

# 22nd International Conference of **EURO-INBO**

May 22, Parma, Italy

Session 3 Adapting to climate change:

*How to better manage and prevent droughts?*



**EURO  
INBO**



**DROUGHT – NEW CHALLENGE**  
**Experience of Bulgaria**

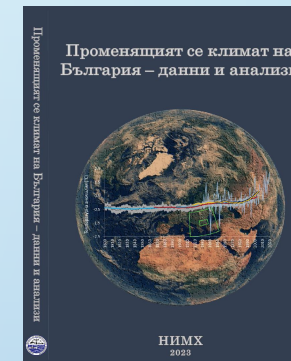
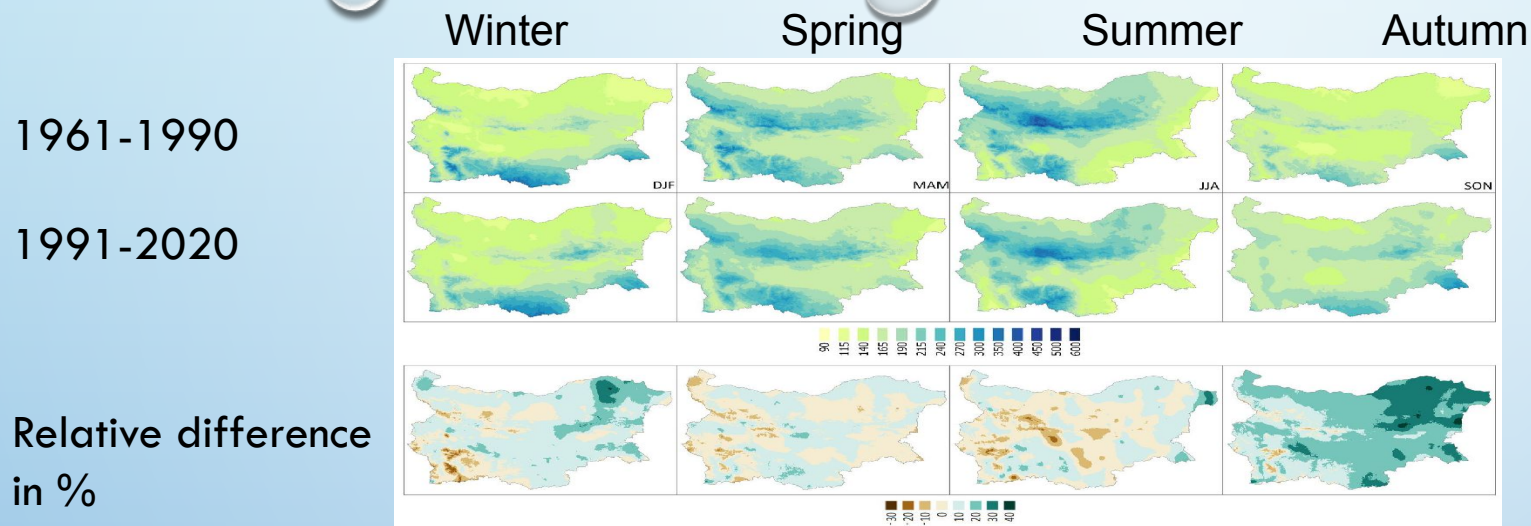


# What is the situation now?

## Reducing of water resources

The frequency of extreme events such as droughts and floods has increased in recent years. In 2022 the available renewable fresh water resources are **24.5% less** than the average multi-year value for the period 1981-2022.

