# SECOND NATIONAL CONSULTATION DIALOUGE in Czech Republic

## 1. General Data

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| *Country:* | **The Czech Republic** |
| *Organizer:* | **Research Institute For Soil And Water Conservation in Prague** |
| *Date & Place:* | **12.6.2014, Prague, the Czech Republic** |
| *Participants:* (name & institution & email) | *Attached separately* |
| *Attachments:* (Attendance list, photos, etc.) | - *attendance list*<br>- *https://www.flickr.com/photos/gwpcee/sets/72157645255882117/* |

## 2. Agenda

*Objective:*

To discuss the outputs of IDMP project – Activity 2.1 Guideline for Drought Management Plans, Content of Drought Management Plans and its implementation within the government system and rules.

*Agenda – presentations:*

Registration of participants

Opening speech

a. General information about GWP and IDMP (Ing. Eva Mlejnská)
b. General Introduction about IDMP project – Review of Project's activities where Czech Republic participate (Ing. Petra Kulířová)
c. Review of outputs from First National Dialogue and information about the results of questionnaire (Ing. Petra Kulířová)

Coffee break

d. Drought Management Plans – proposal of guidelines based on Slovak case study (Ing. Petra Kulířová)
e. Presentation of Slovak Case Study (Ing. Petra Kulířová)
f. Presentation of definitions related to drought issue (Ing. Marek Batysta, PhD.)

Lunch

g. Activity 1.3 Drought information exchange platform (Ing. Petra Kulířová)
h. Activities of CHMI usable for implementation of DM plans, data exchange within the activity 1.3 (Ing. Hana Středová, PhD)
i. Introduction of Drought Monitoring for Czech Republic – INTERSUCHO project (Prof. Ing. Zdeněk Žalud, PhD)
j. Example of different attitude to the soil management by farmers – user (tenant) and owner (Ing. Jiří Hladík, PhD)
k. Activities of T. G. Masaryk Water Research Institute usable for implementation of DM plans (Ing. Radek Vlnas)

Coffee break

l. Activities of Soil and Water Research Institute usable for implementation of DM plans and drought monitoring (Ing. Jan Vopravil, PhD)

m. Introduction of Activity 5.1 Experimental field research on increasing soil-water holding capacity in agriculture and Activity 7.1 Compendium of Good Practices (Ing. Marek Batysta, PhD)

*Main points of discussion:*
Strategy of solving drought issues in the Czech Republic, main content of DMP and possibilities of its Implementation, policy and decision support system in Drought Risk Management Scheme.

## 3. Report

**Introduction:** The meeting was opened by Ing. Jiří Hladík, PhD., the director of the Research Institute for Soil and Water Conservation in Prague. He informed everybody about existing experiences in a solving of hydrological extreme issues; and about the current need of risk management plans linked with decision support schemes.

**General information about GWP and IDMP:** Ing. Eva Mlejnská informed about the activities of Global Water Partnership (GWP) and a project Integrated Drought Management Programme (IDMP) which is funded by GWP. This project is divided into few activities. The Czech Republic is involved in some of them, too.

**General Introduction about IDMP project – Review of Project's activities where Czech Republic participate:** Ing. Petra Kulířová informed in detail the most important activities of the project for this year and activities where Research institute of soil and water is involved. There were presented the expected main outputs of the project and the objective of second national dialogue: Guidelines for Drought Management Plan. As an additional outcome of the project is also expected a Compendium of good practice - which will be created from case studies and insights from the project itself. It should serve to the needs of the whole world and to support exchange information on drought - website.

**Review of outputs from First National Dialogue and information about the results of questionnaire:** Evaluation of the questionnaire, which was the gateway for this project (during the first consultation dialogue were resolved remarks based on discussions with public). It is the activity 1.2: Review of the current status of the implementation of Drought Management Plans (DMP) and measures within River Basin Management Plans (RBMP) according to the Water Framework Directive (WFD). Outputs of this activity form the base information pillar for other activity, particularly activity 2.1 (Guidelines for drought management plans), which is one of the main points today's dialogue. The final report of this activity is freely downloadable on the website of the project.

**Drought Management Plans – proposal of guidelines based on Slovak case study:** Drought management plan is the main outcome of the project. The main coordinator of this activity is Elena Fatulová. Ing. Petra Kulířová presented the "Guidelines" based on the Slovak case studies and possible approaches to deal with the effects of drought issues. This approach is based on crisis management of drought - measures adopted when drought occurs or prevention of the effects of drought in the meaning of the planning process (PMS) as the main administrative tool for drought risk management. This approach is based on the development of DMP. The main goal for this year is prepare the groundwork for the final methodological guidelines for the development of drought management plans. Ing. Kulířová reported about proposed basic principles for creating a plan and steps in the process of drawing up of DMP. As the first step is proposed to establish a commission for drought management.

