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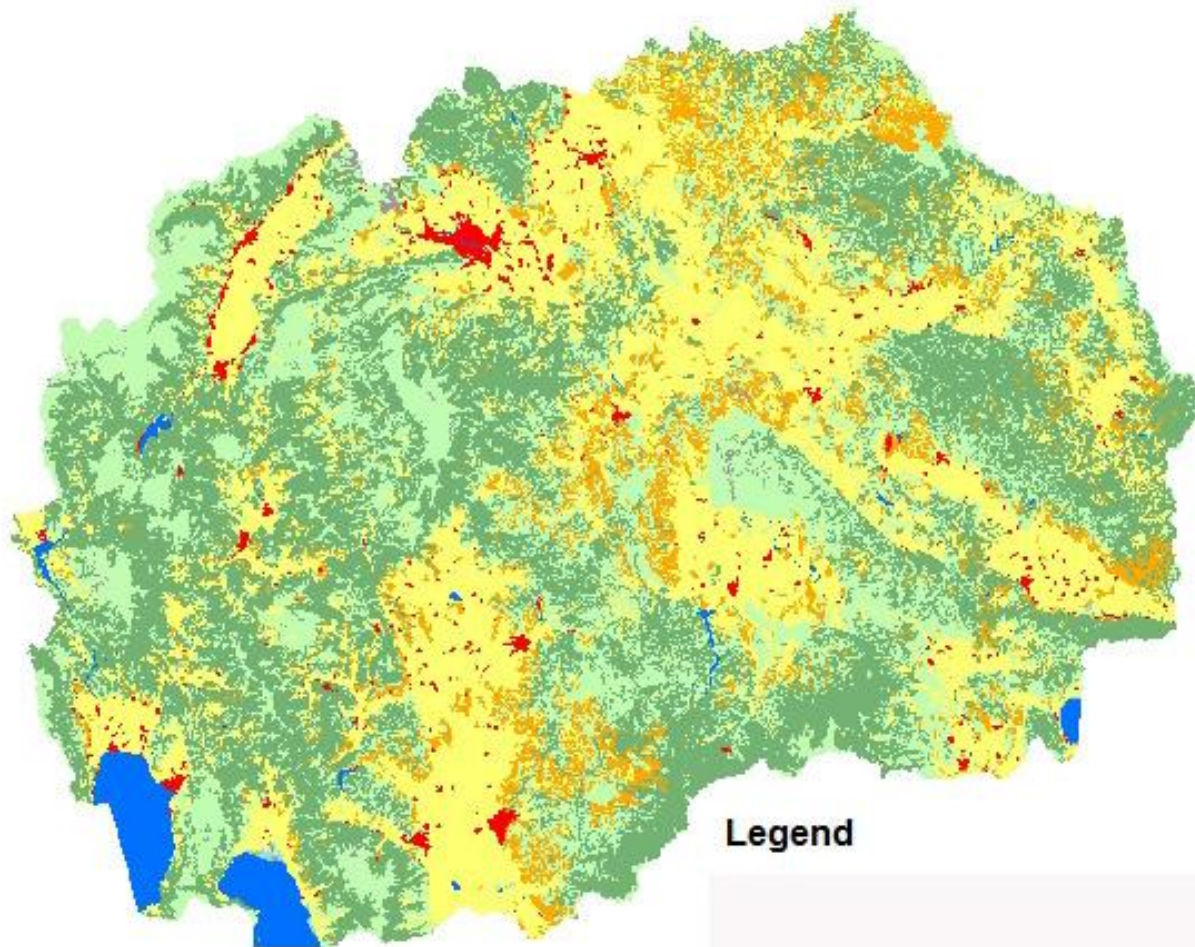
How climate change has been addressed by forest policy in the WB region

Country/territory: Republic of North Macedonia

Ivan Blinkov, Nikolco Velkovski

13th – 15th of November,
Skopje, North Macedonia

CORINE LCU - Level 1 + some classes from level 2



Legend

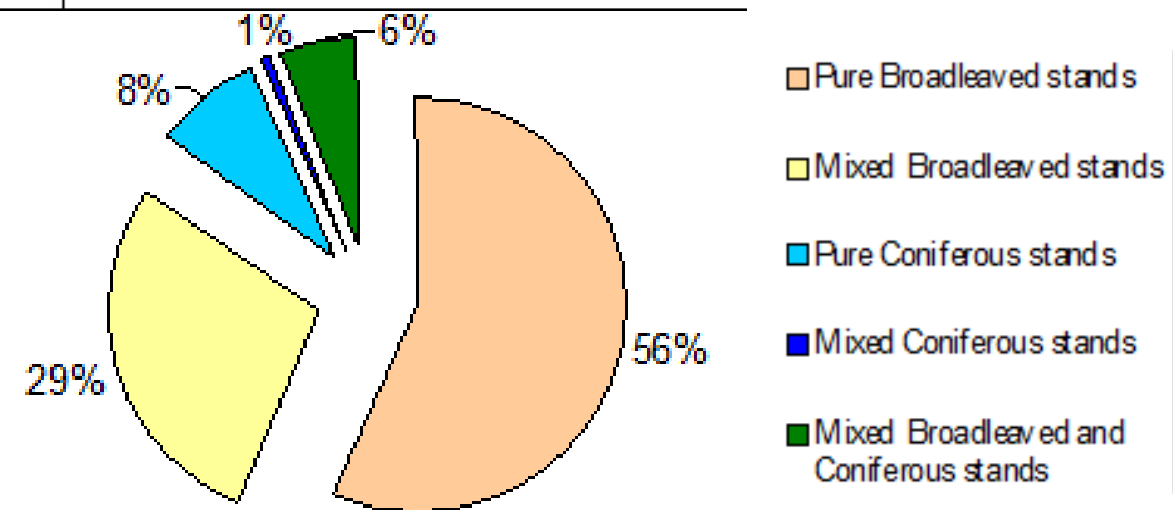
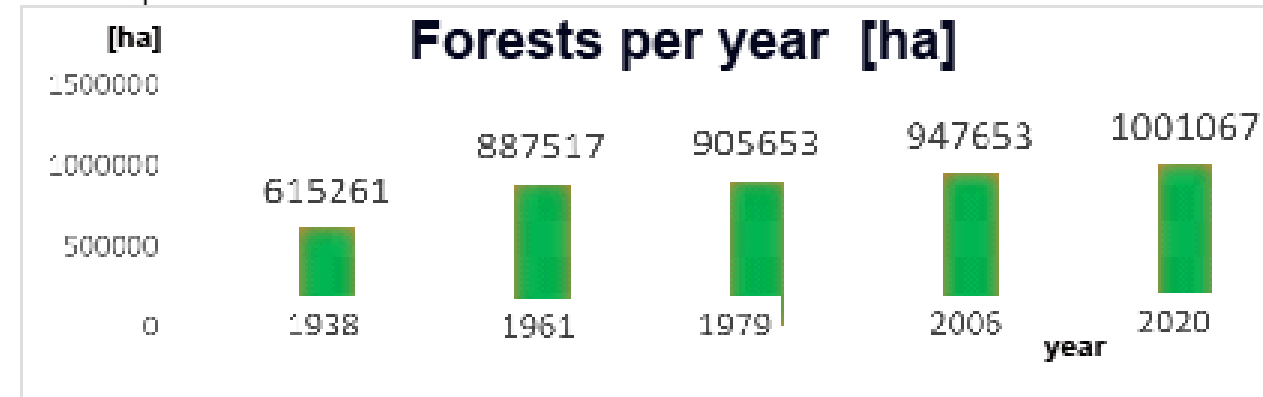
level_1

- Agricultural areas
- Artificial surfaces
- Forest and semi natural areas*
- Water bodies
- Wetlands

level_2 - extracted

- Pastures
- Open spaces with little or no vegetation
- Scrub and/or herbaceous vegetation associations