# CHANGES IN PRECIPITATION PATTERNS



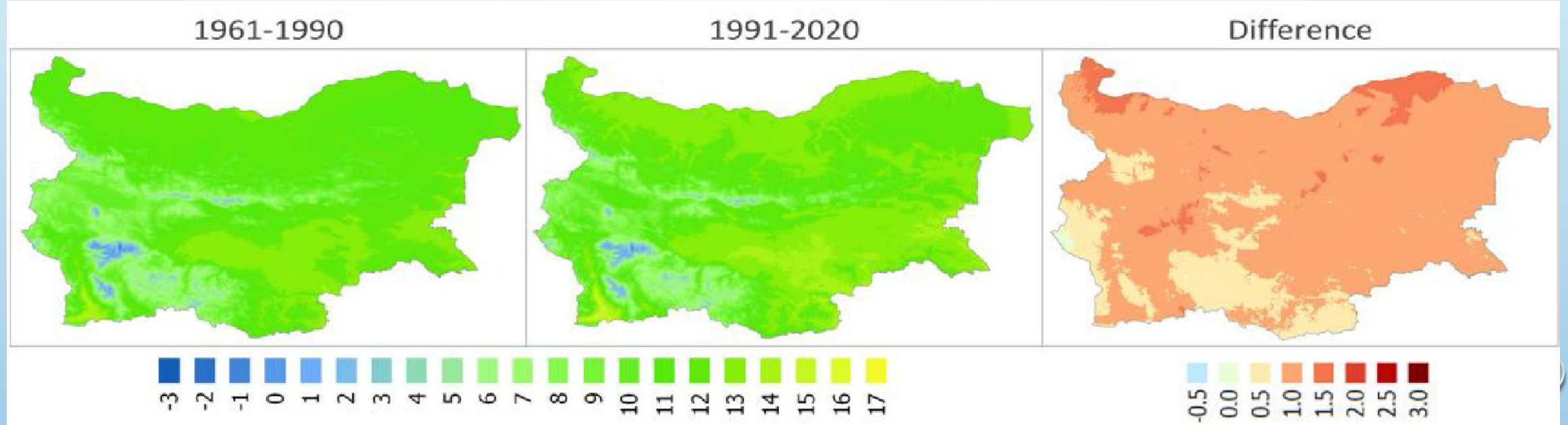
Source: NIMH

Book: Changing Climate | Bulgaria – data and analyses, 2023

The fluctuations in the annual precipitation amount do not follow a clear trend in the period 1931–2020, mainly due to the **different signs of change in individual regions**. The precipitation regime has observed **changes in both seasonal amounts and in the distribution of light, moderate and heavy precipitation**.

In the period 1991–2020, the **change in seasonal precipitation amounts is within  $\pm 10\%$**  compared to the period 1961–1990 for a large part of the country. **In the high parts of the mountains, precipitation in all seasons decreases significantly (up to 30-40%)**

# INCREASING AIR TEMPERATURE



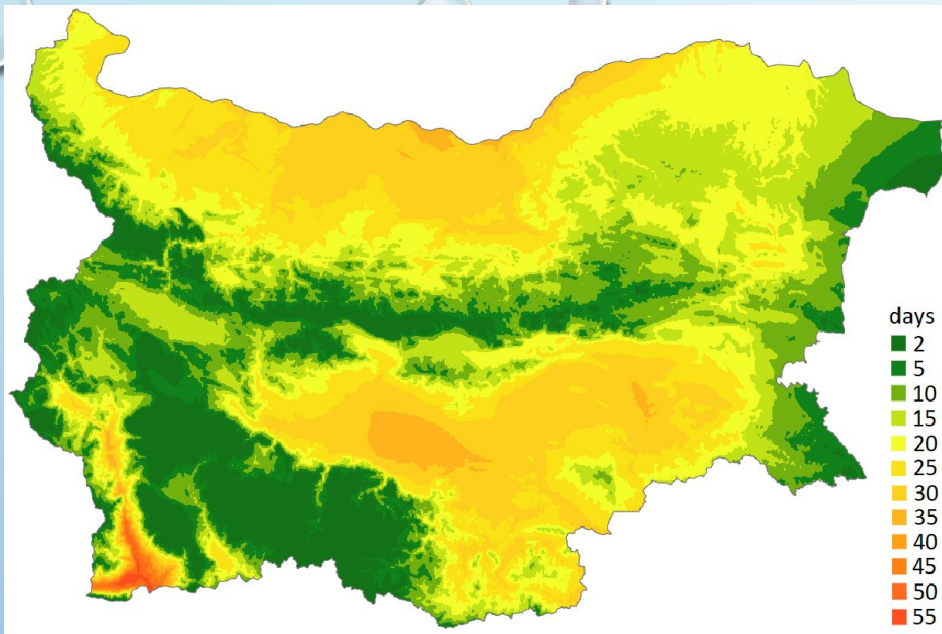
Fluctuations in the average annual air temperature in the period 1931–2020 are with a **statistically significant warming trend**, the winter temperatures increasing the fastest, but summer warming has being the most pronounced.

The temperature changes include both increases in average seasonal temperatures and more frequent temperature extremes. In the period 1991–2020, **the average annual temperature in Bulgaria increased by 0.8 °C** compared to the previous 30-year period.

