



# Overview of IHMS' drought monitoring activities in Montenegro

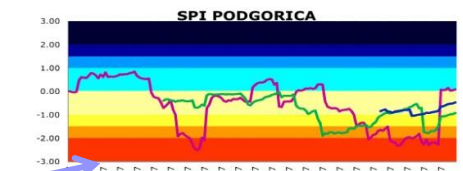
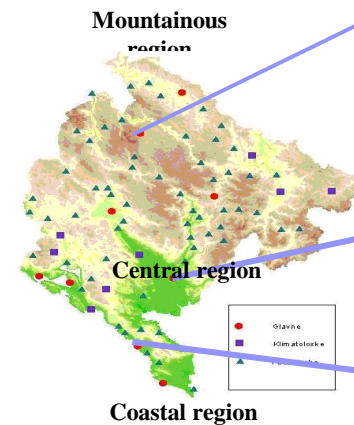
Prepared by Mirjana Ivanov  
IHMS



# Drought monitoring products

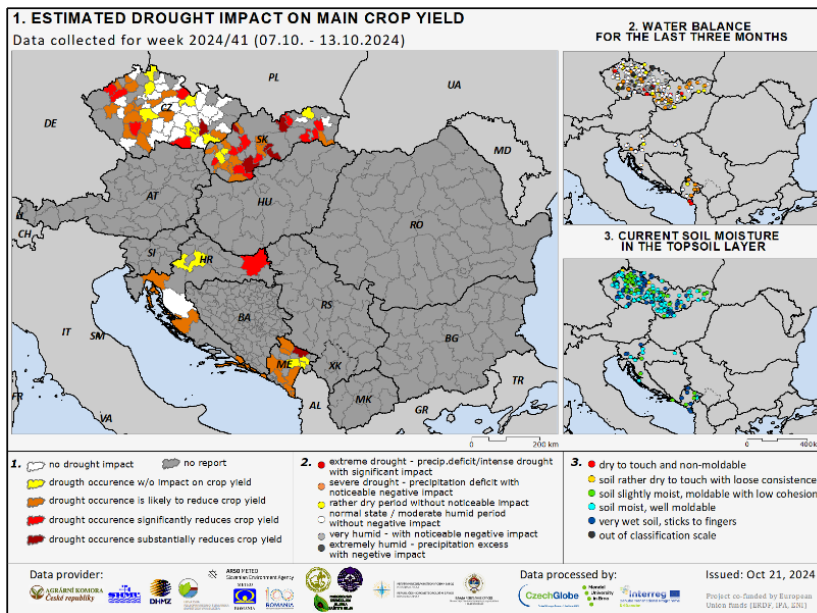
- Daily and monthly SPI 1,2,3,6,9,12 (established within DMCSEE project)
- SPEI 3, 6, 12
- CDD, precipitation
- FVC with assistance of DMCSEE
- Drought watch tool (when it was possible) – regional established within DriDanube project
- National network of reporters

|               |           |
|---------------|-----------|
| -0.99 to 0    | Normal    |
| -1 to -1.49   | Moderate  |
| -1.5 to -1.99 | Very      |
| $\leq -2$     | Extremely |

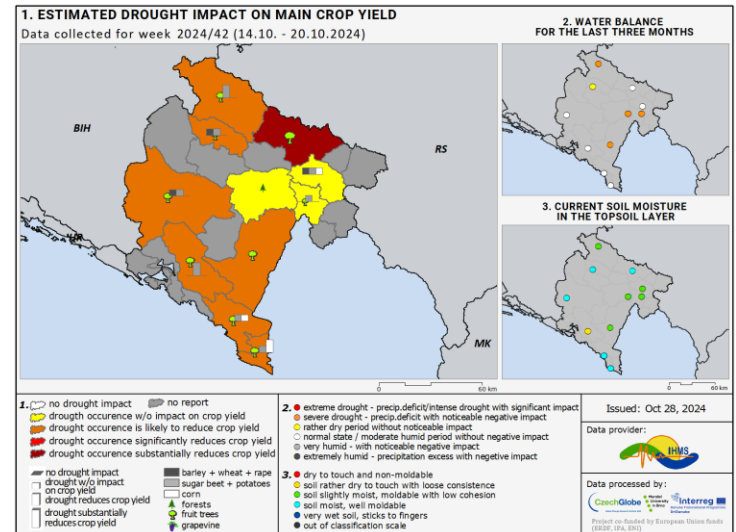


# Drought monitoring products

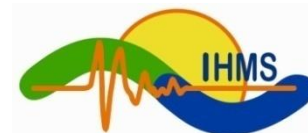
## ■ Impact maps (with assistance of CzechGlobe and DMCSEE)