Forests - 10017 km² or 38,96%

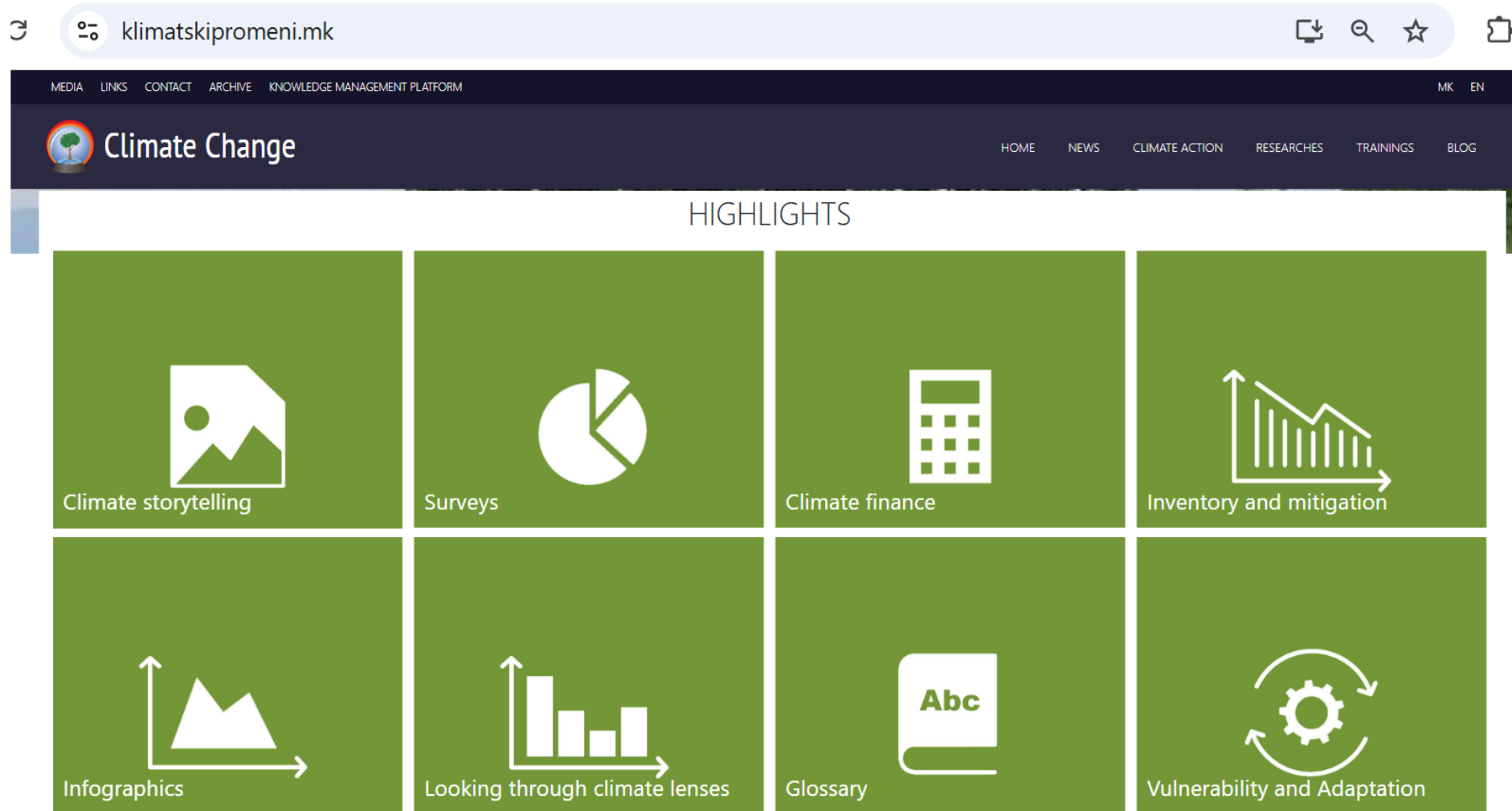


According to the area dominate oak forests (50%) but according to the wood mass: beech 59% , oak 26%

Web – site for Climate changes in North Macedonia

Ministry of Environment and Physical Planning

<https://klimatskipromeni.mk/>



Forestry is included in various documents :

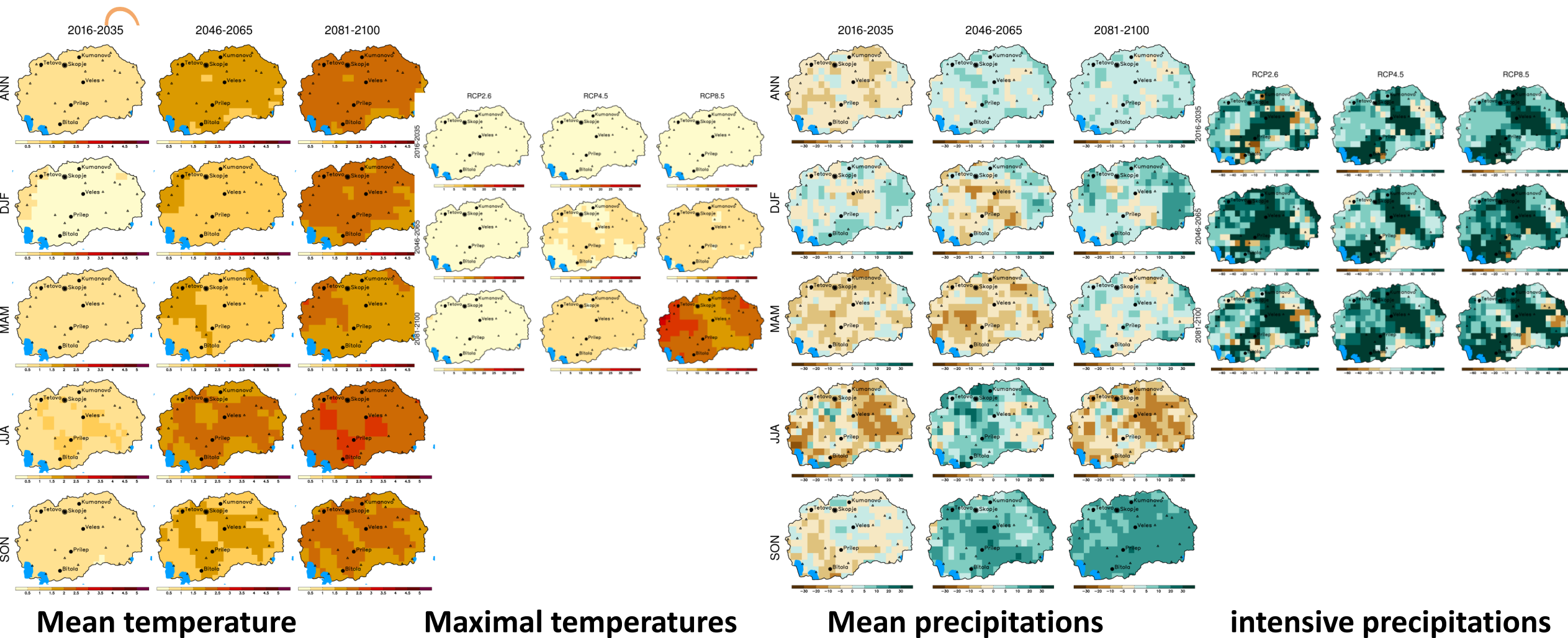
4 National Communications ; Vulnerability assesment; Inventory and mitigation.....

**Has climate change been
recognized as a problem for
forestry? - YES**

**What figures or studies project changes in key
forest parameters like precipitation and
temperature?**

Report on climate change projections and changes in climate extremes for the Republic of North MACEDONIA (Vladimir Djurdjevic , GEF – UNDP, 2020)

For three different GHG emissions scenarios, RCP2.6 (*low*), RCP4.5 (*mid*) and RCP8.5 (*high*) future climate projections of essential climate variables, temperature and precipitation and climate indices are presented for territory of Macedonia.



CC scenarios for North Macedonia – conclusions

Climate projections include:

• **Increase in annual average temperature of 1.0 – 3.3°C by 2050. Increases are expected to be higher in summer months.**

• An increase in number of hot days, hot nights, and heat waves.

• **Projected 5% decrease in annual average precipitation by 2050, with 17% decrease expected in summer.**

• Likely increase in precipitation variability.

• **Likely increase in frequency and intensity of droughts, with the probability of projected change in annual severe drought likelihood increasing by between 0.23 and 0.37 by 2060.**

• A 2°C increase in temperature puts 6 of the 7 ski resorts in North Macedonia at medium to high risk of no longer being snow secure in the future.

- According to simulations by Djurdjevic (2020) Macedonia will face hotter and drier climate in the future.
- **Amplitude of this change primarily will be related to the future concentration of GHG.**
- Associated with hotter climate in future, increase in hot extremes and decrease in cold extremes are expected.
- **Even that drier condition is expected on average on annual level, analysis reveals potential increase in daily extreme precipitation that will introduce higher risk of flash floods.**
- On the other hand, expected decrease in summer precipitation and extension in duration of consecutive dry days, will increase risk of drought.
- **Finally due to warmer climate, in general, expected growing season length will increase on average.**

Effects of CC on: forests (Matevski et al) and forestry (Nikolov et al)

Negative changes expected:

- Riparian forests of willow, poplar, alder, tamarisk;
- Thermo-mesophilic forest of Turkish and Hungarian oak
- Sessile Oak mesophilic forest;
- Subalpine spruce forest.

