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Agricultural Policy Forum 2023

Towards Climate Adaptation Partnership in Southeast Europe

Towards preparation of a Climate Adaptation Partnership
Aleksandra Martinovska Stojcheska
Ss. Cyril and Methodius University in Skopje
Faculty of Agricultural Sciences and Food - Skopje

24 - 26 October 2023
Podgorica, Montenegro

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Outline

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- Why climate change adaptation in agriculture?
- Objectives of the status analysis
- Composition of the country case studies (national reports) and cross-country study
- Method and data
- Sections outline and preliminary insights into the status analysis

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What is happening?

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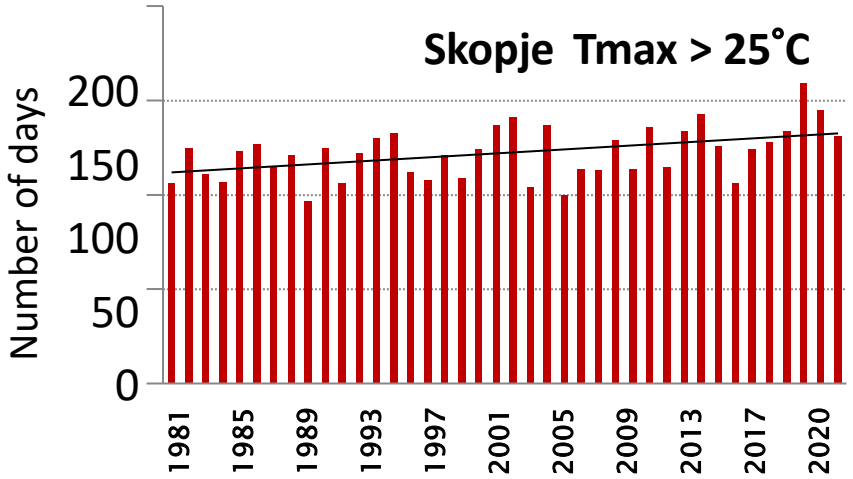
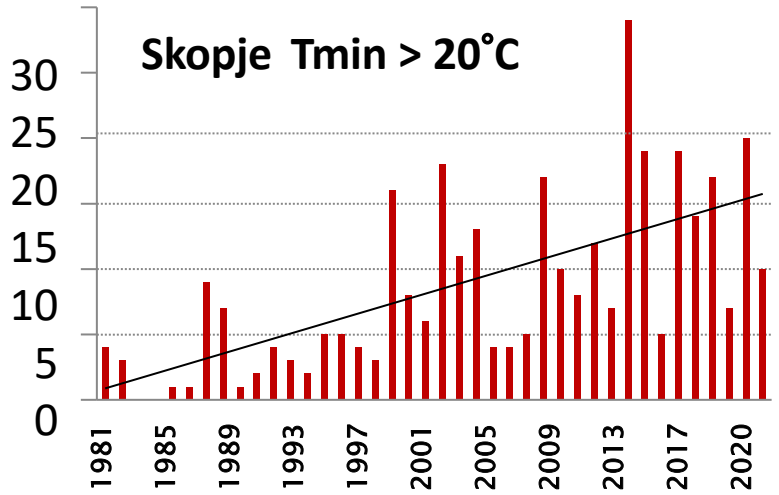
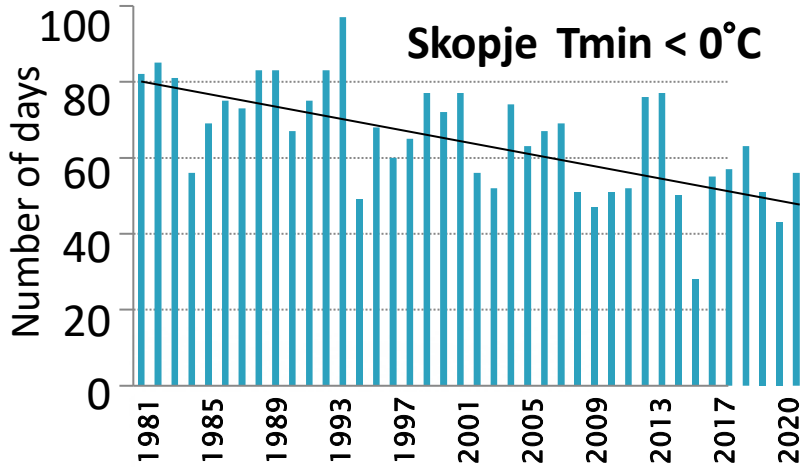
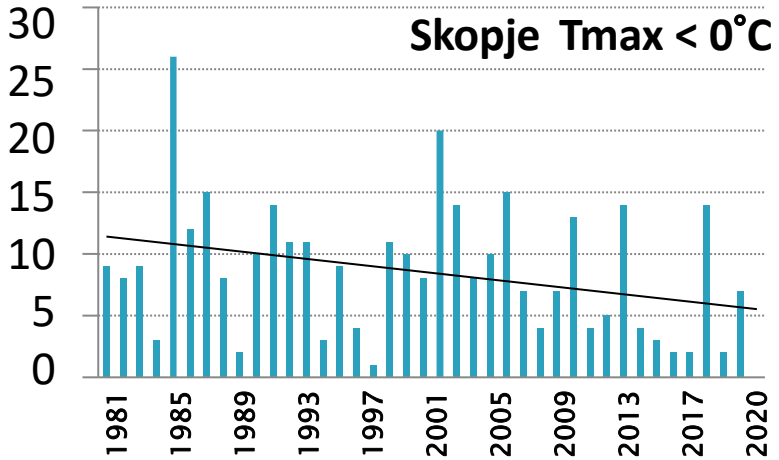


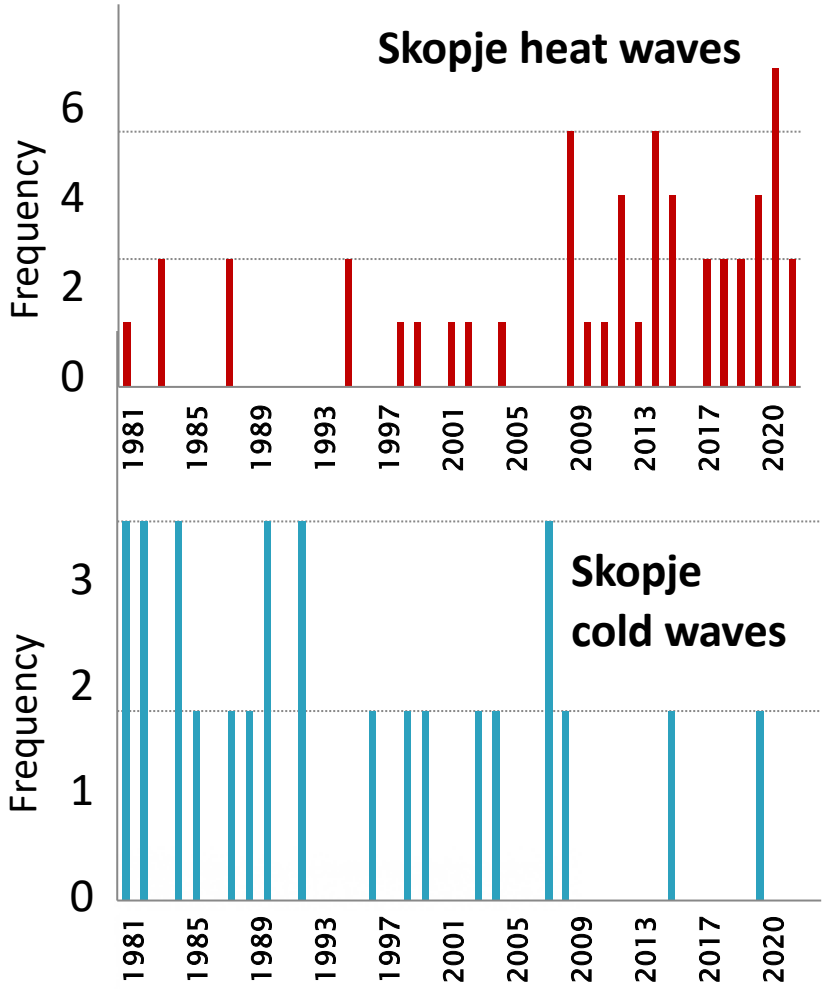


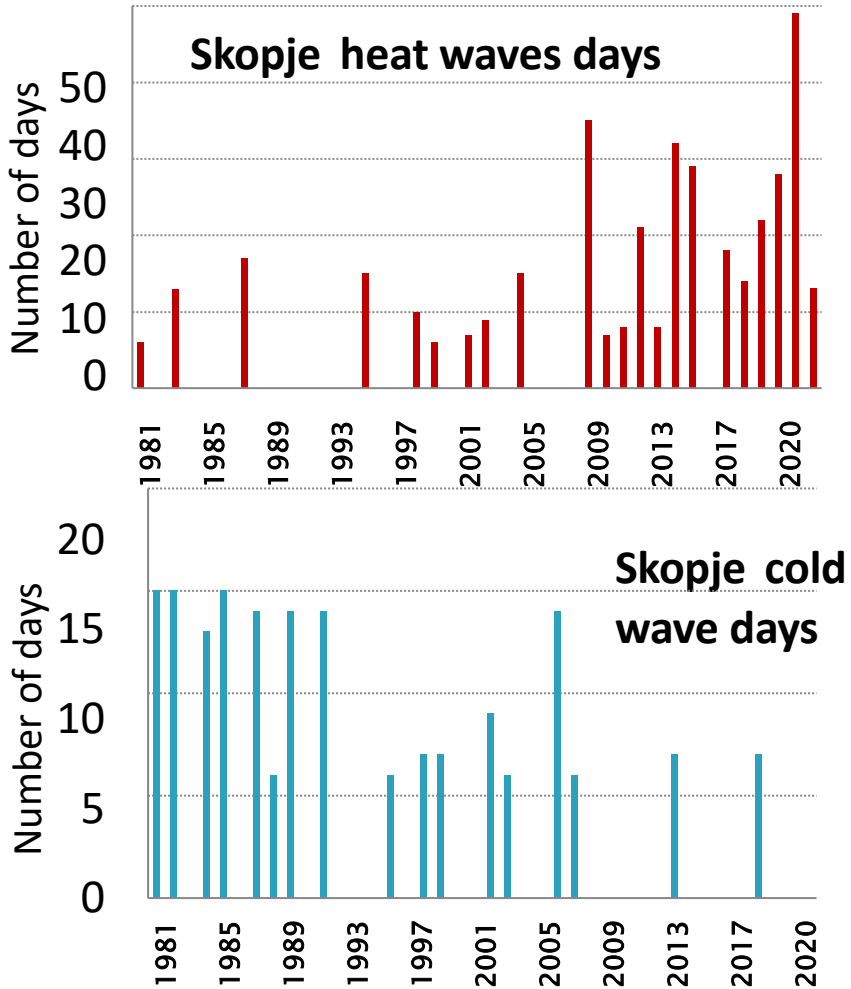




Source: HMS MK, 2022

What is happening?





