"Protection of water resources in the context of a 5-year dry period in The Czech Republic“

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Mgr. Lukáš Záruba

Ministry of the Environment
of the Czech Republic

Ministry of the Environment
Vrsovicka 65, 100 10 Prague 10
Czech Republic

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General information: Climate change - expected scenarios for the Czech territory

- Total amount of annual precipitation will not change – but the time distribution will change dramatically
- Climate change is closely related to the increase of air temperature, which causes higher evaporation from the landscape and thus increases pressure on water resources
- Flood situations might occur in winter and in early spring
- Summer droughts will be longer and inferior
- Growing importance of rainwater harvesting

Measures of adaptation have to be prepared against both hydrological extrems: floods as well as droughts

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General information: drought

Year 2018

- was a continuation of the dry season, which began in 2014, and together with the year 2015 became its peak so far
- was the second driest year in terms of total rainfall since the beginning of the monitoring in 1961
- from July to September was the largest dry episode ever seen since the 1960s

- **National Reports on Drought**

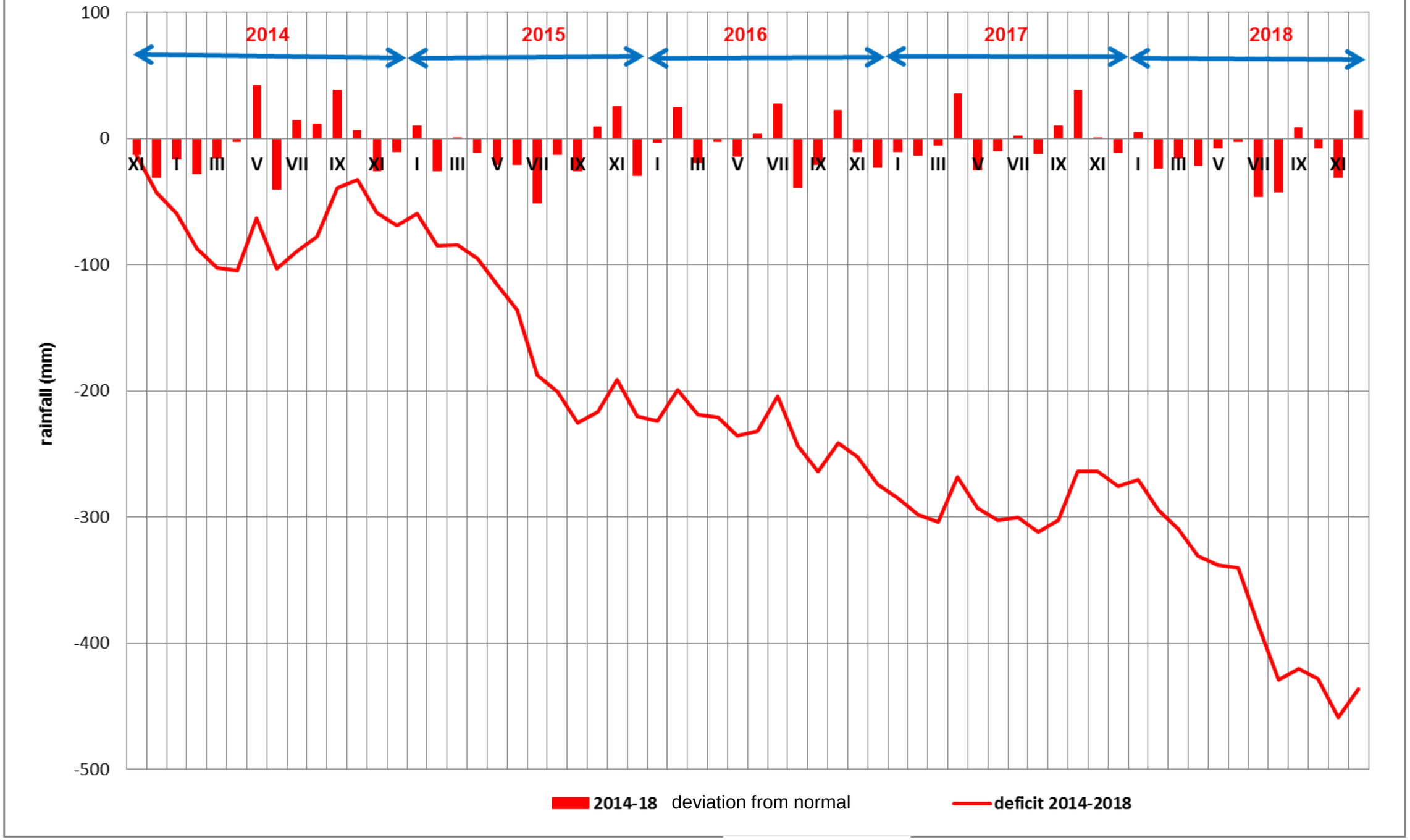
Report on Drought in The Czech Republic in 2015 in English