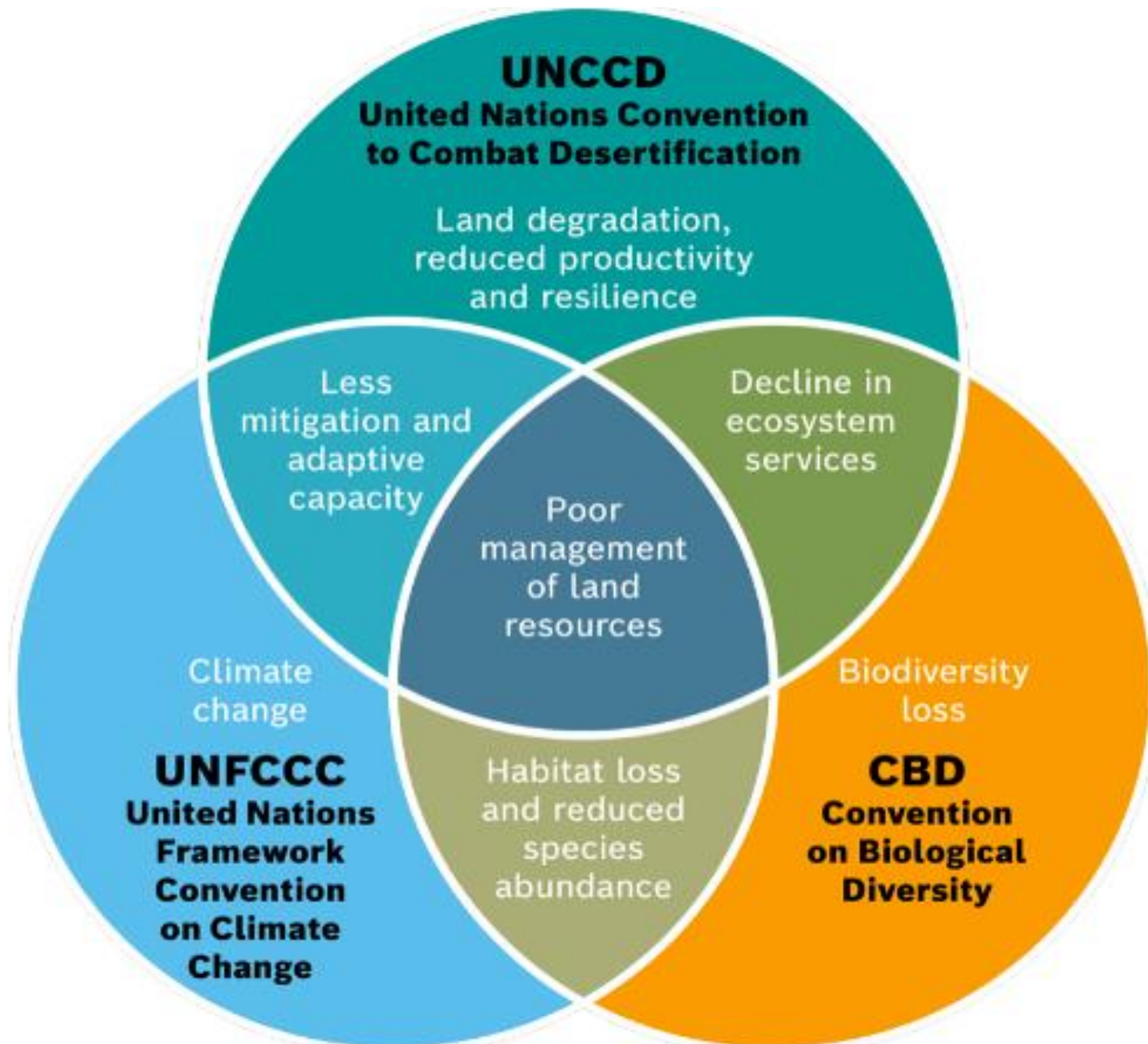
Positive changes expected

- Thermophilic forests of Pubescent oak
 - Mountain beech forest,
 - Macedonian pine forest

The main impacts of climate change on forest ecosystems in the country are:

- availability of water;
- impact on the health condition of forests;
- canopy transparency;
- forest fires;
- impact on forest ecosystem services;
- productivity;
- carbon storage and sequestration;
- impact on forest management.

RIO Conventions



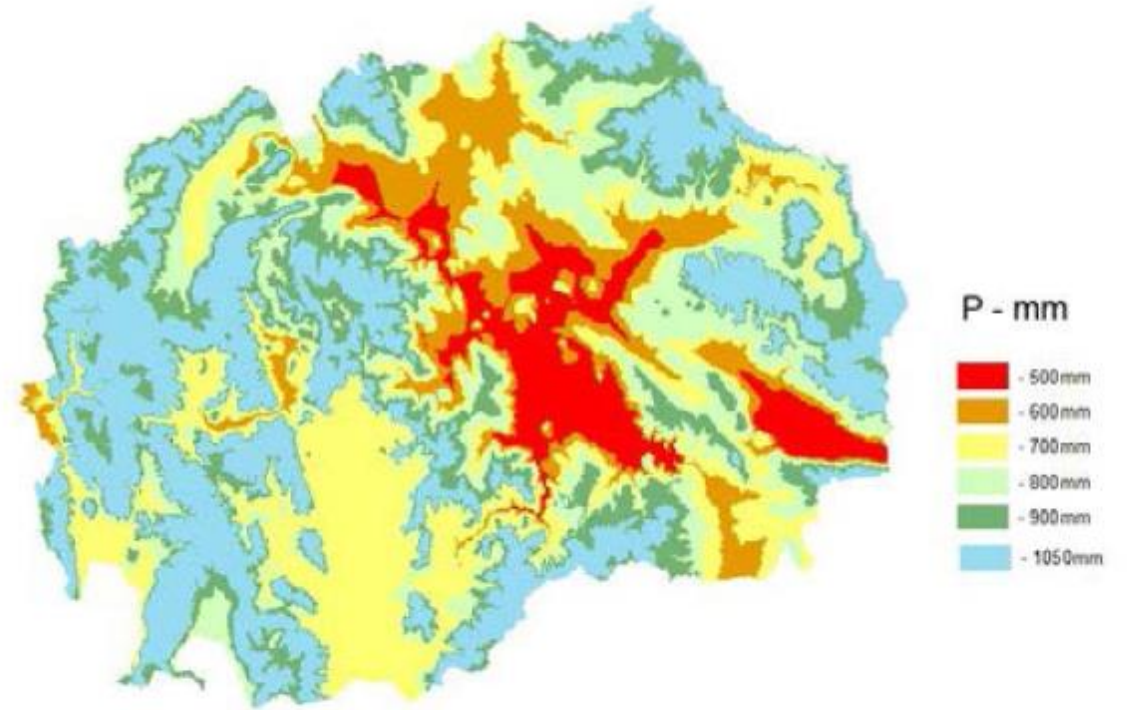
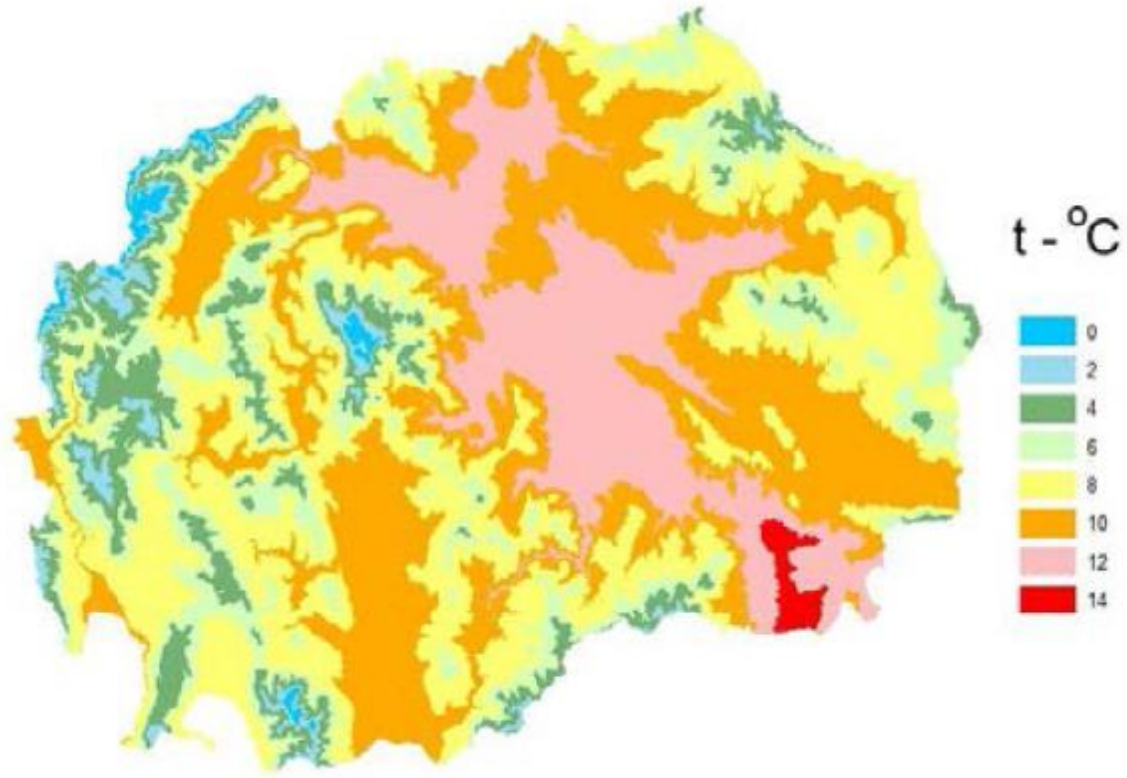
The EU does not declare itself as a (a region) affected by desertification although it is a huge problem in Portugal, Spain, South Italia and they are part of annex IV- Northern Mediterranean

