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MAKING DROUGHT MANAGEMENT IN THE DANUBE REGION EFFICIENT AND OPERATIVE: DROUGHT RISK IN THE DANUBE REGION PROJECT (DRIDANUBE)

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ABSTRACT

Droughts hit the Danube region frequently and have had large impacts on the economy and the welfare of people. Drought damages are indirect frequently and are not so explicit like in the case of flood or frost, and, according to some estimations, can be higher than the other natural disasters in the Danube region. Drought is still not considered an issue of high priority, and people are not aware of its impacts. Therefore, DriDanube aims to increase the capacity of the Danube region for drought emergency response and enhance preparedness for drought management by introducing recently developed monitoring and risk assessment tools. One of the main products of the project will be Drought User Service which will enable more accurate and efficient drought information via improved monitoring and timely early warning. The service will integrate all available data, including large volume of the most recent remote sensing products, using modern web services and "Big Data" management techniques. Apart from the timely warning a risk analysis is required to mitigate the effects of drought. Following a transnational approach, DriDanube will harmonize the currently heterogeneous methodologies for risk and impact assessments, based on existing achievements in participating countries and on EU guidelines in the frame of the Civil Protection Mechanism. Users' capacities at different level in the management cycle (monitoring–impact assessment–response–recovery–preparedness) will be strengthened through sharing experiences and project learning interactions. DriDanube's main expected results is the Strategy to improve drought emergency response (tested on pilot actions) and better cooperation among operational services and decision-making authorities in a Danube Region.

Key words: Drought, drought management, environmental risk, remote sensing, emergency responses

INTRODUCTION

The Danube catchment area is characterized by high climate variability especially in the precipitation. Neighbouring region is the Mediterranean region, where climate model projections show strong summer precipitation decrease, unanimously. Observations make evident the growing frequency and severity of drought events especially in the middle and lower part of the Danube region, including Serbia [1-7].

The growing number of heat waves and the temperature increase in summer, the most warming season cause more frequent summer droughts. The high precipitation variability can cause droughts even wintertime despite of the generally increasing precipitation in this season. The growing drought damages directed the interest to this disaster. That was the reason why Slovenian Environment Agency engaged different institutions across Danube region to join forces in preparing a proposal for the project entitled Drought risk in the Danube Region (DriDanube). Project was submitted to the call opened within the Interreg Danube Transnational Programme. It was accepted for financing for the period January 2017 – June 2019 with a budget of 1.974.750 €.

PROJECT OBJECTIVES

The main objectives of DriDanube project are as follows:
- to increase the capacity of the Danube region to manage drought related risks;

- to improve drought monitoring by operational innovative service (Drought User Service);
- to unify drought risk assessments based on the Civil Protection Mechanism;
- to improve drought emergency response (to change mainly ad-hoc drought response to pro-active response based on risk management procedures).

DriDanube's main expected result is improved drought emergency response and better cooperation among operational services and decision-making authorities in the Danube region so its primary target groups are:

- National Hydrometeorological Services
- Emergency response authorities
- Non-governmental organizations
- Water and Farmer communities/chambers
- Industries

PROJECT PARTNERS

Drought is a larger scale natural disaster, therefore, the transnational cooperation is especially important. Project partnership consists of the most relevant institutions, which are directly or indirectly involved in drought monitoring and management in 10 countries of the region (Figure1). 15 project partners and 8 associated strategic partners are from 7 EU and 3 non-EU countries.

Figure 1. DriDanube project partners

Almost half of the project partners are National (Hydrological and) Meteorological Services (N(H)MSs) from Slovenia, Hungary, Romania, Croatia, Slovakia, Serbia, Bosnia and Hercegovina and Montenegro (in the order of partnership). Other partners are research-oriented knowledge centres with strong end users outreach: 3 universities (Vienna University of Technology, University of Novi Sad and Szent Istvan University from Godollo), research institute and 3 organizations (EODC Earth Observation Data Centre for Water Resources Monitoring GmbH, Global Change Research Centre AS CR, Centre of Excellence for Space Sciences and Technologies) specialized in state-of-the-art IT and remote sensing techniques. This composition ensures best environment to transfer technical capacities to N(H)MSs which generally don't have sufficient internal resources to follow new developments in the relevant fields. The contact with end users is assured through an international organization, Global Water Partnership Central and Eastern Europe, which is coordinating the smooth transfer of know-how to the project target groups.

The administrative organisations and authorities are in the group of Associated Strategic Partners: Administration of the RS for Civil Protection and Disaster Relief of Slovenia, The State Land Office of Czech Republic, Agricultural Station/Forecasting and Warning Service of Serbia in Plant Protection of Serbia, Environment Agency Austria, Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management, Water management Directorate of Ministry of Agriculture of Croatia, International Commission for the Protection of the Danube River, Ministry of Agriculture of Hungary.

PROJECT CONTENT

The project content consists of 6 work packages; 4 of them are technical, the management and the communication. There are 22 activities within the work packages. The technical work packages will be introduced in more detail.

WP3 Drought User Service, responsible partner is EODC. The main objective of this work package is to develop a user service for drought monitoring and early warnings. The main output of this WP is a web-based user service for targeted users (national and regional meteorological and emergency response authorities). It will represent a further development of work on existing collaborative platforms developed within EuroGEOSS and DMCSEE projects and implemented in the European Drought Observatory and DMCSEE. It will be developed and operated on one and the same cloud platform, enabling access to large volumes of satellite data sets with high spatial resolution and precision and the seamless transfer of service prototypes into operations. The necessary satellite datasets will be collected and made available for the platform. The user interface will enable access for individuals with different skill levels, ranging from basic to expert users. Finally, training of trainers will be organized within the project partnership to obtain capacities for the organization of national trainings.

WP4 Drought impact assessment, responsible partner is the CzechGlobe. In the case of drought the impacts cannot (usually) be easily related to the hazard intensity as they depend e.g. on the vulnerability of the impacted ecosystem or sector. This WP will focus on the development methods that will allow a quick and efficient assessment of drought impacts during an ongoing drought episode. This will be combined with a retrospective analysis of the relationship between past drought intensities and reported impacts. In order to improve the management of drought risks and drought events, it is critical to estimate not only drought intensity but also expected impact. Therefore forecasting of impacts will be essential part of the WP4 activities.
The project will integrate and build up a network of impact reporters. The WP4 will also coordinate data collection on drought impacts for the whole project and will lead research activities at the field of impact forecasting. Each partner will be responsible for engaging and training of the system users in their countries who will in turn provide near-real time impact assessment via the project User Service.

WP5 Drought risk assessment, the responsible partner is the Hungarian Meteorological Service. WP5 will use the main results and outcomes of the DMCSEE, ORIENTGATE and CARPATCLIM and its enlargement projects. In DMCSEE project drought indices were calculated, drought periods were collected based on historical records and drought vulnerability was examined. SEERISK project has produced Guidelines with demonstration of drought risk assessment in a single municipality. This methodology will be updated and applied in participating countries. These results will be the inputs of drought risk assessment. In CARPATCLIM project daily gridded meteorological database was established that can be the base of drought risk calculation in this project. Drought risk assessment will be based on existing achievements in participating countries (collected in a review) and on agreed methodology (based on EU guidelines in frame of Civil Protection Mechanism).

According to the EU guidelines drought risk can be expressed as the product of hazard impact and probability of occurrence. Values of hazard impact will be obtained from different target groups (case studies) and the probability values, based on meteorological variables will be estimated. A manual on common risk assessment methodology (tool) will support the implementation of the methodology; reports on regional and national risk assessments (including risk matrices and maps) will be prepared and included into the User Service (WP3). The result of the WP will provide inputs for WP6. Capacity building activities will be held for different stakeholders, end users, scientific communities.

WP6 Drought response, the responsible partner is ARSO. The main purpose of this WP is to capitalize from previous WPs and to prepare a Strategy to improve the drought management cycle for each participating

country. Among the starting points is the output of the Integrated Drought Management Plan CEE project - the Guidelines for preparation of drought management plans. Since there are numerous legislation mechanisms that regulate drought response and preparedness measures, the Strategy to optimize the drought management cycle within countries should cover a broad set of regulations. The screening of drought related regulations with focus on the structure of management procedures within the participating countries, which will be prepared.

As soon as the prototype of Drought User Service with the methodology for near real time drought impact assessment will be ready, pilot implementation in 4 countries will start. Pilot implementation of a decision-making model will be implemented in 2 countries (EU, non-EU). Two strategy implementation plans for improved cooperation and interoperability among the emergency response authorities and stakeholders will be prepared as pilot implementation for two countries.

The Strategy to improve drought emergency response will be based on the current status of the drought management, examples of previous drought episodes (including responses and mitigation measures) and the consideration of new available tools (outputs of WP3 and WP4). For capacity building, ten national seminars for users on understanding drought information from User Service will be organized.

PROJECT RESULTS

Based on the objectives above, the following outputs are foreseen:

- Drought User service
- Methodology for drought risk assessment
- Methodology for drought impact assessment including forecast
- Pilot actions testing the Drought user service and both methodologies
- Capacity building on national and regional level
- Stakeholders engagement in development of DriDanube tools and their use in everyday work.

Being in the second year of the project, some of the results are already available as prototypes. Figure 2 presents how Soil Water Index will be visualized in the Drought User Service interface. Results of the methodology developed for drought impact assessment including forecast are given on Figure 3.

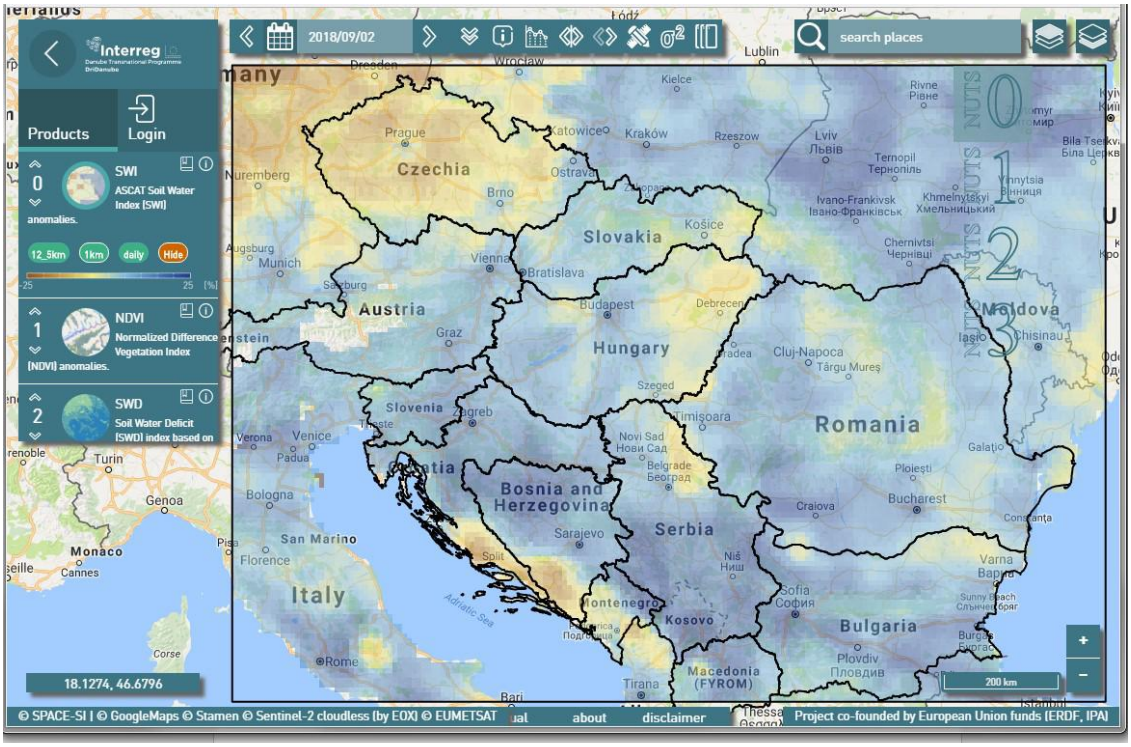

Figure 2. Soil Water Index on September 2nd 2018 across the Danube region as seen in Drought User Service

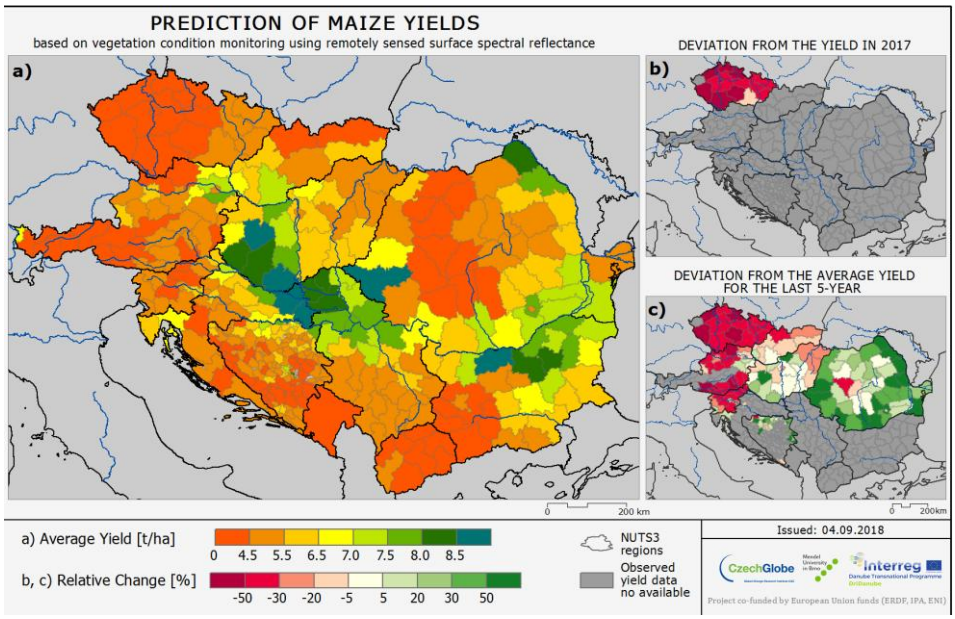

Figure 3. Drought impact on maize yields in the Danube Region for the week 34-35, 2018

CAPITALIZATION

DriDanube project works in narrow co-operation with other DTP projects having similar topics using synergetic effect of their cooperation. These projects are the JOINTISZA, CAMARO-D and DANUBE SEDIMENT projects. Link: http://www.interreg-danube.eu/relevant-documents/dtp-capitalisation-strategy/thematic-pole-4-waterways.

CONCLUSION

Drought is becoming one of the main topics for water management in the near future but it is still not considered an issue of high priority despite impacts on the economy and welfare of the people. DriDanube wants to change this and move from mainly ad-hoc drought response to pro-active response based on risk management procedures. Cooperation and capacities among all relevant institutions will be strengthen and the current slow reactions during drought will be speed up with the improved decision-making process in all parts of the drought management cycle (monitoring–impact assessment–response–recovery–preparedness). The products will be more stakeholder oriented, and support the easy and on-time information flow to the end-users. This will lead to an increased culture of preparedness throughout the Danube region.

In addition to the brief overview of the DriDanube project provided in this article, more detailed information and updates can be found on the project web-page http://www.interreg-danube.eu/approved-projects/dridanube.

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KAKO DO OPERATIVNOG I EFIKASNOG SISTEMA UPRAVLJANJA SUŠOM U DUNAVSKOM REGIONU: PROJEKAT DROUGHT RISK IN THE DANUBE REGION (DRIDANUBE)

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Rezime

Suša je složena prirodna pojava sa mnoštvom definicija i klasifikacija. Ono što je ključni preduslov nastanka bilo koje suše je nedostatak padavina u dužem vremenskom periodu. Za razliku od drugih fenomena, suša pogađa skoro sve klimatske zone i regionalnog je karaktera.

Uprkos štetama u regionu Dunava u poslednjih nekoliko decenija, suša se još uvek ne posmatra kao pitanje visokog prioriteta i ljudi još uvek nisu svesni uticaja koji suše imaju na brojne sektore (poljoprivreda, snabdevanje vodom, saobraćaj, energetika, životna sredina, zdravlje ljudi, itd.). Isto tako se nedovoljno razmatraju uticaji koji ljudska delatnost (npr. način korišćenja zemljišta ili degradacija zemljišta) imaju na pogoršanje efekata suše. Problemu suše se najčešće pristupa ad hoc, tj. kada se suša već desi, uz uobičajena pitanja kolika je šteta naneta, kome, ko će štetu da plati i šta uraditi na prevenciji. Pristupi su najčešće sektorski čime se povećava ranjivost celog društva na sušu. Na primer, mnogi rešenje za poljoprivrednu sušu vide u znatnom povećanju površina pod sistemima za navodnjavanje iako analize o dostupnosti površinskih (posebno u malovodnim periodima) i već preterano eksploatisanih podzemnih voda pokazuju da neće biti dovoljno vode ni za navodnjavanje ni za druge korisnike.

S obzirom na to da su predviđanja da će ekstremni klimatski uslovi biti sve češći u budućnosti, evidentna je potreba promene pristupa problemu suše i smanjenju njenog uticaja na život i delatnost ljudi i pritiska na ionako ugrožene vodne resurse i životnu sredinu. Unapređenje multisektorskog i međusektorskog monitoringa razvoja suše, kao i pravovremena procena rizika od suše i njenog uticaja, treba da budu praćeni zakonskim rešenjima i jasno definisanim nadležnostima i ulogama svih aktera u procesu upravljanja sušom. Postoje brojni primeri organizovanog naučno-istraživačkog napora da se problem suše temeljno izuči i da se ponude rešenja za operativan i efikasan sistem upravljanja sušom baziran na integrisanju dostupnih podataka (istorijskih, merenih, procenjenih, i dobijenih putem satelitskih snimaka), najnovijih tehnika njihove obrade (npr. "Big Data" analitika) i poboljšanja saradnje između operative i donosioca odluka.

Jedan od aktuelnih projekata u ovom domenu je Drought Risk in the Danube Region (DriDanube) koji treba da pruži odgovor na pitanje kako doći do operativnog i efikasnog sistema upravljanja sušom u Dunavskom regionu. Projekat finansira Dunavski Transnacionalni Program. Nosilac projekta je Slovenačka agencija za životnu sredinu, a učestvuje ukupno 15 partnera i 8 pridruženih strateških partnera iz 10 zemalja Dunavskog regiona, uključujući Republički hidrometeorološki zavod Srbije i Poljoprivredni fakultet Univerziteta u Novom Sadu.

Posebni ciljevi projekta su: (1) ujednačavanje i harmonizacija trenutno postojećih metodologija za procenu rizika u državama Dunavske regije i definisanje zajedničke metodologije; (2) operativno praćenje suše putem Korisničkog servisa za sušu; (3) izrada web platforme sa kompjuterskim modelima koji koriste izmerene podatke i podatke dobijene putem satelitskih snimaka; i (4) izrada strategije za unapređenje sistema pravovremenog reagovanja na sušu i definisanje efikasnijeg procesa donošenja odluka (monitoring - procena uticaja - odgovor - oporavak - spremnost). Kao najvažniji očekivani rezultati izdvajaju se Korisnički servis za sušu; Metodologije za procenu uticaja suše i procenu rizika; i Strategija za poboljšanje hitne reakcije na sušu.

Ključne reči: Suša, upravljanje sušama, rizik po životnu sredinu, hitna delovanja, daljinsko osmatranje.

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