

Hydrological Balance of Water Quantity Assessment

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Hydrological Balance of Water Quantity Assessment

➤ Introduction

According to Water Act No. 254/2001:

Water balance assessment

✓ **Hydrological balance assessment – CHMI**

- Hydrological balance of water quantity assessment
- Hydrological balance of water quality assessment

✓ **Water resources balance assessment – River Board, state enterprise**

The content of the water balance and style of compilation is regulated by Decree No.431/2001 (Ministry of Agriculture)

Hydrological Balance of Water Quantity Assessment

➤ **Methodical principles**

Hydrological balance of water quantity assessment compares the increases (precipitation and inflows) and decreases of water (evaporation and water outflows) with changes of surface and groundwater storage caused by **natural variability influences** in the area for a given time interval

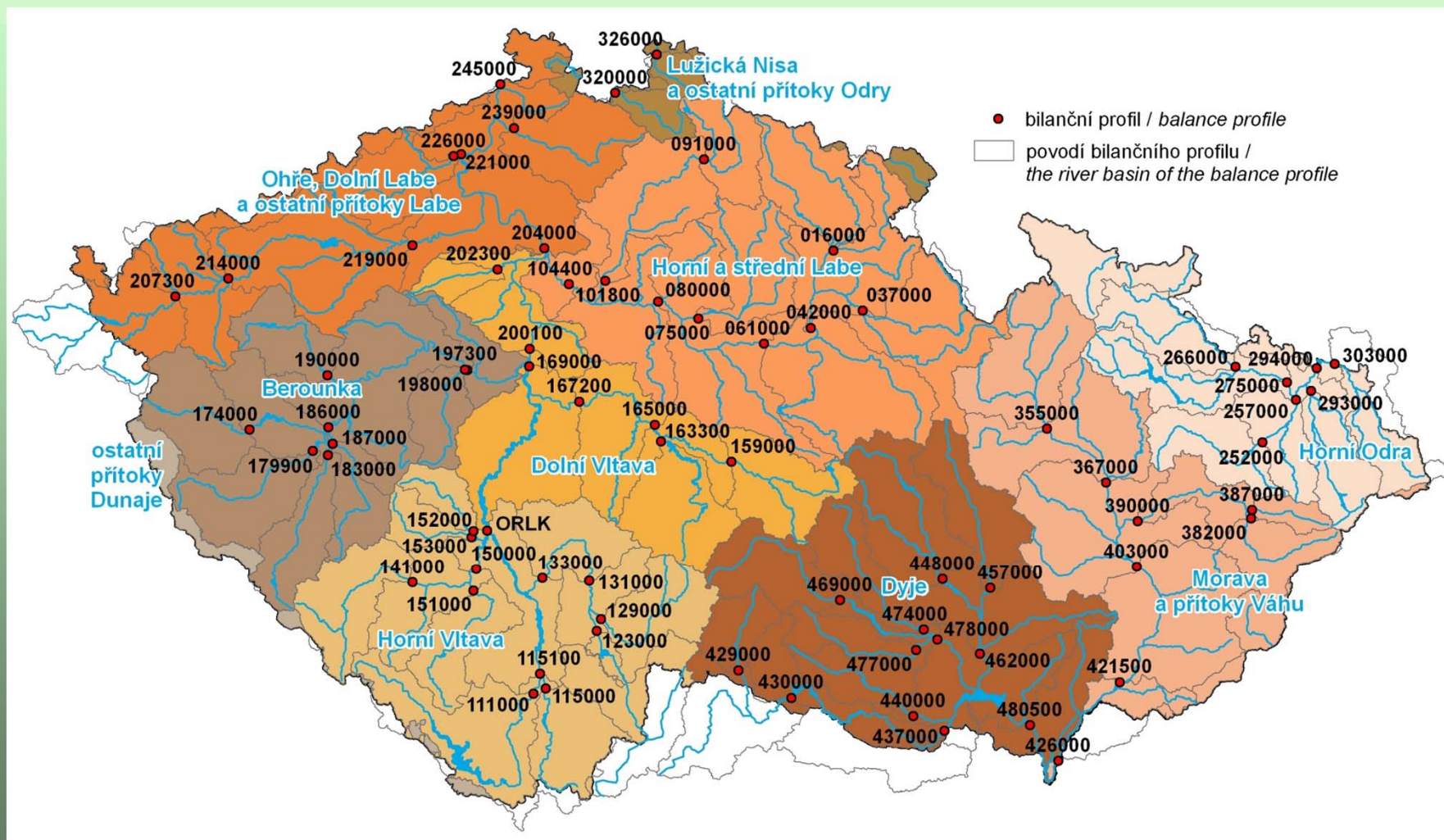
Hydrological Balance of Water Quantity Assessment