But

UNCCD is very important for RNM and is deep connected to UNFCCC and UNCBD

Forestry is a one of key sectors for mitigation negative effects of extreme climate related phenomena including desertification

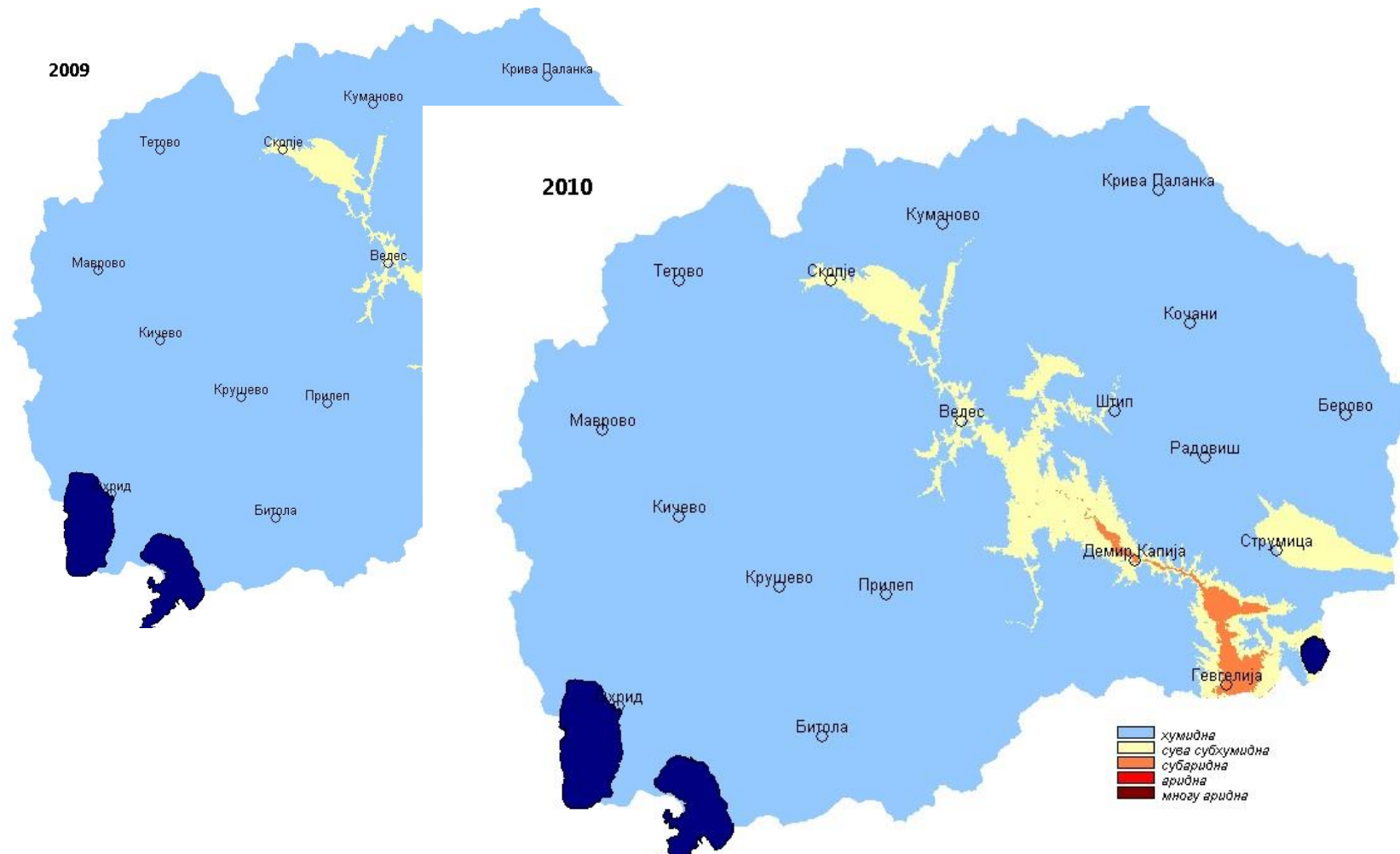
Isothermal and Isohyet maps



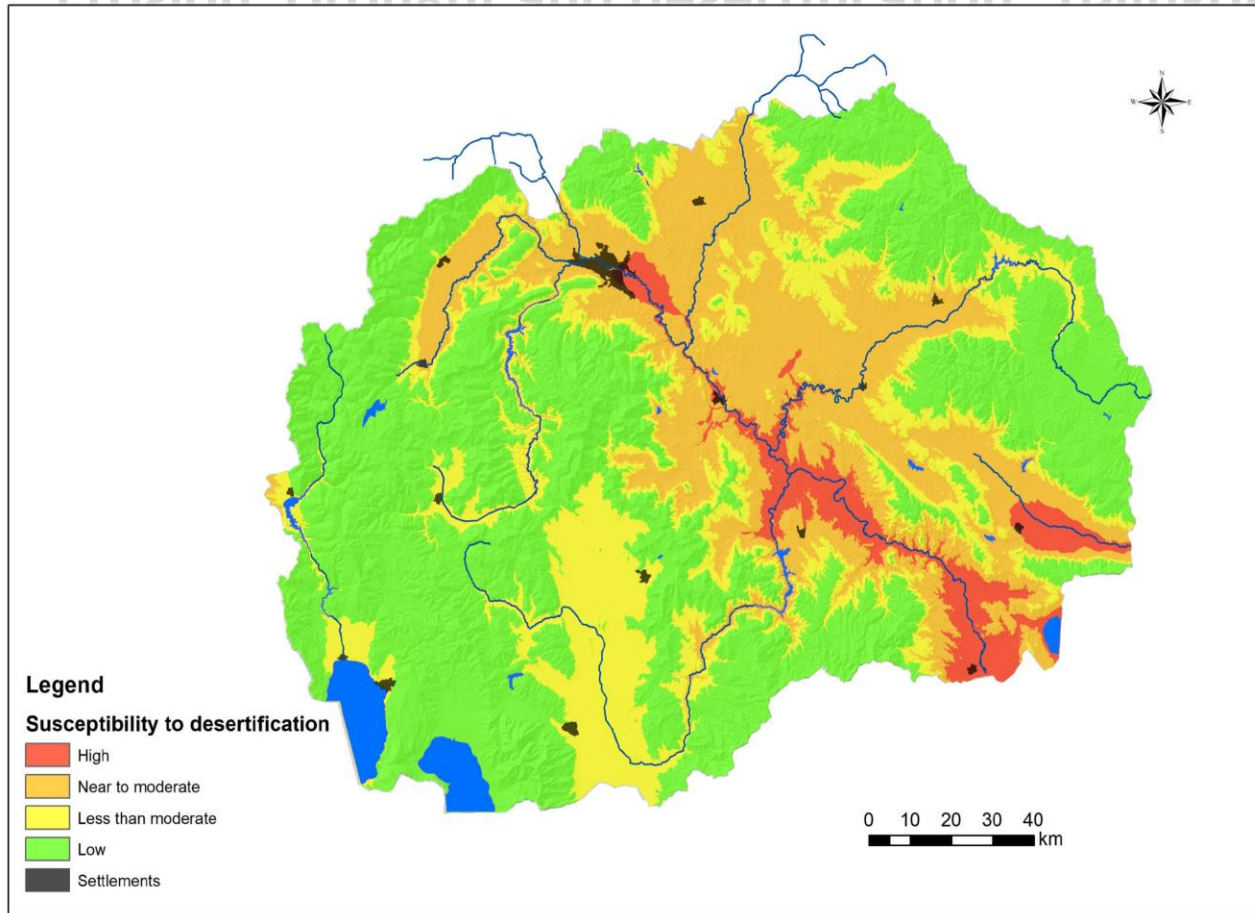
- Aridity index = $\Sigma H / PET$
- $AI < 0,65$ - desertification