Source: HMS MK, 2022

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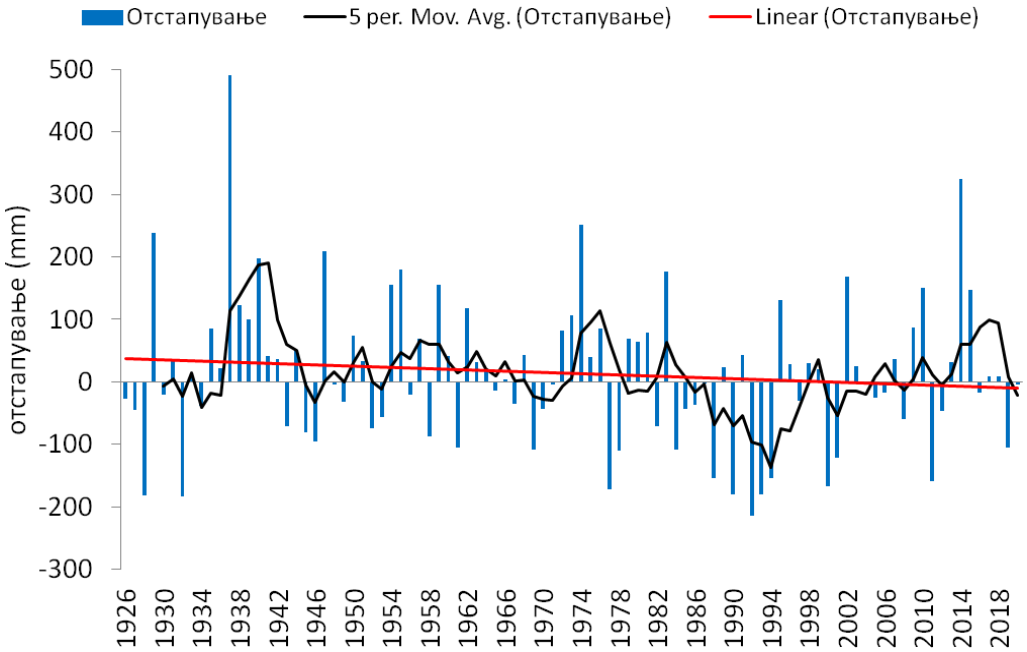
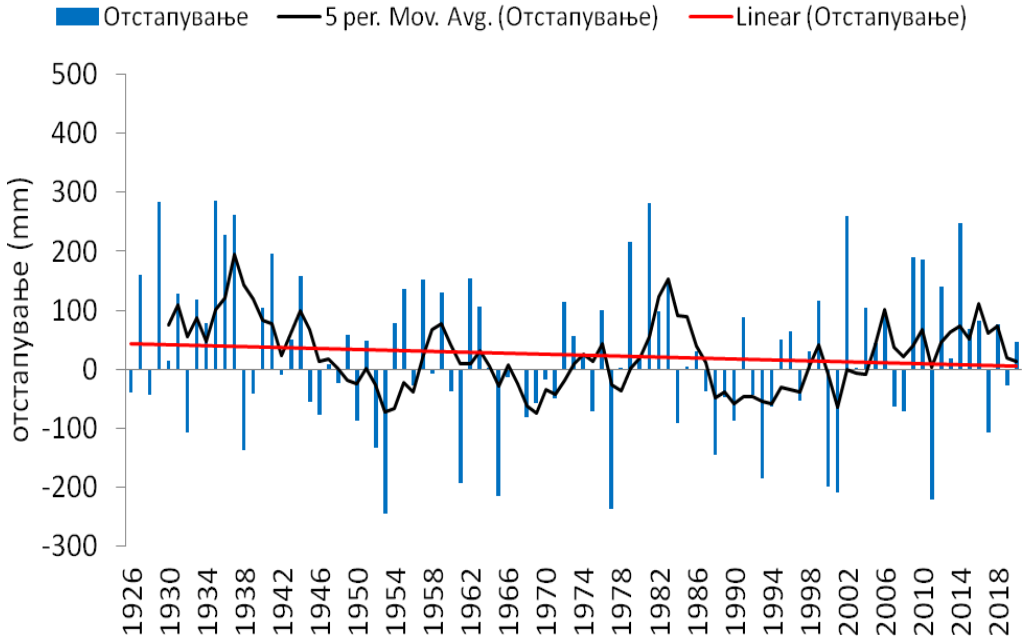
Shtip precipitation per annum



Bitola precipitation per annum



Climatic variability of precipitation

Deviation of the annual amount of precipitation from the average for the period 1961-1990

Source: HMS MK, 2022

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What will happen – reality for the WB?

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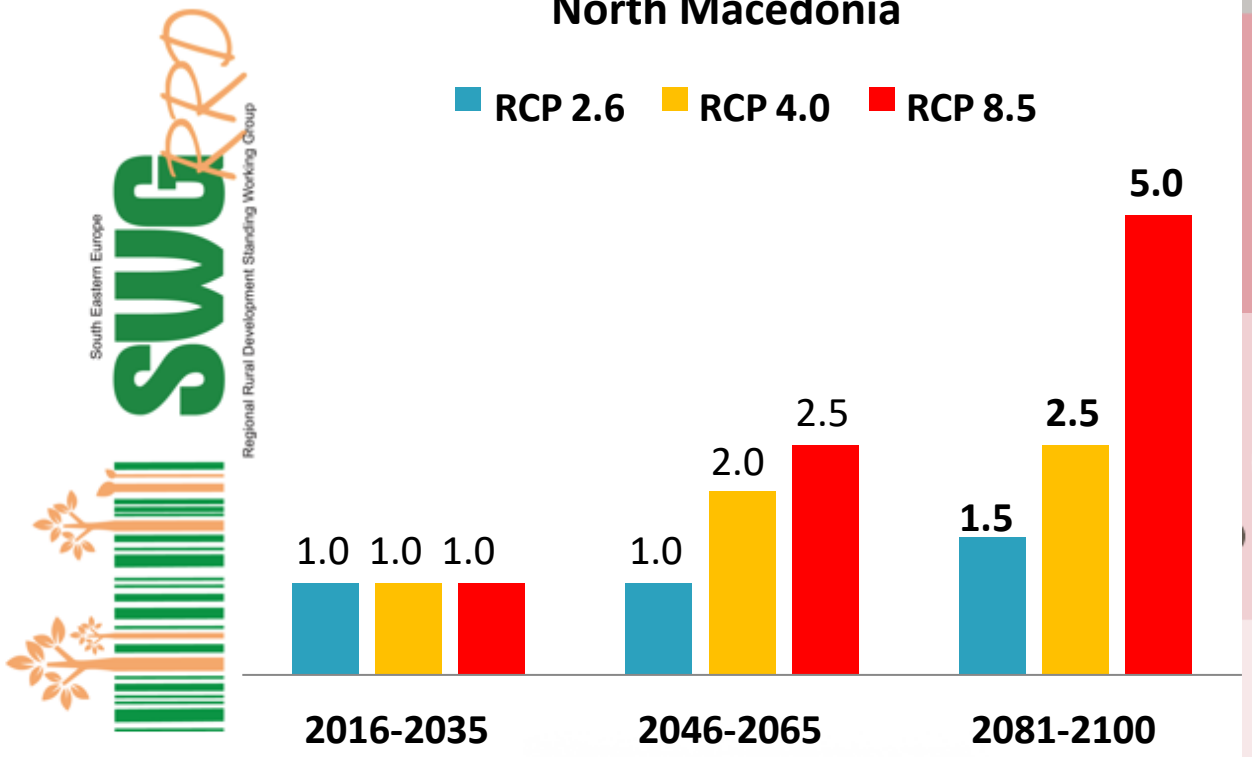
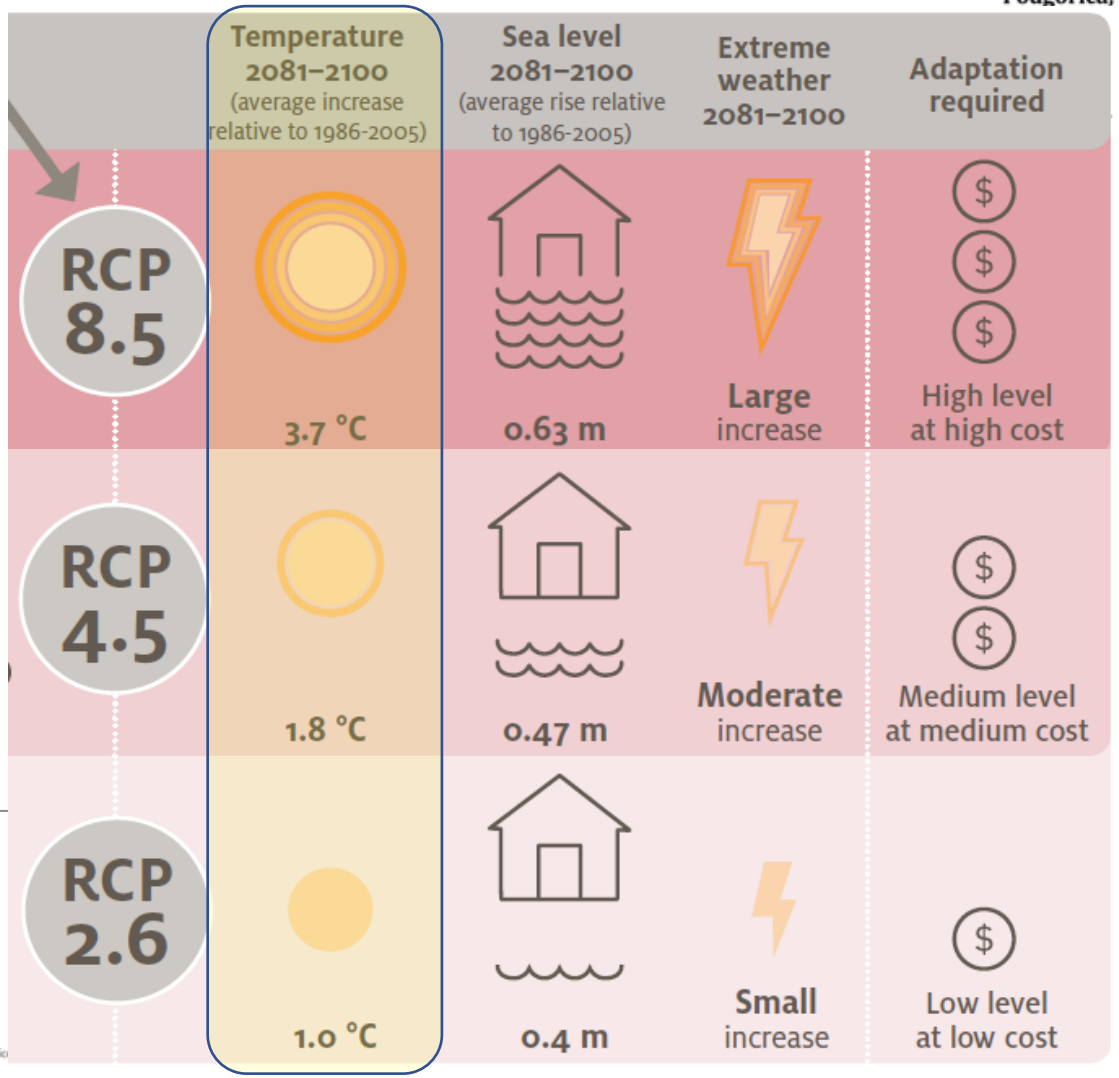