**Presentation of Slovak Case Study:** The aim of the study was to provide an example on how to develop key items of DMP presented in the Report 2007 and the practical experience gained during the implementation of this study as the basis for creating an outline of the Guidelines. It is part of Activity 2.1 Guidelines for DMP (Activity coordinator is Elena Fatulová). The study analyzes and characterizes one season (2011/2012) using the existing real monitoring data. The purpose of this evaluation was to compile data from a single drought event in order to develop a representative national system of indicators and other essential items allowing implementing DMP at

the national level.

**Presentation of definitions related to drought issue:**
Because of disunity in the terms used within the project by its participants were on the workshop in Ljubljana (April 2014) arranged an agreement in which all partners in the IDMP CEE have to accept and use the list of working definitions associated with drought issues. Definitions were prepared by Fatulová Elena (Activity Manager 1.2 and 2.1) and Tamara Tokarczyk (Activity Manager 5.4).

**Activity 1.3 Drought information exchange platform:** The activity 3.1 is other one of the main outputs of the project (Activity coordinator is Gregor Gregorič). The platform is summarizing an existing platforms and the goal is to create a proposal for integration IDMP's products and data into one in order to design a common concept of capacity development and knowledge transfer. Ing. Petra Kulirova presented where it is possible all information find and how this platform works.

**Activities of CHMI usable for implementation of DM plans, data exchange within the activity 1.3:** Ing. Hana Stredova informed about activities within the monitoring of drought by CHMI and how CHMI participate on this project (activity 1.3: data exchange). Within the activity CHMI provided data and information of the implementation of monitoring drought in the country. Information have been transmitted about (i) the drought monitoring carried out under the standard Hydrometeorological activities, (ii) the risk of fire monitoring and (iii) outputs of the project INTERSUCHO. All information from the monitoring are also presented on CHMI website and information are updated at periodical intervals. On the CHMI website is possible to find information relating of hydrological, climatic and soil drought monitoring.

**Introduction of Drought Monitoring for Czech Republic – INTERSUCHO project:** The project, which aims to create a platform for monitoring of drought that is clear and understandable for users (mainly for farmers). The idea is that it should be the practical application and usable in the long term point of view. The project is based on a dialogue between farmers and the main task is monitoring of soil drought (based on a soil model SoilClim) up on a cadastral level. It creates long-term prognosis of drought - drought probability forecast. Data are weekly updated on the website.

**Example of different attitude to the soil management by farmers – user (tenant) and owner:** Short presentation as a reaction on discussion where was discussed the relationship farmers as users and farmers as owners to soil; and the soil management in the light of soil degradation and soil erosion measures. The main problem of Czech Republic is that more than 70% of farmers are only users of farmed agriculture land not owners which has an effect on landscape itself and is linked with drought issues.

**Activities of T. G. Masaryk Water Research Institute usable for implementation of DM plans:** Draft concept for dealing with the crisis caused by drought and water scarcity in the Czech Republic. The presentation was introduced drought indicators proposed by WRI, category of drought, and adaptation measures to mitigate drought.

**Activities of Soil and Water Research Institute usable for implementation of DM plans and drought monitoring:** Ing. Vopravil presented drought problems from the point of view of soil as a natural source. He introduced materials of monitoring the development of soil properties in relation to drought. The impact of climate change and impacts on the production of soil.

**Introduction of Activity 5.1 Experimental field research on increasing soil-water holding capacity in agriculture and Activity 7.1 Compendium of Good Practice:** Management of drought agricultural practices and measures to increase the water holding capacity of soils (Activity 5.1). The main coordinator of activities is Pavol Bielek. The aim is to identify and verify in practice the measures leading to increase the water retention capacity. Were presented preliminary results from an experimental fields: Prachov, Třebsín, Ouběnice.

## 4. Conclusions

*Outcome of the public consultation:*

- Create a long-term strategy, which will be obligatory for the next government.
- Cooperation across departments MoE and MoA, ie dialogue between ministries and establish one inter-ministerial group (for now are two groups working on drought monitoring and DMP implementation, one is under MoE and other under MoA).
- Currently, there is a document with proposals for drought management and adaption measures which is prepared for comments by the Ministry of Environment and other resorts.
- Water Act Amendments.
- Commission have to be an inter-ministerial group of experts not only MoE and MoA, but include into the DMP also the Ministry of the Interior and Health.
- the DMP should be a two-part: (i) prevention to avoid the impacts of a drought at the time of drought; the plan should include not only measures to address the situation (prevention), but also (ii) sanctions under various degrees or levels of drought (what to do when drought has already come).
- It is necessary to define what "a crisis" is and to define the various degrees of drought - Once a drought reaches a defined point (degrees of drought, the crisis point), the management of drought come under the competence of the BrE and crisis plan management.
- In the context of hydrological drought it will be effective to implement plans at the municipal level/scale. In other type of drought to do it on same level as neighbouring countries
- Need to link the soil protection, good agricultural practice management plans and other plans.
- It would be advisable to set management on farm blocks, but the problem is attitude to land users.
- As a precaution against drought it is necessary in first to change the approach to the use of the landscape.