http://portal.chmi.cz/files/portal/docs/meteo/ok/SUCHO/zpravy/en_drought2015.pdf

Preliminary Report on drought in 2018 in Czech only

http://portal.chmi.cz/files/portal/docs/tiskove_zpravy/2019/Predbezna_zprava_o_suchu_2018.pdf

Average precipitation in CZ in 2014 - 2018



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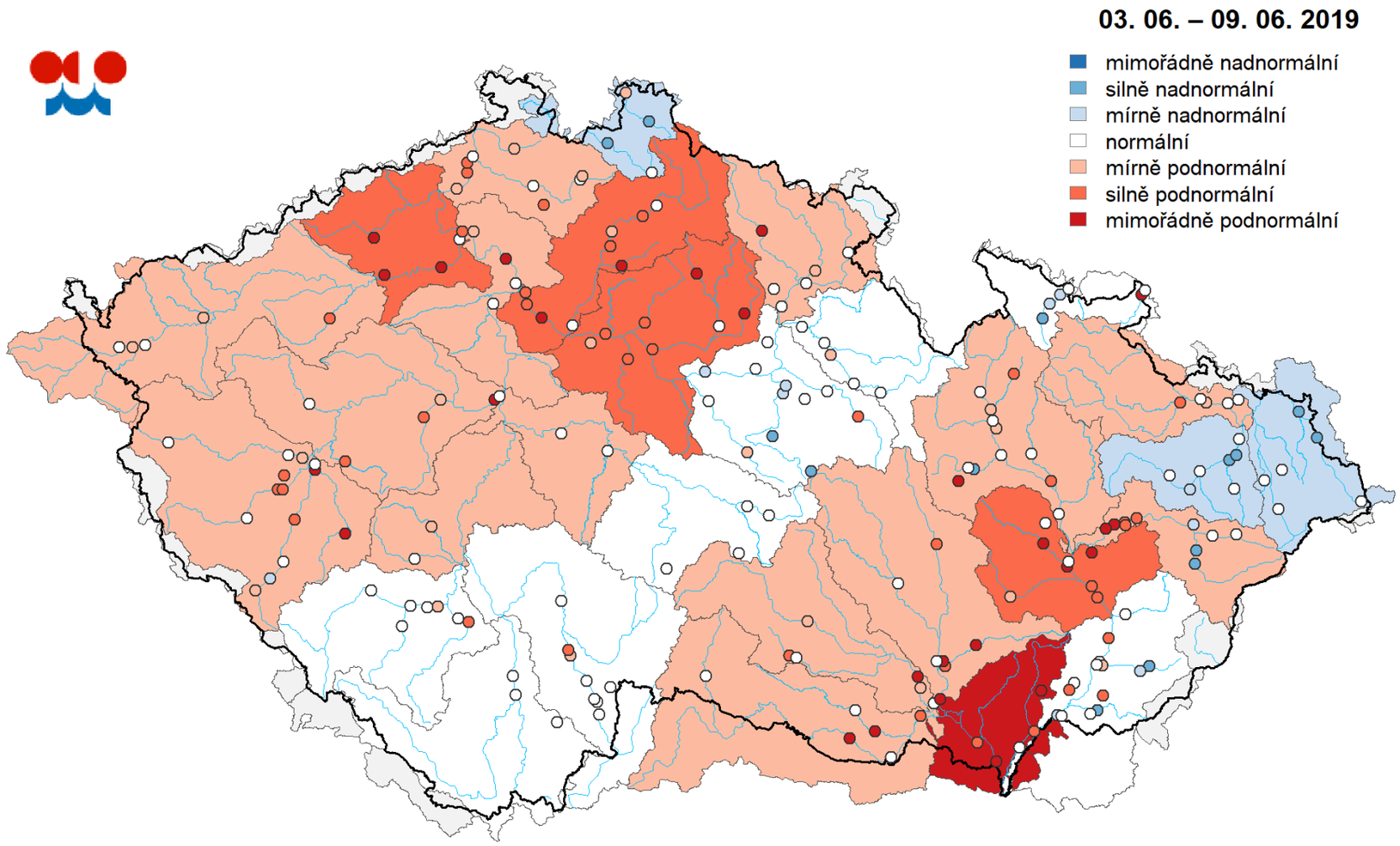
Groundwater level in shallow boreholes



