

Climate Change Adaptation in Agriculture **Status Analysis : Soil**

Country/Territory: Macedonia, Serbia, Montenegro, Albania, Bosnia and Herzegovina, Kosovo

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Activities

- Revision and adoption of the scope of work, June 2023,
- Drafting of the first National reports on adaptation of land to CC, September,
- Coordinative meetings with the experts, July-September,
- EU4Green Regional workshop, Tirana, September 21st
- Revision of the first national reports, October,
- Presentation of the main findings on the APF in Podgorica, Montenegro, 24-27 October,
- Drafting of the revised versions, November,

Exposure, sensitivity of soils & consequences

In all Western Balkan countries the climate conditions are worsening as a result of the aggravated influences of climate changes,

Climate factors altered by the negative influence of climate change reported by all countries are: increased air temperature and variability, change in the total sums and intensity of precipitations, altered precipitation regime, change in aridity/dryness of climate etc.

Appearance of climate extremes that are common for all WB countries- intense soil erosion, frequent flash floods, drought events, forest fires and land slides the soils in WB countries,

Land slides: affects 30% of the territory of the country (Serbia), in Albania 9% with over 3000 records all over the country. Montenegro also faces a considerable risk of landslides at various locations. The number of active landslides in B&H are estimated on 1,800 while in Macedonia this number is around 400 landslides out of this 255 are officially recorded,

Floods: in Serbia in the period of 2020-21 affected almost 75 000 ha, 70% of it used as agricultural soils, while in Montenegro floods affected 30,000 hectares of agricultural land in 2010, over 16000 ha each year flooded in Albania, potentially threatened by floods in about 6.3% (3,227 km²) of the total land area of BiH, while in Macedonia 54380.6 ha. are prone to floods. In Kosovo The Preliminary Flood Risk Assessment revealed that at flood risk are 12.300 ha, with 398 spots of potentially prone to a significant flood risk

Erosion: In Serbia, in the period 2017-2021 7,8% of the country territory where affected with soil erosion, around 300 registered torrential catchments spanning over 460,000 ha, in Montenegro, in Albania the most affected areas are the coastal regions and the erosive river flows. In B&H more than 80% of the terrain in B&H has slopes greater than 13%, due to what soil erosion is a serious problem. In Macedonia area affected with the highest category of soil erosion is bit more than 52000 ha.

Exposure, sensitivity of soils & consequences

Forest fires: *in the period of 2005-2015* about 800 large fires in Montenegro damaged over 18,000 ha of forests. In B&H in 2022 around 71,000 hectares and 2020 more than 100000 of forest were burned, and in 2. In Macedonia every summer, after a prolonged dry periods and high temperatures, forest fires affect various locations. According the EFFIS data, the total burnt area in 2022 was 4384 ha, in Kosovo according to the data of the Forestry Agency of Kosovo, from 2010 to 2014, the fire affected 8,887 ha, while in Albania 352 major forest fires were registered in a period of two years (2006–2007)

Drought: drought monitoring in most of the WB courtiers: Serbia, Montenegro, Macedonia and Bosnia is evaluated on the base of the same methodology by **using the SPI index**. Out of the data presented on the maps from those countries it can be concluded that **drought is variable** in the countries of the WB. For instance in Bosnia the area affected by drought annually is 258 km² or (0.56%), while in Macedonia almost **one third of the country**, in Albania drought one of the most alarming problem

Common consequences – acceleration of land degradation with soil erosion, salinization, SOC depletion, flooded areas etc.

High sensitive are cultivated agricultural land with intensive systems of production, 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 – the exposure and sensitivity is rather high!!!!

Adaptive capacities of producers

❑ Human resources:

- **Vast part of the working force in agricultural sector is over 45 year old with elementary or secondary degree of education. Only small percent have specialized agricultural education** For instance, in Macedonia almost 20% over 65 years, while in 42.5% and in Montenegro 23.58% of the labor force are actively engaged in farming are older than 65 years. In Macedonia and Serbia, 45-47% have accomplished secondary education while in Montenegro 33,74% have at least least four years of other secondary education,

❑ Physical Resources - Farm size, Irrigation, Ownership of farm implements/machines:

- **Farm and parcel size in all countries is rather small (up to 2,5 ha).** The average farm size and parcels size in Macedonia is varying between 0.8 to 2,47 ha. In Montenegro 73% of family farms own less than 2 hectares and only 0.9% of family farms possesses 38% of the total utilized. In B&H the average farm size is about 2 ha, which is usually divided into 6-8 plots. agricultural land.
- **Classic techniques of land cultivation are prevailing, which causes serious disturbances of soil surface.** In Albania sustainable land management techniques are applied on very small areas, while in Serbia for instance,- reduced tillage is present on 10,06% of the territory of the country, and no-tillage in less than 1% of farms
- **Agricultural mechanization is quite old which usually prevents implementing of advanced adaptation practices.** Over 70% of tractors in Macedonia are older than 20 years, while in Serbia 86% of tractors and 82.2% of combines are over 20 years old.

