Interreg
Danube Transnational Programme
DriDanube

DriDanube Manual for drought impacts assessment

DriDanube – Drought Risk in the Danube Region
www.interreg-danube.eu/dridanube
Project co-funded by European Union funds (ERDF, IPA)

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Danube Transnational Programme
DriDanube

WP	4
Activity	4.1
Activity leader	CZECH GLOBE
Number and name of the deliverable/output	D. T2.1.2 MANUAL FOR DROUGHT IMPACTS ASSESSMENT
Participating partners	ALL
Type of the deliverable/output (analysis, report, guideline, workshop, brochure, etc.)	MANUAL
Purpose of thedeliverable/output	DESCRIPTION OF ALGORITHM FOR DETECTION OF NEAR REAL-TIME DROUGHT IMPACT
Connection with other deliverables	D 4.1.3, D 4.1.1
Start date End date	01.01.2017 30.04.2018

Content

REPORTING WEBSITE

Primarily prepared in English but each country has it owns language mutation. Your language mutation will open automatically according to language of your web browser. Each reporter or user of web will have own registration (the registration will create automatically after sending first questionnaire). After the registration the reporter will get email with username and password. All questionnaires will be saved on his/her registration page. On the webpage you can find questionnaires in your language which are ready for your reporters (Fig. 1.). There is also place for contacts –reporters can easily have connection with you and you can easily follow the questionnaire through the administration access (Fig. 2).

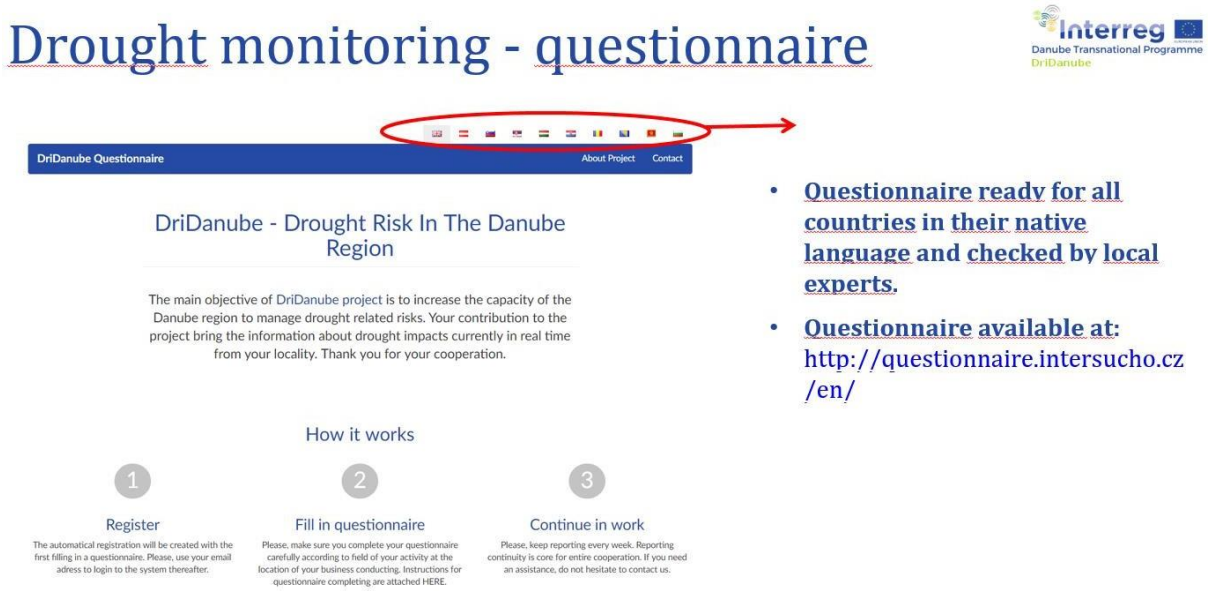

Fig. 1. The questionnaire web page with the language selector.