07.10-13.10.2024.



14.10-20.10.2024

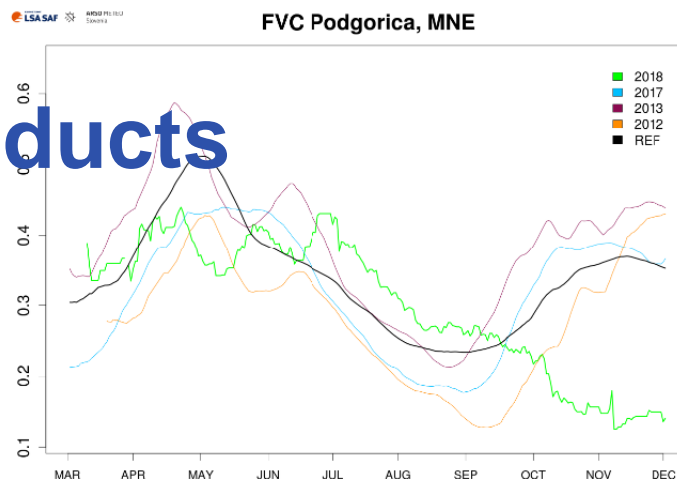


# Drought monitoring products

- DMCSEE bulletins
- National drought bulletins
- Inform project result – regional sources:

<https://app.powerbi.com/view?r=eyJrIjoiZDMxNGI5NjctZmMwMS00NjQ1LTk4OTItOTZmODQ4YjQ0NTNhliwidCI6IjBmOWUzNWRiLTU0NGYtNGY2MC1iZGNjLTViYTQxNmU2ZGM3MCIslmMiOjh9&pageName=ReportSection541e3500be9609aa7650>

- <https://drmkc.jrc.ec.europa.eu/inform-index/INFORM-Subnational-Risk/South-East-Europe>



# Update of DriDanube drought impact database and yield data

| No. | WHEN |        |       |                          | WHERE                  |            |                                      | IMPACT DEFINITION                    |                 |  |  |  |
|-----|------|--------|-------|--------------------------|------------------------|------------|--------------------------------------|--------------------------------------|-----------------|--|--|--|
|     | Year | Season | Month | Date_begin<br>(YYYYMMDD) | Date_end<br>(YYYYMMDD) | Country    | NUTS 2<br>(1 event/1 or more nuts 2) | NUTS 3<br>(1 event/1 or more nuts 3) | Region          | Impact categories<br>(1 event/1 or more impacts) | Subcategories  | Short description in English   |
| 1   | 2006 | summer |       | 20060701                 | 20060801               | Montenegro | CentralniRegion                      | Danilovgrad                          | central region  | Wildfires  |  | Forest fires in coastal region, Zeta-Bjelopavica region and karstic region   |
| 2   | 2006 | autumn |       | 20061101                 | 20061123               | Montenegro | CentralniRegion                      | Nikišić                              | central region  |  |  | Water deficit in the middle of Autumn affected Nikišić (karstic region) Restriction in water use   |
| 3   | 2006 | autumn |       | 20061128                 | 20061128               | Montenegro | SeverniRegion                        | Kolašin                              | northern region |  |  | Famous lake Biograsko Lake in Kolašin (northern mountainous region) was affected   |
| 4   | 2005 | summer |       | 20050620                 | 20050621               | Montenegro | CentralniRegion                      | Podgorica                            | central region  | Wildfires  | D1: Increased burned area  | Forest fires affected grass and vegetation in vicinity of Podgorica town   |
| 5   | 2005 | summer |       | 20050629                 | 20050629               | Montenegro | PrimorskiRegion                      | Kotor                                | coastal region  | Wildfires  |  | Forest fires in vicinity of Kotor (coastal region) Forest fires affected grass and vegetation in vicinity of Podgorica town                        |
| 6   | 2005 | summer |       | 20050715                 | 20050715               | Montenegro | CentralniRegion                      | Podgorica                            | central region  | Wildfires  | D1: Increased burned area  | Forest fires in vicinity of Podgorica town   |
| 7   | 2005 | autumn |       | 20050909                 | 20050909               | Montenegro | PrimorskiRegion                      | Herceg Novi                          | coastal region  | Wildfires  |  | Forest fires in vicinity of Herceg Novi (coastal region)   |
| 8   | 2003 |        |       |                          |                        | Montenegro |                                      |                                      |                 | Agriculture                                      | A5: Reduced productivity of livestock farming (e.g., reduced yields or quality of milk, reduced stock weights) | Reduced purchase of milk   |
| 9   | 2003 | summer |       | 20030601                 | 20030910               | Montenegro | PrimorskiRegion                      | Bar                                  | coastal region  | Wildfires  |  | Long Forest fires season in coastal, karstic and Zeta-Bjelopavica region (Ulcinj, Bar, Budva, Tivat, Kotor, Cetinje, H.Novi, Nikišić, Danilovgrad) |

