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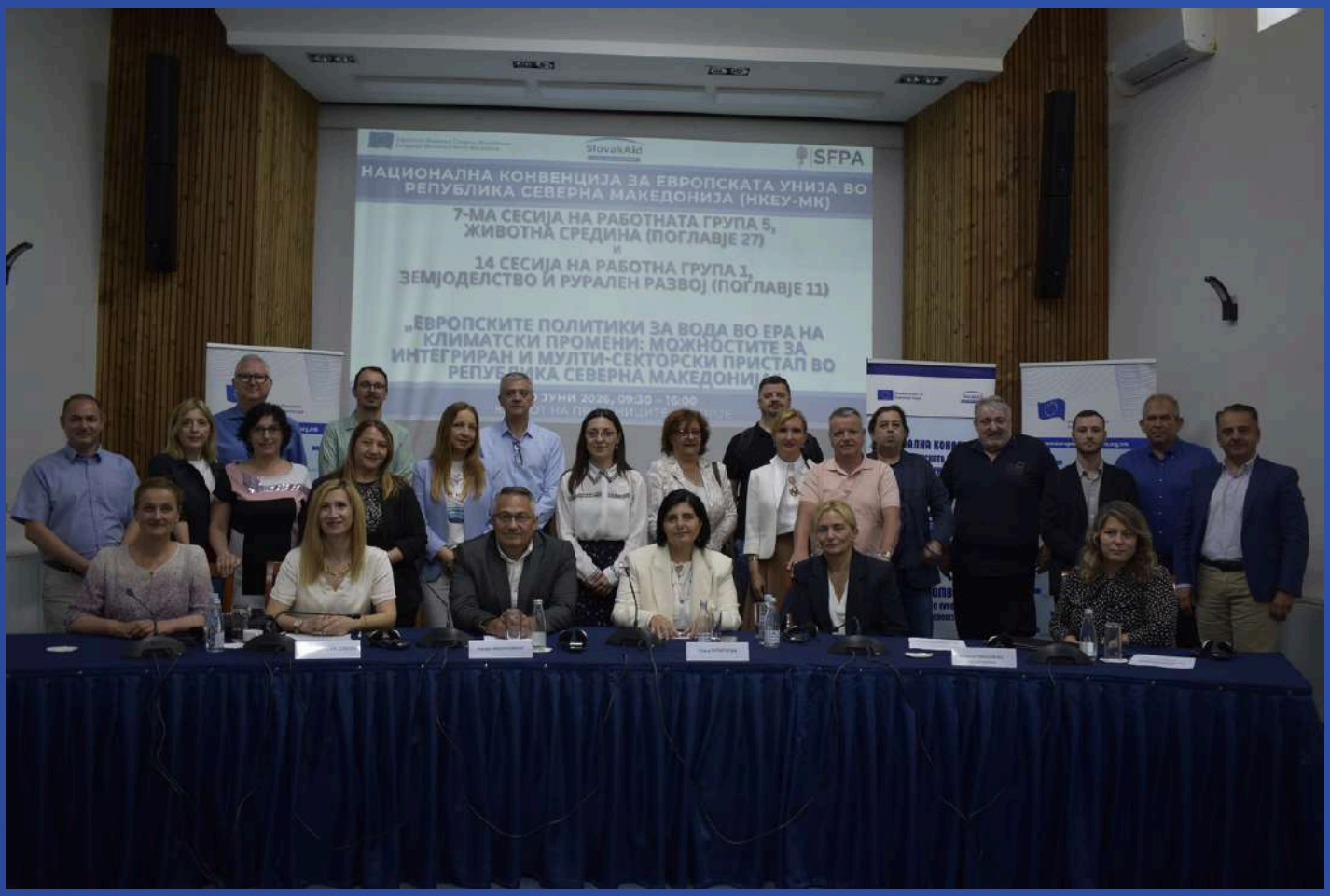
NATIONAL CONVENTION ON THE EUROPEAN UNION IN THE REPUBLIC OF NORTH MACEDONIA (NCEU-MK)

"EUROPEAN WATER POLICIES IN AN ERA OF CLIMATE CHANGE: OPPORTUNITIES FOR AN INTEGRATED AND MULTI-SECTORAL APPROACH IN THE REPUBLIC OF NORTH MACEDONIA"

7TH SESSION OF WORKING GROUP 5, ENVIRONMENT (CHAPTER 27) AND 14TH SESSION OF WORKING GROUP 1, AGRICULTURE AND RURAL DEVELOPMENT (CHAPTER 11)

Water is not merely a natural resource—it is the foundation upon which economies thrive, food systems depend, ecosystems flourish, and communities build their future. In the face of accelerating climate change, this fundamental truth has never been more urgent. The Republic of North Macedonia, like many nations across Europe and beyond, finds itself at a critical crossroads where the sustainable management of water resources must evolve from a sectoral concern into a strategic national priority.

On June 9, 2026, the National Convention on the European Union in the Republic of North Macedonia hosted a landmark joint session bringing together the 7th Session of Working Group 5 – Environment (Chapter 27) and the 14th Session of Working Group 1 – Agriculture and Rural Development (Chapter 11). Organized by the European Movement in the Republic of North Macedonia, this gathering was dedicated to the theme "European Water Policies in the Era of Climate Change: Opportunities for an Integrated and Multi-Sectoral Approach in the Republic of North Macedonia."



The event united institutional representatives, the academic community, civil society, agricultural organizations, and international partners in a shared commitment to addressing one of the most pressing challenges of our time. Ministers Cvetan Tripunovski of Agriculture, Forestry and Water Economy and Muamet Hodza of Environment and Physical Planning delivered powerful messages underscoring that water security is no longer an isolated environmental issue—it is a matter of economic competitiveness, public health, food security, and national resilience.

Through three thematic panels, participants explored European water security policies, climate adaptation strategies, integrated water management for agriculture and rural development, and the transformative potential of digitalization in water governance. The discussions reaffirmed that modern challenges cannot be addressed in isolation; they demand improved inter-institutional coordination, better data exchange, strengthened compliance with EU legislation, and long-term policies grounded in scie
ntific evidence.

The recommendations and conclusions from this historic session will be formally submitted to the competent institutions, contributing directly to the Republic of North Macedonia's preparation for European Union membership. As we move forward, let this newsletter serve as a testament to the collective resolve—that water, our most precious and shared resource, remains protected for generations to come.