Representative Concentration Pathways (possible future GHG and aerosol emissions scenarios)



Source: HMS MK, 2022

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Mean temperature changes

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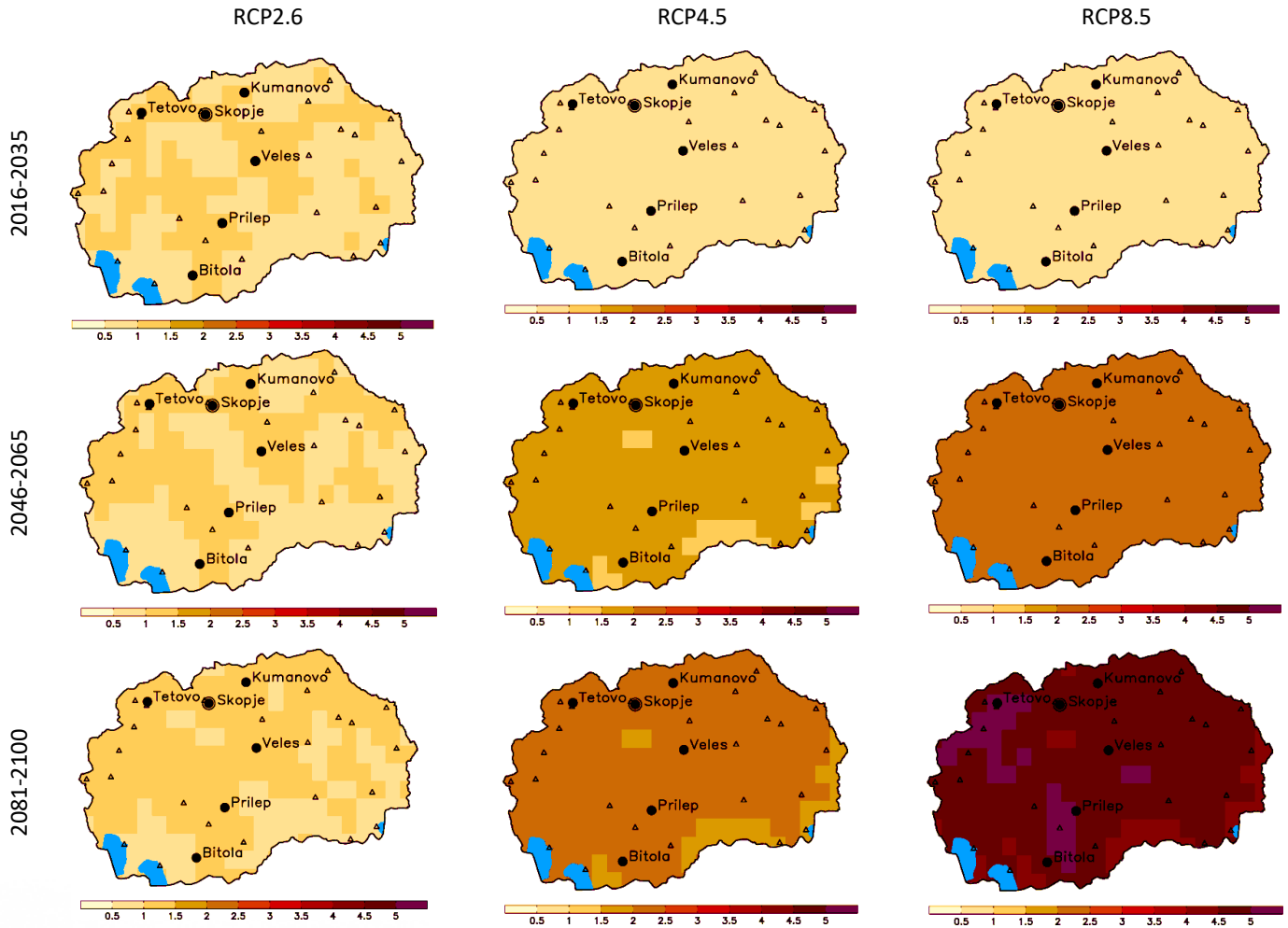

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Min temperature changes

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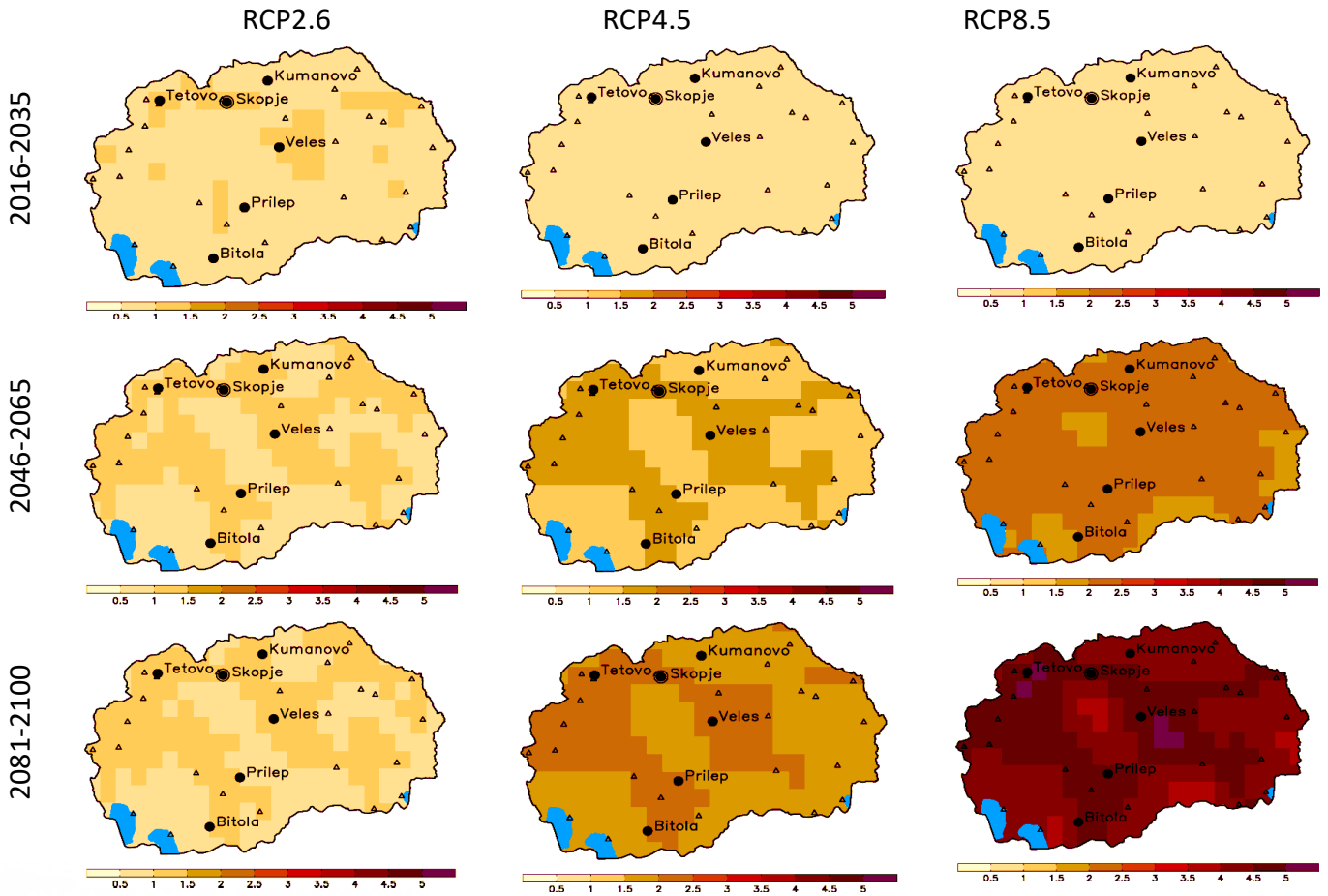

