24.03.2015

1. Basic information

Number and name of the activity	5.4 **Drought Risk Management Scheme: a decision support system**
Activity leader *(name, organization, email)*	Tamara TOKARCZYK (PL) Tamara.Tokarczyk@imgw.pl
Duration of the activity	June 2013 - March2015
Participating partners *(name, organization, email)*	Tamara Tokarczyk [a)] ,Wiwiana Szalińska [a)], Leszek Łabędzki [b)], Bogdan Bąk [b)], Edvinas Stonevicius [c)], Gintautas Stankunavicius [c)], Elena Mateescu[d)], Daniel Aleksandru [d)], Gheorghe Stancalie [d)] Poland: [a)] Institute of Meteorology and Water Management, National Research Institute, Wroclaw Branch(IMGW-PIB), [b)] Institute of Technology and Life Sciences (ITP) Lithuania: [c)] Vilnius University, Department of Hydrology and Climatology (VU) Romania: [d)] National Meteorological Administration (NMA) [e)] National Research and Development Institute for Soil Science-Agrochemistry and Environment (ICPA –Bucuresti)
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2. Contribution to Challenges

Your activity belongs to:

- *Operational mode (e.g. next year drought, ongoing multiple-year drought)*
- *Strategic mode (e.g. future drought, prepared for global change)*

Please explain (max 500 characters).

The Activity 5.4 “Drought Risk Management Scheme: a decision support system” provides scheme of planning process for drought risk management. Elaborated recommendations for the decision support system in drought risk management are serving as a common denominator for different regional and sectoral specifications. Introducing a common framework in the form of a step-by-step process lead to compatibility and complementarity among different systems. Developed framework defines main principles for drought management that can be applied for various drought aspects.
Recommendations for operational support system in drought risk management concern application of selected drought indices in main parts of the risk management process: drought monitoring, early warning and risk assessment. Drought indices can help to improve drought mitigation efforts through more timely, effective and efficient assessment and response activities. Activity 5.4 consist elements of operational mode as well strategic mode.

What is your activity addressing?

- *Which of the seven steps described in the Guidelines for Drought Management Plans (act. 2.1)*
- *monitoring, forecasting / prediction, impacts, vulnerability, measures, management, risk management*

Activity 5.4 presents a planning process (scheme) that can facilitate preparation of decision support systems for drought risk management. Individual elements consisting on drought risk management scheme refer to: monitoring network, drought indicators, drought hazard assessment, drought early warning, drought prediction, impact assessment and risk assessment. It addresses a wide range of users involving researchers, decision makers as well as stakeholders at different levels.
Planning process presented in this activity refers to 10 steps guidelines for preparation og the Drought Management Plans which was developed in Activity 2.1. Planning process of preparation decision support system for drought risk management in Activity 5.4 mainly relate to step 4 “Produce/update the drought management Plan”.
In the frame of presented activity selected elements of planning process were developed and verified in involved countries. Practical approach also takes into account the operational mode of the system.

Shortly describe main challenges which you have addressed with your Activity at the international, regional (especially CEE), national level? How has your Activity contributed to these challenges? (Max 1000 characters)

The overall goal of activity 5.4 is to provide the recommendations for operational support system in drought risk management. These recommendations are country and sector specific. They can be treated as guidelines oriented towards national level, utilizing all practical experiences of the countries involved in the project. Providing integrated guidelines for drought risk management within the CEE countries will be a step forward to establishment of a common drought management policy. The challenge for development of drought risk management scheme is integration of different approaches and concepts arising from different national, regional and sectoral context. The recommendations on how to assess drought risk, how to mitigate drought impact and create the catalogue of mitigation tools are frameworks for drought risk management. Framework was based on institutional, methodological, public and operational structures serving to compose integrated body of methods.

3. Contribution to Objectives (max 1000 characters)

Were the Activity objectives achieved (see Activity List)? Describe how you have achieved these in qualitative and, if possible, quantitative terms. Are there any, which were not achieved?