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Response to long-term drought- strategic documents

- **Strategy on Adaptation to Climate Change in The Czech Republic**

  „Adaptation Strategy“ approved by Government in October 2015

- **National Action Plan on Adaptation to Climate Change**

  Approved by Government in January 2017

  Implements Adaptation strategy by defining concrete actions together with responsibilities and deadlines

Both documents are available at https://www.mzp.cz/en/climate_policy_of_the_czech_republic

- **Concept of protection against consequences of drought on the territory of The Czech Republic**

  Approved by Government in July 2017

  Based on work of interdepartmental Commission VODA-SUCHO

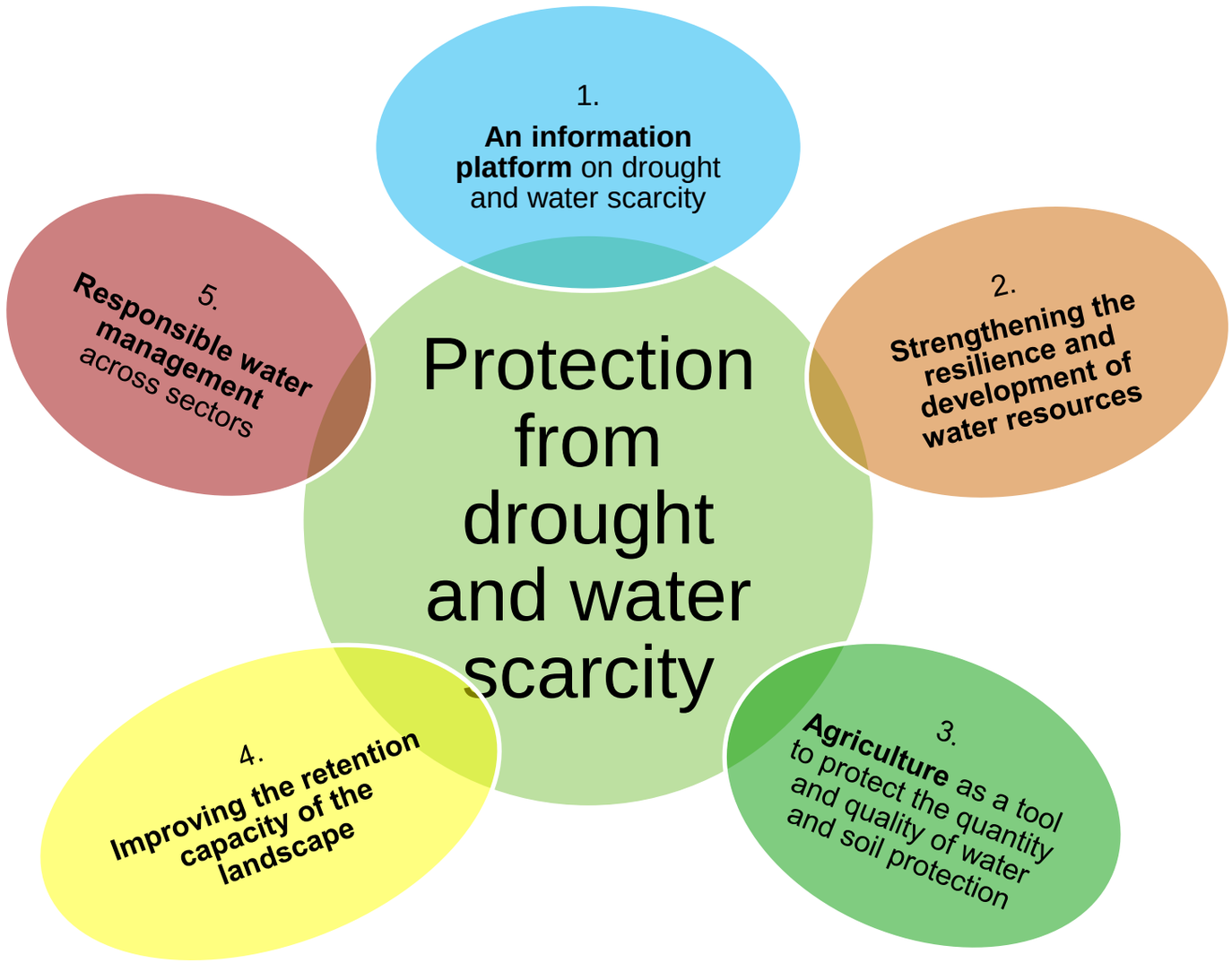
  Available at www.suchovkrajine.cz

  Adaptation measures with the highest priority (adaptation to all climate change manifestations)