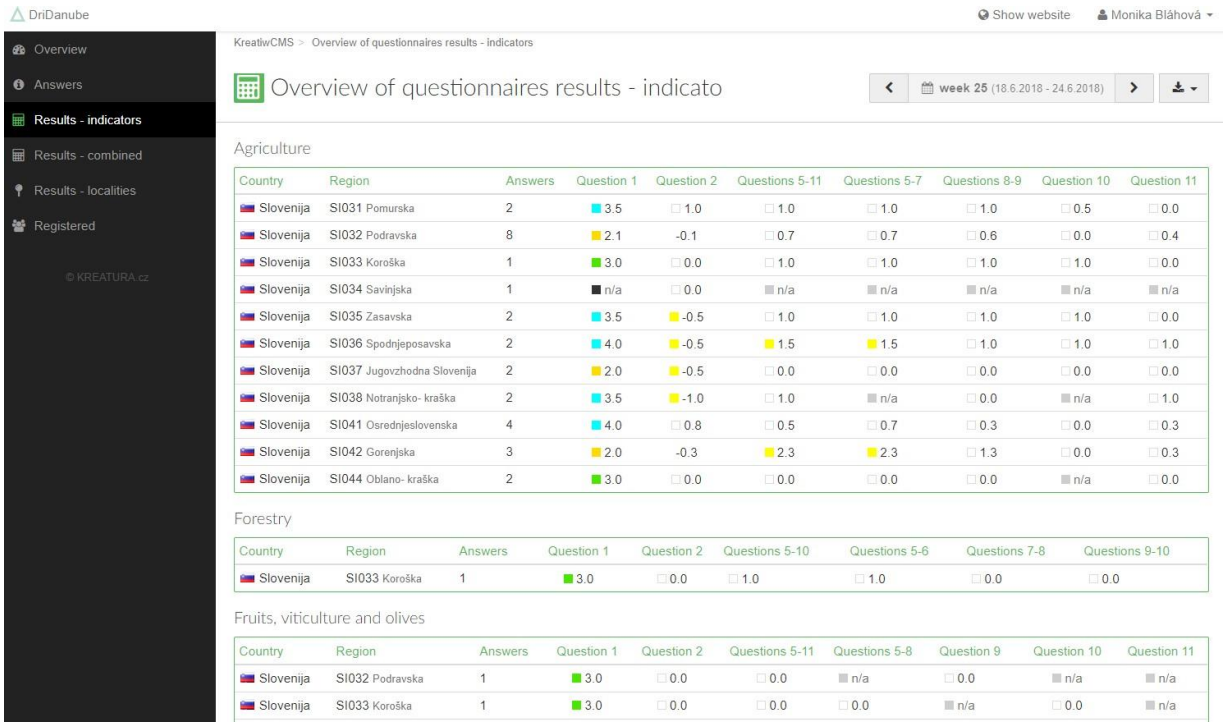

Fig. 2. View of the administrator´s dialog in Slovenian version of the questionnaire

ENGAGEMENT OF REPORTERS

How we can start?

Try to prepare and think where you can find the reporters (farmers, foresters, meteorologists, climatologists or people who work in nature protection). It is best to contact the leaders or head of e.g. agriculture union or agriculture office (or head of departments of Ministry of agriculture) in given districts and communicate this topic with them. Ask them for help and discuss with them the possible number of reporters. It is better to start the negotiation in districts where the drought is serious problem for long time and people want to be involved in work on this topic.

Why we need reporters?

Within the DriDanube project we will create tool (website) with different and various maps (for the DriDanube region) which will be actualized every one week. Within this web we also need bring actual and real information about drought impacts (not only information about drought occurrence). Real and actual information about impacts can bring only farmer (or forester, meteorologist etc.). This information from reporters can subsequently help us to negotiate and show how serious the drought problem is. Results from questionnaires by reporters will be elaborated within two – three days and every week new map about "Drought impacts" will be published on website.

How many reporters?

You should have 2 - 3 reporters for suggested NUTS3 regions. But realize how many you can get in real, let us know and subsequently you will manage the final number of reporters for each country. Example of the usefulness even small network of reporters is visible on the Fig. 3 and originates from the initial days of Croatian network.

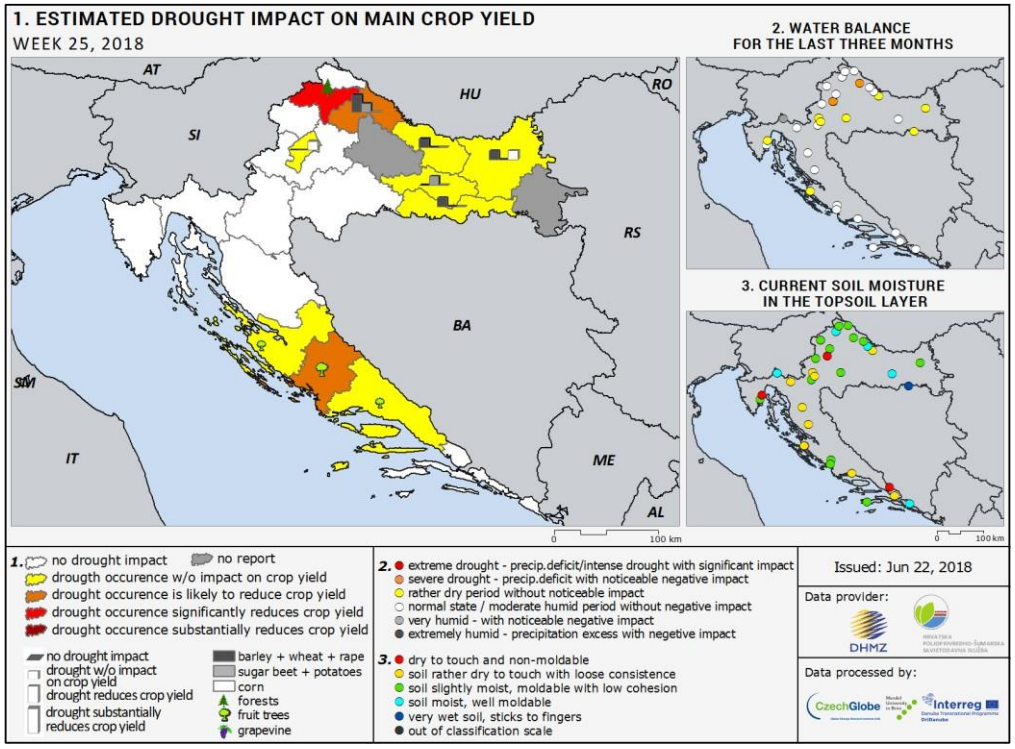

Fig. 3. Overview of the Croatian network in its early days. Despite relatively low number of reporter the drought patterns and its impacts can be monitored.