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Max temperature changes

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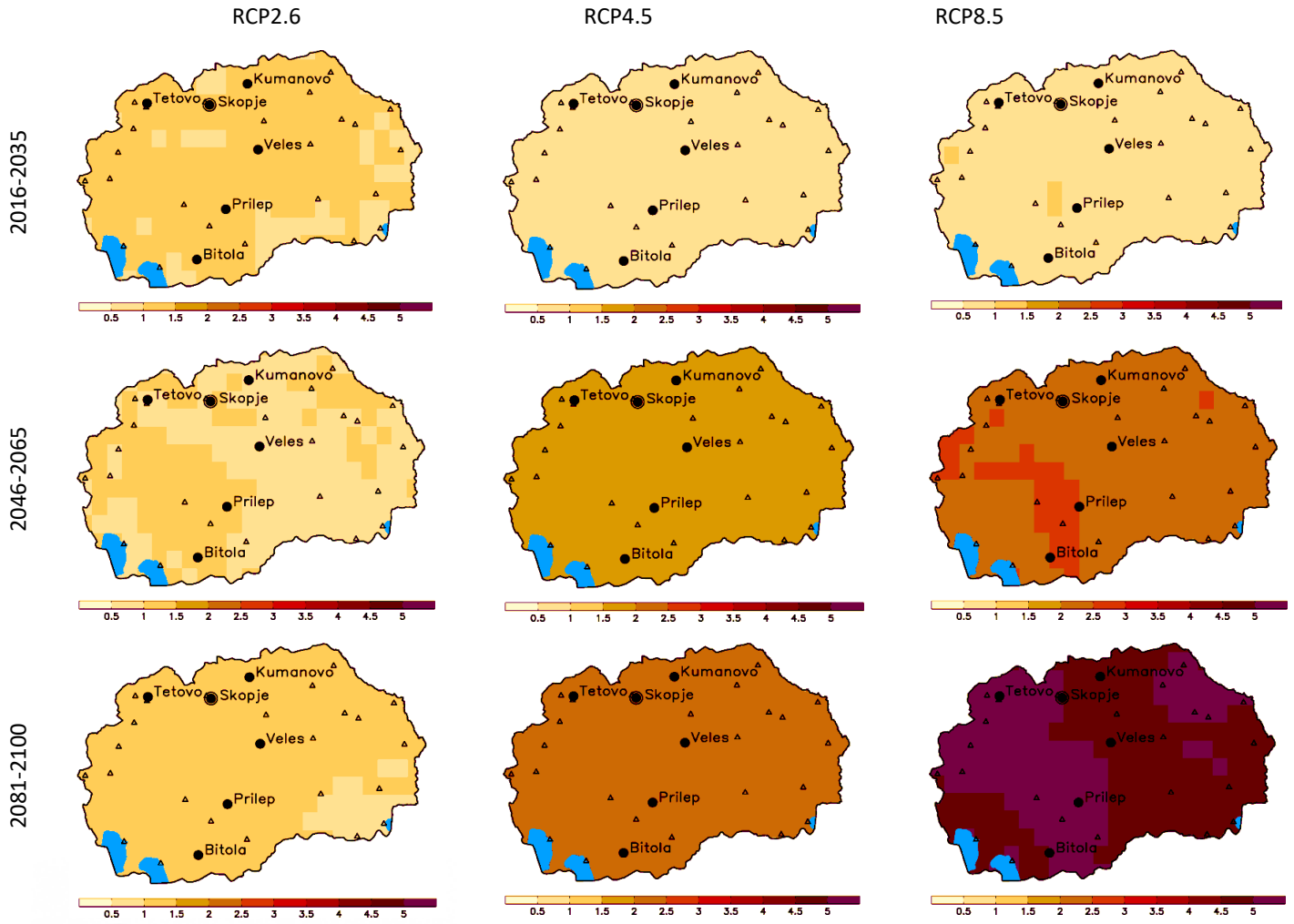

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Precipitation changes

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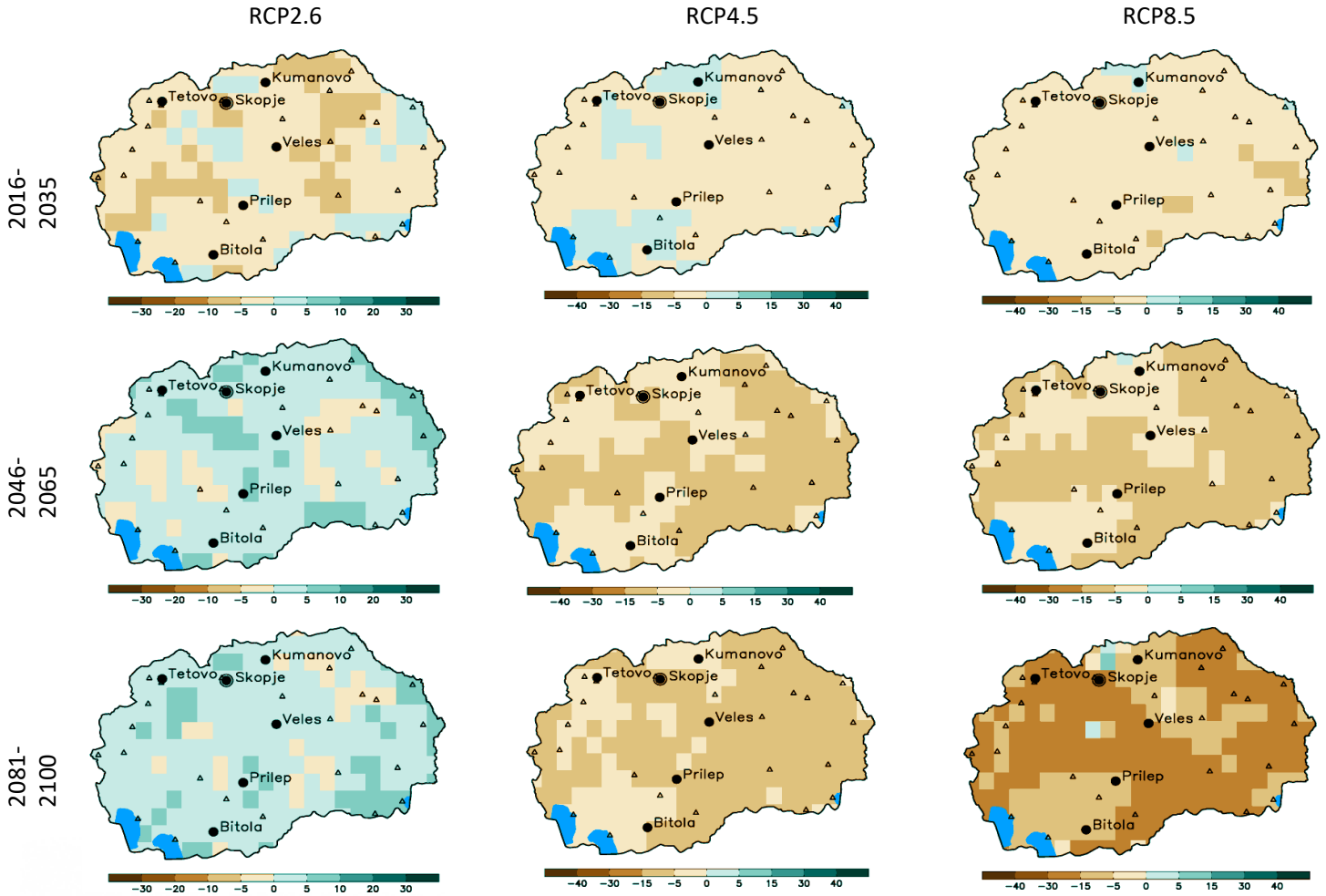

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Dimensions of climate vulnerability

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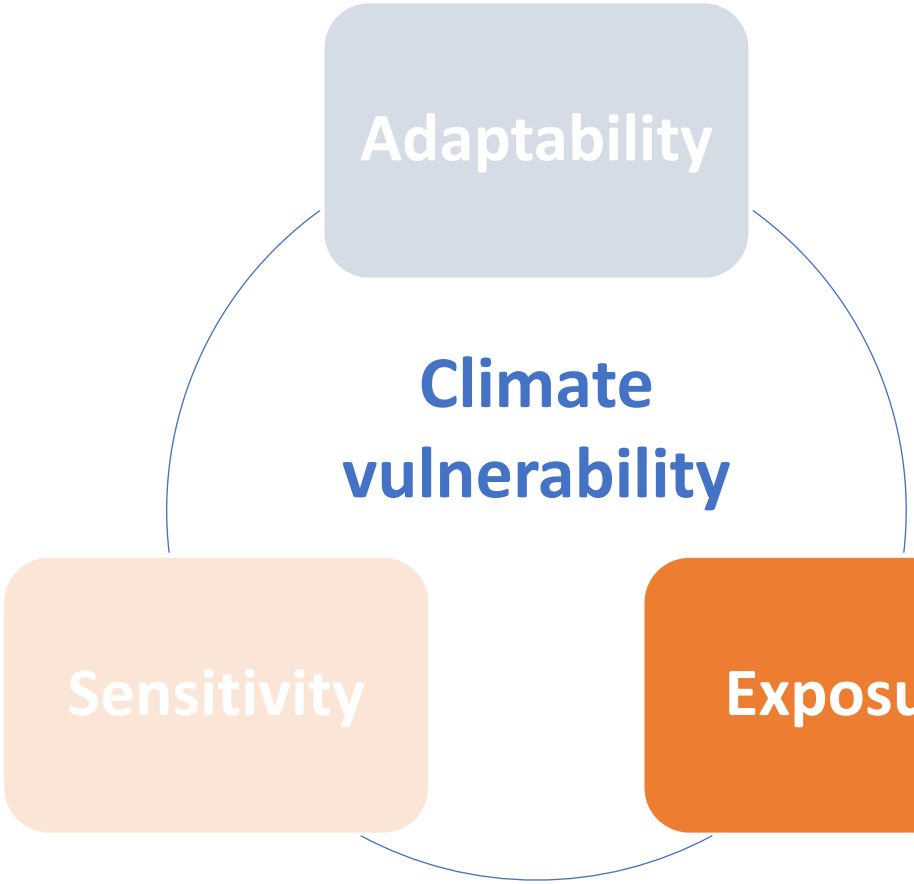

External factors (natural hazards, shocks and stresses)

"The nature and extent to which the system is **exposed** to significant climate variation" (IPCC, 2001).