Mileva GJUROVSKA

National Coordinator of the National Convention on the EU – Republic of North Macedonia (NKEU-MK), Professor at the Faculty of Philosophy, Skopje, President of the European Movement.

Professor Mileva Gjurovska opened the joint session, emphasizing that the topic of water management represents one of the most significant issues in the context of climate change.

She pointed out that this is the second time the two working groups have held a joint session, following the previous one dedicated to forests, assessing that precisely this approach enables better addressing of complex policies that require cross-sectoral coordination.

Gjurovska stated that water can no longer be treated as an inexhaustible resource, but rather as a strategic issue connected to the survival, development, and functioning of the entire ecosystem. According to her, climate change is no longer a future scenario, but a reality felt through drought periods, high temperatures, and re-duced availability of water resources.

Referring to the European context, she emphasized that the European Union is developing serious and long-term policies in the areas of environment and water management, but that alignment with these policies should not be understood exclusively as an obligation of the accession process.

On the contrary, according to her, it is an opportunity to build a functional and efficient system that will respond to domestic needs and challenges. In that direction, she particularly emphasized the importance of integrated water management and the use of digital tools and systems for better monitoring and resource management.

Gjurovska pointed out that one of the weak points in the institutional system remains insufficient interoperability between institutions, which creates discontinuity in policies and their implementation. She assessed that precisely such joint sessions represent a space for overcoming institutional barriers and establishing more effective dialogue.

Additionally, she emphasized that natural resource management cannot be the sole responsibility of institutions, but requires active participation of all social actors – the public sector, citizens, the academic community, and expert public.

In the concluding part of her address, Gjurovska also referred to the nine-year functioning of the National Convention on the European Union, highlighting its democratic and consultative model of work, as well as the continuous support from Slovakia in developing the dialogue platform.

Cvetan TRIPUNOVSKI

Minister of Agriculture, Forestry and Water Economy of the Republic of North Macedonia

The Minister of Agriculture, Forestry and Water Economy, Cvetan Tripunovski, emphasized the importance of cross-sectoral cooperation in the process of water resource management and dealing with the consequences of climate change, assessing that these issues are becoming increasingly important in the context of the country's European integration.

He emphasized that the joint session of the working groups represents a significant space for coordination between institutions and opening discussion on shared competencies and prerequisites for meeting European standards in the fields of agriculture and environment.

The Minister pointed out that ensuring competitive agricultural production and rational use of natural resources remain among the strategic priorities of the Ministry, with irrigation playing a central role in creating a resilient and productive agricultural sector.

In conditions of increasingly pronounced climate change and frequent drought periods, Tripunovski emphasized that investments in new irrigation systems and modernization of existing infrastructure are a necessary prerequisite for stable production, higher productivity, and long-term sustainability of rural areas.

He pointed out that the Ministry has already implemented several capital investments in the field of water management and irrigation, with some systems put into operation and others in the construction and reconstruction phase. As part of these activities, investments in dams, canal reconstruction, and construction of new irrigation systems in various regions across the country were mentioned.

Special emphasis was also placed on international support in the development of water infrastructure. The Minister referred to ongoing programs implemented with support from international financial institutions and European Union funds, including investments in small, economically and environmentally acceptable irrigation systems.

According to Tripunovski, the successful implementation of these policies does not depend exclusively on institutions, but on establishing a strong partnership between central government, local self-government, the scientific community, civil society, and the farmers themselves as direct users of water resources.

In the concluding part of his address, he expressed expectation that the discussions within the session will result in concrete recommendations and guidelines for further advancement of water management policies and development of sustainable agriculture.

Muamet HODZA

Minister of Environment and Physical Planning of the Republic of North Macedonia

Muamet Hodza emphasized the growing importance of water resource management in the context of climate change, assessing that this issue today takes a central place in European public policies as well.

He emphasized that modern European policies no longer treat water exclusively as an environmental topic, but as an issue with direct impact on security, economic development, public health, and the quality of life of citizens. In that context, according to him, alignment with European standards represents simultaneously an obligation and an opportunity for the state.

Hodza pointed out that the Government and the Ministry remain committed to implementing reforms that will enable more efficient, more responsible, and sustainable water resource management, as part of the broader European integration process.

Referring to current climate challenges, the Minister warned that the country is already facing consequences such as prolonged drought periods and frequent floods, which create serious pressure on natural resources, agriculture, economic activities, and local communities.

In that direction, he emphasized the need for an integrated approach that will connect environmental, agricultural, energy, and spatial planning policies, in order to ensure a more resilient and more coordinated management system.

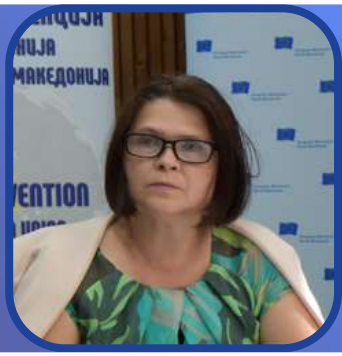
The Minister particularly emphasized the role of integrated water management through a basin approach, reliance on scientific knowledge, and active participation of all relevant stakeholders in the policy-making process.

Additionally, Hodza pointed out that digitalization of the water sector represents an important tool for better monitoring of conditions, greater transparency, and more efficient resource management. At the same time, he emphasized the need for investments in nature-based solutions such as protection of river ecosystems, afforestation, and preservation of natural functions of water areas.

In his closing remarks, the Minister stated that challenges related to water cannot be solved in isolation and that coordination between institutions, local self-government, the scientific community, the business sector, and civil society organizations will be key to creating long-term sustainable policies.

Iveta HRICOVA

Ambassador of the Slovak Republic to the Republic of North Macedonia



The Ambassador of the Republic of Slovakia, Iveta Hricova, welcomed the organization of the joint session of the working groups on environment and agriculture, assessing that precisely this approach reflects the reality of modern policies, where ecology and agriculture can no longer be treated as separate areas.

She confirmed Slovakia's continued support for the National Convention on the European Union in North Macedonia, emphasizing that this platform represents an important mechanism for democratic dialogue and an essential part of bilateral cooperation between the two countries.