Why we have three types of questionnaire?

(one for agriculture, second for forestry, last for fruits)

Primarily we all should work with the agriculture one. But if you have in your country no agriculture districts or it is problem for you to find reporters who can answer the agriculture questions, then you can work with the forestry. E.g. in Czech Republic we have 95% of all reporters farmers (so we have mainly the agriculture reactions) and only 5% create the forestry reporters. All forestry reporters are from National parks or Protected landscape areas, generally from district where the agriculture production does not exist or is less important. But feel free to have e.g. 50% of farmers reporters and 50% of forestry reporters. It is up to you and also up to possibility of your country. Generally is better to observe the forestry impacts in districts where are bigger areas with forest production (national parks, forestry areas) and agriculture impacts in district with more agriculture production.

Where the observation should be done? Where reporters should observe impacts?

The reporter should define one locality for which the observation will be done continuously. He/she can change the location within his/her region but we recommend not to change the place and bring the information always for the same location. Our advice for reporters – try to define the place for reporting on the place where the drought impacts are long-term and where you can see that the situation is really bad (thanks to drought). It is also good to choose place where the drought impacts are visible well and the reporter visit this place routinely.

How much time it takes to fill in the questionnaire?

The questionnaire should be fill in every week to precisely describe the impacts of drought. Continuity and periodicity of filling questionnaires are quite important. Finally, it will take 5-10 minutes. Reporters will visit the website where will be questionnaire in their national language; they will see their reactions from the last week so it can take 1 minute if the situation have not changed from last week.

- It takes only 5-10 minutes to fill in questionnaire
- Differences each week
- Questionnaire keep the last answers –no need to fill in if no change
- Reporters always evaluate last week (from Sunday to Sunday)

The questionnaires are filling in during the whole year. Since 2015 we cooperate with reporters during the whole year and we highly recommend this periodicity – the situation in winter can influence spring or summer drought significantly.

How to communicate with reporters?

✓ Communication by emails

- First email –automatically send (username and password for registration)
- Second email – should be more personal, with specific information, longer enough to give robust and comprehensive information, with contact on one or two persons from your team who will bet he „leader“ for your reporters – HIGHLY RECOMMENDED
- Every week one short email – reminder to fill in the questionnaire –HIGHLY RECOMMENDED:
    1. we ask them (by email) to fill in questionnaire usually on Monday – really simple, short email with links to questionnaire, sometimes we send them actual information, what is new etc. But we try to keep the email as short as possible.

2. during Tuesday, Wednesday and first half of Thursday –receiving questionnaires
3. in the second half of Thursday the questionnaires are processed and new map is online

✓ Personal and collective meetings/visits

- Personal meeting with the most active reporters – If possible we HIGHLY RECOMMEND
- Meetings with given reporters who ask for it – if possible we HIGHLY RECOMMEND
- Collective meetings – if possible we HIGHLY RECOMMEND

We recommend you to have one „leader" for you reporters within your group who will communicate with your reporters and who prepare also the evaluated questionnaires as a output for preparation of final map. Since the cooperation between reporters and your team will be settled the whole leader´s work should take only c. 2 hours every week.

RESULTS PROCESSING

How to evaluate the final outputs? - Excel tables

Please, go to the administration via this link:
http://questionnaire.intersucho.cz/admin/core/sign/in/

Your user name (first line): *will be defined directly for you*
Your password (second line, you can change it): *will be defined directly for you (could be changed later)*
If you wish we can set up access to anyone else, just send us the names and emails.

In administration website you can see all received questionnaires. Since the cooperation with reporters will start you can control the questionnaires here, prepare export (Excel table) and send the final results to us (we will prepare the map). Leader of reporters from each country is responsible for accuracy of Excel table – outputs from questionnaires. WP4 group is responsible for creating the final map.

If you have any questions according to reporting system do not hesitate to contact us on email: centrum@czechglobe.cz.

Maps are prepared by CzechGlobe in each week, based on data from questionnaires administration. In each week two maps are created – national maps, for each involved country and also a regional map, showing a current state in the whole DriDanube region. Map layout always consists of 3 maps, and all data for those maps are available to get through your national questionnaire administration.

