### MANAGEMENT OF IRRIGATION BUILDINGS AND MIXED MELIORATION BUILDINGS IN THE REPUBLIC OF CROATIA

The State Audit Office (SAO) has audited the efficiency of the management of irrigation buildings and mixed melioration buildings in the Republic of Croatia, and the auditees were **the Ministry of Agriculture, the Ministry of Economy and Sustainable Development - Directorate of Water Management and Sea Protection, Hrvatske vode** *(eng. Croatian Waters)* **- legal entity for water management** and **all counties**.

**The subject of the audit** were the activities of the counties (as bodies responsible for the management of irrigation buildings), the Ministry of Agriculture, the Ministry of Economy and Sustainable Development and Hrvatske vode (as participants in the adoption and implementation of planning documents and the implementation of the National Project of Irrigation and Management of Agricultural Land and Water in the Republic of Croatia - NAPNAV).

The audit covered the period from 2005 to 2021 in connection with the adoption of NAPNAV and counties irrigation plans and the achievement of the goals set in the aforementioned plans, while data on other activities of the audited subjects was covered until the end of 2022.

NAPNAV is the first document that regulated the management of irrigation in 2005. At the time of its adoption, there was no data on the number of irrigation systems and on the areas irrigated. Therefore, it was estimated that 0.9% of agricultural land is irrigated in the Republic of Croatia. The planned goal from NAPNAV to build an irrigation system on 65,000 ha by 2020 has been achieved with approximately 50.0%, which is partially based on estimates, given that there is no reliable data on the total agricultural areas in the Republic of Croatia for which the possibility of irrigation is ensured, that is, those one that are covered by irrigation systems.

Public irrigation is the activity of capturing underground and surface water and delivering it for the purpose of irrigating agricultural land through irrigation structures owned by counties or mixed melioration structures owned by the Republic of Croatia. The management includes the tasks of the investor in the construction of water structures, i.e. their maintenance, preservation and use for the purposes for which the water structures serve.

According to the provisions of the Water Act, water reclamation structures include irrigation structures, reclamation drainage structures and mixed reclamation structures. Irrigation buildings and mixed melioration buildings are used for irrigation. Irrigation facilities are public goods in public use and are owned by the counties.

Mixed melioration buildings of interest to the Republic of Croatia, determined by the List of buildings for basic melioration drainage and mixed melioration buildings of interest to the Republic of Croatia, are owned by the Republic of Croatia, while mixed melioration buildings that are not on the List are public goods in public use owned by the counties.

**The main goal of the audit** was to evaluate the effectiveness of the management of irrigation buildings and mixed melioration buildings.

The audit of the effectiveness of the management of irrigation buildings and mixed melioration buildings covers **the areas of audit**: legal, strategic and planning framework for effective management of irrigation buildings and mixed melioration buildings, records of irrigation structures, construction, use and maintenance of irrigation structures and mixed melioration structures, use of water for irrigation in accordance with water potential and irrigation needs, as well as monitoring of water use and information on irrigation.

**Criteria** have been established, according to the areas of audit, which derive from laws and other regulations in accordance with which the aforementioned ministries, Hrvatske vode and counties conduct their business in connection with the management of irrigation buildings and mixed melioration buildings, namely:

* a legal, strategic and planning framework has been established for the efficient management of irrigation buildings and mixed melioration buildings
* records of irrigation buildings and mixed melioration buildings are kept
* the construction, use and maintenance of irrigation buildings and mixed melioration buildings are carried out
* irrigation water is used in accordance with water potential and irrigation needs
* monitoring of water use and information on irrigation and implementation of NAPNAV is carried out.

Based on the facts established by the audit, applying the established criteria, the SAO assessed that activities related to the management of irrigation structures in the Republic of Croatia were carried out in **four counties that have built public irrigation systems** and **two counties that do not have public irrigation systems built,** **effective with certain improvements needed**, while the activities of **six counties that have built public irrigation systems** and **eight counties that do not have public irrigation systems built,** **partially effective**. SAO did not give one county an evaluation of the efficiency of the management of irrigation structures because the county determined, by analyzing the data, that there is no agricultural production in its territory that would be suitable for public irrigation. Also, the assessment of efficiency was not given to the Ministry of Agriculture, the Ministry of Economy and Sustainable Development - Water Management and Sea Protection Administration and Hrvatske vode, as participants in the adoption and implementation of planning documents and the implementation of NAPNAV, because they do not manage irrigation structures.

