Water management and mitigating the effects of climate change

28th PURPLE GENERAL ASSEMBLY
27th June Brno, Czech Republic

Miroslav Foltýn

Morava river basin, state enterprise

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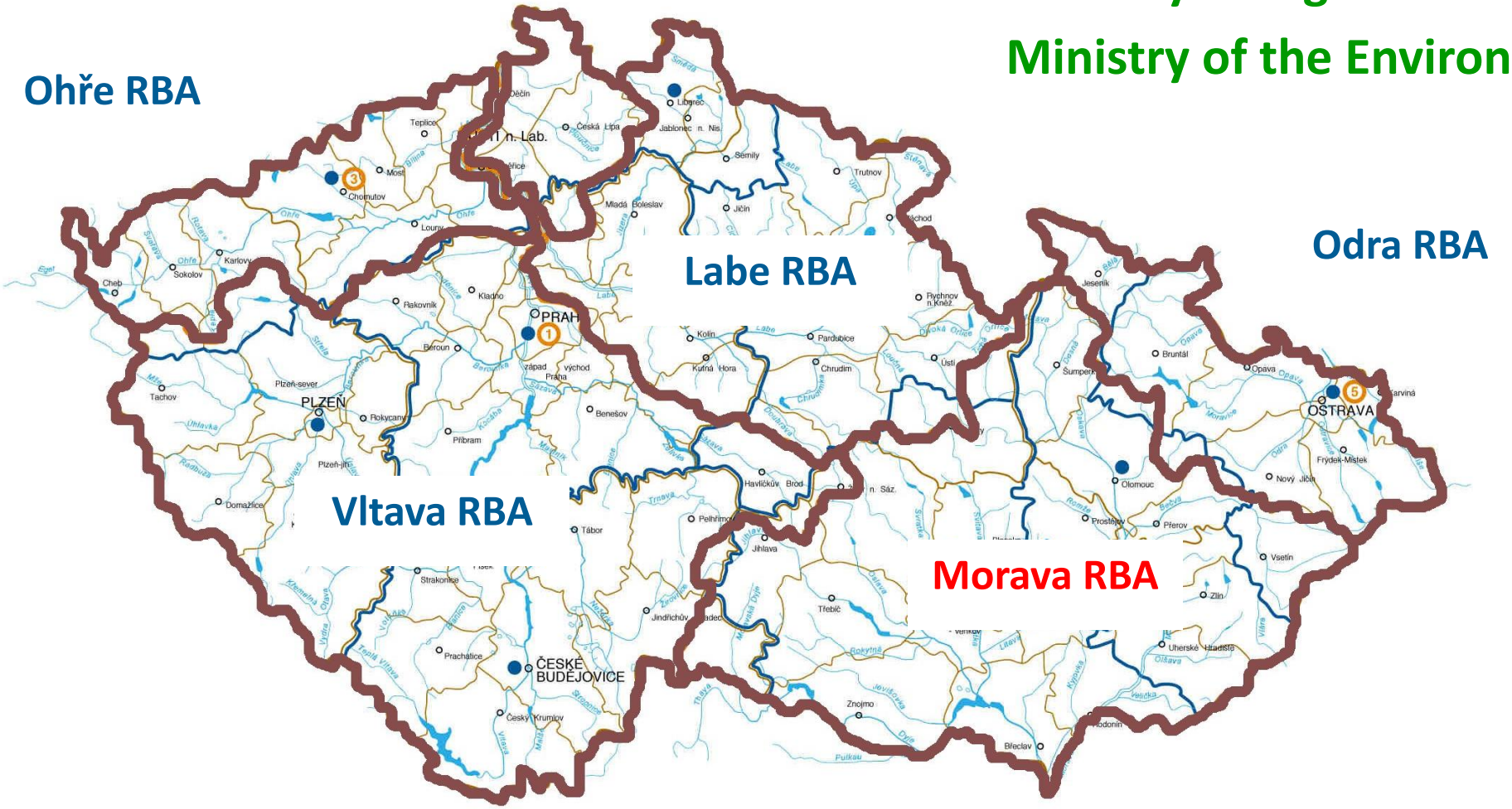
River basin administrations (RBA) in the Czech republic

Ministry of Agriculture

Ministry of the Environment



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Morava River Basin, state enterprise