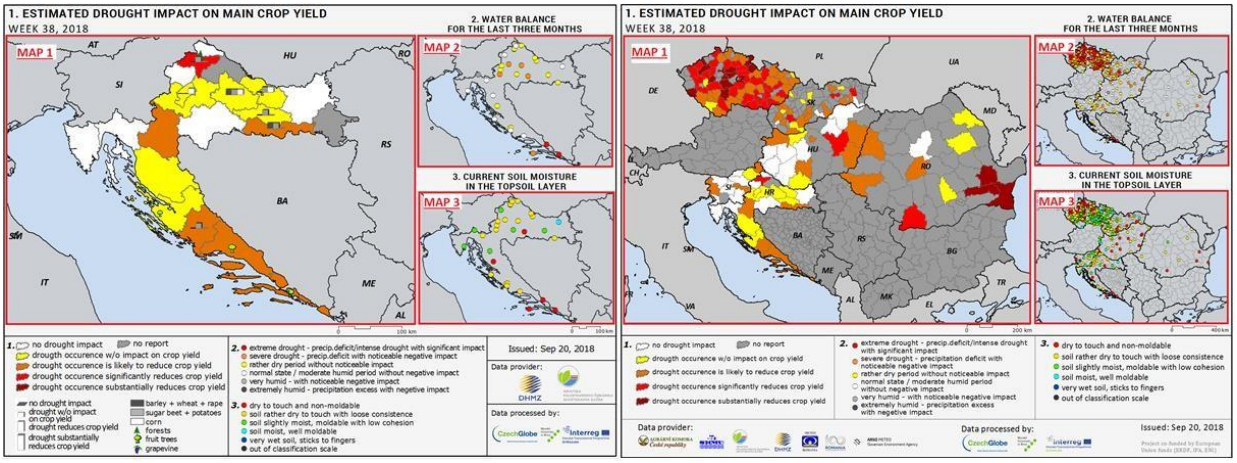

Fig. 4: Example of a national and regional map of drought impacts

You can see 4 different types of results in the administration part of the web:

1) **Answers:** here you can see all received questionnaires in given week (name of the reporter, region, specification, date of receive etc.). For example look on the 40. week (you can move in between weeks on the upper right side). You can check not only a general overview but you can look directly on each questionnaire with answers (the button„i" – detail of answer). Here also you can deactivate given questionnaire so it will not be implied in final processing (e.g. questionnaire has some mistakes). Here you will also see new reporters (they will have sign „new" by their name), so you can easily contact them and save their names.

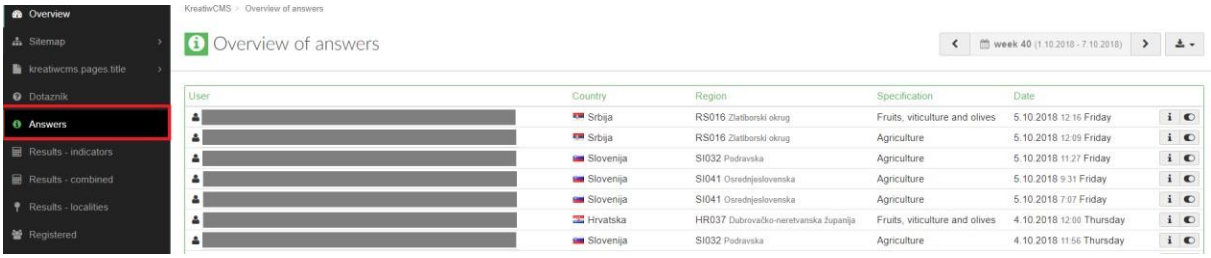

Fig. 5: Screenshot of 'Answers'

2) **Results – indicators:** here you may find processed questionnaires for each week, for all 3 questionnaires types (Agriculture, Forestry, and Fruit). You can download all the results, by clicking on "Download button" in the upper right corner. Results of each questionnaire type are combined with groups according to surveyed crops. First two questions are the same for all questionnaire types, other groups differ according to questionnaire type.

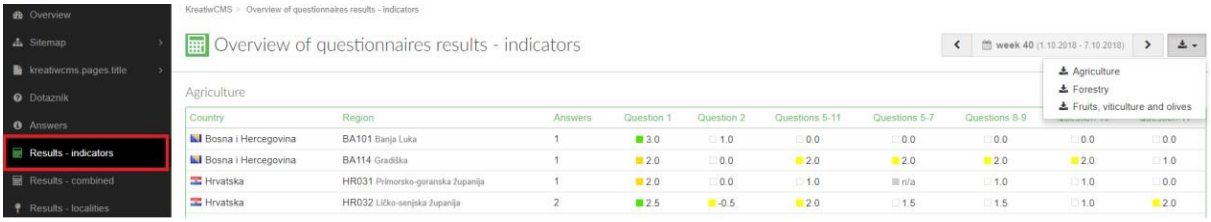

Fig. 6: Screenshot of 'Results-Indicators'

3) **Results – localities:** here are questionnaires with coordinates and you can check the given location of each questionnaire, you have here also the emails and answers for questions 1 and 2 (so you can check actual soil moisture for given questionnaire). And here you need to prepare (download) the Excel table – outputs for map 2 a 3.