*Proposals for further steps:*

- Water Act Amendments.
- Start dialogues with users of landscapes (water managers, farmers).
- Start dialogue between ministries MoE and MoA.
- Define "Crisis point" of drought.
- Establish the Commission.

**Proposals for further steps focused on elaboration of**

Drought management plans (DMP) are in relationship with both River Basin Management Plans (National River Basin Management Plans, NRBMP) and Sub-catchment Management Plans (SMP). These water management documents are actualized in a 6-year cycle. Sub-catchment Management Plans will be dealing with drought issues that will be included in chapter V. That means, that the drought issue will be to a certain extent addressed within the framework of Basin Management plans. Hence, it is appropriate to include a concrete list of measures leading to drought impact decreases (guidelines, specific actions or measures etc.), into the Sub-catchment Management Plans. Besides that, it is more than appropriate to create documents which will be based on the same principles such as, for example, Flood Plans. These documents have to be primarily focused on operative measures in an area, i.e. constitution of committee, activities, contacts etc. Such documents must be periodically actualized, so that their character doesn't let them be implement within NRBMP or SMP.

**Annex I:**

Identification of the historical drought events based on assessment of annual runoff and annual precipitation total in particular years should not be a problem to given available datasets of the Czech Hydrometeorological Institute (CHMI). The significance of such an analysis is what we see in the determination of hydrological drought. We are able to even more accurately analyse with more involved factors (temperature, evapotranspiration) which will be in better correlation with an agriculture drought. We have focus on the agricultural drought, too. It is due to the fact that the agricultural drought is from the frequency point of view more often and moreover more economically hazardous than the hydrological drought. It will be convenient to do a quantification of damages that is, unfortunately, not possible to do in the Czech Republic not even in the participating countries.

**Annex II:**

T. G. Masaryk Water Research Institute (TGM WRI) within their project has proposed a system of drought indicators applicable for a hydrological drought. The proposed system is partially compatible with the proposal mentioned in the Annex II of this document. But, the system of indicators proposed by TGM WRI has been missing with the evaluation by international accepted methods (SPI, PDSI, AWC). These methods were only used by Directorate of Morava River Basin (povodí Morava) in the frame of pilot projects.

On the topic of groundwater assessment it is necessary to point out that in the Czech Republic evidence of groundwater logging is non-existent. From the point of view of actually realized groundwater and surface water offtakes, can be assumed only from Water Management Balance; i.e. offtakes above 6000m$^3$ per year or 500m$^3$ per month). Another piece of evidence of actual amount of water offtake doesn't exist.

The Czech Republic has very accurate database with a record of precipitation and temperature. All climate data are under administration CHMI. The Czech Republic (CHMI, RISWC etc) has also very quality datasets of soil moisture, evapotranspiration and other parameters that are obtained from the meteorological network. These data have higher geographical variance than data obtained for temperature and precipitation but still, it is possible to cover whole area of the Czech Republic by these datasets. That means, it is possible to do evaluation on national level.

**Annex III:**

We see a high importance in these proposed indicators for a determination of a hydrological drought. It is mainly important from the point of view of water supply. A lack of water supply for an inhabitant is currently serious only at one locality in the Czech Republic. In the frame of whole country it has been occurring sporadically. Nevertheless, proposed indicators are very important for us and usable in the Czech Republic. We think, that they have to be fully implemented into the system of early warning. We would like to extend this system around indicators of agriculture drought where the temperature and evapotranspiration are substantial. Currently we submitted a project proposal for a national call. The main idea of this project is to bring an evaluation of agricultural drought based on the link of precise soil mapping dataset and meteorological forecast systems.

**Annex IV:**

The responsible one for the implementation of WFD are MoA (Ministry of Agriculture) and MoE (ministry of environmental) which should have to be responsible in the drought issue, too. Currently, the drought issue is more in detail solving by MoI (Ministry of the Interior) within the frame of crisis management. The drought issue under MoA and MoE is only solved in the frame of two "working" groups under each ministry.

Cooperation across departments MoE and MoA instead two work groups that are working separately without sharing data, i.e. dialogue between ministries and establish one interdepartmental group Drought-Water. This inter-ministerial group Drought-Water will be responsible for completion of the Guidelines. This group will be like

a Drought working group of Slovakia Case study and this can be comparable with its mandate too.

During drought events (episodes) there has to be a local committee like a flood committee. In the Czech Republic such a commission was already made, but for now their establishment nor mandate is not legally defined. And this would be one of the main objectives of the Drought-Water working group.

**Annex V:**

We agree with the proposed system in the annex V. Effective drought management system requires an adoption of wide range of measures, which can be aggregated into 5 groups (organizational, preventive, operational, follow up and restoration measures). The most important ones, which should be described in more detail in the early stage of drought management (in DMP) and policy development, are as follows (organizational, operational, preventive). This approach and its detailed breakdowns are for us inspiring. We will try to get it through within the Drought-Water group. According to past experience, it can be assumed problems with the link between individual actions and particular measures. Problems can occur mainly in the retrospective evaluation of the effectiveness of the measures.