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Dimensions of climate vulnerability

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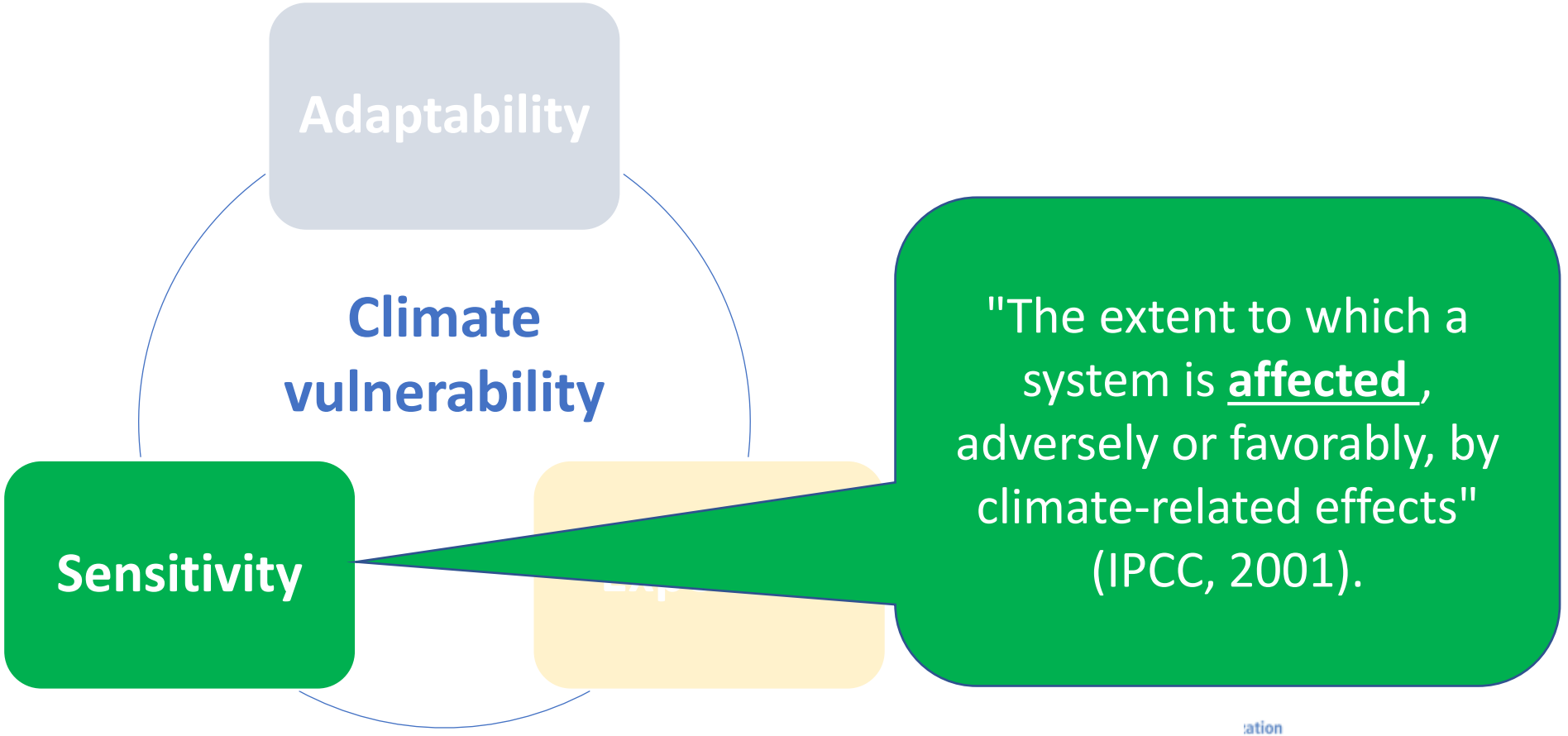

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Dimensions of climate vulnerability

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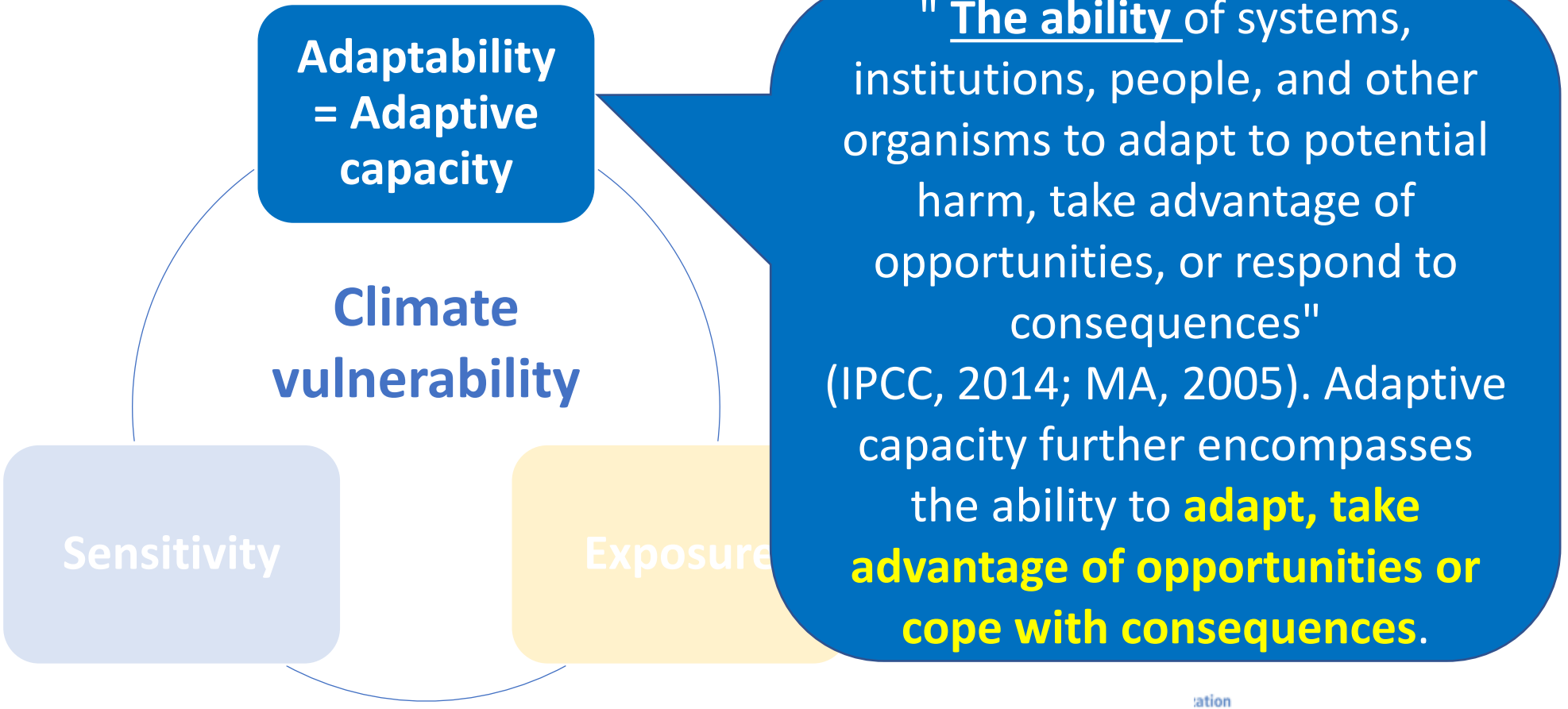

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Dimensions of climate vulnerability

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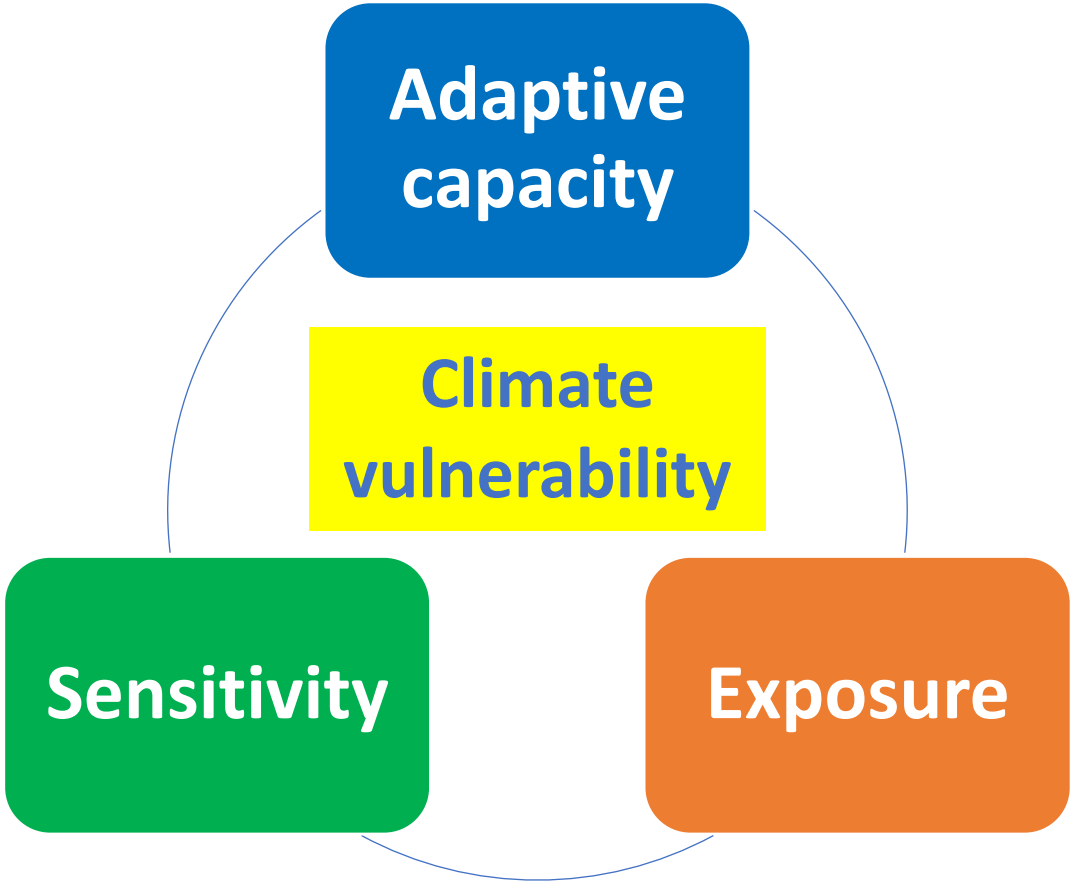

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The magnitude and duration of climate-related exposure (eg drought or precipitation), the extent to which the system is sensitive to the impact of the exposure, and the system's ability to withstand or recover from the exposure.