**AUDIT FINDINGS**

The audit identified irregularities and omissions related to the legal, strategic and planning framework, recording, construction, use and maintenance of irrigation buildings and mixed melioration buildings, use of water for irrigation and monitoring of water use and informing the public about irrigation.

Further on, more significant irregularities and omissions are described according to the areas of the audit.

**Legal, strategic and planning framework for efficient management of irrigation buildings and mixed melioration buildings**

The irrigation is regulated by national regulations and strategic and planning documents related to water management and irrigation buildings and mixed melioration buildings (NAPNAV and county irrigation plans).

The Water Management Strategy (Official Gazette 91/08) was adopted by the Croatian Parliament in July 2008 as a long-term planning document that defines the vision, mission, goals and tasks of the state policy in water management. The strategy defines as an irrigation-related activity the creation of conditions for the development of irrigation according to user requirements in accordance with NAPNAV. The bearers of the activity are the Ministry of Agriculture and the County.

National project of irrigation and management of agricultural land and water in the Republic of Croatia - NAPNAV was adopted by the Government of the Republic of Croatia in 2005 for the period 2006 - 2020. NAPNAV contains starting points, expected results, national project framework, project activities and institutions involved in the implementation of the project. The expected result of the implementation of NAPNAV is that the measures of systematic organization of infrastructure in agriculture, consolidation of agricultural areas and introduction of irrigation and new production technologies will result in more efficient agricultural production. This will stimulate a change in the structure of production by introducing high-income crops that are mostly imported and the project will ultimately result in a favorable macroeconomic effect.

The multi-year construction program is a water management planning document that elaborates ways of achieving the goals set by the higher-level plans. The proprietor of the multi-year construction program is the ministry responsible for water management.

The audit determined the following:

* Activities of the Ministries of Economy and Sustainable Development and Hrvatske vode for the purpose of adopting the planning documents - the new NAPNAV and the multi-year construction program were not undertaken in a timely manner.
* In some cases, the counties did not adopt irrigation system construction programs before the start of the construction of the system, which is not in accordance with the provisions of the Water Act and the Ordinance on the Management and Regulation of the Irrigation System.
* Irrigation system maintenance programs, for systems that have started operating, were not adopted by individual counties, which is not in accordance with the provisions of the Water Act and the Ordinance on Management and Regulation of Irrigation Systems.

**Records of irrigation buildings and mixed melioration buildings**

Counties invested in 96 public irrigation systems, and according to county data, the total value of investments by the end of 2022 was 967,013,612.00 HRK. The most significant investments in terms of value refer to investments in Vukovar-Srijem (six systems), Istria (two systems) and Virovitica-Podravina counties (three systems) in the total value of 619,763,711.00 HRK.

The audit determined the following:

* The cadastre of water structures has not been organized, and the Register of water used for irrigation does not contain all prescribed data in accordance with the provisions of the Ordinance on the content, form and manner of keeping water documentation.
* Counties that manage irrigation systems have not organized records that contain data necessary for irrigation system management, data on system coverage, investments, technology, ownership of land, agricultural crops grown, nature and area on which irrigation was used (by years). Also, no data was collected on the nature of agricultural products on irrigated agricultural land from users of the public irrigation system in order to determine the effects of irrigation.

**Construction, use and maintenance of irrigation buildings and mixed melioration buildings**

The construction of irrigation structures owned by counties is carried out according to the program adopted by its representative body. The construction of mixed melioration buildings is carried out according to the Water Management Plan, which Hrvatske vode adopts for each year.

By June 2023, 21 public irrigation systems (irrigation buildings) have been built, covering agricultural land with a total area of 7,580.54 ha, and total investments in public irrigation buildings amount to 690,415,427.00 HRK. The most significant investments relate to the construction of two systems in the County of Istria in the amount of 200,270,244.00 HRK and three systems in the Virovitica-Podravina County in the amount of 140,123,837.00 HRK. Also, since 2005, three mixed melioration buildings have been built, the construction of which enabled irrigation on an area of 5,916 ha of agricultural land. The construction was financed from the state budget, and the total investments amount to 658,468,000.00 HRK.

Out of the 21 constructed public irrigation structures owned by the counties, the table below provides data on the area of agricultural land covered by public irrigation systems built, the area of agricultural land that can be irrigated, because the users have equipment, and the area of irrigated land.