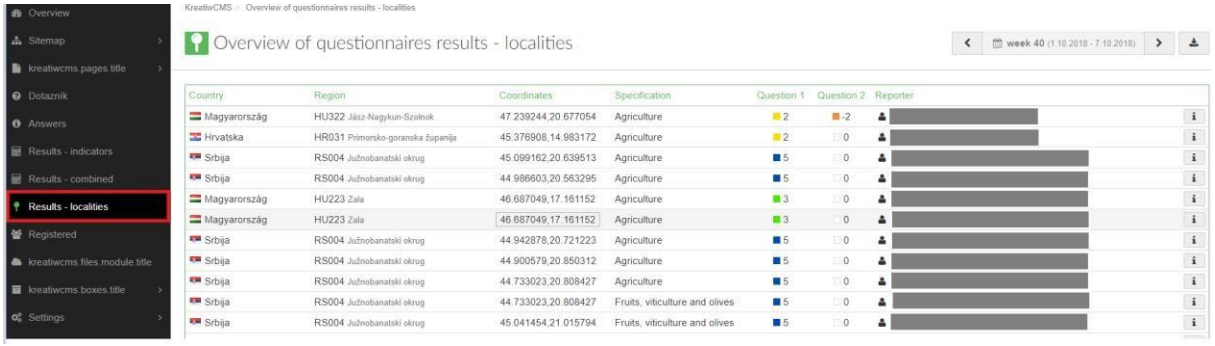

Fig. 7: Screenshot of 'Results-localities'

4) **Results – combined:** Here you can find final questionnaires results for each week. Results from all types of questionnaires are combined here. Data from this results are the basis for map 1.

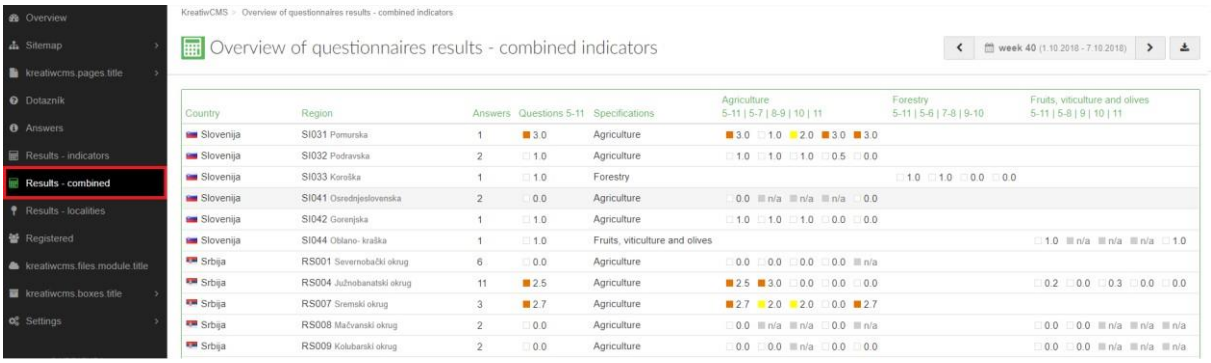

Fig. 8: Screenshot of 'Results-combined'

How we process your results to create final maps?

To prepare the map we will need the tables downloaded from „Results – indicators" (3 tables for 3 types of the questionnaire) and „Results – localities" (one table) and "Results

– combined" (one table) since we will have a sufficient number of reporters from your country. For example in the Czech Republic, we started with 10 districts and c. 25 reporters (from 77 districts; now we are moving between 55-65 districts and 230 reporters).

Those tables are prepared for each country and send to us by FTP we created for this. Each partner gets credentials to FTP server when they are ready to start with regular map creation. If you don't have access to FTP and you are ready to start, please contact us.

Final map layout produced in each week looks like following, with 3 maps, showing different information.

Map 1

Map 1 is created based on Results – Combined. These results sum up data collected in all three types of the questionnaire (agriculture, forestry, and fruit). This map brings 3 parts of information – the colour of the region (drought impact on all monitored crops), bar chart in each region (drought impact on cereals, root crops and corn) and fruit/pine tree icon (drought impact reported in forestry on fruit area).

The colour of the region - shows general drought impacts, regardless of the crop. This value is highlighted in blue in the following figure (Fig. 9). The final value is based on results of agriculture questionnaire. We take all reports from each region and look at all answers for questions 5 – 10 (using questions numbering as used here: http://questionnaire.intersucho.cz/en/). For each response (in other words for every report from the single reporter) we take the worst reported value (highest number) and make an average value for the region. So the final value is the 'worst average' value for all reports in the region. If there is no other response from the same region from forestry or fruit, this value remains unchanged. If the value reported by forestry or fruit type of questionnaire is worse (the number is higher), we replace value calculated from agriculture by this, worse value. If a report from agriculture is missing (as for example shown in the following figure, for region HR048), region value (colour) is directly calculated from forestry or fruit values.