## TEMPLATE FOR YIELDS

| Crop              | Region    | Yield, t/ha | 1981 | 1982 | 1983 | etc. |
|-------------------|-----------|-------------|------|------|------|------|
| e.g. Winter wheat | e.g. Plav | XY t/ha     |      |      |      |      |

Note: please, comment if you observed any special condition (extreme drought, floods, heatwaves etc.) which can influenced the yield in given year

| potato | region       | yield, t/ha | 2001  | 2002  | 2003 | 2004 | 2005  | 2006  | 2007 | 2008 | 2009 | 2010 | 2011 |
|--------|--------------|-------------|-------|-------|------|------|-------|-------|------|------|------|------|------|
|        | Bar          |             | 6     | 6     | 6.5  | 7    | 7     | 8     | 6    | 7    | 8    | 8    | 7    |
|        | Ulcinj       |             | 3.5   | 4     | 40   | 40   | 40    | 40    | 30   | 40   | 40   | 40   | 40   |
|        | Herceg Novi  |             | 15    | 30    | 30   | 14   | 14    | 14    | 14   | 14   | 14   | 14   | 14.1 |
|        | Podgorica    |             | 8.36  | 8.36  | 8.2  | 8.56 | 8.79  | 8.98  | 8.9  | 9.1  | 9    | 9.2  | 9.3  |
|        | Nikišić      |             | 10    | 20    | 12   | 10   | 19    | 15    | 11.9 | 16.9 | 17.9 | 15.9 | 18.5 |
|        | Danilovgrad  |             | 10    | 25    | 15   | 10   | 9.5   | 9.75  | 7    | 7.5  | 20   | 11   |      |
|        | Pijevlja     |             | 8.02  | 12.03 | 7    | 12   | 12.25 | 12.14 | 7    | 14.9 | 18   | 15   | 15   |
|        | Berane       |             | 1.4   | 1.4   | 1.5  | 1.8  | 1.8   | 1.9   | 0.7  | 3    | 3.5  | 3.6  | 4.2  |
|        | Bijelo Polje |             | 6     | 8     | 18   | 17.5 | 18.02 | 24    | 20.9 | 22.1 | 25.8 | 26.9 | 29.9 |
|        | Kolašin      |             | 10.21 | 12.72 | 9.16 | 7.92 | 9.08  | 7.4   | 8.2  | 8.6  | 7.4  | 9.3  |      |