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The role of adaptive capacity in vulnerability reduction

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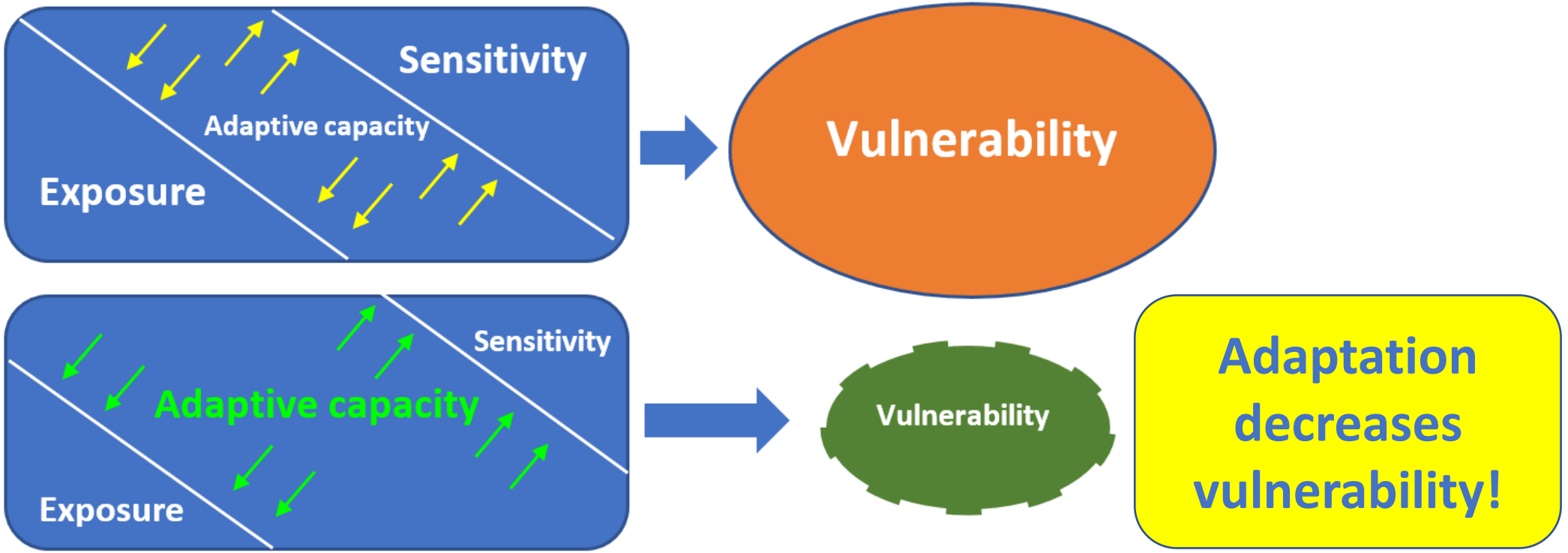

Source: Adapted from Engle (2011)

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WBCs on the map

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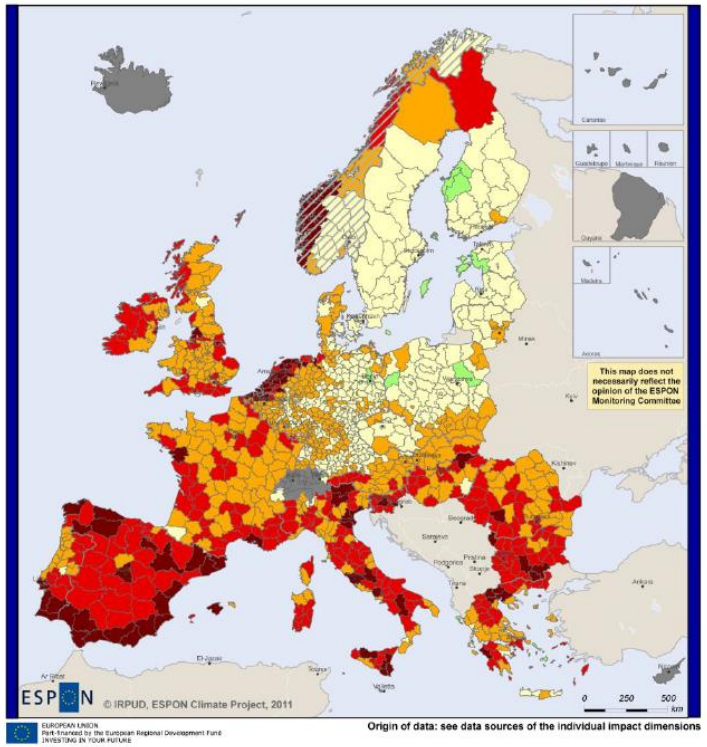

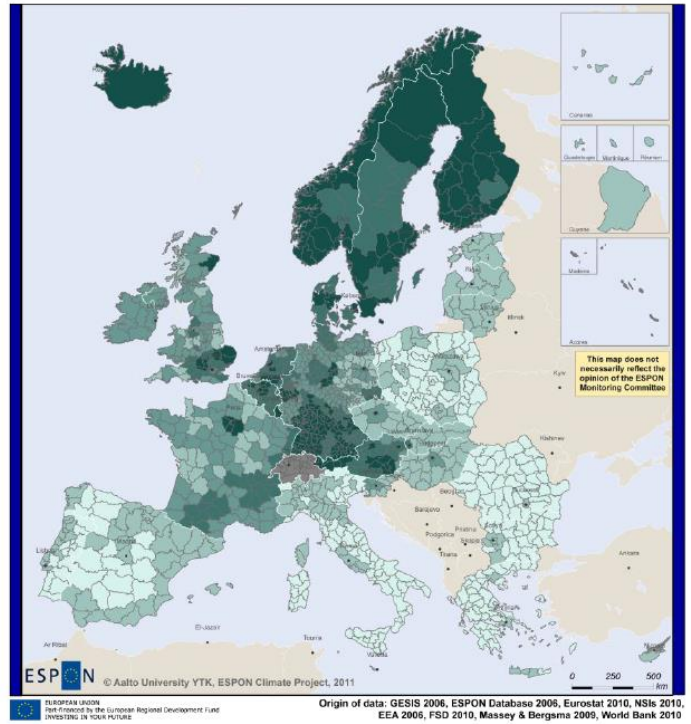

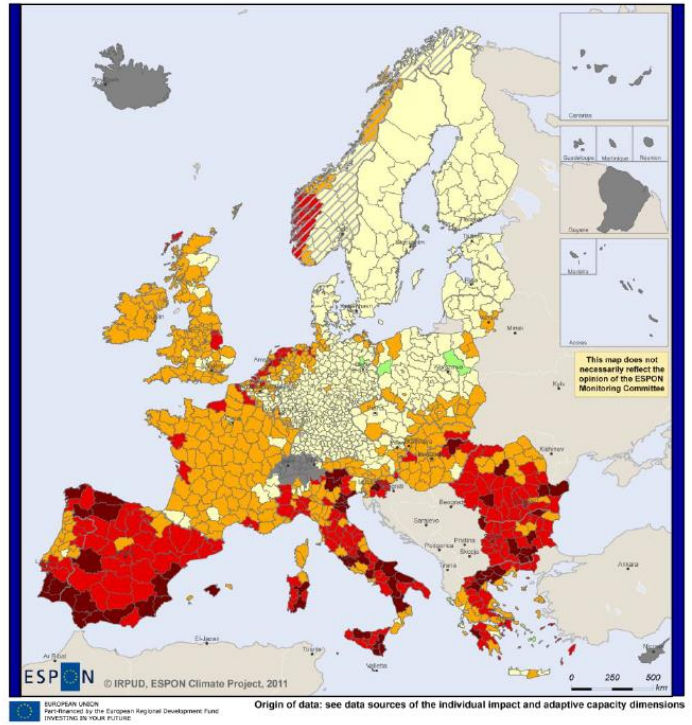

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Objectives

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"Adaptation to climate change in agriculture - status, gaps and recommendations in Western Balkan countries/territories"

- Provide an **overview of the status of adaptation to climate change in agriculture** in the Western Balkan countries/territories, with focus on the main developments in socio-economic context, natural resources (soil and water), crop and livestock sector in the relevant countries.
- Provide a **summary of the existing analyses and assessments** related to climate change in agriculture in the countries/territories.
- Provide a summary of the **institutional responsibilities, strategic and operational framework** linked to climate change in agriculture in the countries/territories.

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- Identify the **trends, practices and responses** to climate change effects in the countries/teritorries.
- Identify the main **gaps between actually implemented adaptation and goals set by policy**, reflecting resource limitations and competing priorities.
- Identify the **gaps linked to data availability and quality**, related to analysis of climate change in agriculture.
- Main **issues (conclusions) regarding environmental aspects and impacts**.
- Provide **conclusions and recommendations** of the status of adaptation to climate change in agriculture in the Western Balkan countries/territories.

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Composition of the analysis

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Cross-country comparative analysis
"Adaptation to climate change in agriculture - status, gaps and recommendations in Western Balkan countries/territories"

Regional coordi-nators

Country case studies (national reports)

National experts

Albania	Bosnia and Herzegovina	Kosovo*	Montenegro	North Macedonia	Serbia

* This designation is without prejudice to positions on status, and is in line with UNSCR 1244/1999 and the ICJ Opinion on the Kosovo declaration of independence

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Composition of the analysis

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Cross-country comparative analysis
"Adaptation to climate change in agriculture - status, gaps and recommendations in Western Balkan countries/territories"

Country case studies (national reports)

Albania	Bosnia and Herzegovina	Kosovo*	Montenegro	North Macedonia	Serbia
1. Socio-econ.	1. Socio-econ.	1. Socio-econ.	1. Socio-econ.	1. Socio-econ.	1. Socio-econ.
2. Soil	2. Soil	2. Soil	2. Soil	2. Soil	2. Soil
3. Water	3. Water	3. Water	3. Water	3. Water	3. Water
4. Crop	4. Crop	4. Crop	4. Crop	4. Crop	4. Crop
5. Livestock	5. Livestock	5. Livestock	5. Livestock	5. Livestock	5. Livestock

Five sections

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Methods and data

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- Analysis of climate change impact and adaptive capacities on the agricultural sector and rural development, through **literature review** of formal policy documents, strategic documents, climate change reports to UNFCCC, research studies, expert papers, etc.
- **Statistical and meteorological data** for certain sections of the report (templates provided, historical and future, where applicable), available from national statistical offices and supplemented where needed with international sources.
- Input from the **key players in the governmental and expert structures** (interviews), where needed, to supplement data gaps.
- **Expert assessment** of the national developments.

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1. Socio-economic analysis linked to climate change in agriculture

Aleksandra Martinovska Stojcheska

Edvin Zhllima, Albania
Željko Vaško, Bosnia and Herzegovina
Iliriana Miftari, Kosovo*
Mirsad Spahić, Montenegro
Aleksandra Martinovska Stojcheska, North Macedonia
Vlado Kovačević, Serbia

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Agriculture in the WB

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- The contribution of agriculture, forestry and fisheries to the **gross value added** in the Western Balkans between 5.6 % in Bosnia and Herzegovina and 21.3 % in Albania, compared with 1.9 % in the EU (2021).
- **Employment in the sector is generally declining** as share of total employment; e.g. in Albania it fell from 40% in 2016 to 34% in 2021; in Bosnia and Herzegovina from 18% to 9.4% over the same period (3.6 % of the total number of persons employed in EU in 2021).
- Half of the area of North Macedonia is **land used for agricultural activities**, followed by Albania, Serbia, Kosovo* and Bosnia and Herzegovina (over one-third), Montenegro less than one-fifth. Within the EU, roughly two-fifths of the total land area are used for agriculture.