  =

  Change of agricultural and forest management in our landscape

Strategic documents on drought



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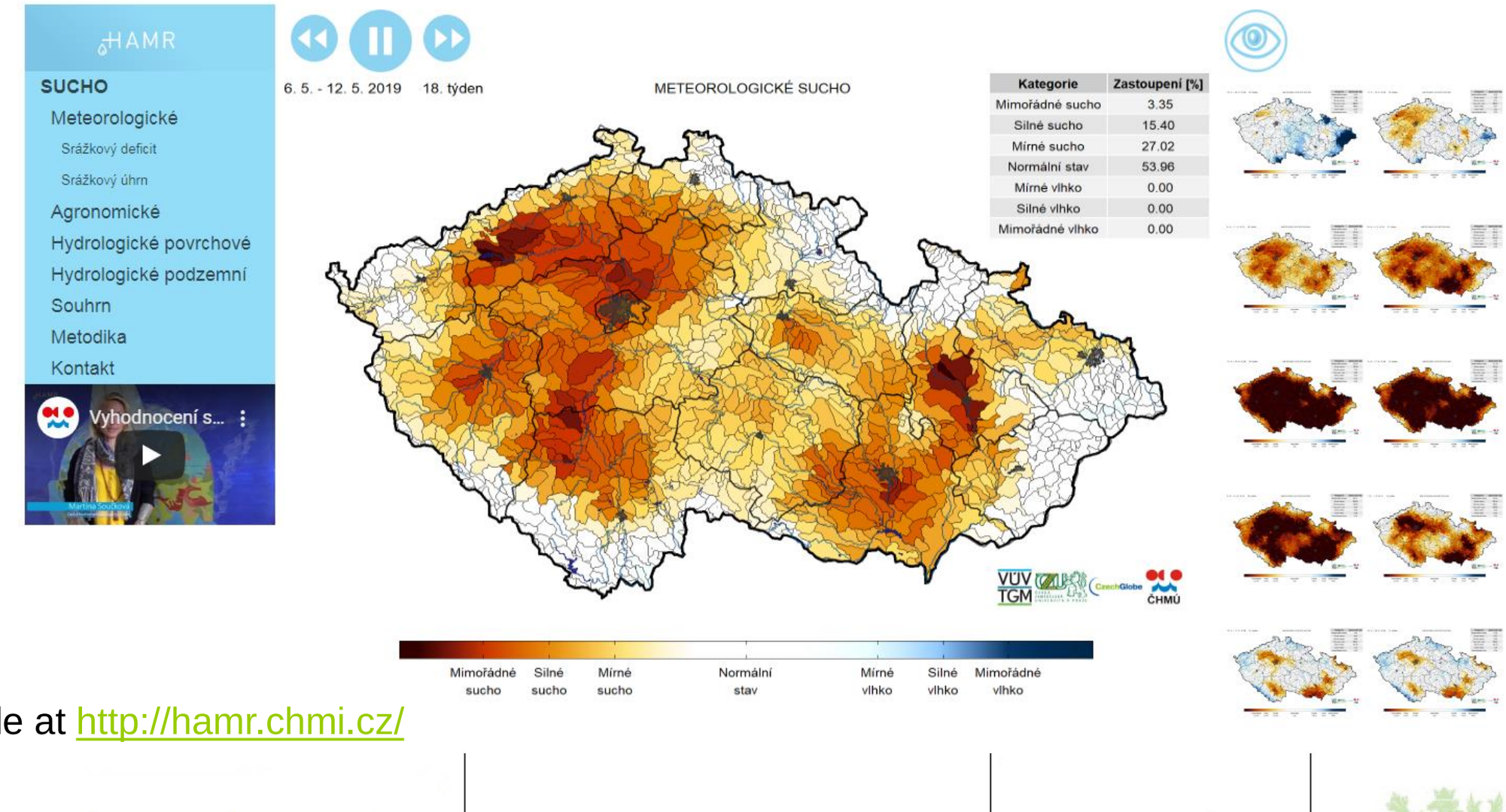
Response to long-term drought – The On-line System HAMR

What does HAMR do?

- Shows the current state of drought, i.e. the state of surface and ground water, the state of the water level in the reservoirs and the soil moisture
- Presents the intensity of drought using the drought indexes
- Predicts the development of the hydrological situation for up to 8 weeks
- Compares available water resources with requirements of water users and simulates the effects of potential planned restrictions
- Generates a list of water users with issued permission for a defined area
- Creates a web-based platform for sharing information on current water requirements by customers to optimize water handling on dams

On-line system HAMR – pilot version

- Pilot version launched at the end of 2018
- Updated every Wednesday noon
- Short video commentaries are added to better interpret the data to the general public



Available at http://hamr.chmi.cz/

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Response to long-term drought - Strengthening water resources

- Last dam bulit in The Czech Republic: **Slezská Harta** (approved in 1996)

- Long-lasting preparatory works and permitting process in case of building new dams (for instance **Nové Heřminovy dam**, realization planned for 2020 (included in Water Management Plan since 1973)

- **Ongoing activities:**

  Realization of Vlachovice dam (Zlínsko)

  Preparatory works for dams: Skalička (originally planned as polder, today multipurpose dam),

  Senomaty, Šanov a Kryry

  Elevation of water level on Novomlýnské dams including compensation measures for NATURE 2000 protection

  (**35 cm = increase in the volume of retained water by 9 million m^3)**

Drinking water protection - Protection zones of drinking water sources

- By the amendment of the Water Act the compensation in case of introduction of measures limiting land use was extended also to **tenants**

- The comprehensive national database of „Protection zones of sources of drinking water“ is being set up - The aim of the ongoing project is to create a layer of valid water resource protection zones with existing water permit

Legislative measures – ongoing amendment of the Water Act

- The aim of the Water Act amendment is to set up the holistic reaction to drought, its causes and impacts