Adaptive capacities of producers

- **Fertilizers use in most of the cases are schematic, and voluntary**, without any previous laboratory testing of nutrient level or fertilization programs. Application of manure or other forms of organic fertilizers is very limited.
- **Precision agriculture is in its initial stages.** In **Serbia** precise agriculture (systems for agroecological zoning, thematic soil quality maps, online services) is present in less than 10% of farms. Examples of online services available in Serbia are **Geoportal of the Agricultural Land Administration** and **Prognostic Reporting Service of Plant Protection**.

❑ Financial resources:

- **Financial potential of producers is very limited.** Big part of farms (over 70%) in Macedonia falls within the first two classes of economic size with a total income of **178 mil. EURO/year**, while the rest of the 30% that are within the ranges from V-XIV class with a total income of almost **650 mil. EURO/year**. In **Montenegro** the 48,870 agricultural farms, most of it being family holdings, earns in total only **125,8 mil. EURO/year**.

❑ Information/trainings/technical assistance/articipates in farm organization

- Apart to the formal education there is **no other recognized systems for informal or vocational training programs** in agriculture. In Serbia targeted training courses for farmers were attended by farmers from 3.1% of farms in (2012).

Gaps and challenges to meet the newly adopted EU strategic and legal documents

- **Legal and strategic gaps and challenges:**
 - In the past decades **climate change vulnerability and** adaptation are widely treated within numerous strategic documents, country reports, projects,
 - Legal documents, Program of works of the Ministries and Action Plans foresees **numerous adaptation and mitigation measures** and sustainable soil management practices,
 - **Soil is still out of the scope of interest** of the decisionmakers in the region.
 - The **lack of special legal acts** in almost all WB6 countries, prevents the more effective implementation of the foreseen actions,
- **Capacity gaps**
 - **Reluctance of land managers, policy makers, and farmers to adopt new technologies and shortage of adequate training programs** and capacity-building initiatives, which are vital to enhance the willingness **to embrace new agricultural technologies,**
 - Significant challenge is the **lack of efficient cross-sector governance** and support mainstreaming of green and low carbon transition as well as the **communication gap that exists between policy makers and academia,**
 - **Institutional and personnel capacities** for land and soil management on both national and local levels are not sufficient,

Gaps and challenges to meet the newly adopted EU strategic and legal documents

• Implementing gaps

- The main identified gaps and **challenges in the implementation of national strategies** relevant to the EU Soil Strategy and EU adaptation strategy are low administrative capacities,
- The **requirements and arousing with the signature of international agreements and Conventions are not adequately implemented**. For instance in almost all WB countries the **Nitrate directive** is not implemented, in Albania the Law for Land Protection has been overall weakly implemented, especially in the first years after its approval and still needs further attention.
- The implementation of **LDN targets** is still represents a challenge for Serbia and Macedonia,
- **Only one sub-measure out of 6 sub-measures** foreseen in the measure “**Support for organic production, environmental protection and reduction of the impact of climate change**” were fully implemented in B&H.
- Lack of decision-making tools in accordance with the goals and implementing mechanisms is another challenge,

• Financial gaps

- The most recent Strategies and Programs of work outlines certain policies and activities related to climate change, adaptation and sustainable soil management.
- The **allocated financial resources are quite small** and don't provides solid ground for efficient implantation of the foreseen measures.
- **IPARD III program seems to be the only cross cutting fund for the most countries in the region**, and the only source of finance. In Serbia for instance almost 17 mil EURO are allocated for the Agri-environment - climate and organic farming measures within IPARD III Program, while in Macedonia this measure is supported with only 1,6 mil. EURO
- The **lack of support for sustainable growth of food production and the greener farm practices** and eco-schemes in Serbia, particularly relevant to soils
- Sufficient funding is a crucial factor **for academia and scientific institutions** to conduct high-quality research and contribute effectively to policy discussions in all countries of the region.