**Annex VI:**

The funding providing agencies of the Czech Republic devote ample space to topics such as adaptation and climate change mitigation. These issue are currently main research priorities of the EU as well as the Czech Republic. Calls are generally targeted on very broad topic of risks following from climate change (changes in rainfall precipitation throughout the year, not the total precipitation amount, and extreme events following from this change) which includes the drought issue. But calls are not targeted specifically on drought problems and associated risks. One of the objectives of the group Drought-Water is the support of research in this area.

## Templates for elaboration of the national experiences included into Annexes of the Guidelines

**Annex I: Examples of the national methodologies for assessment of historical drought**
***STEP 4 (section 3.4.2 of the Guidelines)***

*Country:* Czech Republic
During the years 2000, 2003 and 2007 the extreme drought events had occurred due to the very low total amount of precipitation and the long period of several weeks without precipitation. It is important to highlight, that the negative drought impacts on agricultural lands were recorded even at this year when the extreme drought occurrence had recorded during the first half of this year in South Moravia.

*Indicators used for the historical data assessment:*
Aridity or dryness of the climate in the Czech Republic (CR) is a typical property mainly for Southern Moravia and Central Bohemia. Definition of dry regions of the CR can be, from the climatological perspective, expressed by describing the course of isohyet of the average annual precipitation of 500 mm. Expression of thus defined aridity, i.e. aridity in the climatological perspective, varies depending on soil conditions. With regard to the characteristics of the soil, we are talking about soil drought. Drought definitions can be classified into different categories depending on the variable used to describe the drought. The first kind is meteorological drought defined as a period with subnormal precipitation alternatively in connection to other meteorological elements as temperature, evaporation, wind speed etc. The second kind is hydrological drought, i.e. subnormal flows. Gumbel (1963) defined a drought as the smallest annual value of daily streamflow. The third kind is agricultural drought. The Food and Agriculture Organization (FAO) of the United Nations defines a drought hazard
as the percentage of years when crops fail from the lack of moisture (FAO, 1983). The World Meteorological Organization (1975) defines drought as a sustained, extended deficiency in precipitation. Linsley et al. (1958) defined drought as a sustained period of time without significant rainfall. The encyclopedia of climate and weather (Schneider, 1996) defines a drought as an extended period of deficient rainfall relative to the statistical multi-year mean for a region.
Subjectivity in the drought definition has made it very difficult to establish a unique and universal oneindex. The climatic drought affecting the agriculture production in the Czech Republic was detailed evaluated by the Czech hydrometeorological Institute. This evaluation has been beginning since occurring of a significant drought event. It caused a huge amount of affected farmers for getting a compensation. This evaluation was a part of the injury calculations in two worst affected districts, but it can be extended to the whole country. This work deals with detailed assessment of extremity of monthly precipitationand monthly air temperature and their combinations.

*Short methodology of assessment of long-term series of meteorological data or picture illustrating evaluation of the historical data for the chosen parameters/indicators:*
The technical series of climatic elements was created on the basis of measured data of a station network of CHMI. It is a homogeneous and fully completed station series which was used as a basis of calculation of series of climatic elements in daily intervals for grid points placed 10 km apart. Consequently, one grid point was chosen from the database to represent each area. Data for the period of 1961–2010 were taken into consideration and evaluated.

Example: Evaluation of the Breclav district
Legend to the table of temperature extremes:

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| | above normal |
| | strongly above normal |
| | extremely above normal |
| | below normal |
| | strongly below normal |
| | extremely below normal |