# INCREASING HEAT WAVES

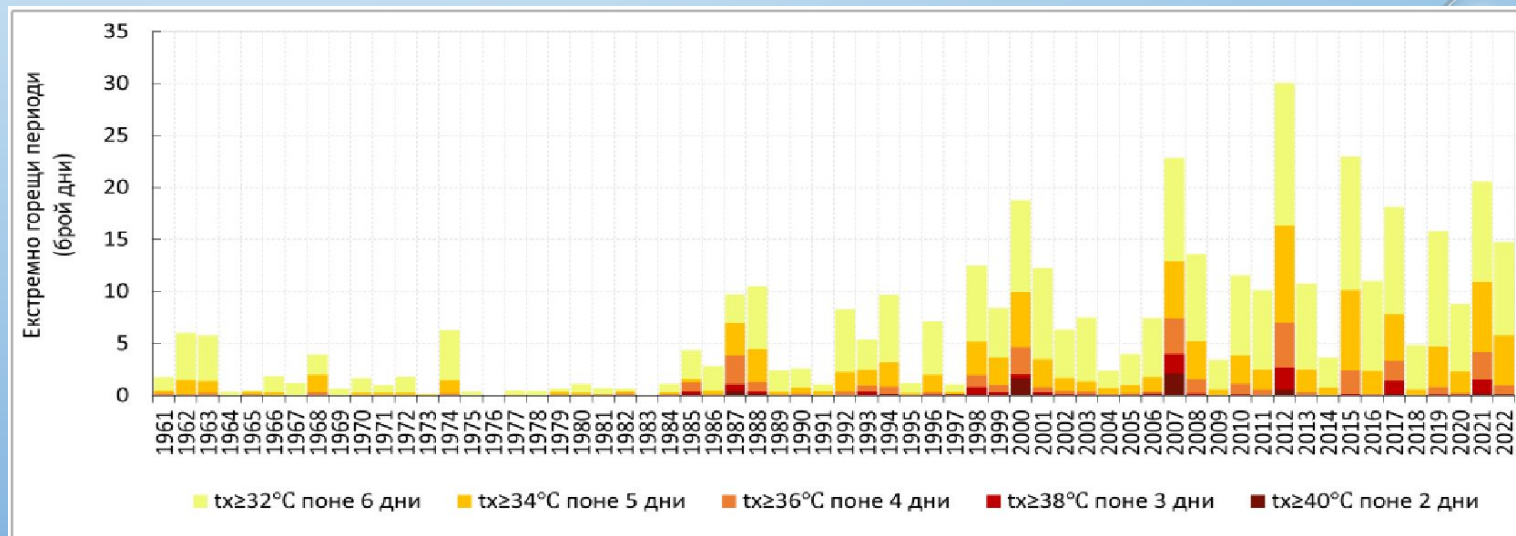
There is a clear trend of **increasing frequency of heat waves in recent decades.**

All extremely hot periods with maximum temperatures ( $\geq 38\text{ }^{\circ}\text{C}$  and  $\geq 40\text{ }^{\circ}\text{C}$  and about 90% of hot periods with threshold values of 32, 34 and 36  $^{\circ}\text{C}$ ) **have occurred since the mid-1980s.**



Spatial distribution of the multi-year average number of hot days (1961–2020)

The phenomenon is characteristic of the months of July and August, but its relative frequency in June and September increases, reaching 5-8% of the total number of cases.