| corn | region       | yield, t/ha | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|------|--------------|-------------|------|------|------|------|------|------|------|------|------|------|------|
|      | Podgorica    |             | 5.08 | 5.31 | 4.99 | 5    | 5.04 | 5    | 5    | 5    | 5    | 5    | 5    |
|      | Nikišić      |             | 2.5  | 4    | 3    | 3    | 2    | 6    | 4    | 7    | 7    | 7.2  | 7.5  |
|      | Danilovgrad  |             | 3    | 8    | 6    | 8    | 8.5  | 8.7  | 6    | 6.5  | 7    | 5    | 4    |
|      | Pijevlja     |             | 1.7  | 1.7  | 1.6  | 1.25 | 1.2  | 1.2  | 0.5  | 1.3  | 1.5  | 1.5  | 1.7  |
|      | Berane       |             | 1.4  | 1.4  | 1.5  | 1.8  | 1.8  | 1.9  | 0.7  | 3    | 3.5  | 3.6  | 4.2  |
|      | Bijelo Polje |             | 4.0  | 5.2  | 4.2  | 4.5  | 5.0  | 5.3  | 4.3  | 5.5  | 6.0  | 7.0  | 7.2  |
|      | Kolašin      |             | 1.9  | 2.12 | 1.82 | 1.94 | 2.48 | 2.35 | 2.1  | 2.1  | 2.1  | 2.1  | 1.8  |

| wheat | region      | yield, t/ha | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|-------|-------------|-------------|------|------|------|------|------|------|------|------|------|------|------|
|       | Podgorica   |             | 2.9  | 3    | 3    | 3    | 3    | 3    | 3    | 3.1  | 3.1  | 3.1  | 2.5  |
|       | Danilovgrad |             | 2.4  | 3    | 3    | 3    | 3    | 3    | 3.5  | 4    | 3.6  | 3.8  | 3.4  |

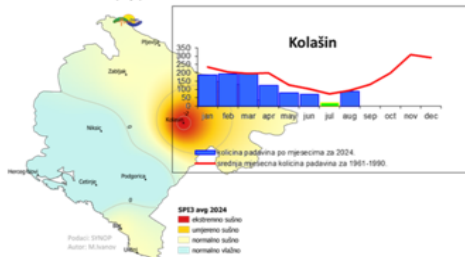
| olive | region      | total yield (t) | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|-------|-------------|-----------------|------|------|------|------|------|------|------|------|------|------|------|
|       | Bar         |                 | 10   | 70   | 32   | 912  | 394  | 477  | 21   | 393  | 405  | 418  | 26   |
|       | Ulcinj      |                 | 43   | 42   | 26   | 284  | 105  | 147  | 90   | 480  | 98   | 500  | 60   |
|       | Herceg Novi |                 | 245  | 245  | 406  | 407  | 407  | 407  | 337  | 407  | 343  | 343  | 414  |

# Update of National Drought Bulletins and impacts

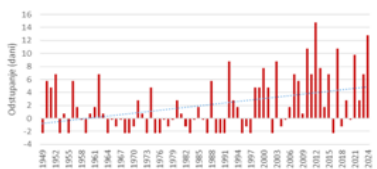
## BILTEN ZA PRACENJE SUŠE Preliminarna analiza /AVGUST 2024.godine Odsjek za primijenjenu meteorologiju i klimatske promjene

**Sažetak informacija:** intenzitet i prostorna raspodjela srednjih mjesečnih vrijednosti SPI indeksa praćena je vrlo toplim i ekstremno toplim vremenom. Poljoprivredna suša se u **oblasti Kolašina** razvila u ekstremnu praćena deficitom padavina od aprila (slika ispod). U Kolašinu je bilo 15 tropskih dana tj. za 13 dana više u odnosu na klimatološku normalu 1961-1990. (grafik ispod). Inače, maksimalni broj tropskih dana u Kolašinu je 17, a realizovan je sušne 2012. godine.

SPI3 - uslovi za poljoprivrednu sušu



Kolašin, avgust: odstupanje broja tropskih dana u odnosu na klimatološku normalu 1961-1990.