Table of temperature extremes in the Breclav district at the years 1961-2010

| | I | II | III | IV | V | VI | VII | VIII | IX | X | XI | XII |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1961 | | | | | | | | | | | | |
| 1962 | | | | | | | | | | | | |
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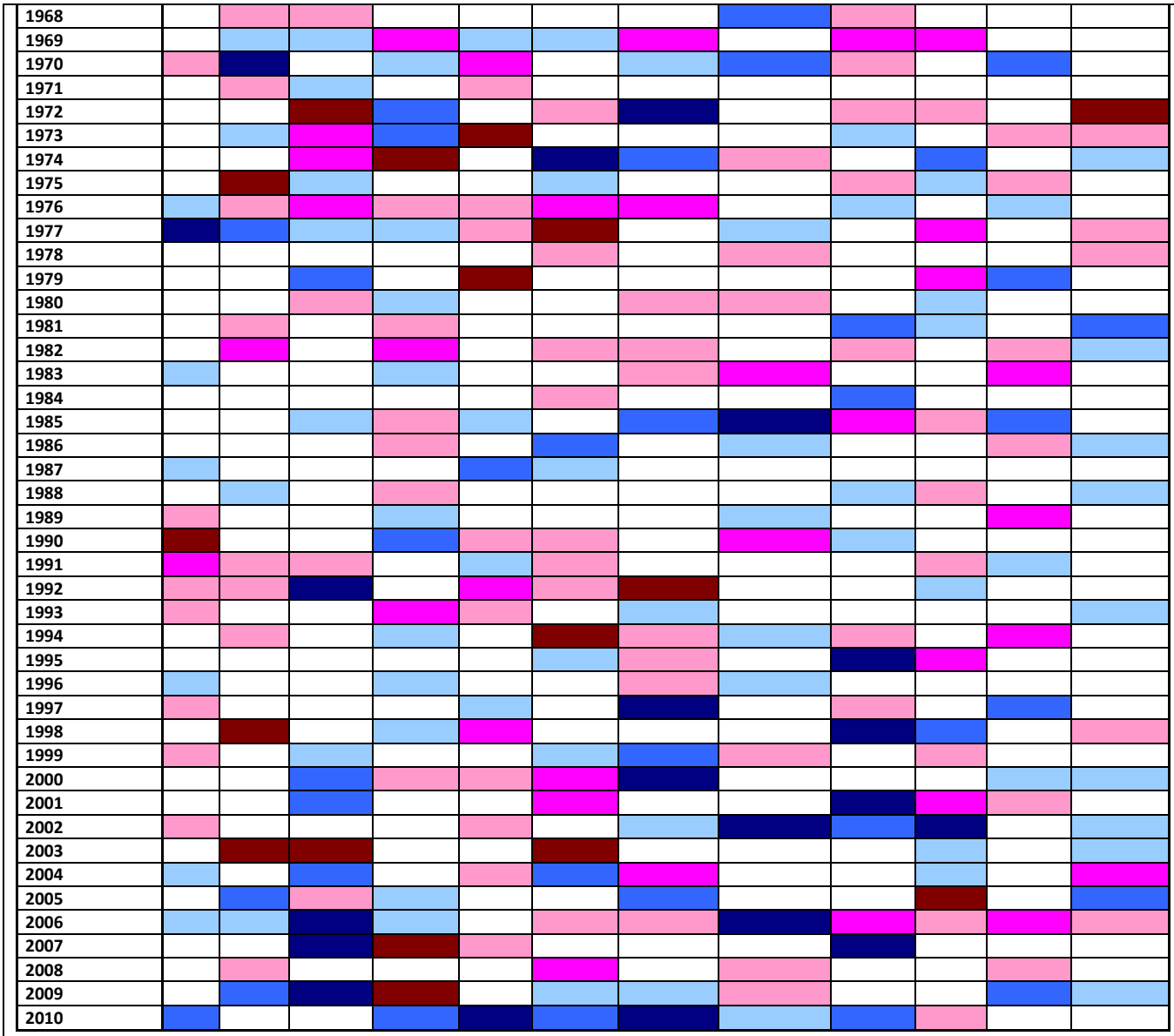
| 2007 | | | | | | | | | | | | |
| 2008 | | | | | | | | | | | | |
| 2009 | | | | | | | | | | | | |
| 2010 | | | | | | | | | | | | |

Legend to the table of precipitation extremes:

| | |
|---|---|
| | above normal |
| | strongly above normal |
| | extremely above normal |
| | below normal |
| | strongly below normal |
| | extremely below normal |

Table of precipitation extremes in the Breclav district at the years 1961-2010

| | I | II | III | IV | V | VI | VII | VIII | IX | X | XI | XII |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1961 | | | | | | | | | | | | |
| 1962 | | | | | | | | | | | | |
| 1963 | | | | | | | | | | | | |
| 1964 | | | | | | | | | | | | |
| 1965 | | | | | | | | | | | | |
| 1966 | | | | | | | | | | | | |
| 1967 | | | | | | | | | | | | |




**Annex II: Examples of the national drought indicator systems**
***STEP 4 (section 3.4.3 of the Draft Guidelines)***

*Country:* Czech Republic

*Parameter/indicators included or proposed into the national drought indicator system:*
In the Czech Republic, the Czech Hydrometeorological Institute (CHMI) has the primary responsibility for the climatic phenomena assessment, such as drought. Therefore, the following text will focus on the systems associated with drought, which are actively used by this organization. CHMI is a key player for issues linked with drought. Simultaneously, other research projects are taking place in the Czech Republic for enhancing of existing systems, especially in the field of hydrological drought. Their final form is not yet completely closed and the full utilization is planned at first in 2015. At the same time, there is ongoing a project Intersucho. This system, which is one of the research results, which, however,is not under coordinating at the national level. The evaluation of hydrological drought is currently very limited in comparison to flood issue. It is already possible to watch portals dealing with the current states of the water levels in major rivers (www.voda.gov.cz) as well as information on the occurrence of drought. But this value is not in any scale, and it is based on the long-term average state of

watercourses level. Intersucho project is based on a comparison of current state with a historical data of soil moisture content. At this phase, it can be only used as an informative support.

