QUBAHAN ACADEMIC JOURNAL
VOL. 4, NO. 1, Jan 2024
https://doi.org/10.58429/qaj.v4n1a267

Sustainable Water Management: An Integrated Approach to Solving the Problems of Wastewater Treatment

Alfred Lako [1] and Elvin Çomo [2]

[1] Department of Environmental Engineering, Polytechnic University of Tirana, Tirana, Albania.
[2] Department of Meteorology, Institute of Geosciences of the Polytechnic University of Tirana, Tirana, Albania.

Corresponding author: e-mail: alfredlako96@gmail.com.

ABSTRACT: The relevance of the study of this problem today lies in the fact that the awareness of the lack of water resources and the threat of environmental pollution forces us to focus on the development of sustainable water management solutions. In the context of population growth, water pollution and climate change, it is necessary to respond quickly and improve wastewater treatment methods, assess their impact on the environment and improve water supply systems to ensure stable and environmentally safe access to water resources for future generations. The purpose of this article is to consider an integrated approach to solving the problems of wastewater treatment, assessing their impact on the environment, and improving the water supply system to build a sustainable water economy. Among the methods used, it should be noted the analytical method, the classification method, the functional method, the statistical method, the synthesis method, and others. Water management and environmental protection research included analysis of wastewater treatment technologies, environmental impact assessment, development of water supply systems, municipal waste management, hydrological processes, environmental pollution, use of renewable energy, risk assessment and soil erosion. The effectiveness of wastewater treatment systems, the need for technology improvement, the impact of some types of industry and agricultural activity on the environment, the need to modernize water supply systems, effective management of urban waste, conservation of water resources and prevention of soil erosion were revealed. Research results indicate the need to develop strategies and policies to preserve water resources and improve the state of the environment. This research makes a significant contribution to science, contributing to the development of sustainable water management by developing an integrated approach to solving the problems of wastewater treatment, assessing their impact on the environment, and improving the water supply system.

Keywords: Hydrological Processes, Soil Erosion, Agricultural Activity, Urban Waste, Renewable Energy.

I. INTRODUCTION

Studying this topic is critically important for several reasons. Sustainable water management is essential to ensure access to clean drinking water and conserve water resources, especially in the face of a growing population and climate change. Ensuring access to safe drinking water is a fundamental human right, and the study of this topic helps to develop strategies and technologies that guarantee the availability and quality of water for all people. The development of an integrated approach to wastewater treatment and assessment of its impact on the environment allows reducing the negative environmental impact and pollution of water resources. Inadequate wastewater treatment can lead to serious contamination of water sources, which negatively affects ecosystems and human health. The study of this topic helps to develop effective treatment methods and technologies, as well as to establish norms and standards that ensure the preservation of water resources and environmental sustainability. In addition, the improvement of the

water supply system is important to ensure the sustainable availability of water for industry, agriculture and public needs. An effective water supply system ensures not only the satisfaction of people's basic needs, but also supports economic development. The development and implementation of innovative approaches to the water supply system take into account sustainability factors, which include reducing water losses, optimizing distribution and ensuring the efficient use of water resources.

The problem of the research is to understand the complexity and interrelationship between the problems of wastewater treatment, assessment of their impact on the environment and improvement of the water supply system. This includes the development of effective wastewater treatment technologies, analysis of their impact on water resources, environmental sustainability and human health, as well as optimization of the water supply system, taking into account factors that affect water quality and availability. According to L. Shumka et al. [1], the study of water ecosystems contributes to the development of new innovative technologies that can be used for environmentally friendly solutions in the water sector. For example, these can be technologies for restoring natural ecosystems, such as wetlands, mangrove coasts or coral reefs. The implementation of such technologies contributes to the preservation of biodiversity and restoration of ecologically important environments.

S. Knez et al. [2] draw attention to the connection between sustainable water management and adaptation to climate change, since changes in precipitation and temperature regimes affect the availability and quality of water resources. According to E. Jorgji and A. Gjika [3], the development of sustainable water management creates new opportunities for creating green jobs and stimulating economic growth through innovations in the sector of water technologies and services. F. Widing [4] emphasizes the importance of involving the public in the decision-making process on water management issues, which contributes to transparency, participation and permanent support of water initiatives. According to M. Preisner et al. [5], improving engineering systems for wastewater treatment and ensuring efficient treatment and use of secondary resources, such as biogas and fertilizers, has great potential for improving the sustainability and environmental sustainability of aquatic ecosystems. One way to achieve these goals is to implement biological wastewater treatment systems, such as activated sludge ponds or bioreactors with biomass absorption. These systems use living microorganisms for wastewater treatment, which allows for effective removal of biological contaminants.