Activity 5.4 was realized within WP 5 Demonstration Projects.
Obtaining outputs address part of the specific objective of IDMP CEE and are important contribution to their components within:

- *Knowledge base: compilation of information and knowledge on recorded practices in drought planning and management* - The aim of the Output 2 was to compile a methodology for drought hazard mapping that can be applied in the participating countries. The inventory of the methods for droughts and their impact assessments for the key sectors vulnerable to drought in participating countries Poland, Lithuania and Romania was done and also the methodology for the development of the vulnerability functions as the element of drought risk mapping.
- *Guidance on technical and institutional aspects*. Tools and methodologies developed to support and improve drought risk responses - the inventory of institutional frameworks and the relevant information on drought exchange pattern in the countries participating in the Activity 5.4 were the subject of the Output 1.
- *Capacity building:* Raising awareness and understanding of drought risk through vulnerability assessments and associated risk mapping in order to develop preventive actions against drought – elaborated framework for Drought Risk Management Scheme (Output 3) present a planning process (scheme) that can facilitate the preparation of decision support systems for drought risk management based on 4 components: institutional, methodological, public and operational.

4. Description of the implementation process and methodologies applied *(max 1000 characters)*

Describe and explain what actions have been taken to address the challenge(s) mentioned in point 2.
What were the key implementation issues of your Activity?

- *describe all phases of implementation*
- *actions taken, instruments used*
- *information and methodologies applied*
- *etc.*

Have you encountered some problems during the implementation phase? If so, how were they overcomed? What problems could not be solved?

Developed framework defines main principles for drought management that can be applied for various drought aspects.
Recommendations for operational support system in drought risk management concern application of selected drought indices in the main parts of the risk management process: drought monitoring, early warning and risk assessment. Drought indices can help to improve drought mitigation efforts through more timely, effective and efficient assessment and response activities. Framework for drought risk management relate to: Institutional framework, Framework for drought risk assessment, Framework for drought prevention measures, Framework for decision support tools and Appendix: Recommendations for operational support system in drought risk management for agriculture in Poland.
The inventory of institutional frameworks and the relevant information on drought exchange pattern in the countries participating in the Activity were the subject of the Milestone 1.1 and 1.2. Drought hazard assessment based upon the indices applicable to the participating countries was presented in Milestone no. 2.1. Resulting in the form of maps present temporal and spatial variation of drought hazard in order to identify drought-prone regions.
Framework of drought vulnerability was presented in Milestone no. 2.2. Framework for Drought Risk Management Scheme presents a planning process (scheme) that can facilitate the preparation of decision support systems for drought risk management. Practical recommendations for development a decision support system are presented for agricultural drought in Poland along with the identification of actions that can be taken to reduce potential drought related impacts and risk. The detailed description of the existing system contains Milestone 3.1. The system was lunched to run operationally for the

selected catchments of the Odra River and the Vistula River basins.

5. Outputs *(max 3000 characters)*

What are the main outputs of your activity? Please shortly describe each of them (how are they going to be used?))

The Activity 5.4 was dedicated to elaborate a common approach among project partners to undertake development and integration of drought management systems and provide a framework for internalizing drought into decision-making process. The framework for drought risk management scheme was established on four components: institutional, methodological, operational and public. Project realization allowed to recognized drought vulnerability and management strategies that were developed and applied in the participating countries. An overview of essential concepts definitions and methodology associated with drought risk management, at national, sub-national and sectoral levels, was the subject of the Output 1 and Output 2. The purpose of the Output 3 was to present a basic roadmap for integrating, developing and planning drought risk management tools at different levels, based on best practices, lessons learned and experiences introduced by project partners.

Output 1: Measures for the assessment of susceptibility and vulnerability to drought

The report contains an inventory of drought measures (indicators) that are applied to evaluate susceptibility, drought impacts and vulnerability to drought in countries involved in the Activity. The inventory covers the methodology to characterize drought impacts and vulnerability assessment along with the revision of the most vulnerable national sectors to drought and the stakeholders identification and the measures for drought assessment that are deployed in the national drought monitoring and early warning systems as well identification of the end-users at national level and their needs for the information on drought.

Output 2: Methods for the drought hazard and risk management

The overall goal of the Output 2 was to develop a concept of drought hazard and vulnerability mapping as a tool for drought risk management for selected regional contexts. Drought hazard and vulnerability assessment was streamlined into the following steps: (i) selection of drought hazard indices that can be used for the drought detection and monitoring for the analysed region and sector of economy, (ii) development of drought hazard assessment methods taking into account drought frequency and severity analysis, (iii) identification of drought impacts within the given regional and sectoral context and vulnerability estimation methods, (iv) integration of the resultant drought hazard assessment with the drought vulnerability analysis in order to categorize the areas subject to drought risk. The selected indices were investigated in terms of providing information on drought hazard for agriculture and water resources sectors within different regional context.

Drought risk elements identified in each regional context were investigated in terms of building vulnerability functions that represents the relationship between potential damage or loss to a given element at risk against a specified event intensity.

Output 3: Framework for Drought Risk Management Scheme

The output has two parts. The goal of the first part provides the context for the framework development that demonstrate the operational risk assessment in the region of Middle and Upper Odra River basin. The second part present a planning process (scheme) that can facilitate the preparation of decision support systems for drought risk management. Developed framework defines main principles for drought management that can be applied for various drought aspects

6. Added value *(max 1000 characters)*

Is there any "added value" generated by your Activity? What new (science, practical experience, guidelines or others) was developed by IDMP CEE and how your work is related to earlier knowledge (research, practice) and experiences of the past?

Outputs delivered within activity 5.4 related to drought hazard and vulnerability assessment based upon the indices applicable to the participating countries in the form of maps which present temporal and spatial variation allow identification of the drought-prone regions. Combining this information with regional context and indicated sectors of economy and elements of the system in the individual countries constitute an easy tool for drought assessment. Ability to interpret the results should be a basis for a construction of a drought information exchange platform. This is the first step to building an integrated Drought Early Warning System.

7. Lessons learnt and transferability *(max 2000 characters)*

This section considers how your experience can be used elsewhere.
What are the most important lessons from this Activity that might be useful for other countries and policy level in the preparation and/or implementation of Drought Management Plans?

Final outputs of activity 5.4 provide useful guidance for the countries involved in the project in integrating drought risk management concepts and practices into development of planning and programme frameworks. Cooperation among project participants especially highlighted the importance of consolidating national and local experiences and developing materials to inform and guide future cooperation processes in a systematic and integrated manner. The obtained results shall be continuously reviewed with partners and stakeholders through various knowledge-sharing mechanisms, and revised to respond to changing circumstances.

8. Proposals for follow-up *(max 2000 characters)*
In case resources become available in what aspects would you like to continue your activity? Some concrete proposals for the follow-up projects?
Elaborated drought risk management scheme should be develop in following aspects: • application of remote sensing data to drought monitoring as a input for drought assessing; • development of geospatial decision support tools to address spatial distribution of drought hazard and vulnerability; • identification of vulnerable regions with the application of remote sensing data and geoinformatics techniques; • applying geospatial technologies for hazard and vulnerability mapping to develop long term strategies for drought management; • adaptation of new tools for drought impact assessing with exploitation of historical data base (meteorological, hydrological, economical, etc.)

9. Annexes
Milestone reports, tables, other data, etc.
Milestone 1.1. IDENTIFICATION OF THE NATIONAL MEASURES FOR DROUGHT SUSCEPTIBILITY (DROUGHT HAZARD) ASSESSMENT. Milestone 1.2. IDENTIFICATION OF THE NATIONAL MEASURES FOR DROUGHT VULNERABILITY ASSESSMENT. Milestone 2.1. DEVELOPING METHODOLOGY FOR DROUGHT HAZARD MAPPING WITH THE USE OF MEASURES FOR DROUGHT SUSCEPTIBILITY ASSESSMENT. Milestone 2.2. FRAMING METHODOLOGY FOR VULNERABILITY TO DROUGHT ASSESSMENT BASED ON AVAILABLE GIS INFORMATION INCLUDING POPULATION MAP, TYPE OF ECONOMIC. Milestone 3.1 DROUGHT RISK MANAGEMENT SCHEME FOR ODRA RIVER. Milestone 3.2 RECOMMENDATIONS FOR OPERATIONAL SUPPORT SYSTEM IN DROUGHT RISK MANAGEMENT