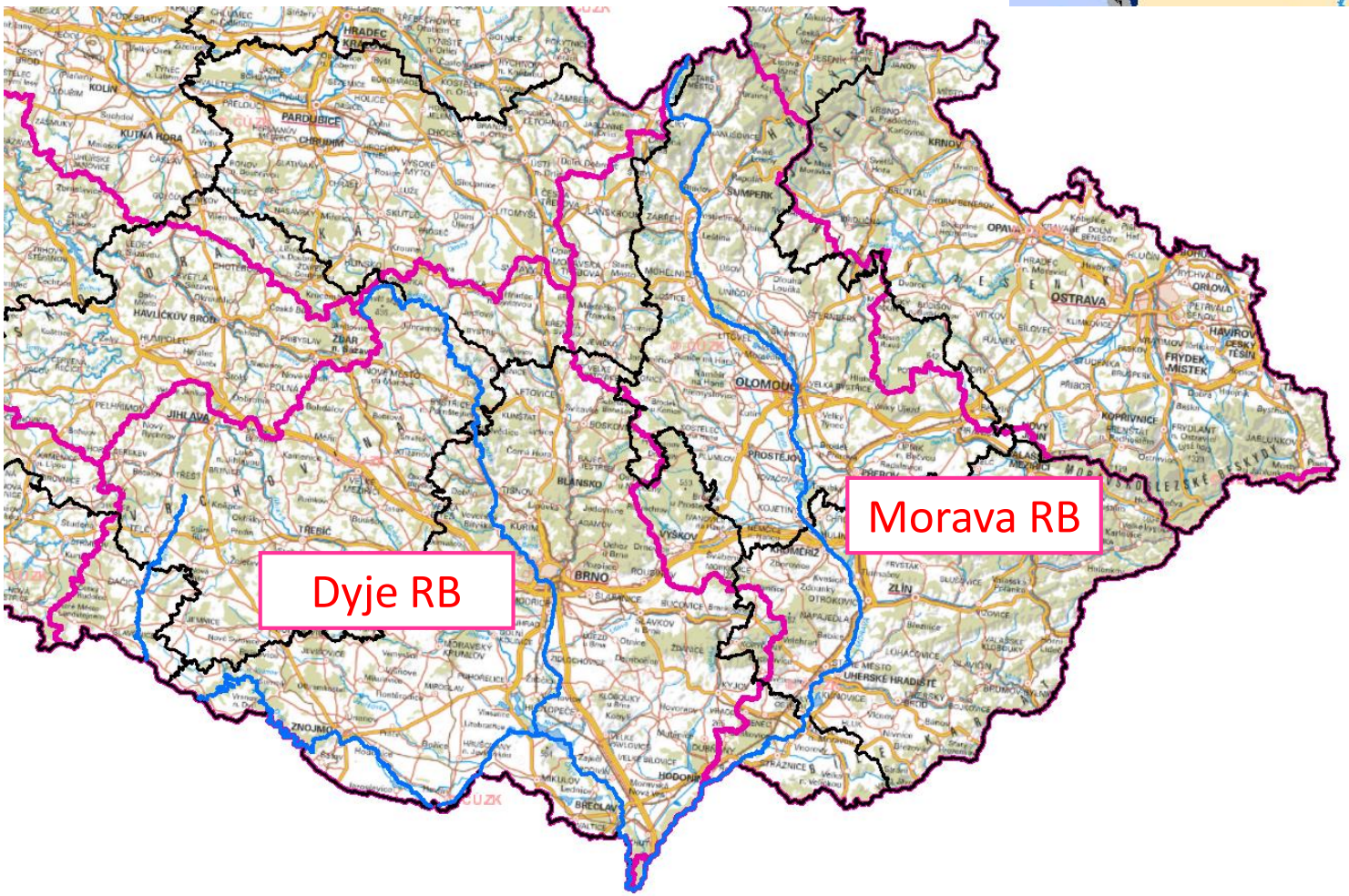
Scope of action in two sub-basins :