Ai – aridity index variations 1981-2010

Ai<0,65 - region susceptible to desertification



Erosion, Drought and desertification (Blinkov et al., 2021)



- 28% of the country is susceptible to desertification and 18% additionally where AI is close to threshold.
- With CC up to 2100 probably >60% of the country would be in the region prone to desertification

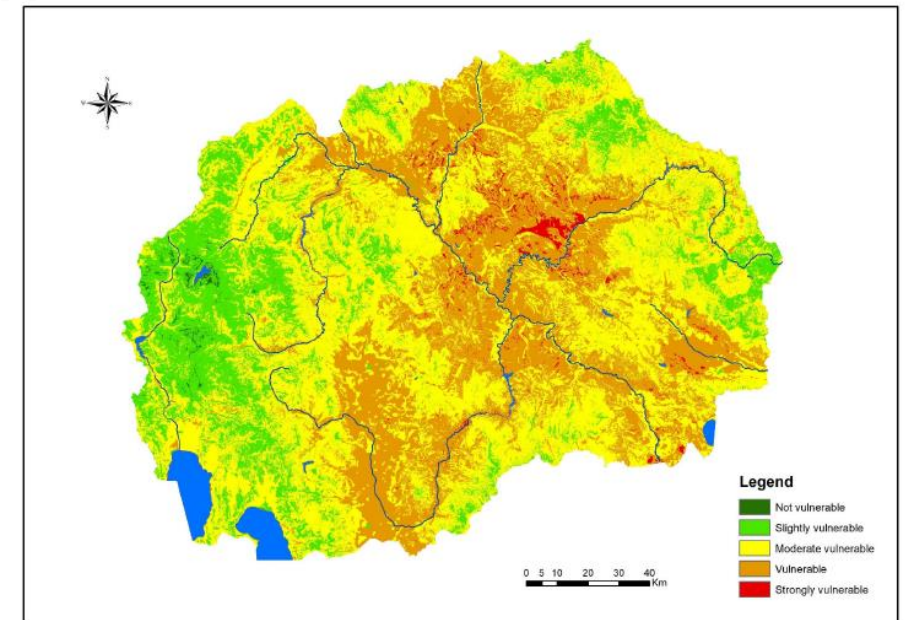
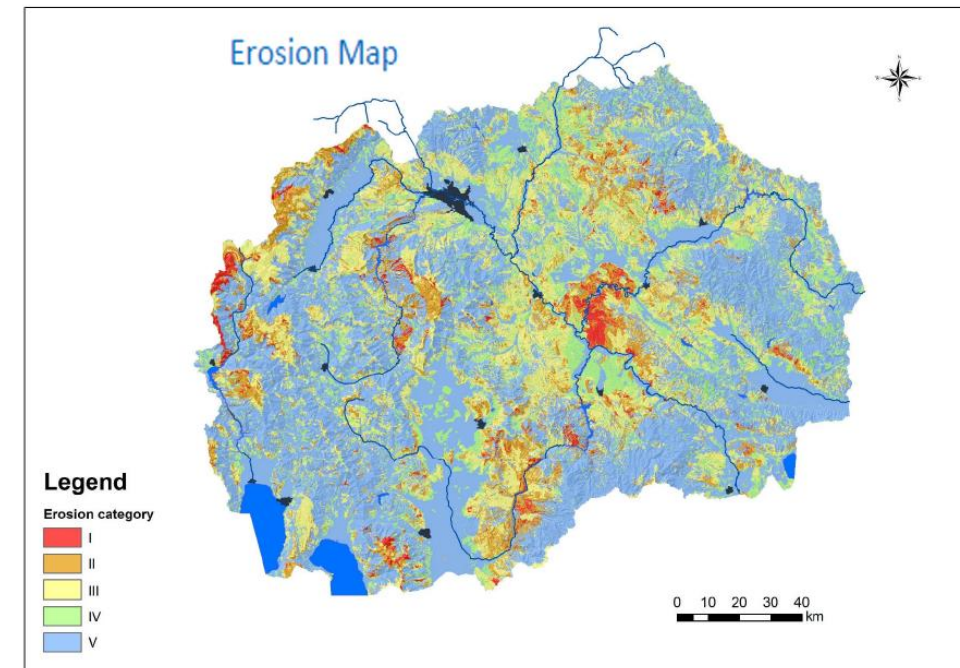
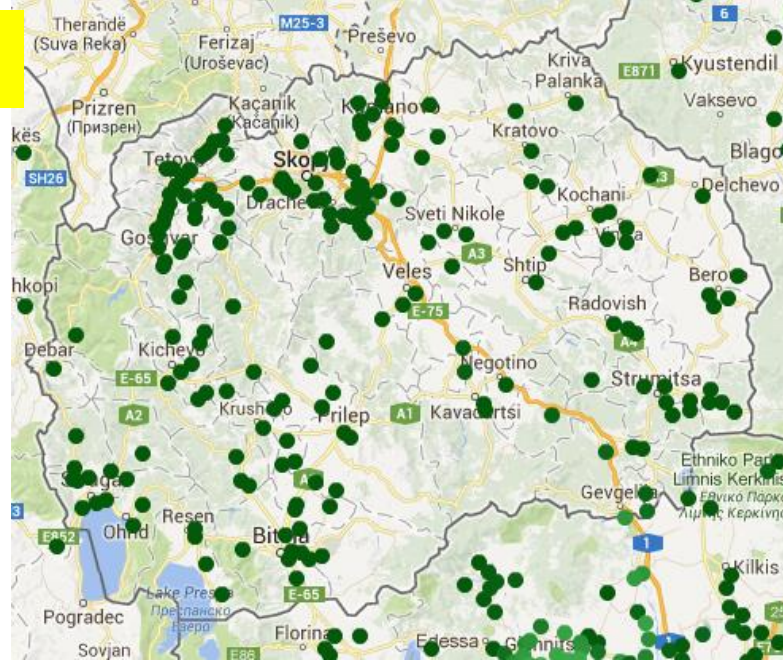
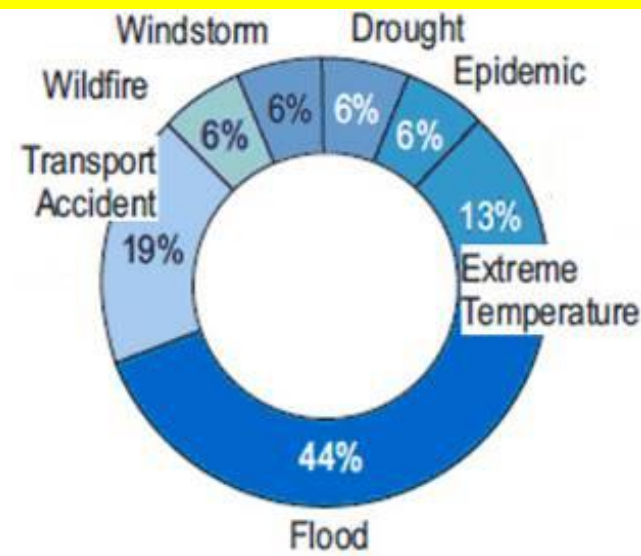