According to K. Xhexhi [6], the development of sustainable water management should take into account social aspects, ensuring equal access to water resources for all sections of the population and reducing inequality in this matter. Thus, an analysis of the views of these authors reveals a wide range of aspects of sustainable water management, including ecological regeneration, climate change, economic benefits, public participation, engineering and social justice. The purpose of this research is to study an integrated approach to solving the problems of wastewater treatment, assessing the impact on the environment, and improving water supply systems to create a sustainable water economy.

II. MATERIAL AND METHOD

Conducting scientific research in the field of studying sustainable water management was carried out using methods that reveal the theoretical and practical content of the object. The analytical method helped to understand the cause-and-effect relationships between the elements of sustainable water management, to identify the main factors affecting water quality and the state of water resources. The application of the analytical method made it possible to assess the risks associated with the pollution of water sources and to develop effective strategies for their prevention and management. In addition, data analysis of information systems and modelling helped identify optimal ways to improve the water supply and wastewater treatment system, ensuring more efficient and sustainable use of water resources. With the help of the statistical method, studies and modelling were carried out, which made it possible to assess trends and relationships between various indicators of water management, such as water quality, volumes of wastewater, pollution levels and the efficiency of the treatment system. This made it possible to identify critical problem areas and identify possible ways to improve the water supply and treatment system, providing scientifically based solutions and recommendations for improving the state of water resources and environmental sustainability. This method contributes to the rational use of resources and provides a scientific basis for making strategic decisions in the field of sustainable water management.

By applying the functional method, a comprehensive assessment of the efficiency of the water supply and wastewater treatment system was carried out. This method made it possible to determine the key functions and tasks of the system, as well as to assess their relationship and impact on the environment. In addition, the functional method made it possible to identify possible risks and problems in the system, as well as to find optimal solutions to improve its functioning and stability. The use of the functional method made it possible to take into account all aspects of water management, from water supply and distribution to wastewater treatment. This approach allows for harmonious interaction between various components of the system and ensures optimal use of resources and energy. The use of the functional method is an important tool for developing strategies to improve the water supply and wastewater treatment system, ensuring efficient and sustainable use of water resources and environmental protection. The structural-functional method made it possible to study the water management system as a complex structure consisting of various elements and functions. The application of this method made it possible to reveal the interrelationships and interaction between various components of the system, such as water supply, wastewater treatment, water resources management. The deduction method helped in understanding cause-and-effect relationships and the formation of general laws in the context of sustainable water management. This method is based on the use of logical deduction from general principles and well-founded facts. By applying the synthesis method, complex solutions and integrated approaches were developed to solve the problems of sustainable water management. This method made it possible to combine different aspects, ideas and resources in order to create new innovative solutions.

III. DATA ANALYSIS

Wastewater treatment is the process of removing pollutants, harmful substances and microorganisms from water that comes from domestic, industrial or agricultural sources. This process aims to ensure that the water is safely returned to natural water sources or used for other purposes, such as irrigation of agricultural land or industrial processes. Wastewater treatment includes various physical, chemical and biological processes that contribute to the removal of various types of pollutants. The main stages of purification include pre-purification, basic (biological) purification and post-purification [7]. To achieve an optimal result, different methods and technologies can be used depending on the type and level of wastewater contamination. Pretreatment involves the mechanical treatment of wastewater to remove solid particles, sand, gravel, and other large contaminants. This may include screens, screens and sumps. Basic cleaning involves a biological process where microorganisms break down organic pollutants found in wastewater. This can be achieved by using activated sludge ponds, biological filters or bioreactors. Post-treatment includes additional processes to remove residual contaminants and improve the quality of treated water before it is returned to the natural environment or used for various purposes. To achieve effective wastewater treatment, various technologies are used, such as aerobic and anaerobic biological processes, filtration, flotation, oxidation, ultrafiltration, reverse osmosis, and others. The development and implementation of new innovative technologies, such as membrane technology or photocatalytic processes, also contribute to improving the efficiency of cleaning and reducing the impact on the environment. When treating wastewater, it is important to consider the variety of pollutants, as well as the potential impact on the environment. Effective management and monitoring of wastewater treatment play an important role in ensuring the quality of treated water and preventing negative impacts on aquatic ecosystems. Wastewater treatment is an important aspect of sustainable development and environmental protection. It helps preserve natural water resources, supports the biodiversity of aquatic ecosystems, and ensures the security of water supply for human and industrial needs.