Moravy

Dyje

intervenes in the territory of 7 region

On the territory live about 2.9 million inhabitants



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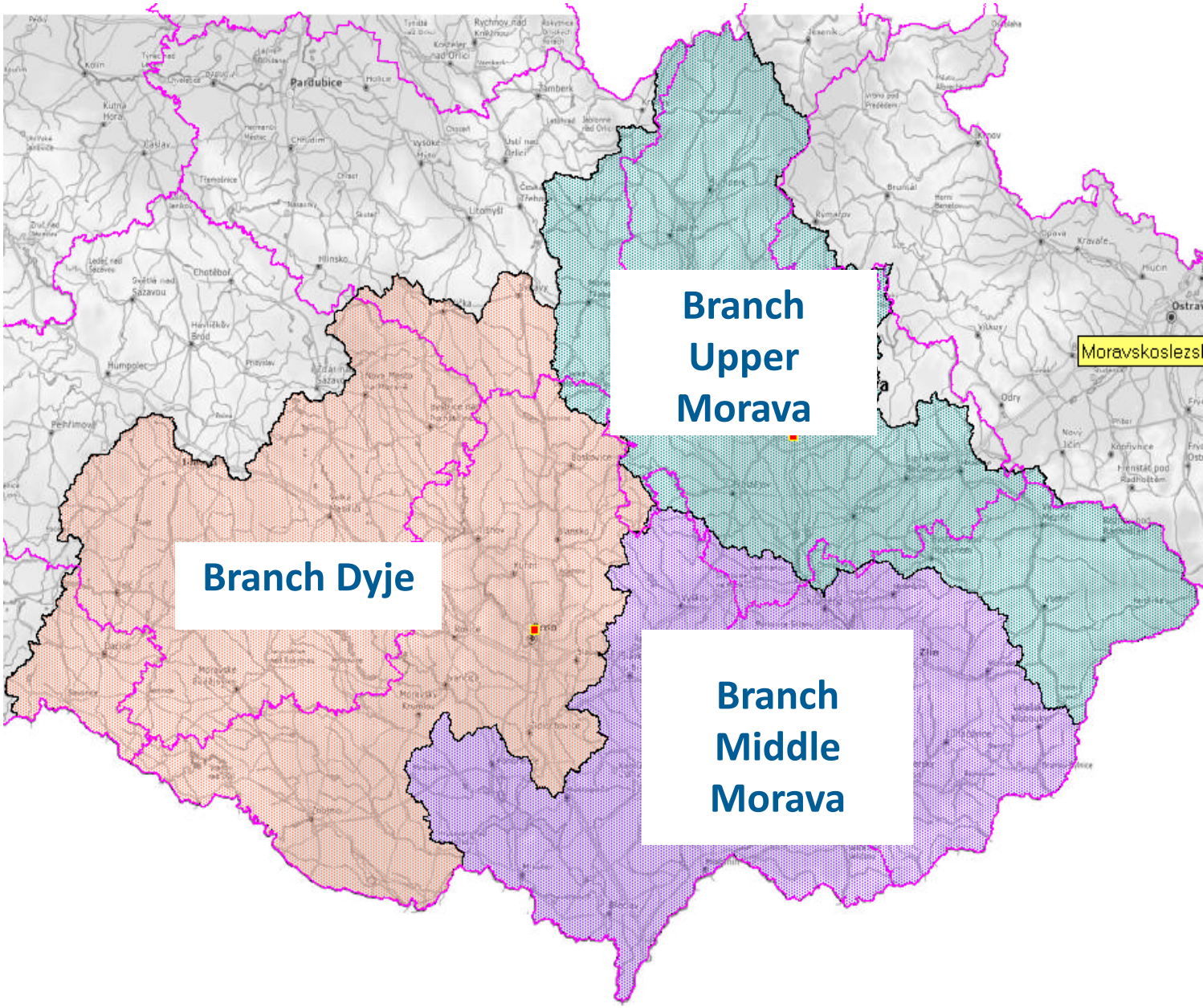
Morava river basin, state enterprise

Water area:	21.132 km^2
Lenght of rivers:	10.798 km
- main rivers:	3.757 km
- small rivers:	7.041 km
Dikes:	1.083 km
Water reservoirs:	
- main	29
- small	139
Other:	
wears	172
h.power plant	15
navigation lock	13
pumping station	20



Characteristic of main river basins

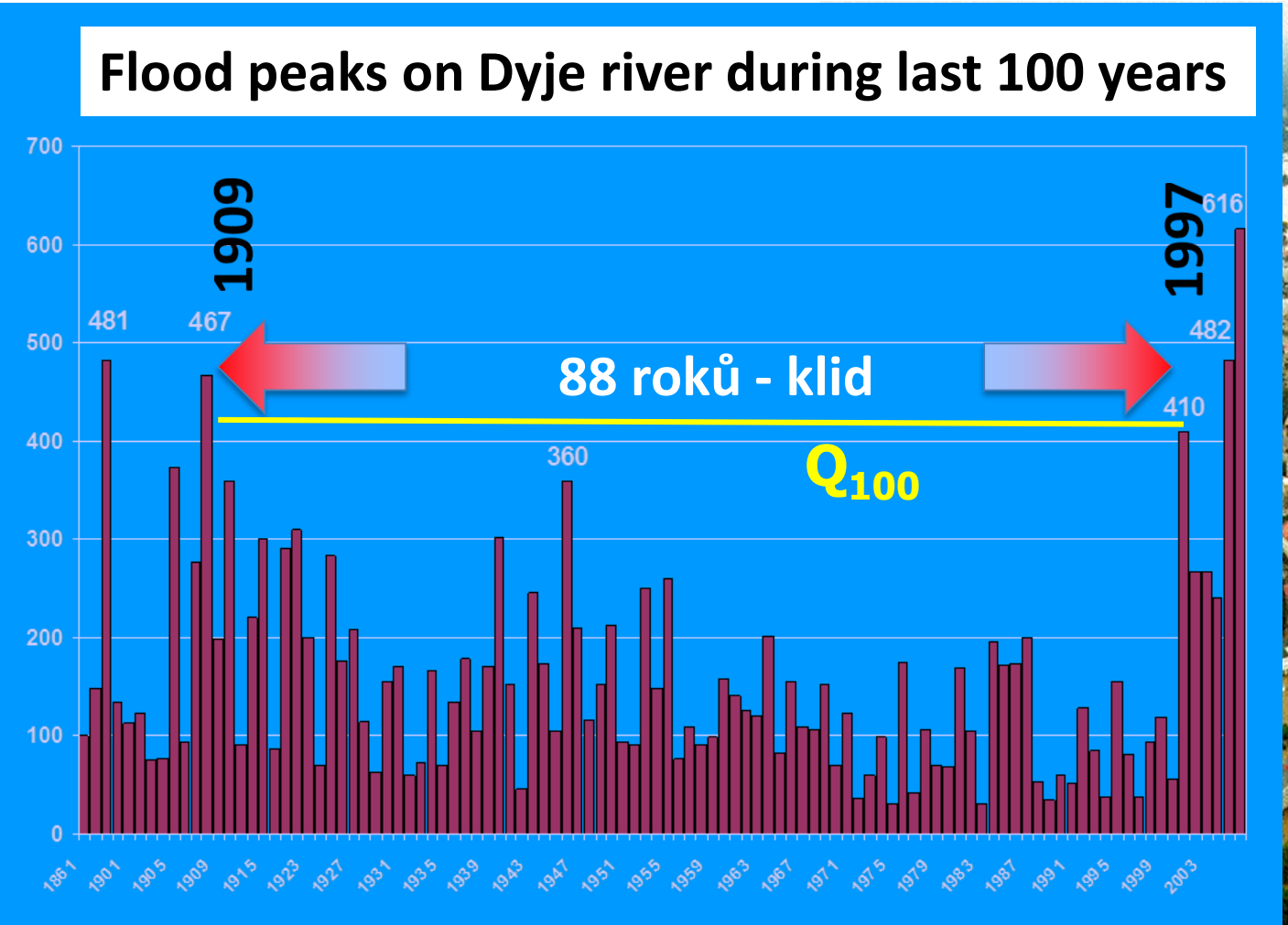
Charakteristic	Main river basin			All CZ
	Labe	Odra	Morava	
Average altitude [m n.m.]	446	443	397	432
Main river long-term average discharge on border profile [$m^3.s^{-1}$]	313	32	101	-
Average annual precipitation amount [mm]	653	808	640	661
Specific outflow [$l.s^{-1}.km^{-2}$]	6,1	10,8	4,8	6,1