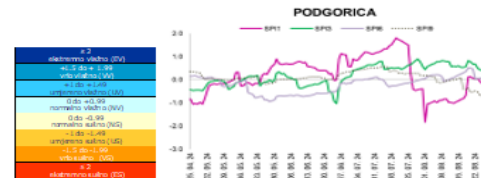


Hidrološka suša ima tendenciju daljeg razvoja u istočnim oblastima. U regionu primorja je u kategoriji „normalno sušno“, a u Ulcinju „umjereno sušno“ (predstavljeno na mapama ispod).

SPI9 i SPI12 - uslovi za hidrološku sušu



### STANDARDIZOVANI INDEKS PADAVINA SPI (1,3,6,9) iz dana u dan: trajanje i intenzitet



Na osnovu vrijednosti indeksa SPI 1,2,3,6,9,12 (graf.SPI/avgust '24.), koje su u velikoj mjeri u korelaciji sa zalihama produktivne vlage u zemljištu i nivoima površinskih i podzemnih voda, data je ocjena prevladajućih **uslova vlažnosti** i procjena uticaja na poljoprivredne kulture (vegetaciju) i hidrološke prilike po regionima tokom posmatranog mjeseca i predstavljena tabelarno.



salju Crna Gore

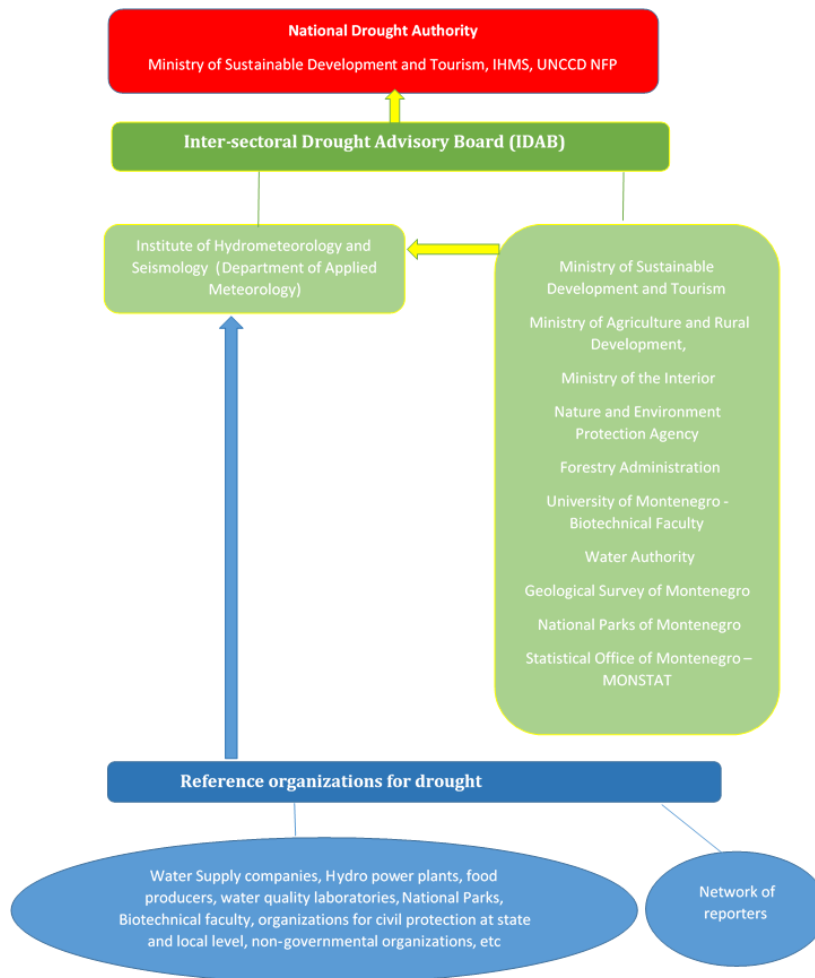
avgust/2024.god.  
Autor: T.Šušć

| SPI3 | Poljoprivredna suša      | SPI6 | SPI9 | SPI12 | Hidrološka suša |
|------|--------------------------|------|------|-------|-----------------|
| NS   | Deficit padavina         | NS   | NS   | NS    | NS              |
| NV   | Deficit padavina         | NS   | NS   | NV    | NS              |
| ES   | izražen deficit padavina | ES   | ES   | NS    | NS              |
| NS   | Deficit padavina         | NV   | NV   | NV    | NS              |
| NS   | Deficit padavina         | NS   | NV   | NV    | NS              |
| NS   | Deficit padavina         | NV   | NV   | NV    | NS              |

