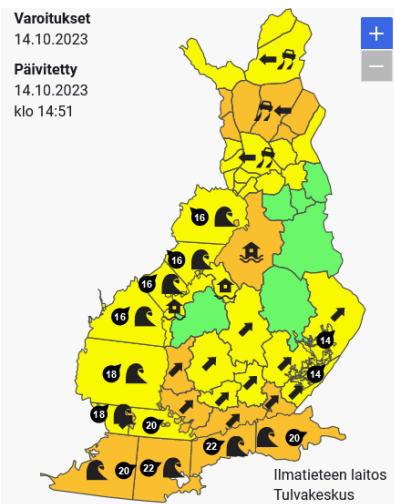
Automatic and manual email warnings for local and national authorities

Information to social media

Water situation information and maps in television broadcast with weather forecast

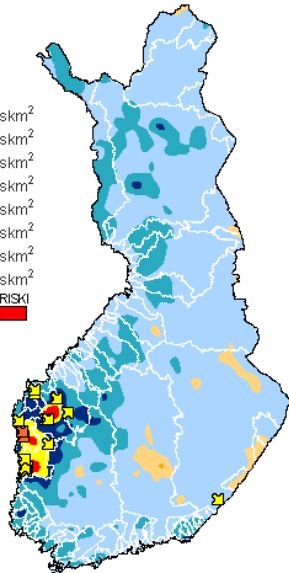
Warnings in FMI's website together with other warning types

Automatic forecasts and warnings in SYKE's website (maps and forecast figures)



Red	>15 mm/vrk	> 180 l/skm ²
Yellow	10-15 mm/vrk	115-180 l/skm ²
Dark Blue	6-10 mm/vrk	70-115 l/skm ²
Light Blue	3-6 mm/vrk	35-70 l/skm ²
Very Light Blue	1-3 mm/vrk	12-35 l/skm ²
Orange	0,5-1,0 mm/vrk	6-12 l/skm ²
Light Orange	0,2-0,5 mm/vrk	2-6 l/skm ²
Brown	< 0,2 mm/vrk	< 2 l/skm ²

KUIVA NORMAALI TULVARISKI



ohjelmat Suorat Sarjat ja elokuvat Viihde ja kulttuuri Dokumentit ja fakta Uutiset Urheilu Lapset

yle

4.TT. JOKIEN VESITILANNE
lähde: Tulvakeskus

tulva / runsasvetinen
normaali
vähävetinen

usteita

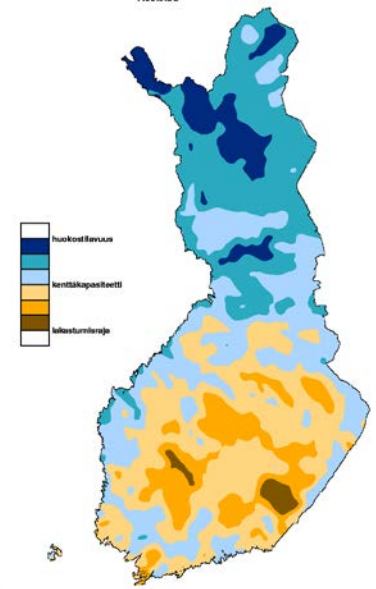
6 h jäljellä

Lisää samankaltaista

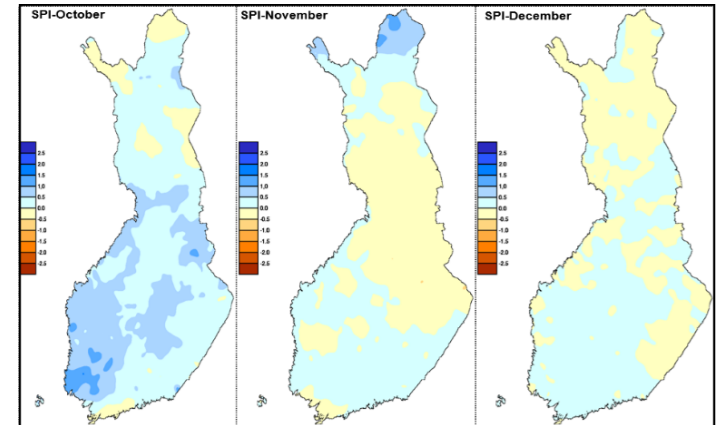
This figure is a screenshot of a television broadcast. It shows a presenter pointing at a map of Finland on a screen. The screen displays the title '4.TT. JOKIEN VESITILANNE' and a legend for water levels: 'tulva / runsasvetinen' (red), 'normaali' (blue), and 'vähävetinen' (brown). A play button is overlaid on the map. At the top of the screen, there is a navigation bar with categories like 'ohjelmat', 'Suorat', 'Sarjat ja elokuvat', etc. At the bottom, there are additional elements like 'usteita', '6 h jäljellä', and 'Lisää samankaltaista'.

Drought forecasts and warnings

- SYKE / Flood centre provides information about drought situation for public and authorities
- SYKE is aiming to improve drought forecasts and warnings
 - With long term forecasts with seasonal weather forecasts
 - Using drought indices and groundwater monitoring
 - Improving groundwater forecasts and warnings
 - Testing different forecast and warning types
 - Comparing the model results with SMOS soil moisture data from satellite
 - Studying the impacts of climate change



Soil moisture, monthly forecast



Recently published in English: waterinfo.fi - Finland's most accurate and up-to-date water information

- Edited, up-to-date information about water situation in Finland
- Realtime forecasts and maps for over 600 lakes and rivers
- Flood information during floods
- Written hydrological forecasts for basins
- Overall and detailed versions for different levels of expertise

The screenshot displays the waterinfo.fi website interface. At the top, there is a navigation bar with links for 'Map service', 'Water situation', 'Water topics', 'Themes', and 'News'. The main heading reads 'Finland's most accurate and up-to-date water information'. Below this, the 'Water situation service' section features a search bar for 'Search by place name' and a map of Finland showing water levels. A text box titled 'General water situation / 21.3.' states: 'Water levels rising in the rivers in Southern Finland. Since Saturday, the warmer weather has caused the stage of rivers in Southern and Southwestern Finland to rise again. At places, the rise is fast, and in some areas, rivers may flood the most low-lying fields during this week. According to forecasts, this is most likely in the Luimajoki and Pemmijoki areas.' A 'Read more about the water situation' button is provided. The 'News' section includes three articles: 'Finnish companies set to become leaders in water stewardship by 2030 - what does it take?' (22.3.2023), 'Sustainable use of water resources takes a leap to a new level - Finnish Environment Institute participates in historic UN Water Conference' (20.3.2023), and 'Finnish launches an inter-ministerial water stewardship action plan in support of fair water footprints' (17.3.2023). On the right side, there are sections for 'Warnings' (listing 'Lusimaa' and 'Varesjärvi-Suomi' with flood warnings) and 'Customer service' and 'Tools' links. A small cartoon illustration of a bear is visible at the bottom right.



Thank you!