Morava river basin has the least favorable natural conditions of water resources from the whole Czech Republic.

Climatic change in the Czech Republic - Flood

Continuously from the first extreme flood in the Morava & Odra River Basin:

1997, 2006, 2009-torrential, 5.+6.2010, 8.2010, 2013



Olomouc city during flood July 1997

Climatic change in the Czech Republic - Flood

Response/Measures to flood events after 1997:

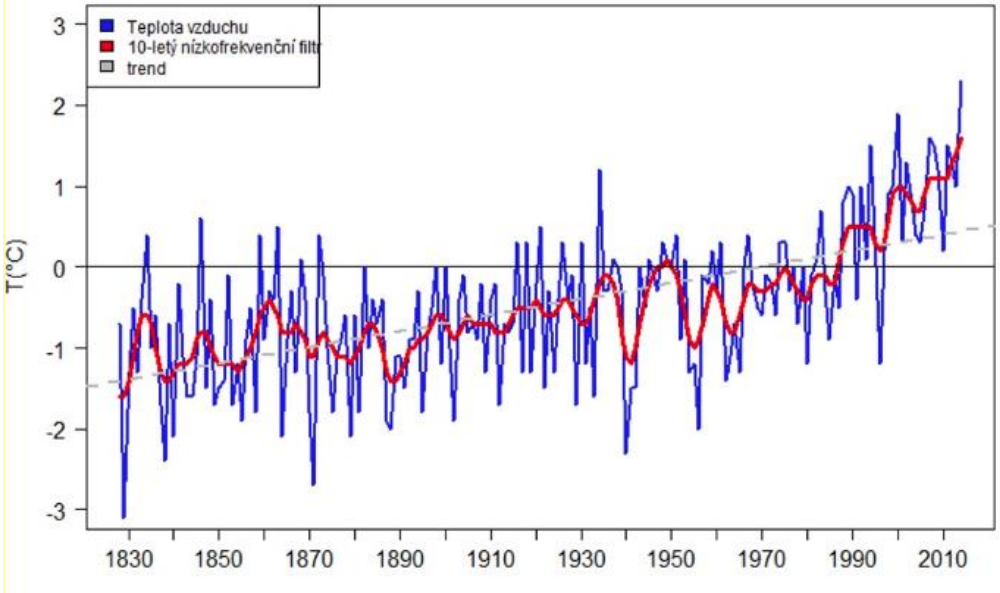
- „General“ of flood protection measures in Morava & Dyje river basin (1998) … mapping of overflowing, estimated of floodplains
- Strategy of Flood Protection in the Czech Republic (2000)
- Significant improvement of Flood Forecasting Services (monitoring)
- Modernization of Integrated Rescue System
- Removal of flood damages
- Prevention of floods (buildings)

General Climatic change in the Czech Republic

Meteorological characteristics change

- gradual increase in mean annual air temperature
- Annual average of the precipitation will not change dramatically, but dramatically change their distribution throughout the year
- Increase of vapor / evapotranspiration

gradual increase in mean annual air temperature



In the last years was achieve assumptions which have be expected in the 2050 and futher:

Annual total precipitation in the 2017 compared with annual average precipitation on selected dams.