| Pločje    | SPI3 | Poljoprivredna suša      | SPI6 | SPI9 | SPI12 | Hidrološka suša |
|-----------|------|--------------------------|------|------|-------|-----------------|
| Pločje    | NS   | Deficit padavina         | NS   | NS   | NS    | NS              |
| Zabljak   | NV   | Deficit padavina         | NS   | NS   | NV    | NS              |
| Kolašin   | ES   | izražen deficit padavina | ES   | ES   | NS    | NS              |
| Central.  | NS   | Deficit padavina         | NV   | NV   | NV    | NS              |
| Podgorica | NS   | Deficit padavina         | NV   | NV   | NV    | NS              |
| Nišić     | NS   | izražen deficit padavina | NS   | NV   | NV    | NS              |
| Cetinje   | NS   | izražen deficit padavina | NV   | NV   | NV    | NS              |
| Ulcinj    | NS   | Deficit padavina         | NV   | NV   | NV    | NS              |

# RECENT DROUGHT RELATED PROJECTS

- **Montenegro Drought Management Plan, 2020 includes:**
  1. **National Drought Authority (NDA) – to be established**
- **Danube Drought Strategy as a basis**
- 2. **Maintain national network of reporters**

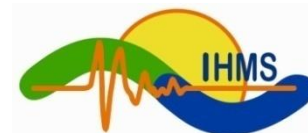


- Thursday, 30.06.2022 FAO organized:
- **Presentation of Comprehensive Analysis of the Disaster Risk Reduction, Early Warning Systems and Agro-meteorology Services for the Agriculture in Montenegro, where experts from IHMS presented work within DriDanube project.**

**Comprehensive analysis of the disaster risk reduction, early warning systems and agro-meteorology services for agriculture in Montenegro**

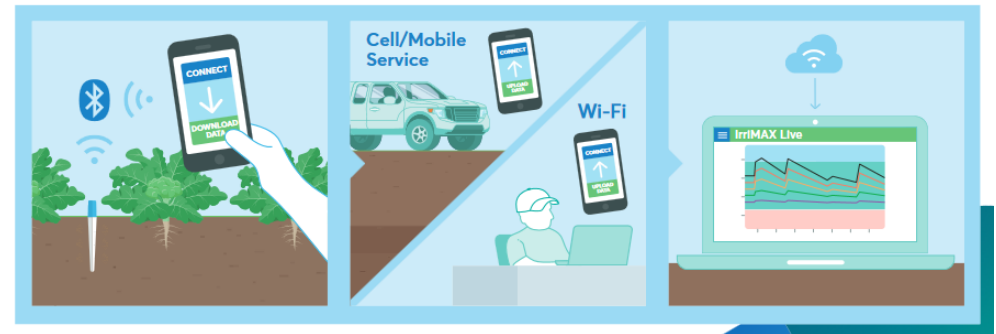
Support to the assessment of Disaster Risk Reduction in agricultural sector in the Western Balkans  
(TCP/RRR/3806/C1)

Food and Agriculture Organization of the United Nations  
Podgorica, 2021





- 5<sup>th</sup> July, 2022.
- Setting up the instrument for soil moisture (within duration of Hungarian project “Forest Fires and Flash Floods” on the sight of meteorological station in Herceg Novi.



Objective information (WMO)

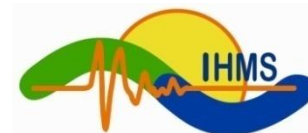
## ■ **FAO PROJECT in 2024:**

**“Preparation of a country-based (Montenegro) vulnerability and impact assessment extended report to provide best practices at global scale for peer-to-peer learning”,**

in collaboration of:

FAO

Ministry of Ecology, Sustainable development and Development of the North  
Biotechnical University and IHMS



Thank you for your attention!