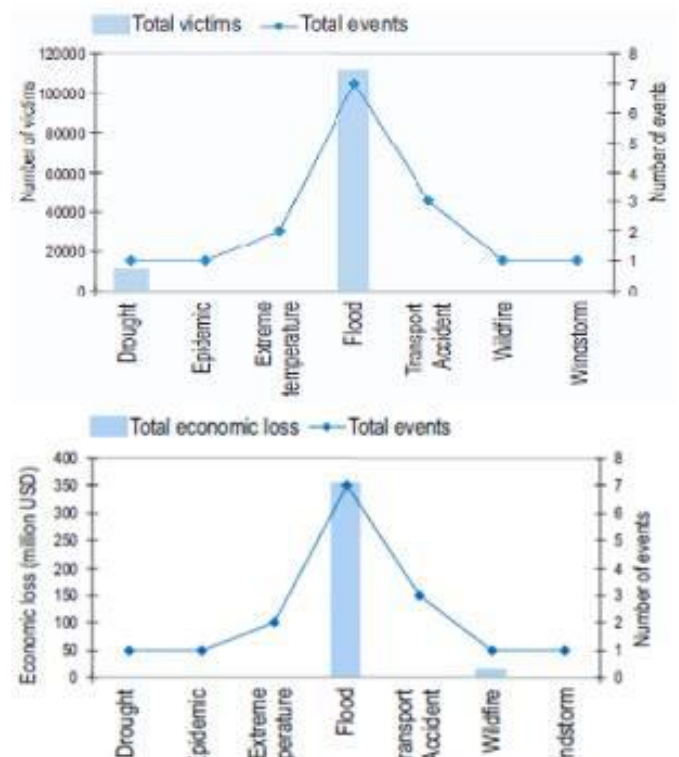
Figure 3 – Drought vulnerability map



Climate related Hazards

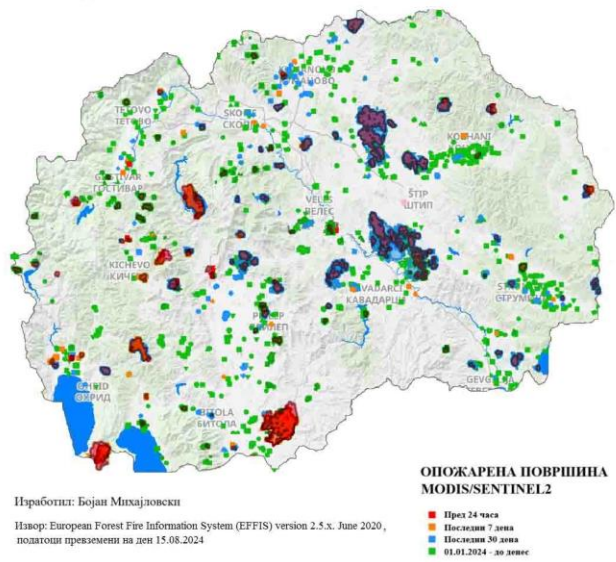


Flood events



WILD FIRES

ПЕРИОД: 01.01.2024 - 15.08.2024



Активни пожари MODIS Сателит

- <=6 часа (MODIS Aqua)
- >6 & <=12 часа (MODIS Aqua)
- >12 & <=24 часа (MODIS Aqua)
- Последни 7 дена (MODIS Aqua)
- Последни 30 дена (MODIS Aqua)
- 01.01.2024 - до денес (MODIS Aqua)
- <6 & <=12 часа (MODIS Terra)
- >6 & <=12 часа (MODIS Terra)
- >12 & <=24 часа (MODIS Terra)
- Последни 7 дена (MODIS Terra)
- Последни 30 дена (MODIS Terra)
- 01.01.2024 - 15.08.2024 (MODIS Terra)

Активни пожари VIIRS Сателит

- <=6 часа (VIIRS Suomi)
- >6 & <=12 часа (VIIRS Suomi)
- >12 & <=24 часа (VIIRS Suomi)
- Последни 7 дена (VIIRS Suomi)
- Последни 30 дена (VIIRS Suomi)
- 01.01.2024 - 15.08.2024 (VIIRS Suomi)
- <=6 часа (VIIRS Noaa-20)
- >6 & <=12 часа (VIIRS Noaa-20)
- >12 & <=24 часа (VIIRS Noaa-20)
- Последни 7 дена (VIIRS Noaa-20)
- Последни 30 дена (VIIRS Noaa-20)
- 01.01.2024 - 15.08.2024 (VIIRS Noaa-20)
- <=6 часа (VIIRS Noaa21)
- >6 & <=12 часа (VIIRS Noaa21)
- >12 & <=24 часа (VIIRS Noaa21)
- Последни 7 дена (VIIRS Noaa21)
- Последни 30 дена (VIIRS Noaa21)
- 01.01.2024 - 15.08.2024 (VIIRS Noaa21)

ОПОЖАРЕНА ПОВРШИНА MODIS/SENTINEL2

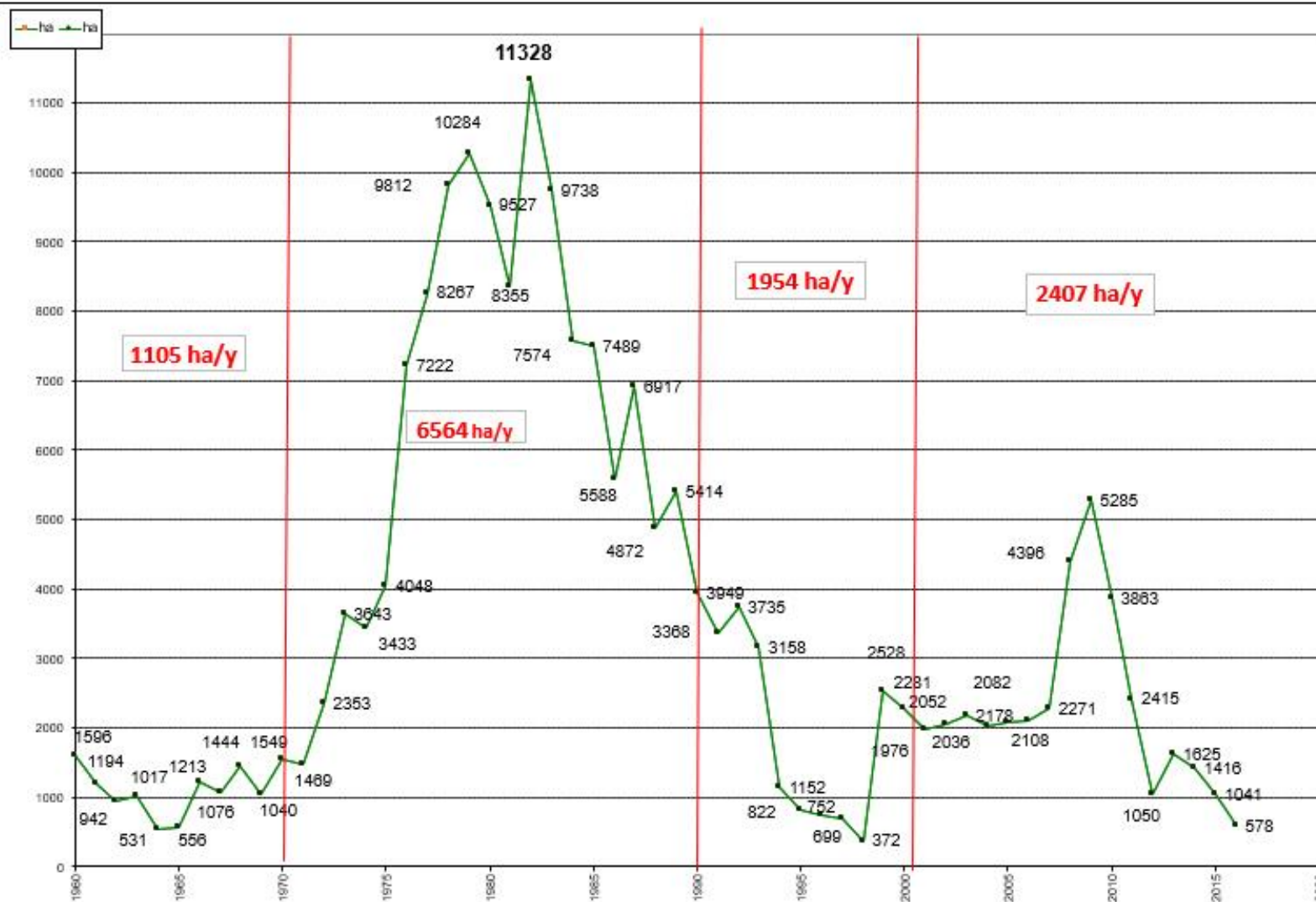
- Прек 24 часа
- Последни 7 дена
- Последни 30 дена
- 01.01.2024 - до денес

Изработил: Бојан Михајловски
Извор: European Forest Fire Information System (EFFIS) version 2.5.x, June 2020,
податожи преземени на ден 15.08.2024

Drought – Lake Kozjak 2019



AF(RE)FORESTATION as a measure for: CC mitigation, erosion and desertification control, carbon sequestration, livelihood improve.....