	Dalešice	Hubenov	Mostiště	Nová Říše	Vír	Vranov	Bystřička	Plumlov	Slušovice	Brno	Koryčany	Letovice
total 2017	468	644,6	517,9	487,1	601	343,2	816,2	461	678,8	475,6	522,8	624,6
Annual average	651.2	701.2	675.6	677.8	768.4	653.7	993.4	647	846.7	668.8	696	686
%	72	92	77	72	78	52	82	71	80	71	75	91

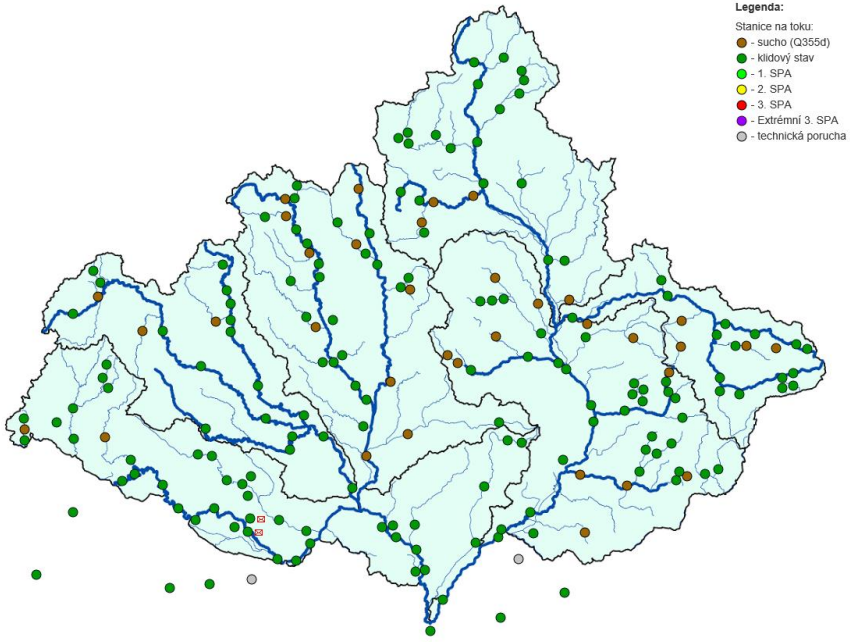
Climatic change in the Czech Republic - Drought

Drought is considered more dangerous than floods

Prevention (water management):

- **Monitoring … surface water – River Basin Authority + CHMI**
  (CZECH HYDROMETEOROLOGICAL INSTITUTE)

  … groundwater – ČHMI
- **Evaluation of the water status – water balance**
- **Forecasts and studies**
- **Management in water management systems**



Water balance

- **Its compared of water sources with water requirements**
- **Every year we process it for the past year**

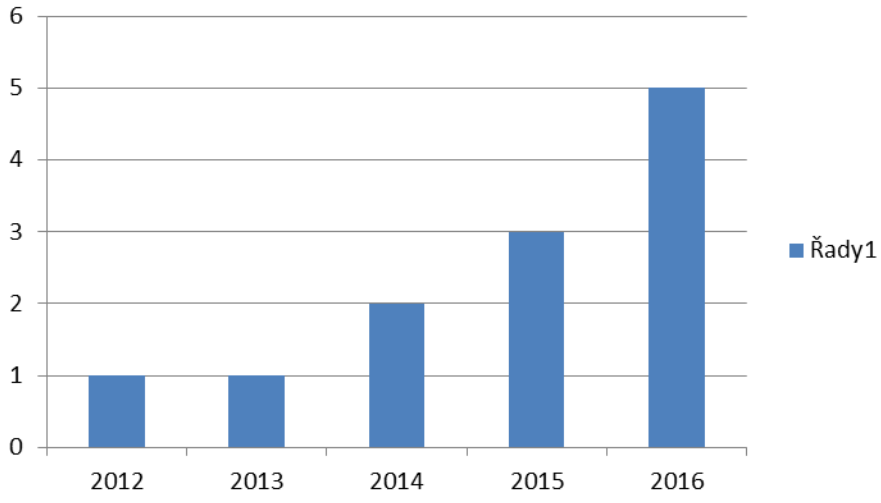
balance status 1 – all right

balance status 5 – problems (in quality + water use)

Development of problem balance status 5 (in the last 5 years):