The Coding of answers and values is the following:

1) Estimate drought impacts on *CROP* for the yield of 2018?
   - No effect of drought; vegetation is optimal. **0**
   - No effect of drought but vegetation is worse for other reasons. **1**
   - Drought affected the development of vegetation but considerable losses aren't expected, yield loss will be to 10% *** 2**

- The middle level of damage, a considerable decrease of yield is expected, yield loss will be to 10-30% *** 3**
- Hard damage of vegetation, the yield on 10-year minimum, yield loss will be to 30-40% *** 4**
- Vegetation extremely damaged by drought, yield loss bigger than 40% *** 5**
- CANNOT BE EVALUATED **n/a**

Result values define the colour of the region (in the map and in the web administration). Values and colours coding is the following:

Value	Colour
0 - 1,8	
1,81 - 2,49	
2,5 - 3,4	
3,41 - 4	
4,01 - 5	
No data	

Bar charts (Highlighted in green in Fig. 9) – show drought impact on 3 groups of crops – cereals, root crops, and corn. Values are calculated in the same way, as for the color of the region. We take an average of worst reported values from each category. For cereals, results are combined from questions 4 – 6 (using questions numbering as used here: http://questionnaire.intersucho.cz/en/), for root crops from questions 7 – 8 (using questions numbering as used here: http://questionnaire.intersucho.cz/en/) and for corn it is simply from question 9 (using questions numbering as used here: http://questionnaire.intersucho.cz/en/). An important rule is that bar is drawn only if result value is 2 or higher (in the other words, if there is any drought impact on the crop. Values 0 and 1 show no drought impact, or other than drought impacts)

Fruit/Pine tree icon (highlighted in red in Fig. 9)– if there is one of those icons present in the region, it means, there is some drought impact reported by fruit grower or forester. Size of the icon is defined by the reported value (the bigger the higher).

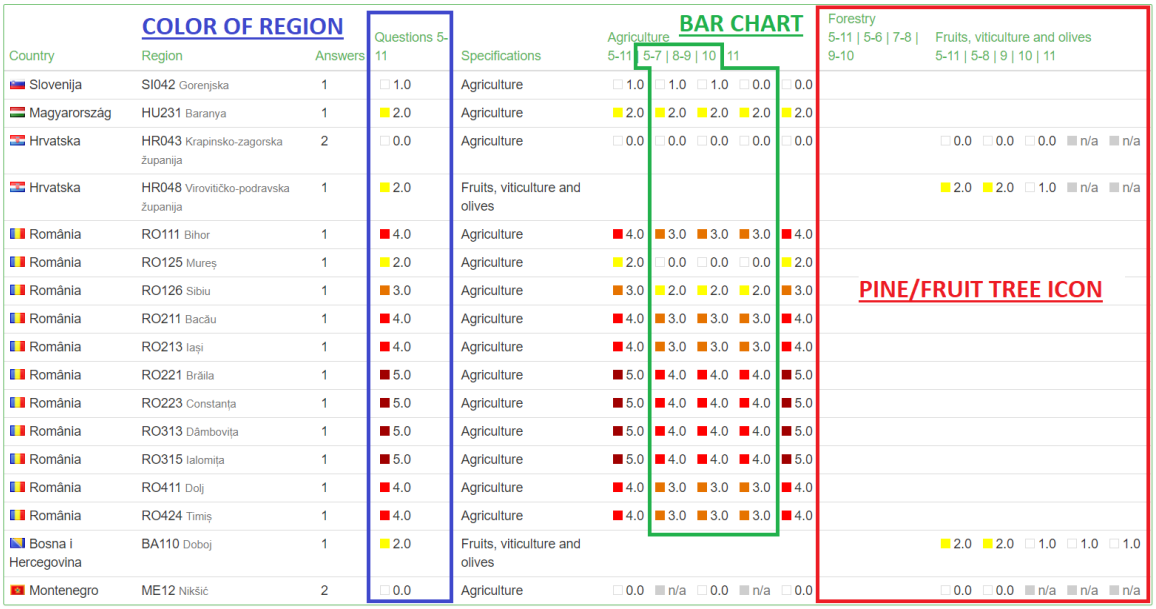

Fig. 9: Data used for Map 1 as shown in the web administration

Map 2 & Map 3

Maps 2 and 3 are created based on Results – Localities. These results, again, sum up data collected in all three types of the questionnaire (agriculture, forestry, and fruit). Results are processed by every single report, and each report is displayed in those maps on its own.

Map 2 shows how reporters evaluate water balance for the last three months directly on their site. Values are answers on question number 2 - How do you evaluate the last 3 months according to water balance?. Data are collected in web administration in Results-Localities, and are highlighted in blue in the following picture (Fig. 10).

Values and colours coding for map 2:

2) How do you evaluate the last 3 months according to water balance?
   - Extremely dry – precipitation deficit/intensive drought with significant impacts. **-3**
   - Very dry – precipitation deficit with detectable negative drought impacts. **-2**
   - The process is rather drier without visible impacts. **-1**
   - Normal state. **0**
   - The process is rather moister, without negative manifestations. **1**
   - Very moist – with detectable negative impacts. **2**
   - Extremely moist – precipitation surplus with negative impacts. **3**

Map 3 shows how reporters evaluate current soil moisture in the topsoil layer directly on their site. Values are answers on question number 1 - Assessment by Finger-print:

what is the state of soil moisture in the layer 20 cm from the surface?. Data are collected in web administration in Results- Localities and are highlighted in red in the following picture (Fig. 10).