Faced with huge problem with erosion and torrent floods in the past afforestation of bare and erosive lands started in 1914 and 250 000 ha were planted (out of them 60-65% successful), But still 33,6% of the country is affected by unacceptable intensity of erosion processes, mostly on degraded grasslands and bare lands in the hilly and mountain region.

Vodno Mt.1920 vs 2020



1951 – 451 ha forests >>>> 2016 – 2579 ha forests

How is the role of forestry distinguished in other sectoral policies?

Can you provide examples?

- **Water economy** - forestry activities relevant for soil and water conservation especially erosion and torrent control and reducing siltation of reservoirs
- **Rural development** – mention forestry in various topics and it is in accordance with the Strategy for sustainable development of forestry
- **Spatial planning** - forestry as both economy and environmental (mostly protective) sector
- **Nature protection** – mostly in negative context



Is climate change recognized by forest policy, and if so, how?

A Strategy for sustainable development of forestry has been updated.

- Climate changes are taken in consideration in the updated version.
- One of 4 general objectives of the strategy is
- ***To contribute to mitigating climate change by adapting the composition and structure of forests and increasing their resistance to climate changes***
- Directions to achieve this objective
- Introduction of multifunctional, closer to nature and economically sustainable management systems in all *forests*.
- Introduction of simultaneous maintenance and improvement of forest functions or ecosystem services through sustainable management of forests and striving for their comprehensive valuation



Aim

To maintain and improve the protective functions of forests by applying the concept of adapted and sustainable forest management and appropriate measures to protect forests in order to ensure and increase the contribution of the forestry sector to environmental protection and carbon sequestration.

Part of Directions: to achieve this aim:

- Mapping the protective functions of forests
- Guidelines for the maintenance of forests that have an emphasized protective function
- Rehabilitation of degraded and eroded protective forests and other forest land as a priority, to the extent possible
- Introduction of adapted systems for sustainable forest management and appropriate silvicultural measures that increase CO₂ sequestration.



What measures does forest policy prescribe for climate change mitigation and adaptation?

Can you give examples of financial, educational, or legislative instruments?

Adaptation encompasses changes in management practices designed to decrease the vulnerability of forests to climate change and interventions intended to reduce the vulnerability of people to climate change.

- Mitigation strategies in the forest sector can be grouped into 4 categories: -
 - reducing emissions from deforestation by maintaining the area under forest and by promoting forest conservation and protection;
 - reducing emissions from forest degradation by maintaining or increasing carbon density at the stand and landscape scales,
 - managing timber production forests and restoring degraded forests;
 - enhancing forest carbon sinks by increasing the area under forest through afforestation and reforestation

An extract of the IVth National CC plan

Table 5-5: Adaptation plans in the forestry sector

Action (adaptation measures that maximizes the economic benefit and minimize the climate change impact per sector)	Type Policy Legislation Capacity building	Stakeholders (Clear distinction of responsibilities among the relevant stakeholders)	Timeframe Short term/long-term	Financing (Financial means for implementation of the measures) –Euro–	Constraints (identification of possible barriers and risks, including legal arrangements, institutional management, financial and technical aspects)	Sectorial/ institutional relationship
1. Develop a program for adapting forestry to global climate change	Policy, Capacity building	HEF, MAFWE, PENF	Short term	150,000	Capacity, finance, sector coordination	Forestry, Agriculture, Environment, Energy,
2. Education/ training for the climate change of the engineers on PE National forest	Capacity building	HEF, MAFWE, PENF, MOEPP, UHMR	Short term	250,000	finance, sector coordination	Forestry, Agriculture, Environment,
3. Education/ training for climate change of the engineers in the Sector for design, planning and hunting in the PE National forests (as	Capacity building	HEF, MAFWE, PENF, MOEPP, UHMR	Short term	50,000	finance, sector coordination	Forestry, Environment, Energy,

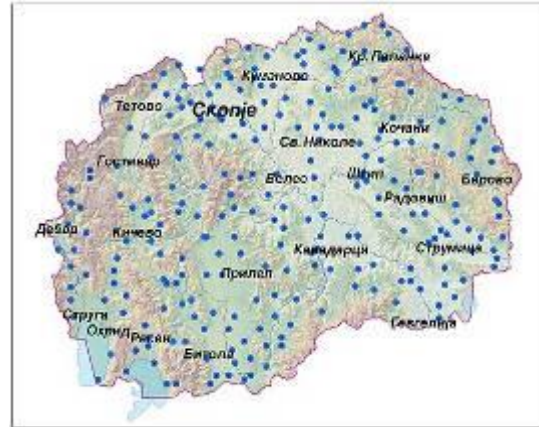
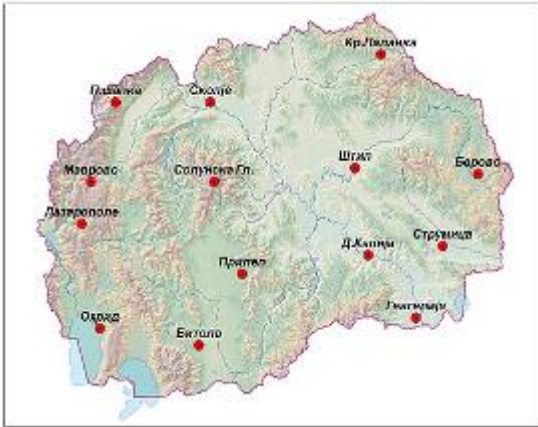
4.Develop a program for improvement of the forest road network in line with the climate change scenarios, case study PENF “Babuna”-Veles		HEF, MAFWE, PENF, UHMR	Short term	1,000,000	Lack of finance	Forestry, Local self-governance, Agriculture, Environment, Energy
5. Adaptation of the Management plans in the forestry in agreement with the climate change	Legislation, Capacity building	FFS, MAFWE, PEMF	Long term	300,000	Law of forestry, education of stuff, lack of finance	Forestry, Environment, Energy
10. Promotion of the possibilities for production of “green “ energy	Promotion, Legislation,	HEF,FASF, MAFWE, PENF, MOEPP	Long term	100,000	Financial, institutional	Forestry, Energy, Environment
11. Implementation of pilot project for renewable energy production from forest and agricultural biomass	Legislation, Capacity building	HEF,FASF, MAFWE, PENF MOEPP	Long term	10,000,000	Financial, institutional, technological, legal,.....	Forestry, Environment, Energy, Agriculture
12. Forest inventory (last one was done in 1977)	Capacity building	HEF, MAFWE, MOEPP	Short term	1,500,000	Financial	Data needed for higher Tier calculations: annual biomass growth (all types of

• **BON CHALLENGE - RNM OBLIGATED up to 2030**

- **to afforest 5000 ha bare lands , to revitalize (ameliorate) 5000 ha degraded forest and shrub; to implement sustainable forest management on 5000 ha.**
- Beside it various subjects as LMAs but also private companies, water economies etc. should invest in afforestation as a part of protection of cities and infrastructure and improve of ambient air.
- Government – MAFWE – Program for extended reproduction
- NAP CCD - measures
- Assessment of forest ecosystem functions in the affected areas and establishment of a mechanism to support afforestation and silviculture
- Improvement of afforestation of degraded lands (analysis of previous activities; determination of suitable species for afforestation according to climate change; new techniques and technologies for afforestation and sustainable cultivation of forests)

Are there secure monitoring and research instruments in place to track climate change? If yes, can you provide examples?