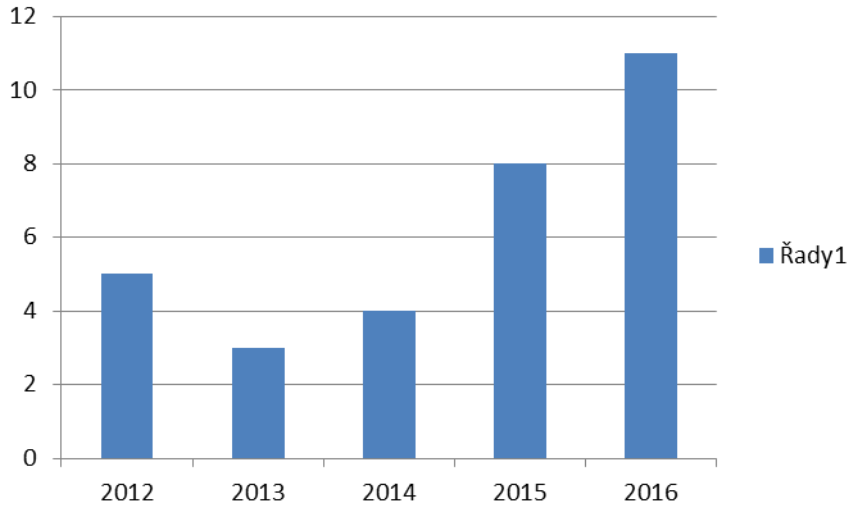
DP Dyje:

Year	Balance status BS5
2012	1
2013	1
2014	2
2015	3
2016	5



DP Moravy:

Year	Balance status BS5
2012	5
2013	3
2014	4
2015	8
2016	11



Balance of water sources CZ/Dyje

- Currently, between 30 and 72% of authorized water abstractions are used in the Czech Republic
- Everywhere else it is up to 50%, only in the sub-basin Dyje = 72%

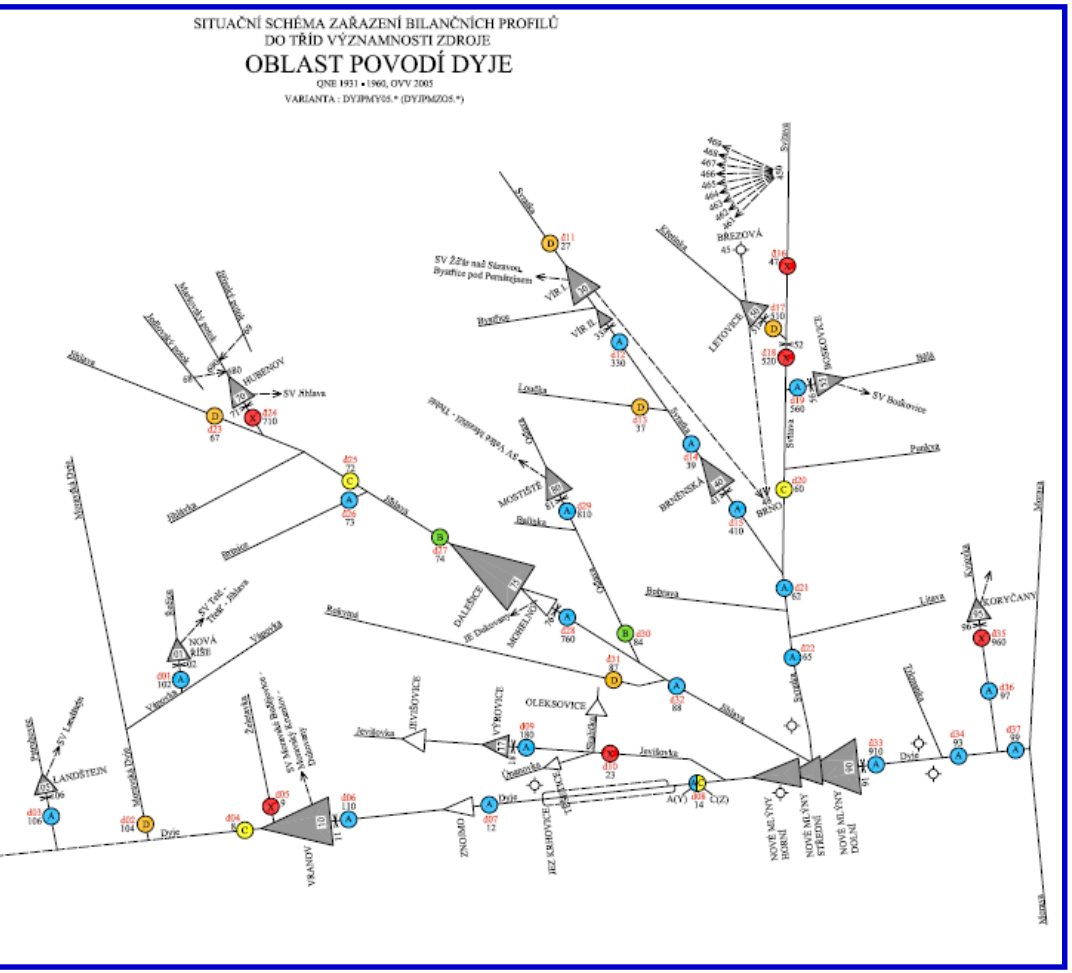
there may be a situation where filling of water abstraction to the allowed level could result in a passive balance - an example of DP Dyje:

Type of water abstraction	Allowed quantity (tis. m^3/year)	Currently water abstraction (in % allowed quantity)
Water supply	86 862	**20,4**
Other	106 727	**93,1**
Irrigation	20 958	**29,8**