- Prepared by Ministry of Agriculture and Ministry of the Environment:
  - new Section **regarding drought and water scarcity management**
    - Reduction of unregistered water abstractions
    - Broadening the competences of water authorities to interfere into existing water permits due to changed conditions
    - Definition of clear preference of rainwater management (1) use of rainwater at source (households, gardens), (2) infiltration (3) retention and outflow

- How to ensure the ground water sources?

  a) financial regulation – results uncertain
  b) „absolut“ regulation
     - better supervision of water abstractions
     - tools to respond to water scarcity by restrictions of some abstractions
     - possibility to respond to a change in the hydrological situation by updating already issued water permits

Legislative measures – ongoing amendment of the Water Act

❖ **The Drought Commission**

Mandatory at the regional and national levels

Members: President of the regional Council, representatives of the Water Authority, River Basin Authority, Czech Hydrometerological Institute, Police, Firemen, Regional Hygiene Authority and others if needed

Takes decissions by majority instead of 1 authorized representative of Water Authority

❖ **Drought management plans**

- Basis for decision-making by the Commission on drought and water scarcity
- The main objective is to prevent the crisis situation
- Contains identification and description of water resources, drought and water scarcity assessments, design of procedures and measures to mitigate the negative impacts of drought

Legislative measures – ongoing amendment of the Water Act

The Drought Commission may, among others ,take the decision, that will:

- regulate, reduce or, where appropriate, prohibit general use of surface water
- **regulate, reduce or, where appropriate, prohibit permitted use of surface water**,
- **reduce the usage of water from public drinking water supplies** ,
- instruct the owner of the technical equipment used for the water abstraction from the **back-up water source to put it into operation** so that this back-up water source can be used,
- regulate the minimal flow or minimum groundwater level set out in the water permit,
- impose an exceptional monitoring of the quantity and quality of water…

Ongoing amendment of the Water Act- drought and water scarcity management

The Drought Comission shall respect given hierarchy:

Ensuring critical infrastructure

Public drinking water supply

Animal production and ecological functions of water

Economic use

Other uses

The Drought Commission decisions are immediately valid, the appeal has no suspensory effect !!!

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Legislative measures – ongoing amendment of the Water Act

6000 m³

1000 m³

Legislative measures – ongoing amendment of the Water Act

New reasons for changing or revoking the water permits introduced:

- If the scope of the issued water permit exceeds significantly and in a long-term the needs of an authorized person

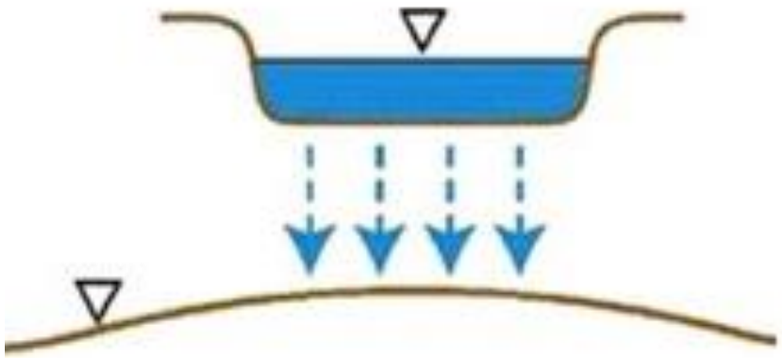
- If a **significant change in the conditions decisive for issuing the water permit** occures (such as neccesity to reset e-flows etc.)

