Output Factsheet

Output title: Methodology for drought risk assessment

Summary of the output (max. 2500 characters)

Output 5.1 presents development of common methodology for drought risk assessment. First, experiences in national drought risk assessment were collected and national and regional reports were prepared.

From review of reports it became clear that applied methods cross the region are most heterogeneous and results are not comparable. Therefore we have decided to prepare a methodology based on EC recommendations. First the algorithm for drought risk assessment was established. Main features of the method are: 1) risk is defined as the expected value of the loss function; 2) if there is no drought then loss function is 0; if there is drought then loss function is the difference between conditional expectation of yield function upon no drought, and the yield function; 3) a special feature is built in the algorithm: drought is defined by SPI but any other drought index can be used; 4) relative rather than absolute yield values are used; 5) regression model was established for the relative yield function with the temperature mean and the logarithm of precipitation sum (3 or 6 months). On the base of the algorithm, the Risk Estimation of Drought (RED) software was developed. Historic crop yield and meteorological data were collected from partner consortium in order to obtain hazard information, and risk maps and matrices were made for 4 common crops (maize, wheat, rape, barley) over DriDanube area. A user manual was prepared to help with using the software.

Analysis of extreme rainless periods (droughts) as approach to drought risk representation was also done. The Zelenhasic-Todorovic (ZT) method calculates the probability of rainless periods (droughts) occurrence during vegetation season (April-September) in the DriDanube countries through stochastic analysis of these events. Main features of the methods are: 1) general stochastic model of extreme rainless events (droughts) at certain locations;2) drought is defined as a period of at least 20 consecutive days with less than 3 mm of daily rainfall; 3) droughts are independent events, represented by identically distributed random variables that follow the Poisson probability law; 4) method considers all important components of the process - drought duration, time of the occurrence, number of droughts within a given time interval, and duration of the longest drought within a given time interval; 5) method provides return periods of the longest droughts, i.e. probability of longest drought occurrence; 6) application of the ZT method for the vegetation season. Maps of rainless periods with several return periods were prepared.

Both risk maps and maps of rainless periods were integrated into Drought User Service (http://www.droughtwatch.eu/)

Contribution to the project and Programme objectives (max. 1500 characters)

In the frame of Output 5.1, approach on assessing drought risk was unified for all participating countries by developing and introducing a common drought risk methodology based on the

Civil Protection Mechanism. Through it, Output 5.1 builds capacity among stakeholders to create and use the risk maps.

This way, Output 5.1 Methodology for drought risk assessment contributes to:

1) Project objectives: specific objective no. 2 “Implementation of common drought risk methodology based on the Civil Protection Mechanism”;

2) DTP Priority Axis 2: Strengthen transnational water management and flood risk prevention; Improve preparedness for environmental risk management;

Transnational impact (max. 1500 characters)

The algorithm and the software is freely available. It could be used in any countries to calculate drought risk assessment on their own data. It was presented at the annual meeting of European Meteorological Society and will be presented at the next EDO meeting.

Since representatives of environmental authorities and institutions from the Danube regions were present in training events and presentations of the software, this project will contribute to more coherent approach to drought risk assessment tasks and updates in the future.

Contribution to EUSDR actions and/or targets (max. 1500 characters)

Output directly addresses EUSDR PA5 (Environmental Risks) Action 4 Task 1 which aims at harmonisation of the regional disaster risk assessment methods and measures.

The action plan of EUSDR PA4 (Water Quality) mentions drought as well, although more in connection with the PA5. According to the Water Framework Directive, activities are based on catchments. The catchments are usually transnational in Danube region but the countries calculate risks in different ways. The DriDanube methodology improves the harmonisation of catchment-based risk assessments across Danube region.

Performed testing, if applicable (max. 1000 characters)

Not applicable for this output due to the nature of the output.

Integration and use of the output by the target group (max. 2000 characters)

Broad range of detected national stakeholders attended national trainings, held in participating countries in late 2018, where developed methodology was presented to, shared and discussed with wide range of stakeholders. Trainings were organised in a manner of learning interaction where participants were taught about the use of software and interpretation of risk maps. Usually, not only the final results were disseminated, but also the entry points within the methodology were shown as well where hazard information comes in as an input to the calculation of vulnerability and exposure. On the other hand, the object-oriented approach at national trainings supported the application of this methodology to any kind of hazards, supporting the common view of the natural disasters. This way, each target group understood the basic idea of the methodology and could discuss their own view about this assessment method. Partnership put in efforts to encourage stakeholders to use the developed methodology and prepared drought risk maps in support of their operational work.

Geographical coverage and transferability (max. 1500 characters)

The final drought risk and rainless periods maps, integrated into Drought User Service, cover the entire area of 10 participating countries: The Czech Republic, Slovakia, Austria, Hungary, Slovenia, Croatia, Bosnia and Herzegovina, Montenegro, Serbia and Romania. This way, any user can view final maps through Drought User Service. However, RED software and its manual are freely available and by using it any user can apply this methodology on their own data and drought criteria independently of geographic borders.
Durability (max. 1500 characters)
RED software with its manual is a timeless product and can be used anytime as a material for drought risk calculation via any kind of drought criteria or input data.
Synergies with other projects/ initiatives and / or alignment with current EU policies/ directives/ regulations, if applicable (max. 1500 characters)
The DriDanube project has regular contact with the Sediment, JoinTisza and Camaro-D projects from the DTP 1st call. Especially, the last two have special interest in drought risk, because JoinTisza prepares the 2nd RBMP of the Tisza river, and the Tisza catchment is known for large spatial and temporal precipitation variability, and as it follows the large runoff variability. The continuous cooperation and participation at different events of these twin-project give a stabile basis to use the synergetic effects of these projects. Furthermore, EU pays more intention to drought events recently. The EU Parliament prepared a communication to different EU bodies with the title 'Report on the Review of the European Water Scarcity and Droughts Policy'. Strengthening the output of this documents, a common drought risk methodology improves the efficiency of drought risk managements. A special subchapter deals with the integration of Water Scarcity and Droughts measures in the RBMPs, i.e. the DriDanube result into the JoinTisza action.
Output integration in the current political/ economic/ social/ technological/ environmental/ legal/ regulatory framework (max. 2000 characters)
This output can be used as basis and e.g. included in appendices in national strategies and action plans to reduce vulnerability and exposure to water scarcity and drought. The easiest application is the damage compensation among the today existing policies. If we do not know much about the drought characteristics, then it cannot be expected to have a real picture about the drought patterns and compensate the different target groups suffered by drought. The methodology and the risk maps should be involved in the operational work of the compensation scheme. Similarly, using different methodology for different disasters could lead to the false understanding of our environment and not appropriate distribution of the (sometimes very limited) resources. The social and economic features appear here, already.