Table number XX

Data on the area of agricultural land in the scope of public irrigation systems built, the area of agricultural land that is

possible to irrigate because the users have the equipment and the area of irrigated land

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Number** | **County** | **Number of public irrigation systems built** | **System coverage area**  **(in ha)** | **Land that can be irrigated because users have equipment to connect to the system** | | **Irrigated land in 2022.** | |
| **Surface**  **(in ha)** | **Share in system coverage**  **(in %)** | **Surface**  **(in ha)** | **Share in system coverage**  **(in %)** |
|  | 1 | 2 | 3 | 4 | 5 (4/3\*100) | 6 | 7 (6/3\*100) |
| 1. | Brodsko-Posavska | 1 | 326 | 97,13 | 29.8 | 97,13 | 29.8 |
| 2. | Dubrovačko-Neretvanska | 1 | 310 | 0 | 0 | 0 | 0 |
| 3. | Istarska | 2 | 870 | 380 | 43.7 | 96 | 11.0 |
| 4. | Međimurska | 1 | 250 | 120,21 | 48,1 | 0 | 0 |
| 5. | Osiječko-Baranjska | 3 | 854.50 | 0 | 0 | 0 | 0 |
| 6. | Požeško-Slavonska | 2 | 479 | 111,18 | 23.2 | 111,18 | 23.2 |
| 7. | Šibensko-Kninska | 1 | 274 | 0 | 0 | 0 | 0 |
| 8. | Virovitičko-Podravska | 3 | 2 171 | 957.61 | 44.1 | 616,10 | 28.4 |
| 9. | Vukovarsko-Srijemska | 3 | 1 254 | 52 | 4.1 | 52 | 4.1 |
| 10. | Zadarska | 4 | 792.04 | 486.96 | 61.5 | 353.04 | 44.6 |
| **In total** | | **21** | **7,580.54** | **2 205.09** | **29.1** | **1 325.45** | **17.5** |

According to county data, in 2022, 127 users within the scope of the aforementioned systems had equipment for connecting to public irrigation systems, while 105 users of the mentioned number of users irrigated a total of 1,325.45 ha or 17.5% of the agricultural land area. The application of certain measures could achieve better, or more efficient, use of public irrigation systems. Measures for improvement are determined by NAPNAV and by the good practice. They relate to the implementation of pilot projects, monitoring the realization of planned/set goals, monitoring nature and informing farmers about the benefits of irrigation, providing financial resources for the purchase of irrigation equipment, monitoring water use and consolidating property.

The audit determined the following:

* Data on the total agricultural areas covered by irrigation systems in the Republic of Croatia, with an indication of whether it is a public or private system, are not collected and are not consolidated, and the Ordinance on records of use of the agricultural land does not establish the Agency's obligation to collect data on the equipment of the ARKOD [[1]](#footnote-1)parcel with the system of irrigation indicating whether it is a public or private system, in order to collect complete data on the state of agriculture and to monitor the achievement of the goals of NAPNAV and the Agriculture Strategy until 2030.
* The criteria for the selection of pilot projects have not been established and some of the pilot projects so far have not been realized, and the objectives of the implementation of the pilot projects, as well as the methods of measuring the effects of irrigation and informing farmers, have not been established.
* When creating the multi-year construction program, there were no clear, measurable and applicable criteria established for the calculation of indicators of program achievement.
* Professional education programs related to irrigation were not implemented in order to achieve the goals set by NAPNAV.
* Informing the general public about consolidation was not carried out, considering that consolidation is a procedure directly related to ownership and involves a large number of people who are usually not sufficiently informed about the process, effects and benefits of consolidation.

**Use of water for irrigation**

The basic assumption for the development of the public irrigation system is water and land potential. Data on water and land potential in the territory of the Republic of Croatia are regulated in the NAPNAV and the Multi-Year Construction Program, while data on water and land potential in the counties within the irrigation plans.

Based on analyzes of the soil suitability, water resource potential and climate factors, and taking into account the areas and lands where irrigation projects will not be able to be developed (for several reasons), NAPNAV determined that 484,025 ha of agricultural land have very high and high suitability for irrigation.

The counties adopted irrigation plans from 2006 to 2019.[[2]](#footnote-2) The county irrigation plans regulate (comprehend) the state of water in more detail, that is, water resources and land potential. The audit found that data on land potential in NAPNAV and county irrigation plans are not harmonized.

According to the provisions of the Water Management Financing Act, the irrigation fee is paid on agricultural land that is irrigated from irrigation structures owned by the counties and on agricultural land that has access to irrigation from that structure. The subject liable to pay the irrigation fee is the owner or other legal owner of the agricultural land. On the basis of the annual maintenance program of the public irrigation system, the representative body of the county makes a decision on the annual amount of the irrigation fee, in which the fee for covering fixed and especially for covering variable costs is shown separately.