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Socio-economic aspects

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- Climate change has major impacts on agriculture and rural areas. It affects all components of humans' livelihood and food security, connected to numerous factors: population, demographics, economic activity, urbanisation, education, social equality, consumption patterns, lifestyles, policy and institutions.
- Large proportion of the population in **WB lives in rural areas**
- **Poverty** is slowly alleviated, but still affects about one-fourth of the population in the WB countries (risk of poverty after social transfers in the Western Balkans ranged from 21% in Serbia to 28% in Kosovo* - EU 16.8% in 2021).
- **Population** is aging in most WBC (14% young people in Serbia), farm managers as well, migration is on the rise.
- Employment rates for **women** are below 50% in four of the WBC: North Macedonia, Montenegro, Bosnia and Herzegovina (49%), Kosovo* (18.5%). Serbia and Albania (just below 60%). In the EU, the rate is 68% (2021).

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Challenges linked to the sectoral and socio-economic development

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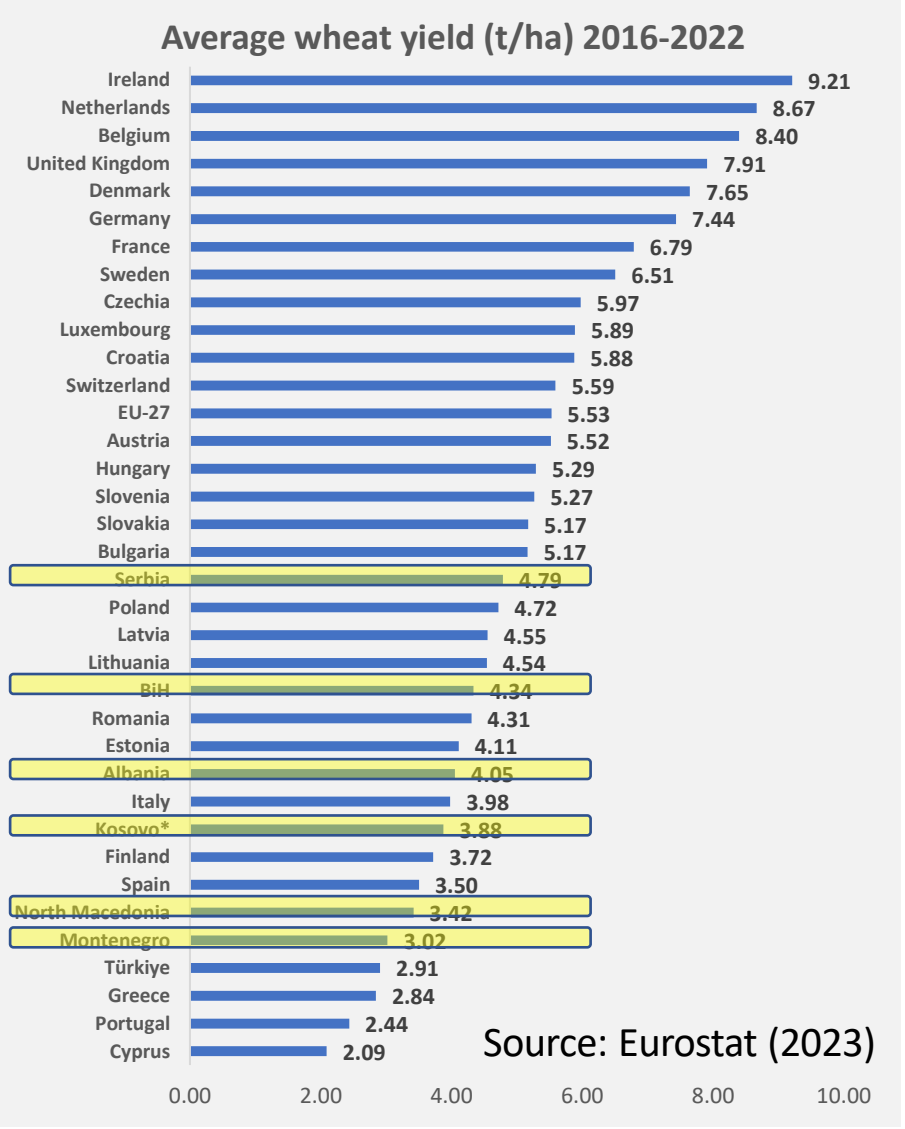
- The **type and level of agricultural production** depends on the climatic conditions, terrain and soil type, but also level of economic development and population density.
- The sectoral and rural development in WB countries **continues to experience hindrances** - still slow productivity growth, high unemployment rates with persisting out-migration trends, limited access to productive assets, fragmentation of agricultural land, weak value chains, lack of modernization and applications of new technologies, not fully functional knowledge and innovation transfer, high vulnerability to external shocks caused by climate change or market distortions.



Source: Eurostat (2023)

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Socio-economic section - brief wrap-up

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- **Legislative framework and institutional setup**: apart from obvious ministries (agriculture and environment), no clear connections with other relevant institutions.
- **Review on climate change sources linked to socio-economic aspects:** modest inclusion in national communications, climate adaptation plans, research still emerging.
- **Agricultural policies**: income support dominant in most countries, structural and rural development slowly increasing (prevailing in e.g. Albania). Climate change adaptation related measures present in strategic frameworks, lacking in programming and implementation.
- **Data availability and accessibility:** National level macroeconomic and sectoral generally available, less on socio-economic aspects. **Regional disparities** within the countries - limited data, especially at NUTS 4 LAU level - limiting research and modelling possibilities.
- **Climate impacts** **will – and already do – influence social and economic activity** (socio-economic damages emerge from the impact on natural resources, human productivity, physical infrastructure, and ecosystem services)**, and vice versa, the socio-economic component is the core of the adaptive capacity.**

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2. Status of soils linked to climate change in agriculture

Dushko Mukaetov

Pandi Zdruli, Italy (Albania)
Hamdija Čivić, Bosnia and Herzegovina
Afrim Sharku, Kosovo*
Mirko Knežević, Montenegro
Dushko Mukaetov, North Macedonia
Dragana Vidojevic, Serbia

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Exposure, sensitivity, adaptive capacity…

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- **Common climate extremes** - intense rainfalls, frequent flash floods, drought events, forest fires and heat waves **influence the soils in WB countries**
- Common consequence: **acceleration of land degradation** - soil erosion, salinization, SOC depletion etc.
- **Highly sensitive:** cultivated agricultural land with intensive production systems, managed forest land, areas with degraded vegetation cover. Particularly sensitive are shallow soils on inclined terrains.
- Having in mind the climate projections and the current management and protection of agricultural and forest soils - **exposure and sensitivity is rather high**
- **Classic land cultivation techniques** prevail, which seriously disturb soil surface
- Rather outdated **machinery** which prevents application of adaptation measures
- Farm and parcel/land plots size in all countries rather small (up to 2.5 ha, plots less)
- Apart to the formal education there is no other recognized systems for informal or vocational training programs in agriculture

General conclusion is that the IMPACT of climate change on soils in WB is HIGH!

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Gaps and challenges vs. adaptive mechanisms and best practices

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- Issues related to climate change vulnerability and adaptation more and more treated within numerous strategic documents, country reports, projects...
- Ministry programs and Action Plans foresee numerous adaptation and mitigation measures and sustainable soil management practices
- The **lack of special legal acts** in almost all WB6 countries, prevents the more effective implementation of the foreseen actions
- **Soil is still out of the scope of interest of the decision makers** in the region, which coupled with the lack of finances and technical and institutional capacities, creates unfavorable environment for effective adaptation to climate change,
- However there are **certain mechanism in place** which can support the adaptation of soil to climate change, like: general farmers income support, IPARD measures, soil fertility testing schemes, organic farming etc.

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Institutional, legal setup and available soil data

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- In all WB6 countries the Ministries of Agriculture and Ministries of Environment are the **responsible parties** on a central level for issues related to climate change and adaptation
- Climate issue is still **not sufficiently articulated within the Ministries of Agriculture**, almost all activities to the moment are within the Ministries of Environment
- The **needed infrastructure and collaboration** within the responsible institutions for effective adaptation to climate change in all sectors including soil – is insufficient
- The **needed legislation, institutional, technical and personal capacities** for effective monitoring and soil research are insufficient
- **Soil data are outdated and an comprehensive and long term soil monitoring program is an urgent need in all countries**

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3. Status of water resources linked to climate change in agriculture

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Mihajlo Marković, Bosnia and Herzegovina
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Water resources and irrigation status in the countries of WB region

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- Water resources **mostly satisfy the needs of the WB countries** (drinking water, industry, irrigation, biological minimum). However, facing huge damages caused by drought of varying intensity, uneven spatial and temporal distribution of precipitation and watercourses (intensified in recent years)
- **Hydromeliorative systems and irrigation situation generally not satisfactory**. Unused resources, also need for new irrigation systems - not only rehabilitation, but in-depth changes in the entire approach to irrigation and systems management, regular inventory, fully integrated systems (LPIS, SCADA), etc.
- **Drainage systems maintenance imperative** (more frequent heavy storms)
- **Different data about irrigation land in the WB countries** (necessary to define a standard methodology, synchronization between institutions)

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Drought risk assessment and crop water requirement

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- Climate change will be associated with extreme weather events such as floods and droughts in WB countries, followed by decrease in yields and higher competition for water. Lack of water is **the limiting factor** for stable production. Most often drought occurs during July and August, when irrigation is needed for stable crop production.

In **Serbia**, damages caused due to climate change vary from none to 30 to 50 % of average profit (occasionally 100% due to hail, or extreme drought). In **North Macedonia**, in an average of 20 years, 10 years are intensely dry, 9 are average, and 1 is characterized as wet. Due to climate change, the risk of intensification of dry periods increases, while the need for water for all purposes grows. **Albania** will experience water stress by the 2050s and pronounced water stress by the 2090s, with most severe drought experienced in the central and southern areas. In **Montenegro**, two different states of the soil-water regime, triggered by drought, i.e. overwetting (flooding): period of excess water in the soil, accompanied by abundant rainfall, from October to May, and a period of water deficit in the soil due to insufficient rainfall during the growing season. July and August are usually driest months in **Bosnia and Herzegovina** especially in the southern parts. From the beginning of October through the end of May, the need for potential evapotranspiration is covered by precipitation. Based on projections of higher temperatures, reduced precipitation and population growth, four of **Kosovo**'s water basins may become water stressed or water-scarce by 2050.