Hricova emphasized that Slovak support is based on a clear commitment to the European perspective of North Macedonia and on readiness to share the experiences gained during their own accession process to the European Union.

According to her, Chapter 27 – Environment and Chapter 11 – Agriculture do not represent only a process of technical alignment with European legislation, but a broader social transformation aimed at strengthening economic resilience and ensuring long-term sustainability.

Referring to water management, the Ambassador emphasized that European policies in this area represent a significant shift and that water today is recognized as a resource of strategic importance, connected to national security and economic competitiveness.

She pointed out that alignment with the goals of the European Green Deal creates additional opportunities for access to European financing instruments and support for modernization of water infrastructure.

Hricova also emphasized the need for stronger coordination between institutions and sectors, pointing out that modern water management simultaneously implies legislative reforms, balancing the needs of agriculture with resource protection, as well as modernization of data and management systems.

At the same time, she expressed satisfaction that Slovak experts are actively contributing to the work of the session, emphasizing that Slovakia does not position itself as an observer, but as a partner ready to share practical experience and expertise.

In the concluding part of her address, the Ambassador stated that Slovakia will continue to be an active supporter of North Macedonia's European integration and expressed confidence that today's dialogue will contribute to formulating concrete recommendations for further progress of reforms.

"Chapters on environment and agriculture are not just technical alignment – they are a transformation of society and an investment in the common European future."

Filip FILIPOVSKI

Director of the Public Enterprise for Water Management (AD "Vodostopanstvo")

Filipovski emphasized that climate change today is most directly felt through water – a resource that simultaneously represents a prerequisite for development, food production, and energy stability, but also a source of increasing risks such as droughts, floods, and ecosystem degradation.

He emphasized that modern European policies position water as a strategic resource with significance comparable to energy and security, adding that for institutions working daily in the water management sector, these challenges have long ceased to be a theoretical topic, but a practical reality.

Filipovski pointed out that the traditional approach to water management was primarily focused on physical infrastructure such as dams, reservoirs, irrigation systems, drainage, and riverbed regulation – but that climate change is changing this logic and requires a much broader approach.

According to him, modern water management today implies managing risks as well – floods, droughts, water scarcity, degradation of natural ecosystems, and protection of the population and economic activities. In that direction, he emphasized the need for application of the European principle of integrated river basin management instead of isolated sectoral interventions.

Referring to the situation in the country, the Director pointed out that the effects of climate change are already visible through intense rainfall, local floods, prolonged drought periods, and reduced water supply security, further complicated by ageing infrastructure and limited financial resources.

Filipovski presented five strategic priorities for the future development of the sector. As the first priority, he singled out the construction of climate-resilient infrastructure through rehabilitation, revitalization, automation, and gradual digitalization of existing systems.

The second priority concerns the digitalization of the water sector through establishment of modern monitoring, a digital water register, and integrated databases. As the third priority, he cited integrated drought and flood management as part of a unified climate system.

Additionally, he emphasized the importance of nature-based solutions – afforestation, protection of floodplains, restoration of riverbeds, and preservation of wetland ecosystems – as a sustainable alternative and complement to classical infrastructure.

As the fifth pillar, the Director highlighted multi-sectoral coordination, emphasizing that water connects agriculture, energy, urban planning, environmental protection, and civil protection systems.

In his closing remarks, Filipovski stated that the role of the Water Management Company (AD "Vodostopanstvo") today goes beyond technical maintenance of infrastructure and represents an active contribution to creating a resilient system that will be able to respond to climate challenges and European policies.

"In the past, water was considered a natural resource that was easily available – today it becomes a strategic resource that requires active management."

Sonja LEPITKOVA

Professor at the Faculty of Natural and Technical Sciences, University "Goce Delchev" Shtip

Professor Sonja Lepitkova emphasized the need for water management to be treated as a strategic national issue that transcends institutional and sectoral boundaries, emphasizing that water policies have direct impact on agriculture, the environment, health, the economy, and energy.

Referring to her experience in processes related to the implementation of the Water Law, she pointed out that the approach to water resource management over the years has significantly changed – from sectoral models to an integrated approach based on river basin management, as prescribed by the European Water Framework Directive.

Lepitkova emphasized that European legislation should not be understood as an administrative obligation related to accession to the European Union, but as a framework based on scientific research, expertise, and long-term practice, which each country should adapt to its own context and specifics.

According to her, one of the biggest challenges in the future development of the sector is insufficient investment in knowledge and human capacities. She warned that climate change and future water challenges cannot be addressed without development of professional staff and strengthening of academic programs related to water resources.

The Professor emphasized that digitalization and modern water management cannot function without continuous monitoring, systematic data collection, and their scientific interpretation. Only through quality and relevant data, according to her, can long-term and strategic policies be created.

As an example of the importance of the scientific approach, she cited specific research related to water quality and the presence of certain elements in lake systems, emphasizing that decisions must be made based on analyses and scientific evidence, not on perceptions or public assumptions.

Lepitkova further warned that climate change will require faster and more precise interventions in water resource management, including protection of wetlands, preservation of small springs, fire management, and planning of water bodies as part of resilience systems.

She particularly emphasized the importance of managing the quality of surface and groundwater, stating that investments in treatment systems and implementation of river basin management plans are already showing results and represent a foundation for future development.

In the concluding part of her address, the Professor stated that the integrated approach does not imply domination of one sector over others, but joint, scientifically based decision-making in which nature protection, food production, energy, and economic development are treated as mutually connected goals.

"The integrated approach does not mean management from one place – but joint decision-making of multiple sectors, strategically based on knowledge."

Ordan CHUKALIEV

Professor at the Faculty of Agricultural Sciences and Food, University "Ss. Cyril and Methodius" – Skopje

He emphasized that this is not a new concept, but a process that has been developing for more than six decades and which implies coordinated action of all institutions and affected sectors.

In his presentation, Chukaliev set the perspective of agriculture as the largest water consumer and the sector that most directly feels the limitations of the existing system. According to him, integrated management should not remain an administrative concept, but must provide accessible information, transparent planning, and real communication with farmers. He pointed out that often institutions offer solutions that do not correspond to the real needs of users on the ground.