# MAIN IMPACTS AND PROBLEMS



**Drinking water**



**Agriculture**



**Hydropower, cooling and  
Industrial activities**

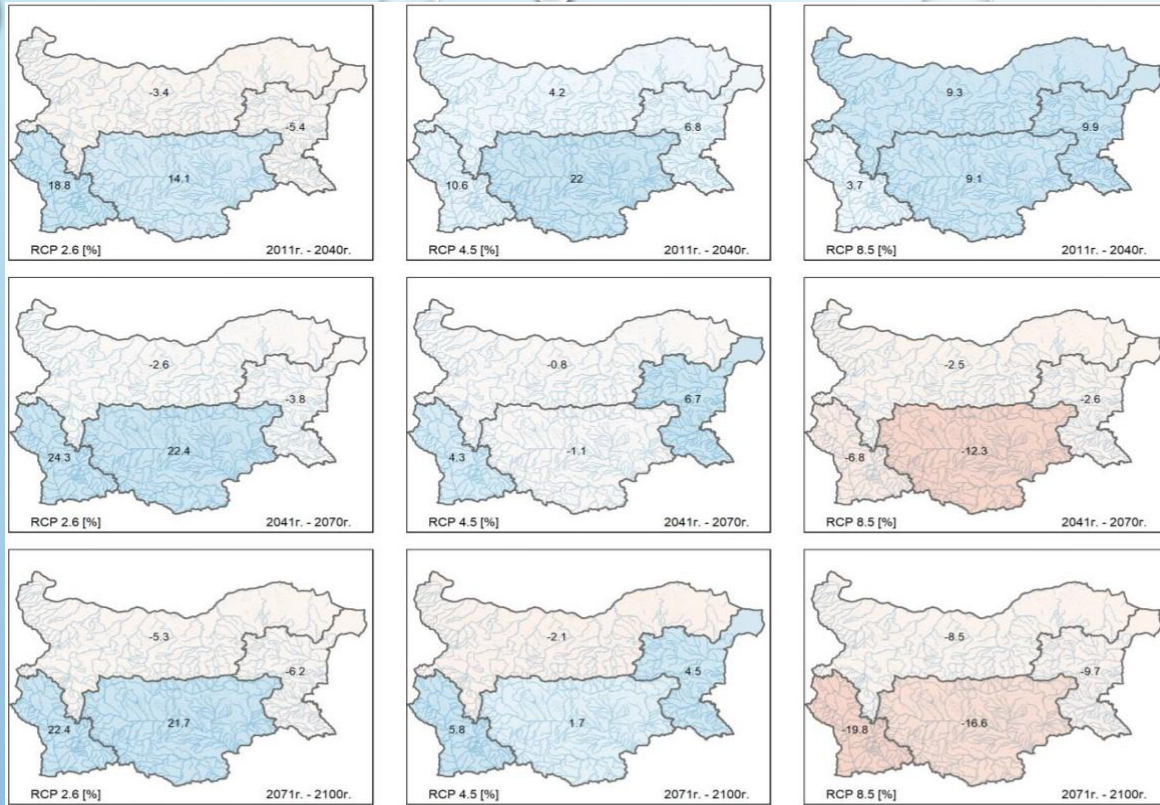


**Ecosystems and biodiversity**

# What we might expect?

Modelling conducted by NIMH shows **that water runoff is decreasing** as a result of the overall reduction in precipitation and increased evaporation losses.

# MAIN CONCLUSIONS



**Temperature:** The average annual temperature is increasing, especially in Northern Bulgaria, with a risk of heat waves and droughts.

**Precipitation:** Decrease in precipitation in Southern and Southeastern Bulgaria (up to -20% by the end of the century in pessimistic scenarios). Reduction in snow cover.

**Drought:** Frequent summer and autumn droughts, especially in the Thracian Lowland.

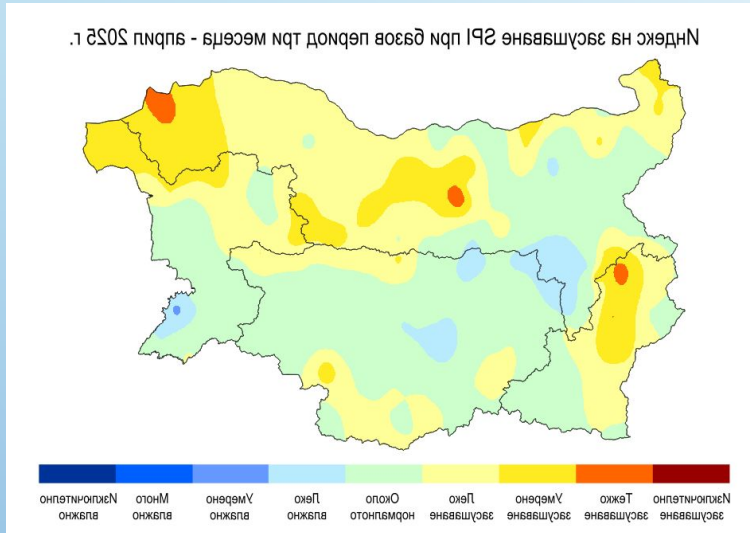
Under the “business as usual” scenario (RCP8.5), the runoff in the two river basin management districts in the southern part of the country could decrease by up to **-19.8%**, while in the Danube and Black Sea regions the decrease is up to **-9%**.