**Drought Monitoring – CHMI**
The system evaluates the moisture-balance condition of the landscape and competently estimates the incidence of drought and its development in the near future on the basis of operational information on current weather. The Drought Monitoring – CHMI assesses the impact of weather on soil hydric regime. Therefore we talk about soil and climatic drought.

**The Drought Monitor**
Integrated system for drought monitoring (The Drought Monitor) focuses on the meteorological and agricultural droughts (that are conditions for hydrological and socio-economic drought), with regard to their frequent occurrence and impact for Czech Republic. The Drought Monitor is a device that combines the results of ground-based measurements, dynamic water balance model and remote sensing methods. It is a new chapter of drought monitoring in the Czech Republic, because of the quality and range of the input data, the used methods, the degree of distinction and of the method of verifying the entire system.

**Danger of Fires Index (DFI)**
Danger of Fires Index (DFI) describes the danger of fires for open land covered with vegetation.

*Methodologies used for evaluation of the chosen parameters/indicators:*
**Drought Monitoring – CHMI**
Based on information from the AVISO model the maps and graphs of the moisture-balance condition of the landscape are created. The information from the AVISO model are daily values of the basic meteorological parameters (air temperature, humidity, sunshine, wind speed and precipitation) from 198 automated professional and volunteer climatological stations of the Czech Hydrometeorological Institute (CHMI). Hereby it can competently estimates the incidence of hydrologic, climatic and soil (agricultural) drought and its development in the near future.
The outputs are two maps of the threat of drought in the soil profile – separately for soil profiles 0-20 cm and 0-100 cm. It is because of significant differences in the values of soil moisture in the subsurface (topsoil) layer and the deeper layers in the period with occurrence of precipitation or vice versa the period without precipitation. Both maps of the drought threat are developed as a combination of documents that evaluates aspects of hydrologic, soil and climate drought. These approaches (that indicate the possible occurrence of drought in different soil depths) are based on a combination of measured and model-derived data of soil moisture. There are also other additional maps and graphs. Maps and graphs are published at regular weekly intervals on Tuesday (Sunday data) in the warm half of the year.

**The Drought Monitor**
The final product is a **map of the drought intensity**. It is determined for each grid by comparing of the current value of the soil moisture at a given day with the values of soil moisture achieved during the 1961-2010 in the time period ± 10 days from the considered date. The obtained value expresses the probability of repetition of the soil moisture at a given day and it is used to assign the appropriate drought intensity (Scale of drought intensity S0 - S5).
Scale of drought intensity:
The normal state:
- soil water content is close to or higher than normal value for the period
- the content of available moisture is greater than the 30th percentile

S0 - reduced level of soil moisture
- relatively lower level of soil moisture is repeated in a given period on average once every 3-5 years
- the content of available soil moisture is in the interval 20th - 30th percentile

S1 - incipient drought
- reduced level of soil moisture is repeated in a given period on average once every 5-10 years

**Danger of Fires Index (DFI)**
Danger of Fires is divided into five levels (in accordance with international practice): 1 - very low, 2 - low, 3 - medium, 4 - high and 5 - very high. The higher the index value, the higher the risk of fires. The measured data from the network of CHMI stations and the predicted values of the ALADIN model are the input data to the model. Model calculates soil moisture for the upper soil profile, the surface moistening and the conditions for the spread of fires (airflow and state of vegetation) during

processing. The model is developed in Doksany Observatory.

**Annex III: Examples of the national drought classification and early warning systems**
***STEP 4 (section 3.4.4 of the Draft Guidelines)***

*Country:* Czech Republic

*Indicators included into drought warning system:*
The Czech Republic currently does not an alert system for drought and all its sign. In the case of exceptional situations, the media has been informing on the basis of information from Czech Hydrometeorological Institute (CHMI) and water managers. Awareness of the agricultural drought is disseminated in an uncoordinated manner. In connection with drought, there is fully functional warning system aimed on fire risks.

**Integrated Warning Service System (IWSS)**
The Integrated Warning Service System (IWSS) is a warning service jointly provided by the Czech Hydrometeorological Institute (CHMI) and the Department of Hydrometeorology Security Military Geographic and Hydrometeorological Office (Department HMS MGHMO - Meteorological Service of the Army of the Czech Republic) for the Czech Republic in the field of operational meteorology and hydrology. The warning information purposes for IWSS are information that is issued for dangerous meteorological and hydrological elements and phenomena (the phenomena). One of the three degrees of danger is assigned to each of phenomenon, which is based on the extent of its intensity. The level of attention that should be given to the predicted situation, possible damage, the extent of the affected area and endangering lives is taken to account at the same time. The warning information may be issued on a total of 32 hazardous phenomena that are divided into 8 groups. The fires are in the 8$^{th}$ group (IWSS – Code VIII. fires). The warning information is issued at the danger of fires (Code VIII. 1), respectively. High risk of fires (Code VIII. 2) when the DFI (ranging within 1 to 5) reaches 4, respectively 5 at least three consecutive days.