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Existing farmer's adaptive practices

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- A number of national reports, policy documents, and research papers indicate that irrigation is considered the **best available adaptation option**, achieving significant yield increases.
- **Surface irrigation is still dominant** in the countries from WB region, but also use drip and sprinkler irrigation.
- Conversely, common problem among producers is the **tendency to over-irrigate**, even with a drip irrigation systems. Yield potential and product quality still suffer since significant area with drip irrigation is not equipped with injectors (fertigators) - still traditional fertilizer use.
- Examples indicate (e.g. North Macedonia, Serbia) farmers trained through different (domestic and international) projects for **proper use of drip fertigation programs, data loggers and soil moisture sensors, weather stations, mulch materials, UV nets**, and other types of equipment for rational water use, its conservation and adaptation to climate change.

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Framework for adaptation activities

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- Many strategies, adaptation plans, reports, projects and research are focused on adaptation measures in agriculture and in the water sector. Generally, still **lack in implementation**!
- **Many stakeholders in charge of managing the waters in WB countries**. Functional institutional mapping lacking, overlapping functions – coordination, compatibility of policies and inter-institutional cooperation needed.
- Priority step is to **adopt national strategies for irrigation and drainage** for those countries who still haven't adopted such.
- Necessary to **properly motivate farmers and actors in the sector** - national programs, IPARD program, other funds to support projects that will directly improve the irrigation and drainage system in WB countries.
- Formal and unformal **education, sharing information, trainings** also relevant for improving of adaptation measures in water sector in agriculture (higher education and research institutions, extension services, hydrometeorological services, etc.)

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5. Crop production analysis linked to climate change in agriculture

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Crop production analysis linked to CC

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- Assessment of the existing capacities for climate change analysis and its effects on crop production.
- Crops are **particularly vulnerable to climate change** - heavily exposed to climate change (outdoor production).
- **Crop sensitivity** to increased temperatures and disturbed rainfall patterns is **different** and a number of factors are included (vegetative period – winter crops, spring and summer crops; biological properties; photosynthesis pathway – C3 or C4 crops; etc).
- The impact (synergetic effect of exposure and sensitivity) of climate change, particularly increased **heat and drought stress** result in decreased productivity; but, increased CO_2 levels **accelerate photosynthesis and biomass productivity** - positive for crop growth.
- **What will be the impact of CC on crop production? Serious research required, based on intensive data for a simple answer (positive or negative)**

Crop production analysis linked to CC

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- "How vulnerable the crop production will be?" - **add the existing adaptive capacities and their expected changes in the future** (changes in soil fertility, irrigated areas, irrigation/fertilization practices, crop protection, level of education, access to the finances, age of the farmers, rural population…..)
- … **multiplied by** the number of crops, number of practices implemented, number of varieties in use, soils cultivated, climate scenarios, etc.
- **Crop section main objective** - determine available data, existing research capacities, available tools and premises at the country level, and find how joining the forces of the researchers from WB countries can contribute to the improvement of the present knowledge base in the region.

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Crop production analysis linked to CC

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- Crop production analysis linked to CCA: **meteorological data availability and accessibility** (essence of CC analysis - data should be consistent, validated and with minimum daily temporal resolution and spatial resolution across the whole agricultural area in the country)
- Most common **agrometeorological indices** available and used in national context (weather data transformed to become usable)
- **Extreme weather events** (records of date, location and effects)
- Crops sensitive to climate change, vulnerable regions and crops and their combination
- **Phenological monitoring** data availability (crop growth stages)
- Existing **crop models** used for estimating the crop response to climate change

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- **Practices used by the farmers** to protect their crops from damages caused by weather variability (hot weather, drought, excessive water, hail, intensive sun etc.)
- **Policy measures and operational framework** related to climate change adaptation - measures that will contribute to increased cropping system resilience, increasing of adaptive capacities or directly protect crops from negative effects of climate change
- **Current infrastructure and systems for preventing and mitigating** the negative effects of weather extremes on crop production - existence of capacities and infrastructure for protection, monitoring, analysis, and forecasting of the influence of weather events and weather extremes on crop production: e.g. early-warning systems, systems for regular monitoring and forecasting, hail protection systems.

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Crop production analysis linked to CC data challenges

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- Information and data/datasets on crop production are **mainly available** in each country
- However, **access** of the scientific community to some data is **limited to severely limited** (e.g. in North Macedonia, the cost for acquiring daily meteorological data per station per year for one parameter is 50 EUR: 30 years x 30 stations x 6 parameters x 50 EUR = 270 000 EUR?)
- There are international sources of meteorological data that include historical data of Europe in spatial resolution of 25x25 km. Moreover there are 50 years of historical data series and 75 years of future data series with very good spatial resolution (0,11x0,11 arc minutes).
- Should we use international data to substitute national???

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5. Livestock production analysis linked to climate change in agriculture

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Status of livestock production related to CC

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- Analysis of meteorological data availability and accessibility:
  - Recorded **systematically**, historical period covered (except in Kosovo*, were data is available from 2000)
  - Spatial **resolution generally low** (Albania reported significantly higher spatial resolution)
  - Data is **not publicly available** and it is not in an easy accessible format
- Analysis of extreme weather events:
  - Extreme weather events (drought, floods, heat ways and frosts) are **partly recorded** (through meteorological system)
  - Data for extreme weather events on **livestock farms not available**
  - Systematic monitoring on **damages caused – not available**

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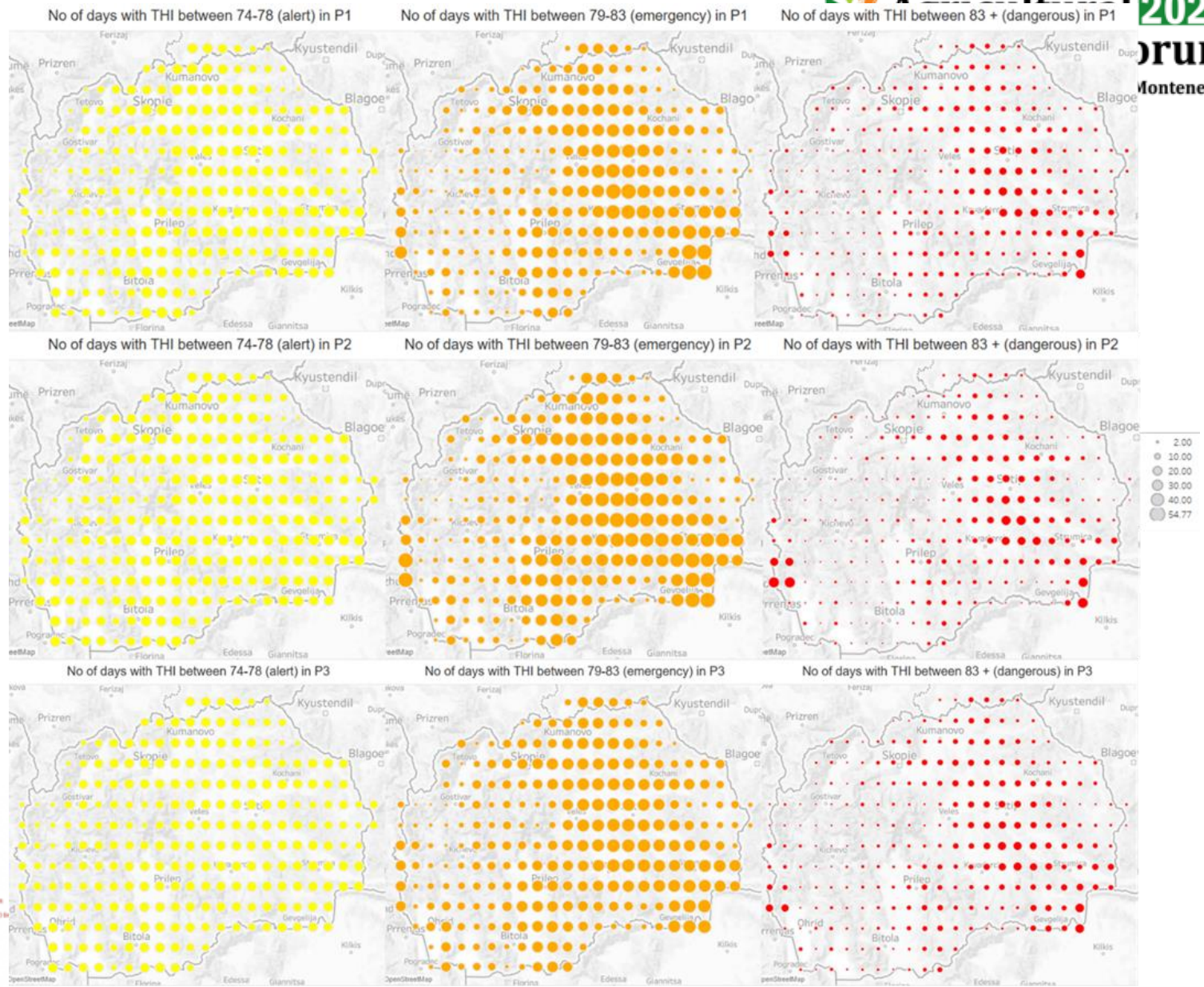
- Heat stress load map for 3 periods (basic, near and far future)
- Heat stress risk assessment for ruminants, pigs and poultry
- Use of **THI load is only for MK**, but can be improved
- Identification of the most vulnerable regions for different species only in MK



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Status of livestock production related to CC

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- Existing farmer's **adaptive practices** - mainly expert judgement for farmer's activities to reduce consequences of heat stress , existing and introducing new technologies
- Policy institutional setup, strategic and legislative framework for adaptation activities - national strategies and programs **partly cover livestock and CCA**, adaptation plans poorly documented, communications to UNFCCC exists for at least last 4 years, project reports to some extent
- **Weak clear-targeted** investment/funding/insurance; no instruments and budget for monitoring
- What is **needed for livestock's adaptation to climate change** - roadmap of actions with budget allocation for improved legal frame work, investment in human capacities, improve meteorological data collection and availability, systems for early warning and monitoring, adaptation on farm activities

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The epilogue (expected)

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- This initial activity of the **Climate adaptation partnership** is going to analyze the status of climate change adaptation in the agricultural sectors in WBC
- All countries in the region are approximating their agricultural policies to the EU and climate change is one of the topics of interest.
- Data and tools available and in operational use (or used in research), with **data and analyses gaps**
- Setting up grounds for **national/regional priorities** and multinational teams that will support each other in national/regional analyses, leading to **roadmaps** to efficient and sound-based addressing of climate change in the agricultural sector

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Thank you for your attention

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