Values and colours coding for map 3:

3) Assessment by Finger-print: what is the state of soil moisture in the layer 20 cm from the surface?
   - The soil is dry and dusty by touch, without the possibility to make any form **1**
   - The soil is drier by touch, it has a loose structure; without moisture impact **2**
   - The soil is moderately moist, it's possible to make a form but low consistency, it gives the feeling of moisture in fingers **3**
   - The soil is moist with good workability and possibility to make a finger-print **4**
   - The soil is fully saturated by water, it sticks to fingers – it's muddy 5
   - CANNOT BE EVALUATED **n/a (x)**

Country	Region	Coordinates	Specification	MAP 3	Question 1	Question 2	MAP 2
Slovenija	SI042 Gorenjska	46.165496,14.501983	Agriculture		4	0	
Bosna i Hercegovina	BA110 Doboj	44.706797,18.076772	Fruits, viticulture and olives		2	-1	
Hrvatska	HR048 Virovitičko-podravska županija	45.952572,17.239811	Fruits, viticulture and olives		2	-1	
Hrvatska	HR043 Krapinsko-zagorska županija	46.138746,15.888072	Agriculture		4	0	
Hrvatska	HR043 Krapinsko-zagorska županija	46.138746,15.888072	Fruits, viticulture and olives		4	0	
Montenegro	ME12 Nikšić	42.820526,18.635503	Fruits, viticulture and olives		4	0	
Montenegro	ME12 Nikšić	42.820526,18.635503	Agriculture		4	0	
România	RO424 Timiş	45.77113,21.258475	Agriculture		1	-2	
România	RO111 Bihor	47.035732,21.89823	Agriculture		1	-2	
România	RO315 Ialomiţa	44.552756,27.38354	Agriculture		1	-3	
România	RO221 Brăila	45.206467,27.919689	Agriculture		1	-3	
România	RO223 Constanţa	44.213839,28.645457	Agriculture		1	-3	
România	RO211 Bacău	46.532003,26.91259	Agriculture		1	-2	

Fig. 10: Data used for Map 2 and Map 3 as shown in web administration

Both of results, used for maps 2 and 3 should be represented by a single dot in the final map. In case of spatial collisions (if there are two reporters on the same place or their sites are too close to each other to be displayed in used map scales) only one report is displayed in the site.

What happens with the final outcomes?

When you process the data and upload them we are producing series of country maps for each country and the automatic email is dispatched to each national team that map is ready to be downloaded and used and promoted by national partners. In the same time the drought impact overview map is prepared and uploaded to the Drought Watch network and commented in the Drought Watch bulletin. Example of such map is presented at the Fig. 11.

Obviously the information collected at the regional DriDanube maps can be and are compared with other drought indicators. For example the season of 2018 was fairly instrumental in carrying out these comparisons. The Fig. 12 provides unique outlook into the true value of the Drought impact map, as it is clear that vegetation conditions well corresponds with the drought impacts.

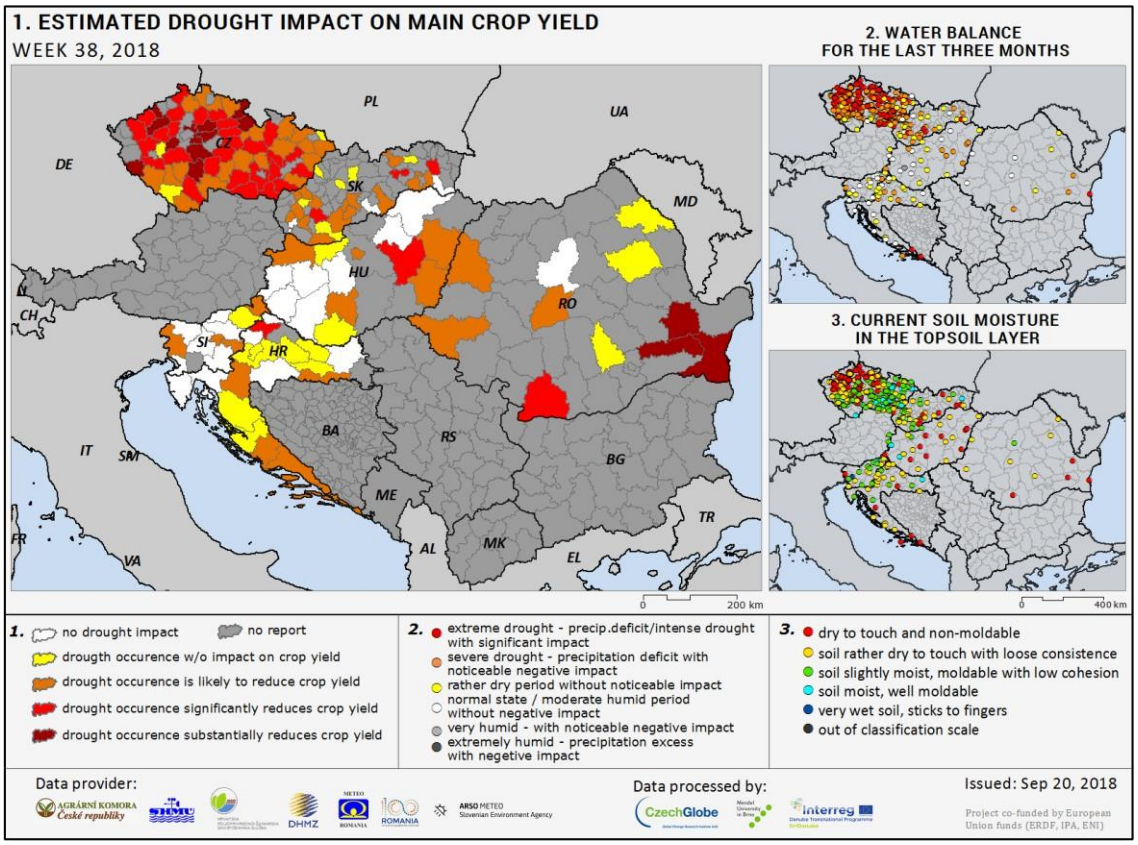

Fig. 11. The regional map of drought impacts in the 38th week

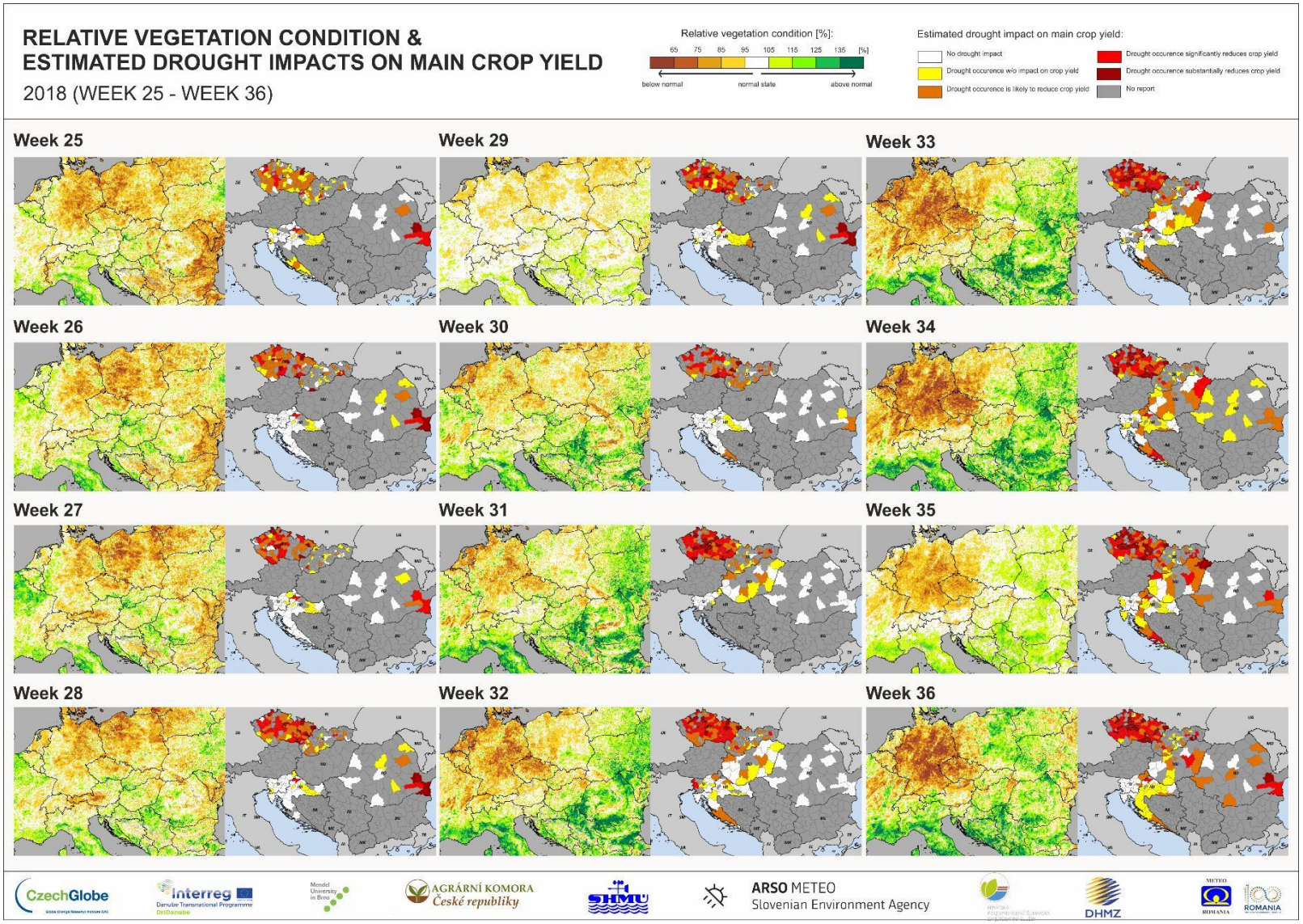

Fig. 12. Comparison of reported drought impacts and condition of vegetation over the 2018 drought episode over the DriDanube region.

Authors

Miroslav Trnka

Daniela Semerádová

Lenka Bartošová

Monika Bláhová

Jan Balek

Lucie Kudláčková

Petr Hlavinka

Gal Oblisar

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