is processed for the last calendar year in monthly step for 74 selected river basins in the CR (45 in Elbe basin) closed by watergauing stations and grouped into 8 balance districts/to 10 sub-basins

5 sub-basins in Elbe basin:

- Upper and middle Elbe
- Upper Vltava
- Lower Vltava
- Berounka
- Ohře, Lower Elbe and other tributaries of the Elbe

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➤ Preparation of input data

time series processing for the reference period from 1981:

- selection of time series of discharges, air temperature, relative atmospheric humidity (for a balance model) and total precipitation, snow depth, water vapour pressure (to determine the water equivalent of snow)
- reconstruction of the natural (unaffected) discharges in water gauging stations (withdrawal, discharge of waste water, manipulation on the reservoirs)

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✧ Calculation of time series of balance components

balance components:

measured

estimated according to the relation to other measured components

estimated by modelling

values of balance components over the basin area:

- precipitation, database CHMI
- air temperature, database CHMI
- relative atmospheric humidity, database CHMI
- water equivalent of snow cover: derived from precipitation, snow depth and water vapour pressure, CHMI

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✧ Calculation of time series of balance components - continued

- total runoff, database CHMI
- base flow: derived from the total runoff using observations of groundwater levels, CHMI
- natural (unaffected) discharge, CHMI, WRI T.G.M., River Board
- evaporation, model calculation
- potential evapotranspiration, model calculation
- water storage in the soil, model calculation
- changes of groundwater storage, model calculation

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➤The balance calculations

Symba model with computational step 1 month

model parameters estimation:

the model values should correspond with the most observed values

for parameters estimate two-stage optimization is used

Outputs of the hydrological balance assessment are the base
for water resources balance assessment (River Board, s.e.)

and

for overall water balance assessment (Water Research
Institute, T.G.M.)

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➤Publishing

Printed publications and pdf files:

- Ministry of the Environment CR
- Ministry of the Agriculture CR
- State enterprises: Elbe River Board, Vltava River Board, Ohře River Board, Odra River Board, Morava River Board
- Water Research Institute, T.G.M.

Chapter in the hydrological yearbook (CHMI)