Mechanisms in place

- **Financial Mechanisms**
- **Rather limited!** Sources of financial support provided to the implementation of cross compliance measures, good agricultural practices for soil conservation, are the subsidies in a form of:
 - Measures within the IPARD Program (exc. B&H and Kosovo)
 - Direct payments realized within the annual programs of the Ministry,
 - Credit support, and
 - Special subsidies.
- **Technical**
- It is evident that **there is lack of specific mechanisms** and regulations to encourage farmers to adopt best management practices, which in turn remain largely sporadic and not the mainstream in the farming system.
 - Advisory system for agriculture and rural development,
 - Climate services
 - Soil Fertility Testing schemes,
 - Organic farming etc.
- **Legal**
 - **Constant work in the process of harmonization** of national regulation with the EU standards,
 - **Development of new measures for support the implementation of agro-ecological measures**, such example is the Agri-environment - climate and organic farming measures within IPARD III Program, Investment in physical assets of agricultural holdings,
 - Drafting of **specific legal documents related to climate change and adaptation**, Law on climate, Adaptation strategies, Climate change strategy, SARD's etc.

- **Albania:** agro-ecological principles are largely unknown and only in sporadic cases are being implemented, the **traditional way of farming mostly in the hilly and mountain regions** with minimum use of chemical fertilisers,
case study: pomegranate cultivation on saline soils, organic manure to create a suitable substrate for the rooting system, well-designed and drainage system, biodegradable plastic is used to cover the topsoil layer and conserve soil moisture, etc.



Kosovo: cover crops in perennial plantations, contour cultivation on a slopes, regulation of riverbeds to minimise the flood risk, introduction of modern systems for irrigation, reducing the burning of plant residues,



Best practices in place

Best practices in place

- **Macedonia: cover crops and UV nets** in perennial plantations, **meteo stations** and **fertigation** is another best practice that becomes very popular among the farmers, MAFWE in its Program for Rural development for 2023, foresees installation of **platforms for precise agriculture** equipped with a set of sensors for measurement of various meteorological and soil parameters, **fertigation** is another on farm adaptation measure, **composting** of the organic by-products attracts more and more attention among the producers,
- **Montenegro: cover crops in vineyards**, platforms for precision agriculture equipped with sensors to measure meteorological and soil parameters, weather stations for the essential meteorological and soil data for agricultural planning and irrigation management, soil laboratory testing schemes, cultivation practices including crop rotation



Best practices in place

- **Serbia:** organic production, no-tilage, organic fertilizers use, modern systems of irrigation, irrigation scheduling practices, **use of the platforms - artificial intelligence, satellite images, meteorological data, and digital field records**, preliminary flood risk assessment and flood hazard maps and flood risk maps, as well as creating and implementing plans for flood risk management



- **B&H** creation of **land use maps** which contribute to the planned use of land, and reduction of erosion, **reduced tillage** in almost all orchards in B&H with sowing grass as an cover crop and mulching of biomass, **recultivation** and remediation of contaminates soil, **soil testing, demining** activities, reconstruction of and construction of new **irrigation schemes**,

Available soil data!

- Soil Maps in digital format is available for all WB countries,
- Soil quality legacy data and data from more recent pilot projects are existing. The format and availability are questionable!
- Land use/land cover maps like: CORINE LC, SENTINEL-Copernicus global datasets are available,
- Land Parcel Identification System is in function in all WB countries,
- In some of the WB countries the Ministries of Agriculture supports the soil testing program for perennial plantations,
- Other data for environmental co-variables are available as well, like: DTM and its derivatives, climate maps, climate hazards maps with projections, geology maps etc.

Data constraints and data gaps!

- Soil data are outdated! Most of the historical soil data sets originates from the long-term Project for production of Soil Map in Former Yugoslavia
- Comprehensive and structured soil monitoring is missing
- The needed legislation, institutional, technical and personal capacities for effective monitoring and soil research are insufficient,
- Low capacities of the key stakeholders,
- Inexistence of functional system for survey, data storage, harmonization and exchange.
- Interinstitutional arrangements indispensable for effective soil monitoring are missing,
- Availability of soil data is vague. Some datasets like Lpis, climate data, geology maps are not freely available,

THANK YOU FOR THE ATTENTION

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