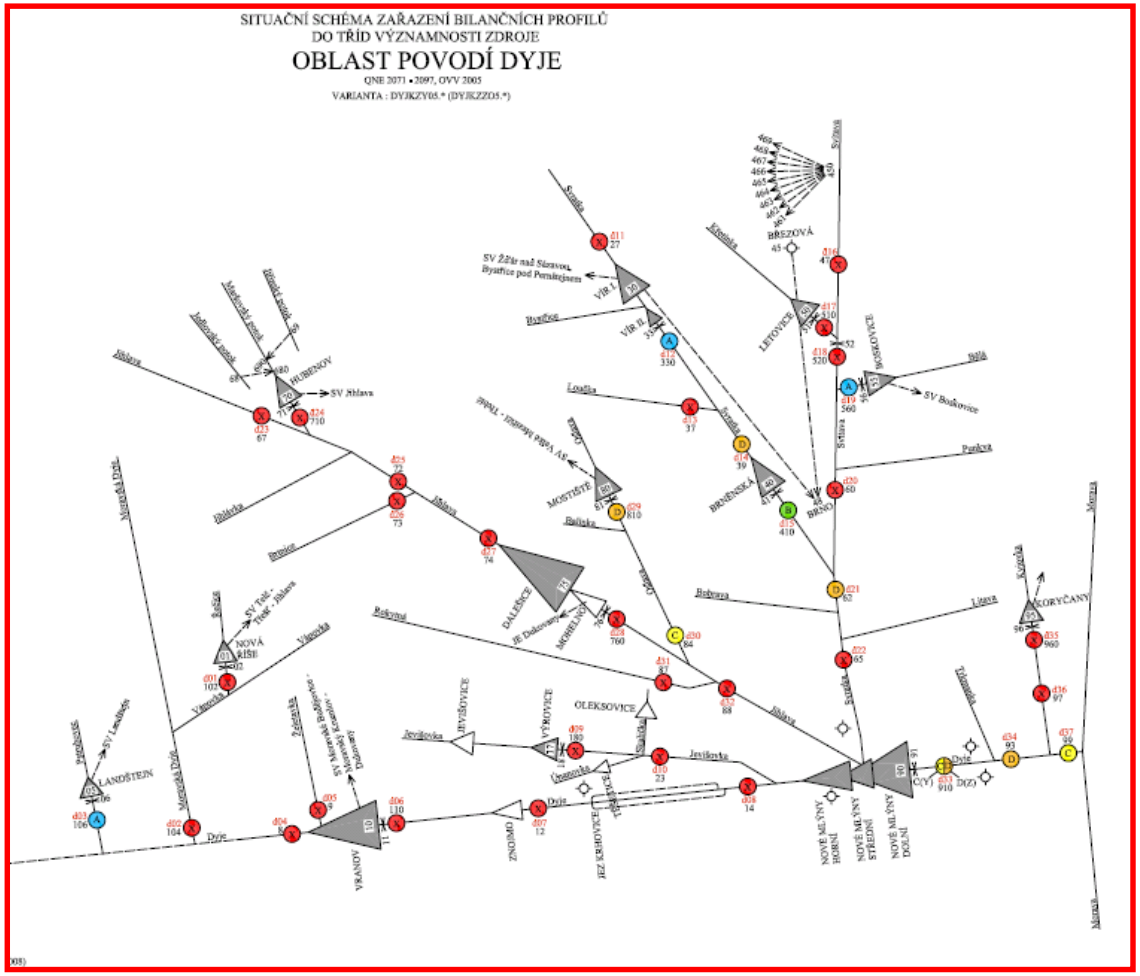
Already in the current time appear tense and passive balance status – **future**?

Expected balance for climatic change in sub-basin Dyje

WR balance – current status:



WR balance – for climate change 2097:



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Climatic change in the Czech Republic - Drought

Elimination of drought measures (water management):

Short-term :

- Operative management with limited water sources

  … is used from 2014

- Regulation of water abstraction (+ authority)

  … is used according to actual situation

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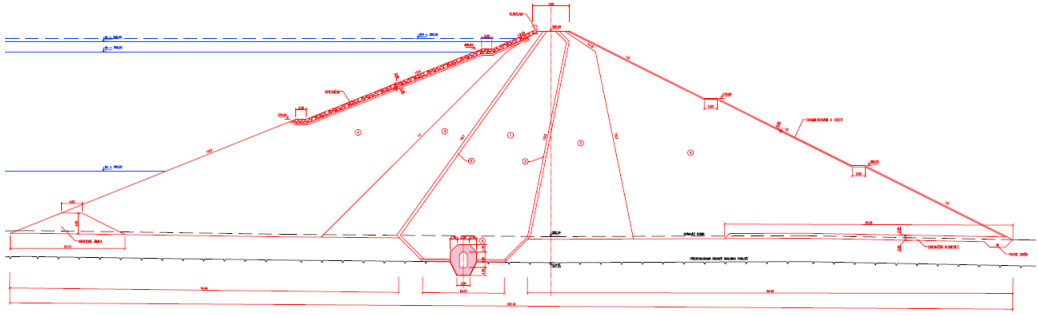
Climatic change in the Czech Republic - Drought