Special emphasis was placed on the transformation of agriculture towards modern irrigation technologies, such as drip systems, automation, and digital management. But he warned that modern practices open new challen-ges, as a large number of farmers are turning to individu-al water sources, especially wells, which often operate outside a fully regulated framework and can pose a risk to groundwater.

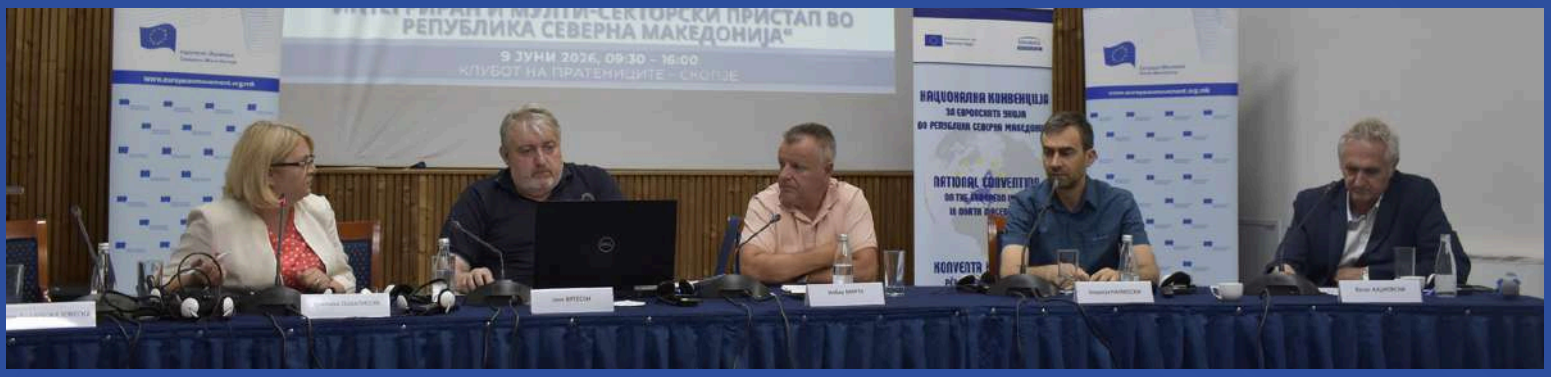
Referring to consumption data, Chukaliev emphasized that agriculture in North Macedonia uses the largest part of available water resources and that the country has high consumption per unit of arable land compared to some neighboring countries. In that direction, he pointed out that it is necessary to analyze not only water quantities, but also the efficiency of distribution and irrigation systems.

The Professor warned that modernization alone is not sufficient if it is not accompanied by clear rules, regular monitoring, and a decision-making system based on relevant data. According to him, future policies should establish a balance between technological progress, water resource protection, and long-term sustainability of agricultural production.

In his closing remarks, Chukaliev emphasized the fundamental role of water as a prerequisite for quality of life, health, and development. He emphasized that water should not be treated as an unlimited resource, but as a strategic national wealth that requires responsible management and respect for established standards.

"Water is what enables our comfort and development. That is why the management process must establish standards – and even more importantly, we must truly follow those standards."

Professor Chukaliev opened his discussion with a reference to the concept of integrated water management, defining it as a long-term process with the goal of coordinated management of water and land resources, with simultaneous achievement of economic and social benefits without disrupting ecosystems.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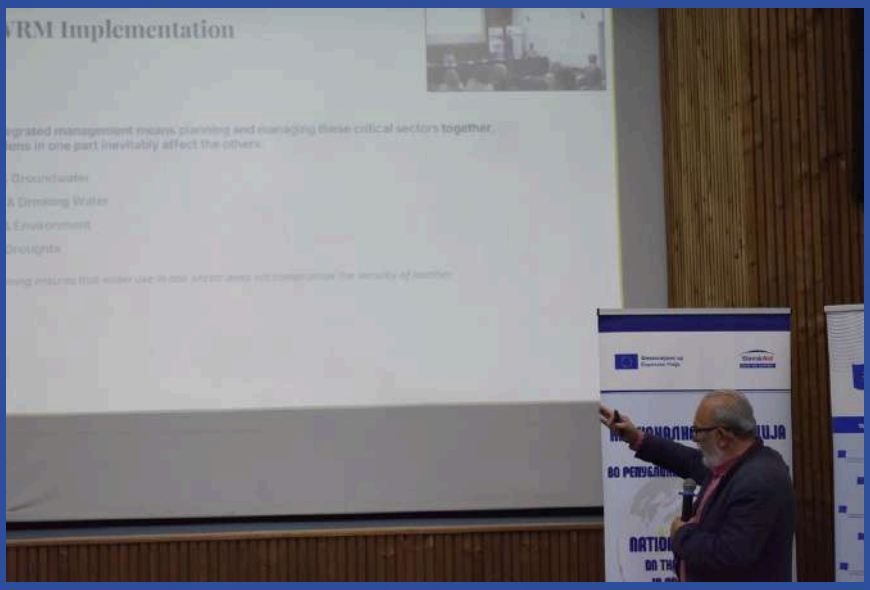
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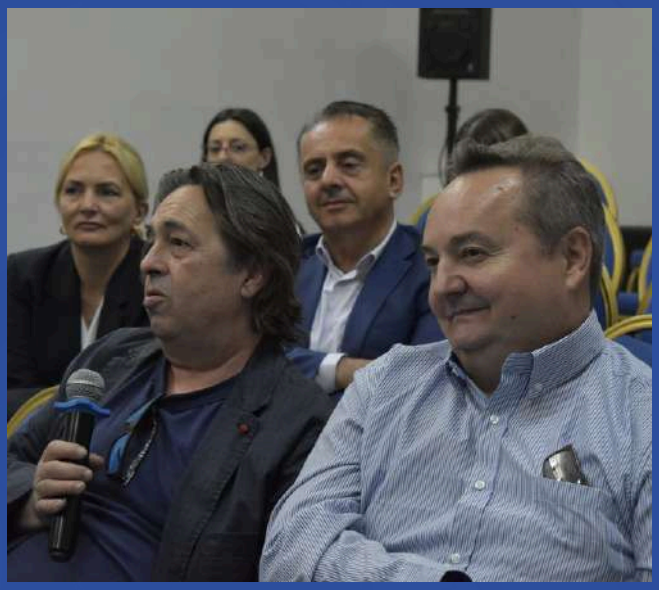

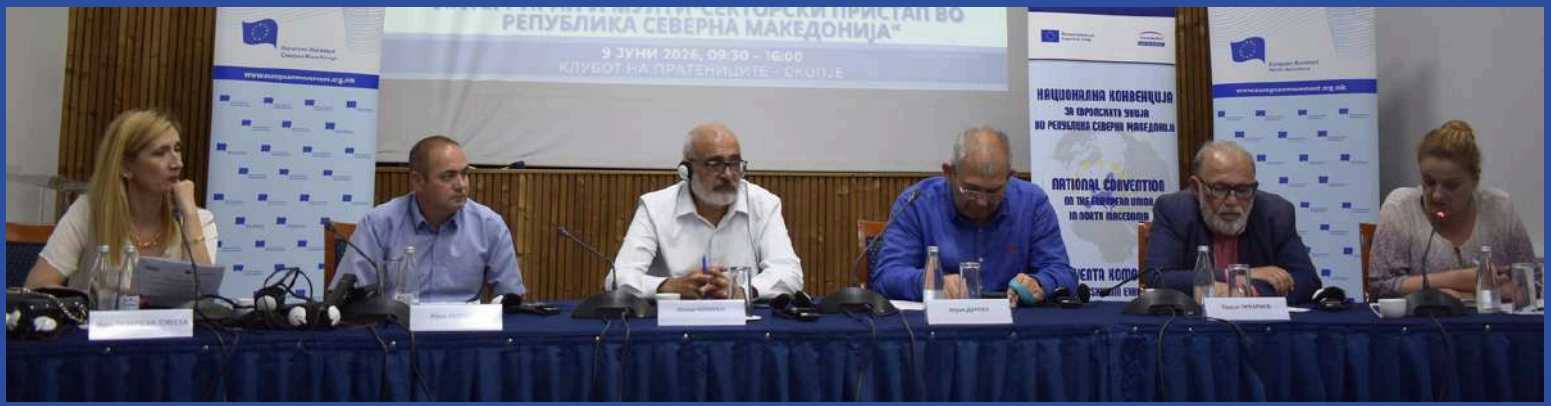
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Bojan DURNEV

Head of Sector at the Water Management Directorate, Ministry of Agriculture, Forestry and Water Economy

Durnev emphasized that in the era of climate change, water must be treated as a strictly limited resource in time and space. The main obstacle to an integrated approach is institutional fragmentation. While the Ministry of Agriculture, Forestry and Water Economy (MAFWE) is responsible only for irrigation and drainage from the moment of water abstraction, the Ministry of Environment and Physical Planning (MEPP) issues permits for dams and wells, which creates a serious rift in coordination with the Water Management Company (AD Vodostopanstvo), the Ministry of Energy, and the three independent public enterprises (Lisiche, Strezevo, and Zletovica).

There is also a huge anomaly between official state projections and the reality on the ground. While on paper the irrigation capacity amounts to 160,000 hectares (with projected consumption of 900 million m³ due to outdated open canals), in practice only between 19,500 and 25,000 hectares are actually irrigated. Additionally, water from private wells remains completely unmonitored because data on them does not reach the MAFWE database.

"As a country, we rank 10th in the world in water consumption per capita according to FAO and the World Bank. With consumption of 1,200 cubic meters per person annually, we face a striking paradox: on the area we actually irrigate, we consume twice as much water as needed, with losses in open systems ranging from 30% to as much as 59%."

These enormous losses are the result of evaporation, illegal theft, and the lack of compensation basins. The financial sustainability of the sector is further threatened because the two-tariff model (fixed and variable part) is applied only in Tikvesh. Municipalities, although legally obligated to pay for cleaning riverbeds and flood protection, in practice do not contribute, so the entire financial burden falls on farmers and the state's capital budget.

To address these problems, MAFWE is already replacing open canals with pipelines and building multi-purpose systems such as Konsko and Rechani. At the same time, construction of an integrated digital system with the Cadastre Agency is underway, which through precise parcel mapping will solve long-standing billing problems caused by outdated property-legal relations.

As an innovative solution in cooperation with the Spanish company "Globaltek," a feasibility study for floating photovoltaics on the Palurci dam, connected to wells in Gjavato, has been prepared. This investment of 10.5 million euros would amortize the enormous electricity bills that reach up to 10 million euros annually.

In conclusion, a sharp appeal was made for urgent adoption of the Spatial Plan, in order to stop the aggressive expansion of photovoltaics on fertile land, which is already decimating domestic production and making us dependent on imports.

Oscar CORONEL

Team Leader of the Project "Strengthening Self-Organization of Farmers in Creating and Managing Small Irrigation Systems"

Coronel presented the project funded by the EU through IPA funds, which is entering a key phase of training farmers for the use and management of already constructed infrastructure on several small irrigation systems. The basic goal of this initiative is long-term modernization of Macedonian agriculture through strengthening the resilience and competitiveness of the sector, especially in areas where low-productivity, subsistence agriculture based on crops dependent exclusively on rainfall currently dominates.

The project targets seven specific locations, each with different levels of functionality. The systems in Konopnica (42 hectares), Slavishko Pole (200 ha), Pishica (30 ha), and Chaushica (85 ha) are fully constructed, although in Konopnica they are still waiting for a water use permit from MEPP. The system in Tearce (300 ha) is before commissioning, while for the locations in Sopot (290 ha) and Novaci (320 ha), a tender procedure for construction is underway. All systems are modernly designed – they use closed pipelines intended for drip systems or sprinklers, and since they operate on natural gravity without pumps, they are immune to rising electricity costs.

A key finding of the project team is the serious institutional vacuum and legal uncertainty regarding the management of these systems. After the abolition of the Water Communities Law in 2015, the state moved towards a centralized model under AD Vodostopanstvo, but subsequent legal changes from 2016 and the later abolition of the Agricultural Cooperatives Law in 2023 left open the question of how to legally delegate management to the users themselves.

"Macedonia faces an acute lack of inter-institutional communication and cooperation in water management, which has also been noted in UN reports (UNEP). Currently, the irrigated area in the new small systems is at most 15% of the designed capacity, mainly due to the alarming trend of migration – a large part of the farmers contacted a decade ago have now already left the country."

An additional burden on the sector's sustainability is climate change and the imbalance between precipitation and evapotranspiration. Statistics show that the country receives rainfall in periods when crops do not need water, while during the summer vegetation season (April–September) drought prevails, making efficient irrigation the only salvation for yields. To increase incomes, the project envisions mentoring for transition from traditional grain production to higher-value market crops.

To overcome weaknesses such as aging population, reluctance for collective action, and weak market orientation, project activities are divided into six development pillars. Through four training programs, farmers are educated on climate-smart agriculture, efficient management of water losses, and business plan development. The last two activities are directly aimed at creating draft legal amendments to the Government, in order to establish clear legal models for participatory irrigation through cooperatives or farmer associations.

Ivan VANGELOV

Cooperative "Agro-Bogdanci", Member of the Management Board of the National Farmers' Federation

Vangelov presented the Agricultural Cooperative "Agro-Bogdanci" which took over management of part of the "Paljurci" Hydrosystem in 2018, following legal changes that allowed cooperatives to fill the institutional vacuum after the abolition of water communities. From the initial 10 founders, the cooperative today serves over 300 users in the southernmost and hottest region of the country. This decentralized model proved crucial because early greenhouse production in Bogdanci starts as early as December, which is in direct conflict with centralized open systems that release water only in May.

The Hydrosystem, built in 1979, covers an area of 1,100 hectares across Bogdanci, Stojakovo, and Gjavato, but its current utilization varies between 12% and 15%. The low percentage is not due to reduced cultivation, but to the fact that many farmers use their own, uncontrolled wells on state land, causing serious damage to biodiversity. The system is primarily supplied from the "Paljurci" reservoir (capacity of 2.5 million m³), which after five full years is completely full thanks to the recent commissioning of the Gavrovska River intake.

"In intensive greenhouse production, which lasts 12 months a year, water accounts for an average of 18% of total costs. However, for industrial second crops such as gherkins or black tomatoes, which are planted in the hottest months with enormous evapotranspiration, the irrigation cost breaks through the ceiling and amounts to up to 70% of the final production price."

An additional financial burden is the ongoing maintenance of the closed pipeline from 1981, where as much as 30% of collected funds are immediately spent on rehabilitation of outdated asbestos-cement pipes and enormously expensive metal fittings. The cooperative is investing in modernization through procurement of "smart" electrofusion welding devices and installation of pressure and flow measurement instruments at key measuring points, thus putting an end to decades of managing the system "blindly."

Climate change is already delivering real damage: in the series of extreme drought years (2017–2025), the reservoir fell below the biological minimum, causing fish kills due to critical water warming. The evapotranspiration problem in this region is radical — measured evaporation ranges from 30 to 50 liters per square meter, and with strong winds, over 260 m³ of water evaporates daily from the reservoir. In such extreme conditions, when viticulture in a dry year requires up to 12,000 m³ of water per hectare, the only salvation for the region is the expensive well area "Gjavato," which consumes electricity up to 10,000 euros daily.

The cooperative realistically charges only a maintenance price on the ground, because farmers cannot pay the true economic price of water. Therefore, there is an urgent need for installation of renewable energy sources (photovoltaics and wind turbines) at pumping stations to ensure cheap and competitive water. As a sustainable conclusion, the cooperative regularly sends data to MAFWE for early crisis forecasting and appeals for state compensation for crops with high export foreign exchange inflow, emphasizing that decentralization and raising environmental awareness against pesticide pollution are the only future of the Macedonian agricultural sector.

Discussion after the first panel

Strategic Challenges and Reforms in the Water Sector

1. Institutional Complexity and Policy Coordination
Divided competencies: The water sector is highly fragmented. Most competencies are divided between the Ministry of Environment and Physical Planning and the Ministry of Agriculture, Forestry and Water Economy. There is a serious lack of cohesive coordination for integrated water management.

Urban planning failures: The lack of coordination between water management authorities and urban planners results in approval of buildings in inappropriate locations (river bends, floodplains, narrowing of riverbeds as in Tetovo and Stajkovci), causing artificial blockages and catastrophic floods in basements and urban areas.

2. Human Resources Crisis and "Brain Drain"
Academic vacuum: Enrollment of students in technical and natural sciences (hydrotechnics, hydrogeology, morphological typification) is drastically falling year after year. It often happens that there are only two or even no students per program, which poses a risk to the sector's foundation.

Loss of expertise: The state is losing institutional memory with the retirement of older experts. Instead of domestic multidisciplinary teams that used to find solutions together, institutions now immediately rely on engaging foreign experts.

Failure to retain staff: Examples like the Bregalnica river basin (funded by Switzerland) show...

3. Financial Sustainability and "Clustering" Reform
Threat of bankruptcy for small enterprises: Construction of modern treatment plants through foreign grants creates a new problem for small utility enterprises, which then cannot cover the enormous costs of electricity and maintenance.

Inappropriate revenue allocation: Due to overstaffing with unsuitable personnel and a populist approach to water pricing, as much as 80% of monthly enterprise revenues go to salary payments, and only 20% remain for electricity and maintenance of outdated systems.

Clustering process: Work is currently underway on a reform to reduce the current 70+ fragmented (urban and rural) enterprises to only 7 or 8 regional clusters at the national level, in order to achieve economies of scale, pooling of knowledge, and easier access to EU funds. (A national workshop has been announced for June 18-19).

4. Climate Extremes and Risk Exposure
High global ranking: According to a document from the German insurance company Allianz, Macedonia is ranked 17th in the world in exposure to water-related risks (droughts, floods, pollution) and is located in the European "red zone."

Hydrological shocks: The country faces extreme oscillations – from years with pronounced aridity (below 250 mm annual rainfall in the Radovish region) to extreme 24-hour flood rains (over 200 mm in Bogdanci).

5. Technical Specificities and Historical Context
Wrong focus in investments: In the last 6-7 years, the focus has been placed exclusively on wastewater treatment, while neglecting the fact that 70% of water supply systems in the country have exceeded their lifecycle. Additionally, accepting different technologies from different donors creates chaos in their subsequent technical operation.

"Polluter Pays" principle: The state must introduce mechanisms to penalize those municipalities that consciously do not take steps to build drainage and treatment systems, in order to avoid financial obligations.

Ecosystem quality vs. drinking water: A strict distinction must be made between the "ecological status of the water ecosystem" (biological parameters: algae, macrozoobenthos, flora and fauna where physico-chemical parameters are only supporting) and "drinking/consumption water," which is governed by completely different, strict health and sanitary rules.

Establishment of a sectoral water information system: Data from field monitoring must be integrated into a unified digital system that unites databases of issued permits, environmental inputs, and analytical tools for assessing diffuse pollution.

Diversification of financing: Implementation of measures requires serious financial resources. Since national budgets are often limited, the state must build its capacities in time for full and efficient absorption of dedicated EU funds.

Ivana BAJKOVIČEVA

Head of Department, River Basin Management Department, Water Planning Division, Water Research Institute, Ministry of Environment of the Slovak Republic

Bajkovicheva emphasized that the Slovak Republic, as an EU member since 2004, went through a complex process of transposition and implementation of the Water Framework Directive (WFD) through its national Water Law. As an active participant in the EU Common Implementation Strategy (CIS) since its inception, the country continuously aligns its policy with new European directives (on floods, groundwater, nitrates, urban wastewater, etc.), relying on over 67 technical guidelines developed at Union level.

The instrument through which Slovakia operationally manages its water resources is the six-year River Basin Management Plans. From the first cycle in 2009, through the second in 2015, to the third plans adopted in 2022 (covering the period until 2027), the strategic focus has evolved. In the last cycle, in addition to traditional environmental goals, water resilience, drought, water scarcity, and climate change adaptation emerged as key issues, currently subject to structured dialogue with the European Commission.

"Achieving a balance between environmental goals and economic use of waters is a sovereign challenge for every state. The Framework Directive primarily protects nature, but true sustainability depends on the ability of national institutions to build a coherent framework where water protection will not jeopardize its economic affordability."

Based on two decades of institutional experience in the EU, the managerial and expert team from Slovakia delivers five key recommendations relevant to the Macedonian European integration process:

Defining responsibilities and institutional capacity: The preparation of strategic plans in Slovakia is not centralized in one office, but is divided through clear horizontal cooperation between the Ministry, the Water Research Institute, the Hydrometeorological Institute, the Geological Institute, and state water enterprises.

Systematic monitoring programs: Analysis of pressures from human activities on surface and groundwater is impossible without continuous, long-term collection of high-quality field data.

Establishment of a sectoral water information system: Data from field monitoring must be integrated into a unified digital system.

Diversification of financing: Implementation of measures requires serious financial resources. Since national budgets are often limited, the state must build its capacities in time for full and efficient absorption of dedicated EU funds.

Integrated approach with focus on resilience (Water Resilience): Implementation must not be rigid and backward-looking. New policies must reflect the latest European Water Resilience Strategy, placing special emphasis on protecting drinking water source areas under climate shock conditions.

Andreja NAUMOSKI

Professor at the Faculty of Information Sciences and Computer Engineering (FINKI), University "Ss. Cyril and Methodius" – Skopje

Professor Naumoski noted that the application of information technologies in water resource management is currently undergoing a radical transformation thanks to the trend of open real-time data. Experiences from international projects show that public sharing of measurement data from rivers and lakes enables scientific institutions and stakeholders to develop sophisticated predictive models for early warning. This concept is based on so-called high-frequency data, which modern sensor technology generates at enormous speed.

The key focus of the current international project "Urban Flood," where FINKI leads the decision-support systems component, is placed on integration and processing of heterogeneous data from ten European partners. The biggest initial challenge is the institutional and technical vacuum in information collection. Many partner institutions possess historical data dating back to the 1950s stored in paper form, which is why the first and most important step is their digitalization, unification, and strict standardization according to European protocols.

"Data is the raw material of modern water management. Their true power is released only when, through open API access, we integrate historical archives with real-time measurements, visualizing advanced hydrological layers directly in Geographic Information Systems (GIS)."

The project is currently piloting solutions at nine specific urban locations across Europe (such as Rijeka in Croatia and Macerata in Italy). Through implementation of GeoServer platforms, users and local authorities are provided with a detailed mapped overview of risk zones. The system combines meteorological forecasts from the advanced WRF model with hydrological modeling through HEC-RAS software, which is an international standard for flood simulation.

One of the most significant practical inputs of this system is its ability to generate precise risk maps depending on water column height. In this way, decision-makers can visually analyze scenarios and consequences of floods with return periods of 50, 100, or 200 years. In ad-dition to technical modeling, the project also analyzes European legislation to create a unified knowledge base on legal regulations and best practices in crisis manage-ment.

As a final conclusion, digital monitoring emerges as a necessity in the era of climate change where, in addition to droughts, so-called flash floods are becoming increasingly frequent. These extreme phenomena are characterized by high unpredictability in urban environments, and integrated ICT systems and standardized data are the only tools that can provide crucial additional information to institutions responsible for civil protection and water management.

Ilber MIRTA

Head of Water Sector, Ministry of Environment and Physical Planning of the Republic of North Macedonia

Mirta pointed out that digitalization of the water sector in North Macedonia, defined through introduction of electronic systems, digital registers, automatic monitoring, and inter-institutional data exchange, represents a key step towards sustainable resource management and alignment with the European Water Framework Directive. Although the Water Law established the legal basis for an integrated system and introduced the so-called Water Register, the state is currently in the initial phase of digital transformation, where isolated pilot projects dominate instead of a cohesive national system.

The key systemic weakness in water resource management lies in the acute fragmentation of data. Information and historical archives are scattered across multiple ministries, national institutions (such as UHMR), local self-governments, and higher education institutions, without a functional platform for their unification.

An additional challenge is the limited capacity for automatic real-time monitoring, which is why MEPP relies on foreign project assistance (IPA, EU cross-border programs, and Swedish support) for procurement of modern measurement equipment for the quantity and quality of groundwater and surface waters.

"Digitalization is not a luxury, but a necessity that can mitigate the acute shortage of professional staff. We face an absurd situation where the Water Sector has barely 20 employees, who must simultaneously cover the entire territory of the state – from policy creation, through transposition of European legislation, all the way to daily issuance of water use and wastewater discharge permits."

Due to disincentive conditions and low salaries in the public sector, institutions remain unattractive for young professional profiles. In such frameworks, MEPP is attempting to introduce partial advanced solutions through international mechanisms. Among the notable ongoing initiatives are:

Water Information System for the Drim Basin: A complex digital platform has already been established for the transboundary basin that Macedonia shares with Greece, Albania, Kosovo, and Montenegro, but its long-term functionality depends on regular "feeding" with data.

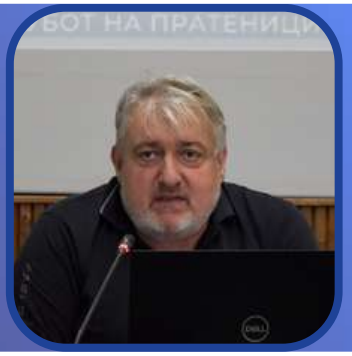
Cross-border application with Greece (Interreg): A project aimed at procurement of digital equipment for monitoring resources of the Vardar River and Lake Dojran.

European Investment Bank (EIB) Loan: A credit line of 50 million euros intended for municipalities for modernization of water supply systems and wastewater treatment, which includes implementation of digital control tools.

As a final conclusion, although technology and digital registers offer transparency, faster administration, and better preparedness for climate shocks, their successful implementation in the Macedonian context is directly conditional on overcoming institutional isolation and urgent staffing reinforcement of the environmental sector.

Jane VRTESKI

Senior Consultant, Balkan Development Solutions



The digital transformation of the water sector must not be reduced to mere computerization of administrative procedures.

It requires essential structural reforms based on advanced technologies, such as "digital twins," machine learning algorithms, and artificial intelligence. Water infrastructure by its nature represents critical national infrastructure, which is why crisis management in this sphere requires urgent integration of all institutions. Currently, as many as eight ministries and state agencies have competencies over waters, while the Ministry of Environment (MEPP), although the formal bearer, has no real political capacity to lead the entire sector.

The key paradox in the country lies in the fact that developed digital highways already exist – such as the Government's interoperability platform and the National Geoportal of the Cadastre

but their utilization is on a voluntary basis and worryingly low. The sector lacks a unified, standardized register of spatial data. The institutions that generate the data refuse to share them for free on the state "highway," thus creating enormous digital gaps between the public, private, and scientific sectors.

"We face an absurd bureaucratic labyrinth. Due to rigid government decisions and tariff schedules, state institutions and EU projects are forced to charge each other for orthophotos and historical hydrological data. While UHMR and the Ministry of Agriculture keep the data under lock and key demanding petty cash, the scientific community, doctoral candidates, and municipalities are blocked, and the data loses value over time."

This lack of coordination directly threatens capital investment planning. According to the National Water Study, North Macedonia needs approximately 2.6 billion euros for modernization of water services by 2040 (corrected with current inflation), and if irrigation systems are added, the sum exceeds 5 billion euros. That implies that the state must invest 100 million euros annually to meet European directives on climate resilience.

Against these needs, there is evident serious inability to absorb existing funds. The state currently has 50 million euros available from the European Investment Bank (EIB), but there is a real risk they will remain unused, as was the case with the previous EBRD fund, where after 10 years and several government changes, as much as 8 million euros remained unspent.

As an urgent way out of this situation, four key conclusions emerge for policymakers:

• Urgent revision of government decisions: Ensuring free and free-of-charge access to all orthophotos, digital models, and historical data for municipalities, public enterprises, and scientific institutions.

• Innovative reallocation of funds: Setting aside approximately 10 million euros from existing credit lines and donations for targeted cleaning, standardization, and digitalization of databases.

• Focus on the local level: Data exploitation and changes occur in municipalities and public utility enterprises, which are currently trapped by the outdated Law on Communal Activities, unchanged for 20 full years.

• Flexibility in implementation: Laws must cease to be used as an excuse for status quo conditions. Their success is measured by functionality on the ground, and practice shows that ad-hoc decision-making without raw data leads to failed million-euro investments.

Conclusion from the Discussion

1. Infrastructure, Investments, and "Grey Zone"

Low capacity utilization: Despite large investments over the past 20 years, the state remains stuck for decades at only 19,000 to 20,000 hectares of actually irrigated area, out of a total possible 160,000 hectares.

Legal grey zone: While small enterprises and local initiatives receive support, the development and management of these systems often enter a "grey zone" from the aspect of legal regulations.

Cadastral registration of infrastructure: A painstaking, long-term, and expensive process of registering all irrigation infrastructure in the real estate cadastre is underway, as well as its overlapping with agricultural land. This is the first such undertaking since the beginning of system construction in the 1950s.

2. The Problem of Data and Digitalization

Inaccessibility of information: Water data collection is extremely difficult because a large part of key information is unavailable in state institutions.

Reliance on military and foreign archives: For the needs of digitalization, vectorization, and preparation of the Water Management Plan, expert teams were forced to seek maps and hydrological data from federal archives (from former Yugoslavia), as well as civilian maps from the military and NATO.

3. Institutional Competencies and Delineation

Permit issuance: It was clearly clarified that the Ministry of Environment and Physical Planning is the sole competent institution for issuing permits and licenses for water use.

Role of municipalities: Local self-government (municipalities) has no competence over water permits, but their role is exclusively in issuing construction approvals and use permits for infrastructure facilities after their construction.

4. Staff Crisis and Knowledge Transfer

Shortage of engineers: The sector faces an acute shortage of professional staff. The interest of younger generations in engaging in technical sciences related to water is minimal, which threatens the long-term operation of systems.

International experiences: The example of Slovakia was presented (through expert Ivana Bajkovicheva) for successful river basin management and water planning, whose recommendations will be directly integrated into the final report of the National Convention on the EU.

5. Key Joint Recommendations from the Panel

Based on the presentations of experts (Prof. Urdan Chukaliev, Bojan Durnev, Oscar Koronel, Ivan Vangelov), the following conclusions were defined:

Integrated information system: Urgent functioning of a centralized information system with accurate data, which is a prerequisite for creating sustainable strategies in the agricultural sector.

Economic association of farmers: Support for cooperatives and organized forms of self-organization of farmers (supported by EU projects) for joint management and administration of small irrigation systems.

Central body (Water Agency): Overcoming institutional fragmentation by unifying the capacities of the Ministry of Environment, the Ministry of Agriculture, AD Vodostopanstvo, and other bodies into a single, efficient managerial body (Agency).