Maintenance programs plan variable costs (costs of electricity required for the operation of the public irrigation system, expenses for compensation for the use of water) which are covered from the variable part of the compensation. Some counties did not plan the amount of the variable part of the fee to cover the expenses for electricity and the fee for the use of water. In the same way, most of the counties did not compile reports on the realization of the annual maintenance program and the annual calculation of income and expenditure of the public irrigation system by the time the audit was carried out. The counties are obliged to submit the aforementioned reports to the ministry responsible for water management and to Hrvatske vode, once a year, and at the latest by the adoption of the public irrigation system maintenance program for the next period.

The audit determined the following:

* Decisions on the amount and obligation to pay the irrigation fee was passed by five counties while the other counties did not make decisions and did not calculate and charge the irrigation fee for the systems that started operating, in accordance with the provisions of the Law on Financing of Water Management and the Ordinance on the Management and Regulation of Irrigation Systems.
* Reports on the implementation of the annual maintenance program and the annual calculation of income and expenditure of the public irrigation system were not compiled and submitted to the ministry responsible for water management and to Hrvatske vode, in accordance with the provisions of the Ordinance on the management and regulation of the irrigation system.

**Supervision of water use and informing the public about irrigation**

Inspection work in the field of water management is performed by the water inspection of the State Inspectorate. The aforementioned tasks include the performance of inspection supervision over the implementation of laws and other regulations governing water management and related to water, water assets and water structures, water protection, water use, protection against the harmful effects of water, actions according to water legal acts and other inspection tasks in accordance with regulations in the field of water management.

According to the Water Management Strategy, one of the activities and measures to improve the irrigation system is to inform the public about the state and possibilities of water use. The county websites publish information on irrigation plans for the county area, information on locations of public irrigation systems, constructed public irrigation systems, the degree of completion of works, irrigation systems that are in the process of drawing up project documentation, the area of agricultural land covered by irrigation projects, and information on cooperation the county with Hrvatske vode, the Ministry of Agriculture and local self-government units on whose territory public irrigation systems are planned or built.

The audit determined the following:

* Hrvatske vode did not create a plan for conducting water inspections of users of irrigation water, as well as a method of monitoring and reporting on the implementation of water inspections.
* The public has not been informed about the results of the implementation of NAPNAV and the Multi-Year Construction Program and about other information related to irrigation.
* The counties did not carry out systematic educational and informational activities for irrigation users regarding the benefits of existing public irrigation systems, new technologies and methods of financing public irrigation systems, choosing optimal irrigation equipment, increasing the nature of agricultural crops on irrigated areas, the need to produce agricultural crops that insufficient production in the Republic of Croatia and other benefits of the application of the public irrigation system.

For all identified irregularities and omissions, the SAO issued a total of 119 recommendations.

The table below shows the number of given orders and recommendations by audit area.

Table number xx

Number of given recommendations according to areas of audit

|  |  |
| --- | --- |
| Audit area | Number of  recommendation |
| Legal, strategic and planning framework for effective management of irrigation buildings and mixed melioration buildings | 25 |
| Records of irrigation buildings and mixed melioration buildings | 15 |
| Construction, use and maintenance of irrigation buildings and mixed melioration buildings | 35 |
| Use of water for irrigation | 26 |
| Supervision of water use and informing the public about irrigation | 18 |
| In total | **119** |

The SAO issued recommendations, the implementation of which would achieve improvements in connection with the establishment of a legal, strategic and planning framework for the effective management of irrigation buildings and mixed melioration buildings, recording in business books, as well as recording of irrigation structures, construction, use and maintenance of irrigation buildings and mixed melioration buildings, use of irrigation water in accordance with water potential and irrigation needs, and supervision of water use and information on irrigation and implementation of the National Project for Irrigation and Management of Agricultural Land and Water in the Republic of Croatia - NAPNAV, which would increase the efficiency of management of irrigation buildings and mixed melioration buildings in the Republic of Croatia.

1. ARKOD is a record of the use of agricultural land in the territory of the Republic of Croatia, which is maintained in digital graphic form by the Agency in accordance with Article 70 of Regulation (EU) no. 1306/2013 of the European Parliament and the Council. [↑](#footnote-ref-1)
2. The Međimurje County adopted the irrigation plan in 2003. [↑](#footnote-ref-2)