Elimination of drought measures (water management):

Long-term: … we provide ongoing

- **Water retention in the landscape – e.g. revitalization of watercourses**
- **Screening of new water sources**
- **Preparation of new water sources**



Climatic change in the Czech Republic - Drought

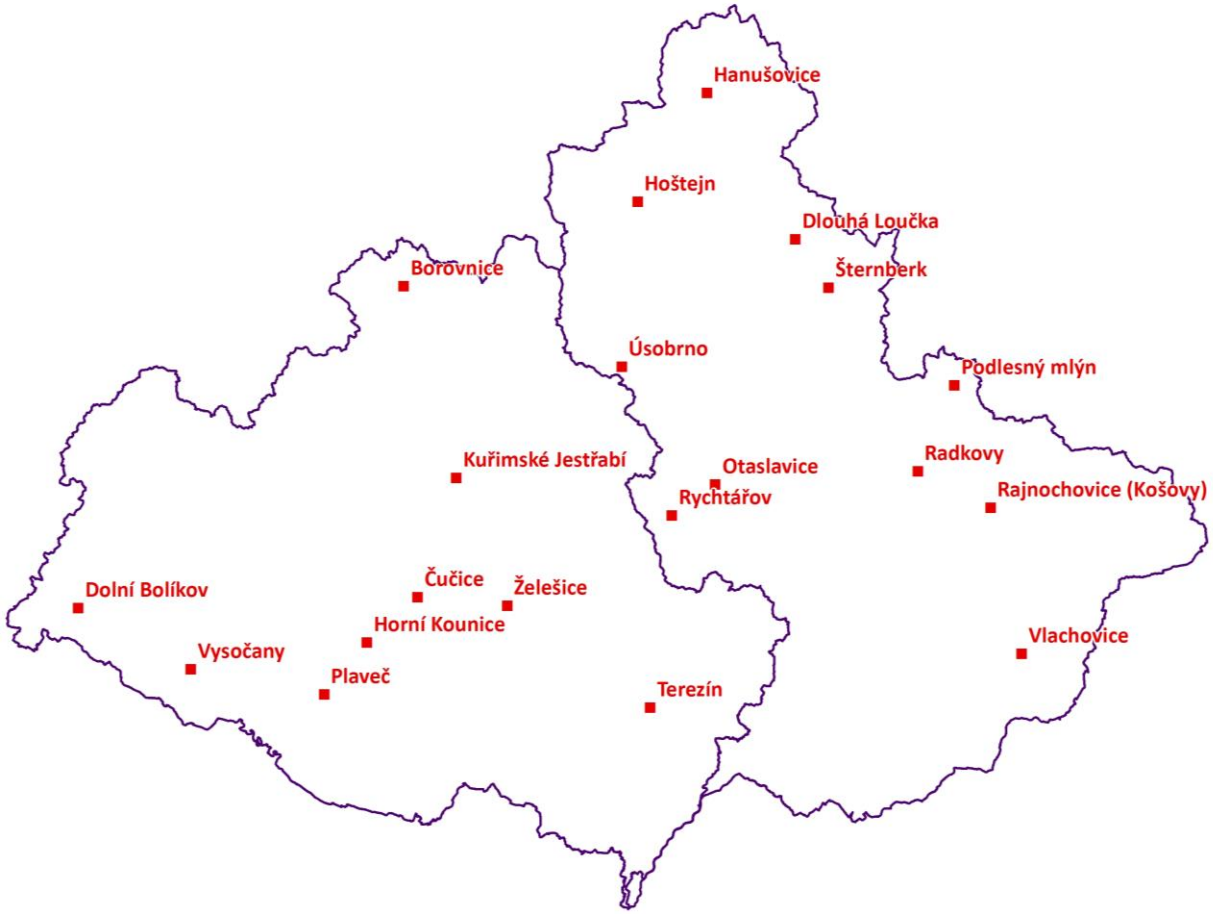
Protection of prospective localities suitable for accumulation of surface water in water reservoirs

Document:

„ General of surface water accumulation localities“

Conceptual document approved by

- **Ministry of agriculture**
- **Ministry of environment**



Climatic change in the Czech Republic - Drought

Elimination of drought measures (other sectors), e.g.:

All sectors:

- **Save water**

Agriculture:

- **Better soil management**

Communal sector:

- **Management of rainwater (retention + using)**

Climatic change in the Czech Republic - Drought

National conception document:

Adaptation Strategy (Strategy of the adaptation to climate change in the Czech Republic conditions)

… approved by the government of Czech Republic 26. 9. 2015

Action Plan (National action plan of the adaptation to climate change)
implementation document

… approved by the government of Czech Republic ČR 16. 1. 2017

Thank you for your attention

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