# What we already do?

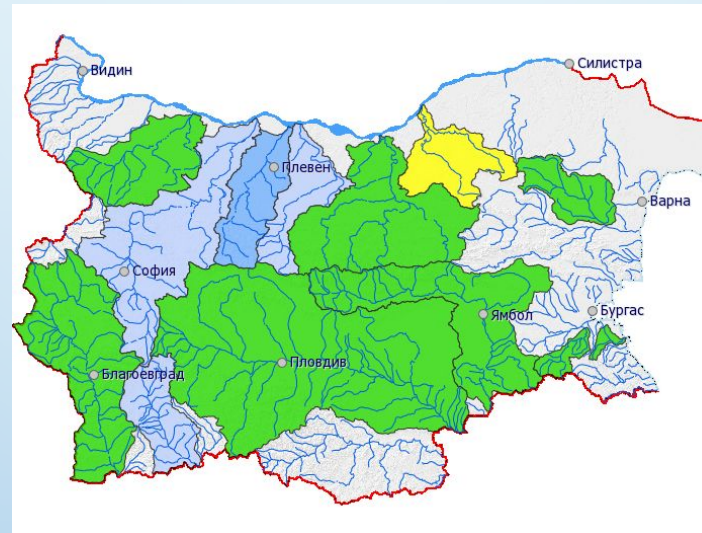


# IDENTIFICATION OF HOT SPOTS

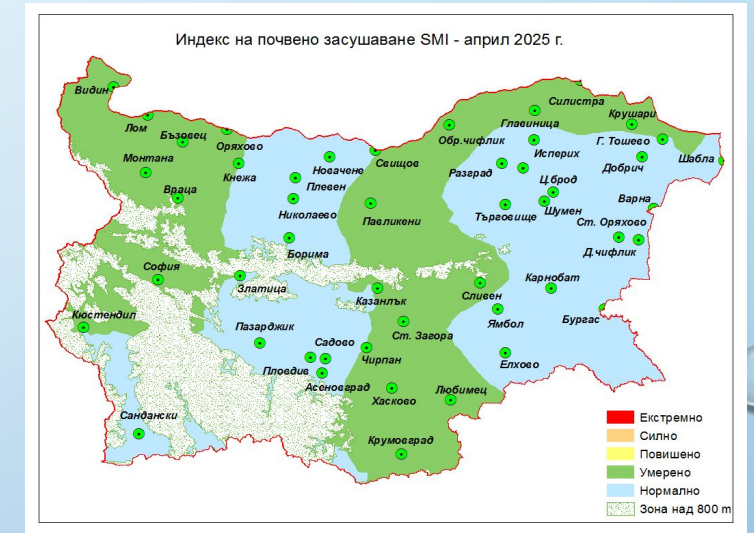
NIMH calculates **drought indicators**, providing a monthly estimate of the spatial distribution of three drought indices and prepared maps (<http://hydro.bg>):



**SPI** – Standardized Precipitation Index



**SRI** – Standardized Runoff Index



**SMI** – Soil Moisture Index

Through a joint analysis of hydrological, meteorological and agro-meteorological drought indicators and the indicators used by the Ministry of Environment and Water (inflow and dam levels), **the hot spots and critical areas are identified** – dams and river basins, which are at risk of prolonged drought.

# ACTIONS

- ➔ **Prioritisation of water abstractions** – Established priorities for water abstraction and use in Water low: drinking water, irrigation, other agricultural needs, recreation, industrial needs, including energy
- ➔ **Coordination** - with responsible ministries/authorities for public water supply and irrigation to explain needs of urgent actions to reduce water losses and to improve water efficiency, including to prepare action plans for needed investments
- ➔ **Water Governance** – Further developments and improvements in monitoring system, water information systems, strategic documents and measures in RBMPs
- ➔ **Financing** – in financial instruments water efficiency and reduction of losses are set as priority
- ➔ **Public awareness** – public information and discussions



# RECOMMENDATIONS

- ➔ Complexity of drought risk demands **cross-sectoral policies** taking into account regional diversity and local knowledge
- ➔ Improving water supply systems and **reduce leakages**
- ➔ It is **important to ensure needed funding** (including EU funds) for water sector taking into account increasing requirements of the water directives and need to improve water infrastructure in order to improve water efficiency and water resilience
- ➔ **Improving drought management and water management capacity and governance** is essential
- ➔ **Sharing knowledge**, data, and best practices between countries is essential to improve expert capacity and governance in water and drought management



**Thank you for your attention!**

**MARIA BABUKCHIEVA**

**Ministry of Environment and Water**

email: