National Hydrometeorological Service - Skopje

SYSTEMATIC OBSERVATIONS

Skopje, August 2021

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HISTORICAL OVERVIEW

The Hydrometeorological Service in the Republic of North Macedonia has a long historical development. The first organized meteorological-climatic measurements and observations on the territory of the Republic of North Macedonia were established in 1923, although individual measurements and observations exist in the periods from 1891 to 1898 in Skopje and from 1986 to 1912 in Bitola. In 1947 a decision was made to organize the Hydrometeorological Service in the Republic of Macedonia and a network of main, ordinary and precipitation stations was established.

When the country became a sovereign and independent state, in 1993, (then the Republic of Macedonia) it became an equal member of the World Meteorological Organization (WMO), which is a specialized agency of the United Nations (UN). In 2011 the Republic of Macedonia became an associate member of the European Centre for Medium-Range Weather Forecasts (ECMWF), as well as of the European Meteorological Services Network (EUMETNET). Opportunities and perspectives are opened for further development in all spheres of meteorology, hydrology and environment, activities arising from its role of National Hydrometeorological Service (NHMS), all in coordination and compliance with WMO programs and strategies. From 2019, all international memberships, communications and obligations are denominated in the Republic of North Macedonia.

STATUS AND COMPETENCIES

The National Hydrometeorological Service (NHMS) performs its competencies in accordance with the Law on Hydrometeorological Activity (“Official Gazette of RM” No. 103/08); the Law on Waters (Official Gazette of the Republic of Macedonia No. 87/08, 6/09, 161/09, 83/10, 51/11 and 44/12); and the Law on Environment ("Official Gazette of the Republic of Macedonia" No. 53/05, 81/05, 24/07, 159/08, 83/09, 48/10, 124/10, 51/11 and 123/12).

NHMS is a body within the Ministry of Agriculture, Forestry and Water Economy with the rights of an independent body. Within the scope of its operations, the NHMS is obliged to implement numerous bylaws and other legal acts in the field of hydrometeorological activity. The Law on Hydrometeorological Activity (“Official Gazette of the Republic of Macedonia” No. 103/08 and No. 115/08, 53/11 I 51/15) gives the NHMS, as a state body, public authorizations to perform the functions and tasks in accordance with the law and bylaws, technical regulations and standards in force in the Republic of North Macedonia, the European Union and international standards.

When performing the activities within its competence, NHMS should apply regulations and mandatory standards regulating the manner and procedures for performing hydrometeorological works that should be in accordance with the standards, i.e. models

defined in the legislation of the European Union. These include institutions, or entities and other bodies whose work is regulated by public law, as well as other organizations of global character that perform this activity. One such organization is the World Meteorological Organization (WMO).

The Permanent Representative, who according to the current practice performs the function of director of the NHMS, also represents the Republic of North Macedonia in the WMO. Also, in accordance with the legislation of the European Union, the representatives of the NHMS are involved in the work of the bodies and commissions of the WMO and the European Associations. NHMS coordinates the implementation of international obligations of the Republic of North Macedonia related to meteorology, hydrology, water quality and water bodies and participates in the implementation of international projects and programs encompassing hydrometeorological activities. The technical regulations and standards of the European Union are mandatory during the performance of the functions within the competence of the NHMS, as it must provide exchange of hydrometeorological data and products.

FUNCTIONS AND COMPETENCES

To ensure efficient weather and climate services as well as sustainable meteorological and hydrological monitoring and infrastructure, the NHMS must be supported by much stronger logistics from the Government of the Republic North Macedonia and other key stakeholders. The value and quality of services to the Government, institutions and citizens depends on real-time monitoring and modeling of atmospheric processes that form the basis of all weather, climate and water forecasts. NHMS, as the only service with such an activity, performs numerous tasks of different nature.

NHMS is a professional-technical organization, which scientifically performs the following activities needed by state bodies, public services, economic and scientific organizations, citizens, international communities and other users:

- meteorological and hydrological monitoring of parameters and phenomena;
- monitoring of surface water and water bodies;
- analysis and forecast of weather and watercourses;
- warning about meteorological and hydrological disasters and excessive environmental pollution;
- receiving, processing and archiving data related to its scope of work;
- International exchange of data and products related to its scope of work.

ORGANIZATION AND STAFFING

According to the current organizational structure, the NHMS is constituted by 6 main sectors, 23 sections. The body is headed by a Director, who also performs the function of Permanent Representative of the Republic of North Macedonia to the WMO. The total number of staff in

the NHMS is 175, of whom 110 are employed in Skopje, while the remaining 65 are deployed in the network of meteorological stations and radar centers in spilled units across the country. In terms of educational profile, approximately 34% of employees have higher education, while 66% have secondary or lower education. About 11% of employees with higher education are meteorologists, only about 2% are hydrologists and also about 2% belong to the IT staff, which is actually the weakest point of the service.

ANALYSIS OF THE CURRENT SITUATION

NHMS is a complex body within the Ministry of Agriculture, Forestry and Water Economy, with the capacity of a legal entity. It is a professional-technical service with complex competencies and functions, and performs program tasks in the field of hydrometeorology as determined by law. Due to the restrictive economic policy, the NHMS on a daily basis faces a number of problems in its operation.

The NHMS is making great efforts to improve the situation by renovating and repairing the meteorological stations and radar centers in the country, the infrastructure and its vehicle fleet, as well as by renewing measuring instruments and information equipment.

The number of employees is not sufficient for a large number of essential needs imposed by increased responsibilities and technical and technological progress. There are problems with the maintenance of meteorological and hydrological traditional and automatic stations, insufficient funds for part-time observers, alarming educational profile of employees in professional sectors, lack of new professional technical staff from the hydrometeorological profession in the Republic of North Macedonia. All these cause major negative effects on the operation of the service, the performance of basic tasks and obligations arising from the Law, as well as on the implementation of the planned operational, program and development activities.

COMPLETED AND ONGOING PROGRAMS AND PROJECTS

In the past few years, NHMS has participated in the implementation of several projects, and still participates in several ongoing projects / programs.

The project "Increased resilience of the agricultural sector by promoting smart climate practices in agriculture" was realized with funds from the FAO program. Within the project, three automatic agrometeorological stations have been installed in Kochani, Gradsko and Strumica. A website www.agrometeo.mk was developed and other IT equipment was obtained.

The following projects have been implemented in cooperation with UNDP:

- "Restoration of the Strumica River Basin", 5 automatic meteorological stations were set up, 3 automatic hydrological stations and equipment for biological water monitoring was obtained;

- "Reduction of the Risk of Floods in the Polog Region", technical and information equipment was obtained - 3 automatic hydrological and 4 automatic meteorological stations;
- Under the project "Improvement of Flood Resistance in the Polog Region" modern equipment was installed (automatic meteorological and hydrological stations) for monitoring the atmosphere at several altitudes, which will provide important information in the monitoring system,
- "Strengthening Institutional and Technical Capacities to Improve Climate Change Transparency under the Paris Agreement" and "Fourth National Plan and Third Biennial Climate Change Report",
- "Flood Management and Flood Risks in the Drini Basin",

Under the project "Adaptation to Climate Change in the Western Balkans - Establishment of an Early Flood Warning System in the Drim and Bojana River Basins", in cooperation with GIZ, 4 automatic meteorological stations, 4 automatic hydrological stations, a motor vehicle and equipment were obtained in total value of 100,000 euros.

The cooperation with the Crisis Management Center (CMC) under the Project "Ecosystem - Based Disaster Risk Reduction" supported by the Japan International Cooperation Agency - JICA has been continued.

NHMS participates in the following international and domestic projects within its competences:

- With the City of Skopje it implements the Program for mesometeorological measurements and observations on the territory of the City of Skopje,
- Project "Assessment of Agricultural Production through Agro-Ecological Zoning and Information System for Management of Land Resources with the Development of Scenarios", which is implemented within the Ministry of Agriculture, Forestry and Water Economy (MAFWE), with financial and technical assistance from the Organization Food and Agriculture Organization (FAO) of the United Nations,
- international project "European Phenological Base" funded by the European Meteorological Network (EUMETNET) in order to promote and strengthen phenological research in Europe,
- "International Phenological Gardens" Project, which aims to introduce standardized phenological observations of phenological objects with the same genetic material,
- Project on "Biotic and Abiotic Factors of Pollen Production and Occurrence of Birch Allergies and Related Health Effects",
- The project of MAFWE and FAO within the program for technical support for North Macedonia, "Increased Resilience of the Agricultural Sector through Sustainable Agricultural Practices, Sustainable Water Management and Improved Information Systems", in which one project component will be implemented by the NHMS ,
- WMO Project "Early Warning System for Multiple Weather Hazards in Southeast Europe" (SEE-MHEWS-A).

In the framework of international cooperation, NHMS actively participates in various trainings, seminars and conferences organized by WMO, EUMETNET, EUMETSAT, ECMWF and other organizations.

STRATEGIC PLAN OF NHMS

NHMS strives to follow the directions and priorities of the WMO (as per the WMO strategy) which are committed to improving information, products and services, maintaining the necessary infrastructure and directly benefiting from the advanced technologies of developed countries. In planning, the NHMS also follows the strategic commitments of EUMETNET. In order to achieve a secure Europe by 2025, the National Meteorological Services, as signatories to the EUMETNET Strategic Document, are obliged to continuously improve and enhance their services.

STRATEGIC GOALS AND EXPECTED RESULTS

The increasing incidence of weather disasters as a result of climate variability and climate change, but also the growing global need for future data and services on weather, water, climate and the environment will require significant targeted improvements, with regard to the following:

- Development of customer-oriented timely, accurate and effective products and services;
- Ensuring and promoting the use of products and services to address the challenges of adapting to climate variability and change;
- Enhancing the effectiveness of services and reducing costs by building partnerships and cooperation;
- Improving visibility of the NHMS and its activities in international programs.

Thus, the support of the Government and the cooperation with other departments in the country, scientific institutions, other partners, the private sector, international organizations will provide the scientific, programmatic and infrastructural support necessary for the improvement of the NHMS status and efficiency.

The NHMS Strategic Plan envisages five key priorities as a condition for achieving the eight expected results.

Strategic goals:

- Improving the capacity of the measuring and monitoring system,
- Improving the quality of the system for forecasting and announcing weather and hydrological disasters,
- Improving the hydrometeorological information system and services for end users,
- Improving research and its application,
- Building and strengthening partnerships, cooperation and good governance.

Expected results:

1. Strengthened ability to access, develop, implement and use an integrated monitoring system,

2. Enhanced ability to prepare forecasts, warnings and announcement of weather and hydrological disasters,
3. Strengthened ability to reduce disaster risks,
4. Enhanced service capability for better access to information and services for end users,
5. Strengthened capacity of the service for access to climate information and services.
6. Enhanced ability to utilize modern research and technological development as well as application of modern weather technologies,
7. Strengthened partnerships and collaborations in order to improve the representation of the service in providing services as well as strengthened international cooperation with WMO and other international organizations,
8. Efficient, effective and recognizable service.

STRUCTURE OF THE NHMS STRATEGIC PLAN BY PROGRAMS	
Strategic goals	Expected results
Meteorology	
1. Quality and continuous meteorological measurements and observations	Improved measurements and observations
2. Automation of the meteorological monitoring system	Modernization of meteorological monitoring by setting up automatic meteorological stations and upgrading the established automatic monitoring; Better quality measurements
3. Application of ISO 9001 standards in meteorological measurements; Establishment of a professional unit / meteorological laboratory for calibration and maintenance of meteorological monitoring; Equipping a laboratory for calibration of meteorological instruments for providing quality data in accordance with WMO and ISO standards.	More accurate and consistent measurements
4. Providing upper-air aerological radiosound measurements	Restoration of upper-air aerological radiosound measurements
5. Improving meteorological research and applications in the field of climatology and agrometeorology	Improved and better climate and agro-meteorological services;
6. Improving the quality of climate services in accordance with the Global Framework for Climate Services initiated by the World Meteorological Organization (WMO);	Improved climate services for the needs of four key sectors: agriculture, health, water management, disaster risk reduction;

7. Improving the staffing;	Increased number of professionals - meteorologists and IT professionals;
8. Use and application of modern climate models and tools for climate forecasting	Enhanced professional competencies
Forecast, warning, informatics and technology	
1. Improving the system for remote monitoring of atmospheric phenomena and processes;	Introducing modern radar monitoring; Improved Nowcasting system; Strengthened capacities of the System for forecasting, warning, informatics and technology; Created network of meteorological radars that will cover the entire territory of R. North Macedonia; Inclusion of the country in the European network of meteorological radars - OPERA;
2. Improving the weather forecasting system;	Obtaining more accurate and detailed weather forecasts; Qualitative-quantitative improvement of forecasts; Improving the forecast time frame;
3. Improving service information and weather services for end users	More accurate and detailed weather information and services; Faster and timely graphic processing of weather parameters and phenomena, faster analysis of the weather in R.North Macedonia and wider and faster assessment of the further development of the weather in the coming period;
4. Strengthened capacity of the system for informatics, telecommunications and technology;	Improving information and technical resources; Modernization of the information department; Improving telecommunications and logistics
Hydrology	
1. Modernizing the hydrological operational monitoring system for flood protection;	Consistently maintaining the established automatic monitoring of the condition of the larger watercourses in R.North Macedonia in real time; Faster and better processing of information in case of danger of weather disaster;
2. Improving the flood forecast;	Establishing an operating prognostic system; Improved flood forecasting; Improving the products and services for hydrological forecasts for the watercourses in R.North Macedonia and the System for early warning of floods;
3. Improving the hydrological information system	Establishing modern IT equipment that accelerates the processing of information in case of danger of weather disasters; Fast and

	timely graphic processing of weather data; Availability of data in real time through a website for all users and institutions, especially for defense and flood protection;
4. Upgrading, improving and modernizing the database for more efficient use, in order to better monitor the water situation	Updating the hydrological database and adjusting according to the needs of the new Water Management Plan; Improved and better monitoring of hydrometeorological parameters
5. Improving technical resources	Improving the operational-technical and field activities in the network of hydrological stations;
Water quality	
1. Establishing operational monitoring for the quality of surface water bodies in accordance with the requirements of the WFD	Establishing ecological and chemical status of surface water bodies
2. Improving the technical-technological equipment of the water laboratory	Establishing operational monitoring for quality of surface water bodies in full compliance with the requirements of the WFD
3. Application of ISO 9001-2015	Improving the quality of work in the Water Quality Sector
4. Establishing a water quality database	Faster and timely processing of historical and current water quality data