*Thresholds for chosen indicators for four drought stages (normal, pre-alert, alert, emergency):*
Like in other evaluated parameters, a fire hazard is also evaluated in three phases (degrees) of danger + normal state, ie normal, pre-alert, alert, emergency.

*Answer on questions:*

- *is monitoring system sufficient for running of early warning system or requires upgrading ?*

The system requires a modernization. The modernization of the system should be based on research projects that are funded by national research funding agencies, or are in a competition for funding.

- *are there technical means available for timely dissemination of warnings?*

There are currently fully operational flood warning systems. It would be appropriate to extend about the issue of drought.

- *How often should be actual data updated – daily or weekly?*

The frequency of updating of warning system for floods is very often and detailed. For the drought warning system would be sufficient to reduce the frequency depending on the degree of risk (normal, pre-alert week; alert, emergency - a day). But with the higher degree of risk is even greater public pressure on the amount and detail of provided information.

**Annex IV: Examples of national organizational structures to deal with drought**
***STEP 1 (section 3.1 of the Draft Guidelines)***

*Country:* Czech Republic

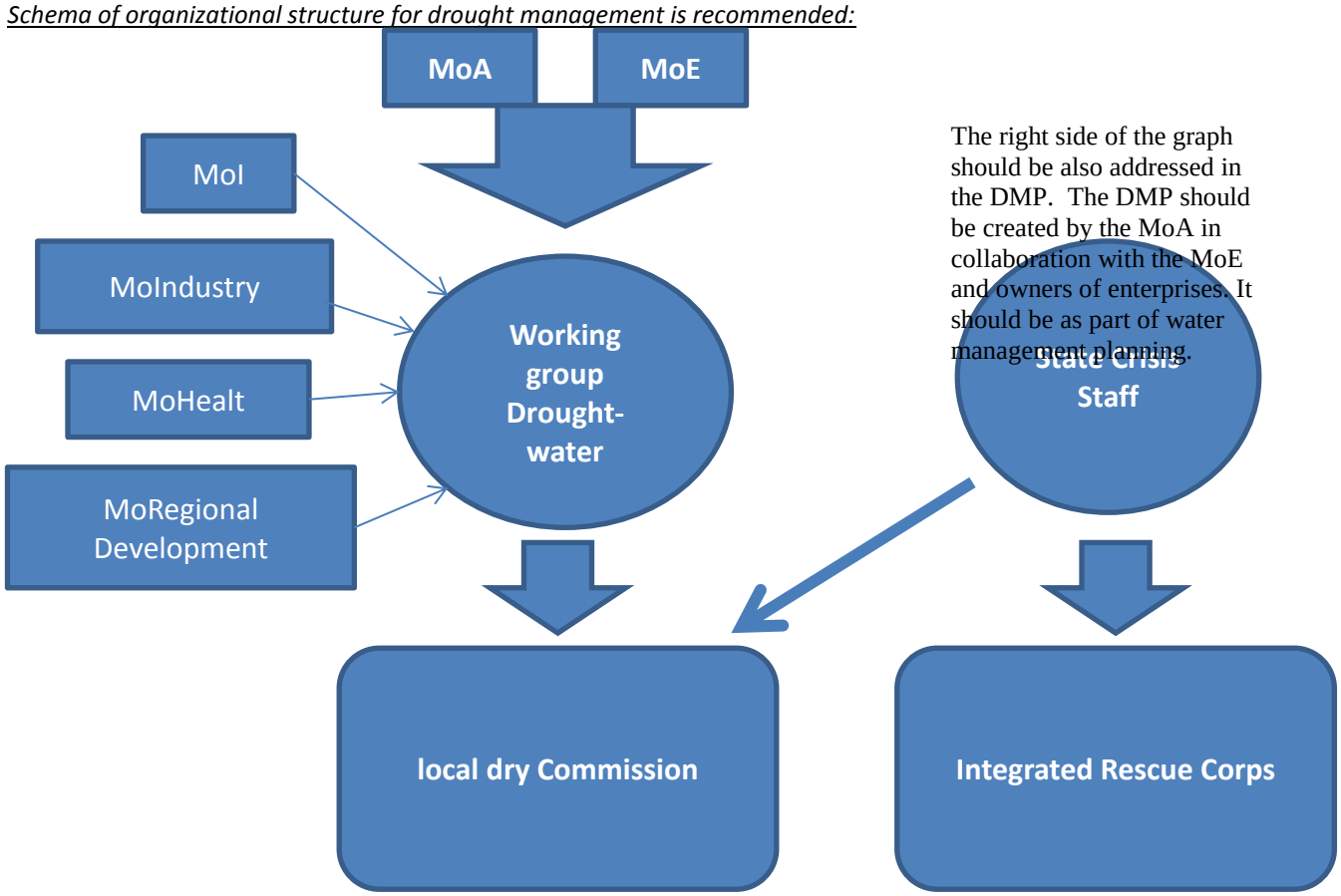
*Competent authority:*
The responsible one for implementation of WFD are MoA (Ministry of Agriculture) and MoE (ministry of environmental) which should have to be responsible in the drought issue, too. Currently, the drought issue is more in detail solving by MoI (Ministry of the Interior) within the frame of crisis management. The drought issue under MoA and MoE is only solved in the frame of two “working” groups under each ministry.
Cooperation across departments MoE and MoA instead two work groups that are working separately without sharing data, i.e. dialogue between ministries and establish one interdepartmental group Drought-Water. This inter-ministerial group Drought-Water will be responsible for completion of the Guidelines. This group will be like Drought working group of Slovakia Case