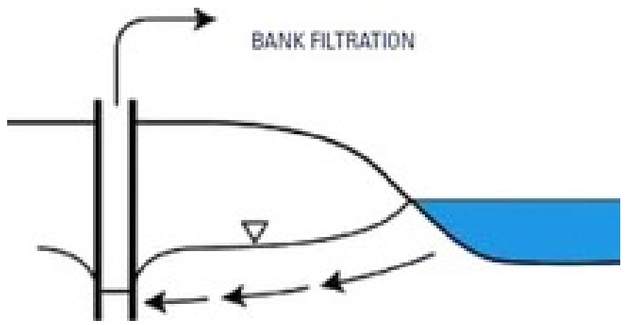
- If there is **a serious or repeated breach of the obligations laid down by law or permit** in the execution of the water permit

Technologies of artificial infiltration to increase ground water levels

- It is a controlled infiltration of surface water into the underground

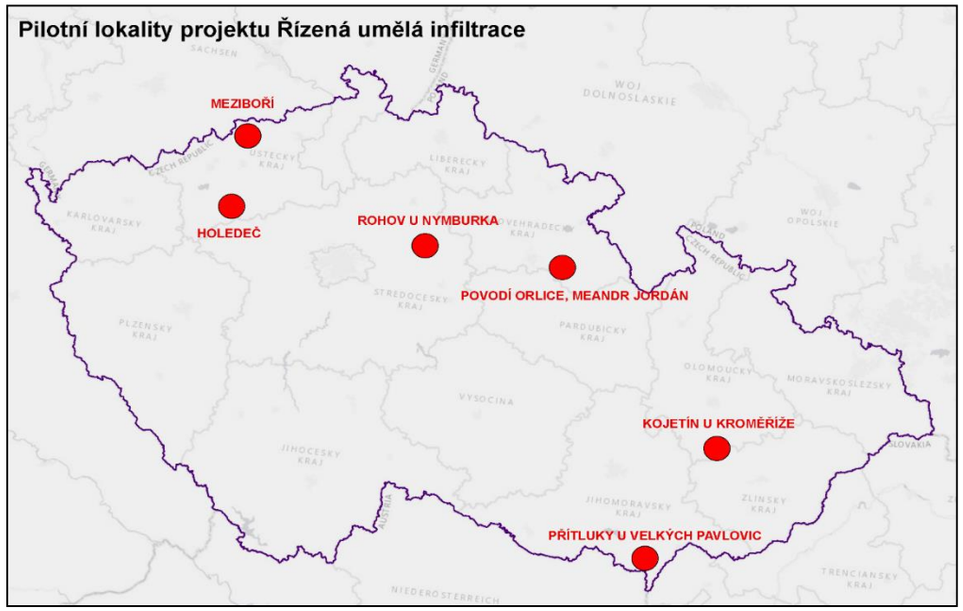
- An example of using artificial infiltration in practice is the water supply in Káraný
  (infiltration tanks - gravel layers - underground aquifers - pumping)





Technologies of artificial infiltration to increase ground water levels

- The research project assessing the functionality of individual technologies of artificial infiltration at 6 pilot sites
  - Site Týniště nad Orlicí : effect of revitalization/bank infliltration is being analyzed ,Labe River Basin Authority, implementation in 2019
  - Underground sealing wall is being implemented at the site Meziboří untill 2020



Conclusions

- The period from 2014 to 2018 is comparable to the most significant long-lasting periods of droughts.

- In general, in The Czech Republic the volume of precipitation is limited due to the amount of evaporation - if the temperature increases, the drought threshold will shift.

- If we are not skilled enough in rainwater harvesting, it is time to learn to do so.

- One of the responses of the state to the drought episode is an the Water Act amendment.

- Prices of Groundwater and surface water are not raised, but greater oversight of withdrawals and withdrawal reduction mechanisms are introduced during the time of water scarcity.

Conclusions

- In order to ensure the availability of water, there is a need for a complete "landscape reconstruction" (**change of agricultural and forest management in our landscape**), as well as the construction of new water reservoirs - where water resources are already scarce and there is no way to provide the water otherwise (e.g. by artificial infiltration or by pipeline from another source)

- **Reduction of drinking water consumption in households**

88 l per person/day

110 l per person/day

144 l per person/day

- **Wastewater reuse**
  (Regulation of the European Parliament and of the Council on minimum requirements for water reuse)

  - are the minimum requirements sufficient?
  - is it´s cost efficient?

Thank you for your attention.

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