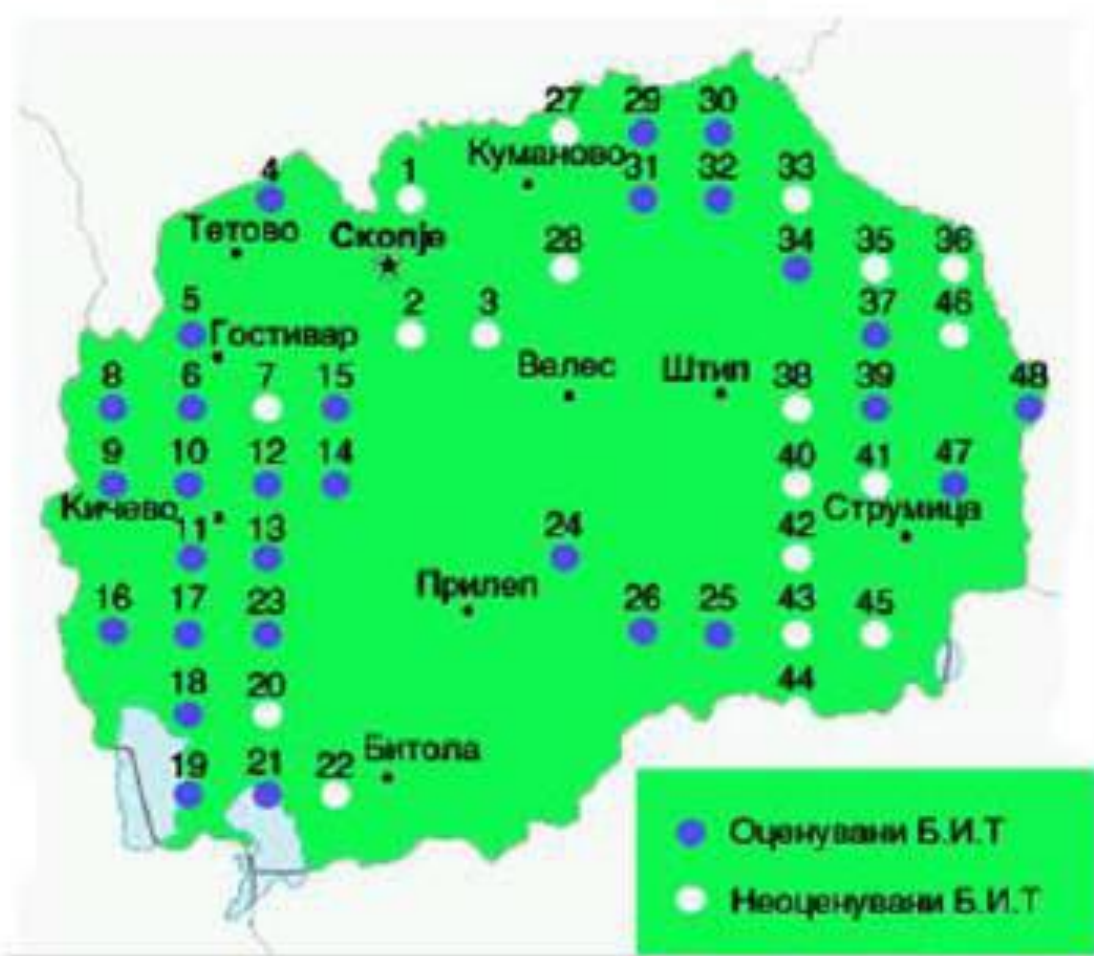
- Hydro-meteorological service is responsible for measuring of climate parameters



- Main meteorological, regular meteorological, precipitation gauge and phenological stations
- With preparation (updating) new forest management plans are registered some changes in vegetation extent and state but it is not only because of CC (abandon grassland ...)
- Jesus thorn (*Paliurus Spina-Christi*) – previously up to 600 m asl, now we found on 750 m asl.

Monitoring network of ICP forest's assessment of forest health

Picture 1: The net of the ICP forest's plots in Macedonia



Worsen situation in 2018/9 compared to 2011

- Around 50% of the assessed trees don't have signs of crown transparency but around 45% of the trees are in the 1 and 2 class of the scale of loss of needles/leaves ($>10<60\%$).

The mortality of trees is also higher. In 2011 the percentage of dead trees was 0.7 percent, and in 2019 its more than doubled to 1.6 percent of estimated trees.

Because of lack of available water In 2019, about 75% of the assessed trees were near drought conditions.

Some projects relevant to wild fires

- **PROJECT FOR DEVELOPMENT OF NATIONAL INTEGRATED SYSTEM FOR PREVENTION AND EARLY WARNING OF FOREST FIRES 2011 – 2014**
 - - **Goal** - To reduce occurrences of massive forest fires by strengthening the capacity for prevention and early warning of forest fire.
 - Macedonian Forest Fire Information System <https://mkffis.cuk.gov.mk/>
- **Landscape fire management in Western Balkan programme – SDC – I phase 2022 – 2026** <https://www.lfmwb.net/>
- The overall goal of this LFMWB is to **increase resilience of Western Balkan forests and landscapes against fires benefit the people who depend on these landscapes for their livelihoods and socioeconomic development** using a participatory approach that includes the local population in the processes, promotes gender equality, and further strengthens public awareness of the importance of safeguarding natural resources.

What gaps exist in current forest policy regarding climate change challenges?

New Law on forests where CC are involved hasn't been adopted yet.

Strategy should be implemented.

- Forest fires (10000 ha /ann) and illegal logging are still huge problem
- Clear cut on large area is still practiced on degraded and coppice forests
- New trends in forestry like SFM or close to nature forestry is partially or not practiced
- Revitalization of degraded forest and shrubs is expensive (lack of finances)
- Decrease of mean annual afforestation in the latest period
- According to the cadaster great portion of bare land is officially grassland (pasture) but Law on Pastures doesn't allow conversion of pastures (grasslands) to other land use type.
- Percent of protective forest is low and there is no finances outside of forest sector for maintaining these forests
- Low knowledge
- Low image of forestry in public

Objectives and measures from updated strategy

- 1) The health, vitality and resilience of forests should be maintained and strengthened by implementing appropriate forest protection and cultivation measures and applying an adapted system for sustainable forest management. Forest degradation should be prevented and degraded forest rehabilitated as much as possible.
- 2) The implementation of clear-cutting over a large area, should be excluded in all forests, except in the case of rehabilitation of damaged forests and direct conversion of scrub and coppice forests with low wood reserve and quality
- 3) The application of clear felling on a small area as a technique for reforestation, in the event that natural seed regeneration is missing or cannot be expected in a reasonable period of time, should be enabled if provided for by the management plans, on the basis of specific The maximum area of individual clear-cutting fields in a certain forest plantation should not exceed the ecological limits set in the criteria.
- 4) The implementation of the current coppice forest management system, which leads to serious forest degradation and subsequent carbon emissions, should be gradually replaced (within 15 years) by a system of conversion of coppices to high forests. Conversion should be carried out by thinning and natural regeneration (from seed). Artificial regeneration by planting or seeding should be carried out in cases where there is no natural regeneration from seed or the same is not expected.
- 5) Traditional management systems with coppice forests can be maintained on a smaller scale in accordance with economic, social and ecological criteria (to be defined in the Law on Forests).

What objectives and measures would you recommend to address these gaps?

- **Afforestation – crucial for increase of carbon sink -. In the past existed Fund for afforestation (1971-90) and the best results in afforestation date from this period. (>5000 ha.ann). Perhaps re-establishing of this fund.**
- **Governmental decision for allowing afforestation of grasslands (pasture) that are not in use or eroded grassland in the watershed of dangerous torrents**
- **Improve of fire protection and protection from illegal logging but beside forestry measures , mostly in the prosecutorial and judicial system (art.227 – negligence 3y , up to 10 y in jail ; art. 288 - – negligence monetary penalty up to 3y, other up to 5 y)**
- **Changes in forest management and Introduction of SFM and Closer to nature forestry**
- **Revitalization (amelioration) of degraded forests and shrubs**
- **Improve of forest road network and usage of contemporary machinery**
- **Introduction of payment for ecosystem services especially on protective forests.**
- **Capacity building programmes**
- **Media promotion of forestry**

Next steps

- Finishing the new law on Forests and its adoption in the parliament .
- Taking in consideration huge forest fires in 2024 cca 40 000 ha forests and >3 million m³ wood mass were burned (*state in media by Z.Trayanov – gen.dir. of PENF*) , current priority (according to the Law on forests) is : cut and cleaning of the burned wood mass, ; then production of seedlings up to full capacities of the nurseries; reforestation in next years on the burned areas where forest hasn't self-restored.
- Changes in forest management practices (all activities in forestry – forestation, silviculture, harvesting, forest protection, forest biodiversity, protective forests, forest socio-economic aspects,) to be more sustainable and introduction of concept of closer to nature forestry.

Blagodaram na vnimanieto



Last Slide

It's not over...

Thank you for your attention