study and this can be comparable with its mandate too.
During drought events (episodes) there have to be a local committee like flood committee. In the Czech Republic such a commissions were already made, but for now their establishment nor mandate is not legally defined. And this would be one of the main objectives of the working group Drought-water.

*Proposed composition of Drought Committee indicating involvement of all actors on three levels:*

- Governing level (Working group Drought-water, ministries, emergency committee)
- Professional level (Integrated Rescue Corps, local emergency committee that is proportional to flood committees)
- Affected stakeholders (water managers, CHMI, farmers, power engineers, industrialists, environmentalists ...)

*Schema of organizational structure for drought management is recommended:*




The right side of the graph should be also addressed in the DMP. The DMP should be created by the MoA in collaboration with the MoE and owners of enterprises. It should be as part of water management planning.

**Annex V: Examples of national program of measures for preventing and mitigating drought**
***STEP 4 (section 3.4.5 of the Draft of the Guidelines)***

*Country:* Czech Republic

*List of the measures identified on the base of the national situation in drought management structured at least into three groups:*
In the Czech Republic, it has not been compiled procedure for dealing with drought yet. The system of measures have be addressed by newly formed a Water-Drought group. This topic was not discussed in the detail during the National Consultation Dialogue, because the itself system has very complicated approval process. Currently, the Water-Drought group is dealing more with financial and time demands of measures that are currently divided as follows:

- Monitoring and Informative,
- Legislative,
- Organizational and Operational,
- Economical,

- Technical,
- Environmental and others.

However, this classification will be discussed and likely will be changed.

The proposal from the Slovak's Case study is one of the variants of adjustments to the current proposal. The latest version of this document was translated in to Czech language and sent as an attachment to involved stakeholders in this issue. The appendix includes measures which have the character of all proposed types of measures (organizational, operational, preventive). The most complicated implementation of individual points can be expected in:

- organizational – legislative and economic measurement
- operational – set of specific indicators, the emergence of DMP
- preventive – economic measurement

Effective drought management system requires adoption of wide range of measures, which can be aggregated into 5 groups (organizational, preventive, operational, follow up and restoration measures). The most important ones, which should be described in more detail in early stage of drought management (in DMP) and policy development, are as follows above (organizational, operational, preventive). This approach and its detailed breakdowns are for us inspiring. We will try to get it through within the group Drought-Water. According to past experience, it can be assumed a problems with the link between individual actions and particular measures. Problems can occur mainly in the retrospective evaluation of the effectiveness of the measures.

**Annex VI: Examples of the national research programme supporting drought management**
***STEP 6 (section 3.6 of the Draft Guidelines)***

*Country:* Czech Republic

*List of suggested actions for the national research program supporting drought management (eventually supplemented by short description of the action):*

In the Czech Republic, the support of research programs focused on climate change are supported by the three agencies: Technology Agency of the Czech Republic (TA CR), National Agency for Agricultural Research (NAZV), and safety research of Ministry of the Interior.

TACR is more focused on the support of industry and resources in the Czech Republic. The program supports projects that reduce demands on water sources. For example the Research Institute of Soil and Water Conservation participates in the research project focused in development and inovation of subsoiling machines. As is also supported by results of Activity 5.1, the soil management with subsoiling technology has the positive effect on hydrological functions of soil. Currently all calls closed.

NAZV is focussed on support of agricultural production, which significantly affects the droug. There are projects amied at developing seeds resistant to stresses caused by drought as well as measures aimed directly at increasing water retention in the landscape. Research Institute of Soil and Water Conservation have been prepared a project proposal for a last call of this agency. It is aimed to develop a drought warning system, which would integrate modern weather forecasting systems with detailed pedological mapping. The submited proposal is now in the evaluation process.

The Safety Research is focused primarily in supporting of Integrated Rescue Corps as well as on food securtiy or crisis management. The drought issue belongs without question under this kinde of reserach programs.

Research projects may be created beyond this basic system, eg. The support of the Ministry of Environment in the research project of The research and Protection the Hydrosphere, here is funded, ie: subproject Determination of appropriate indicators to identify the incidence, prediction and evaluation of drought intensity for the Czech Republic realized TGM WRI.