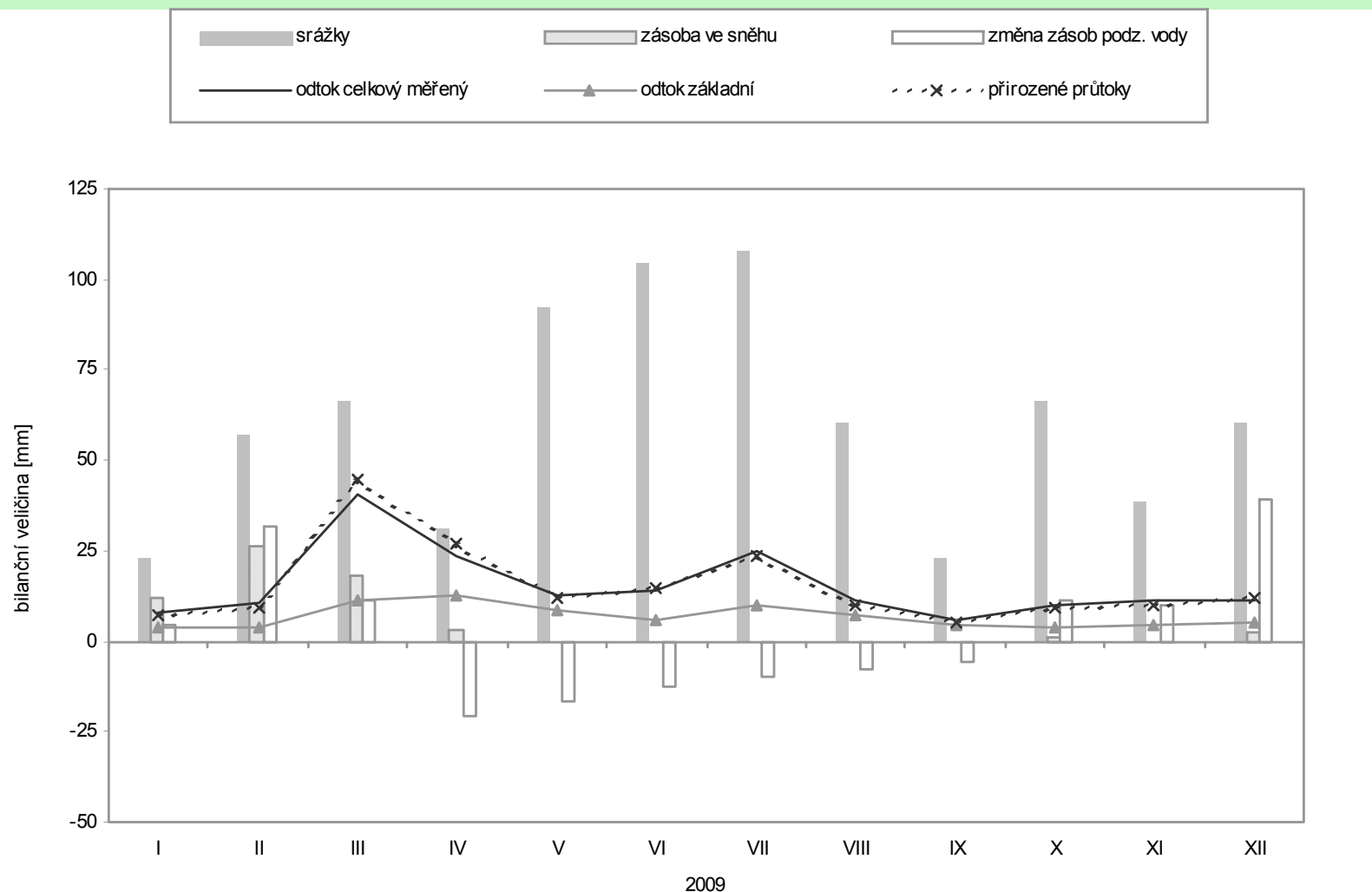
Portal CHMI (<http://voda.chmi.cz/bil/index.html>)

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river	discharge gauging station	dtb	catchment area [km ²]
Labe	Hřensko	2450	51392

month	precipitation		total runoff measured			base flow			water equivalent of snow		change of groundwater storage	natural (unaffected) flow	
	[mm]	% norm.	[mm]	[m ³ .s ⁻¹]	% norm.	[mm]	[m ³ .s ⁻¹]	% norm.	[mm]	% norm.	[mm]	[mm]	[m ³ .s ⁻¹]
I	22,7	57%	7,9	151	42%	3,9	74,6	47%	11,8	60%	4,4	7,0	134
II	57,2	159%	10,4	214	53%	3,7	76,9	46%	26,3	113%	31,8	8,9	183
III	66,6	151%	40,2	772	156%	11,1	214	114%	17,9	114%	11,2	44,5	855
IV	31,0	71%	23,8	471	100%	12,7	252	117%	3,1	119%	-21,1	26,7	530
V	92,1	136%	12,8	246	73%	8,8	168	95%	0		-16,4	11,8	227
VI	104,8	129%	14,2	281	101%	6,1	121	89%	0		-12,7	14,9	296
VII	107,7	134%	24,9	477	200%	10,2	195	165%	0		-9,9	23,6	452
VIII	60,2	80%	11,2	214	95%	7,4	143	133%	0		-7,7	9,6	185
IX	23,0	44%	6,1	120	61%	4,5	89,4	96%	0		-6,0	4,9	97,5
X	66,3	155%	9,7	186	89%	3,8	72,7	82%	1,2		11,1	9,5	181
XI	38,5	83%	11,0	218	87%	4,6	91,9	90%	0	0%	9,6	10,1	201
XII	60,6	127%	11,4	219	69%	4,9	93,4	77%	2,2	24%	38,9	11,8	226
2009	730,7	111%	183,5	297	94%	81,8	133	95%	62,5	86%	33,3	183,4	297

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Thank you for your attention