Wastewater and its treatment in Albania are among the country's most urgent environmental problems. Population growth, the development of industry and tourism create significant pressure on water resources, which leads to an increase in the volume of wastewater and deterioration of the quality of water sources. One of the most important wastewater problems in Albania is the insufficient number and inefficient operation of treatment facilities. This leads to the fact that a large part of waste water cannot be treated properly and flows directly into natural water bodies rivers, lakes and seawater areas. This situation negatively affects the ecological state of water resources, polluting natural ecosystems and threatening the biodiversity of the region. Insufficient awareness of the population about the importance of proper waste management is also a significant problem of wastewater. Many citizens do not follow the

rules for sorting and removing waste water, which leads to its contamination with harmful substances and bacteria. Insufficient awareness of the consequences of such improper handling leads to a decrease in the quality of water in local sources and reservoirs, which worsens the situation with pollution. In addition, insufficient funding and management of projects to improve wastewater treatment systems is a problem. As a result, the national government and local authorities have limited resources to address these issues, making it difficult to implement the latest technologies and develop the necessary infrastructure for effective wastewater treatment.

The consequences of the spread of wastewater in the urban water supply system can be serious and have a negative impact on water quality, public health, and ecology [8]. The absence or ineffective treatment of wastewater can lead to its discharge directly into natural reservoirs, rivers or seawater areas. This leads to contamination of drinking water and natural water sources with harmful substances, bacteria, toxins and other pollutants. Wastewater can contain pathogens, including bacteria, viruses and parasites, which pose a threat to public health. Contact with contaminated water can lead to the spread of disease, including waterborne infections and waterborne diseases. Wastewater pollution can negatively affect water ecosystems, leading to the death of fish and other aquatic fauna, destruction of vegetation and pollution of coastal zones. This can lead to the degradation of natural ecosystems and the reduction of biodiversity. Improper disposal of wastewater can damage water and sewer infrastructure, creating the potential for accidents and leaks. This can increase repair costs and degrade the quality of service for local consumers. Water pollution can lead to a decrease in the suitability of water for consumption and industry, which can affect the activities of enterprises and the economic development of the city. Additionally, the costs of treating diseases associated with contaminated water can be significant. One of the possible ways to prevent the consequences of the spread of sewage is the improvement of sewage treatment systems and effective management of water supply. Countries must invest in upgrading infrastructure, introducing new technologies, and developing water conservation strategies to ensure adequate and environmentally safe water supplies for their populations. Such measures can reduce the negative impact of wastewater on natural resources, health and the environment. Municipal waste treatment is the process of processing and removing waste generated in urban environments. Waste may include rubbish, solid waste, organic materials, construction waste, recycled products, and other materials that require appropriate treatment to ensure an environmentally friendly environment [9].

The process of cleaning urban waste includes the following stages [10]. The first step is to collect waste from the urban area. This may include the location of rubbish containers on the streets, the use of special rubbish trucks to collect and transport waste. After collection, the waste is sorted to separate different types of materials (plastic, paper, glass) for further recycling. After sorting, the waste goes to the processing or disposal process. This can include various methods such as recycling of plastic, paper and glass, composting of organic waste, production of biogas from waste and other technologies. The goal of this stage is to reduce the amount of waste, reduce the negative impact on the environment, and maximize the use of resources contained in the waste. After going through the recycling or disposal process, useless residues or by-products may remain. These residues must be properly disposed of or sent to special landfills that ensure safe storage of waste. An important aspect of municipal waste treatment is the monitoring and control of processes to ensure compliance with quality, environmental and safety standards. This includes implementing effective waste management systems, monitoring process compliance and monitoring environmental impact. Urban waste treatment is an important element of sustainable development and environmental protection. Proper waste management helps reduce pollution, reduce the use of natural resources, reduce greenhouse gas emissions, and improve air and soil quality. To achieve these goals, it is necessary to promote the processing and disposal of waste, to stimulate the participation of citizens in the separate collection of waste and the use of ecological materials and products. Environmental impact assessment is an important tool for sustainable development, environmental protection and environmental sustainability. It helps to balance social, economic and environmental aspects and ensures that environmental consequences are taken into account before making decisions that have a potential impact on the environment.

The water supply system is a complex of engineering structures, equipment and processes that ensure the supply of drinking water to the population, enterprises and other consumers. It includes water sources, a purification system, pipeline networks, pumping stations and facilities for storing and distributing water

to end users. The main stages of a water supply system include water sources, water treatment, pipe network, pumping stations, and water storage and distribution. Starting with the search and selection of the water source, passing through the processes of cleaning, transporting and maintaining the water, this system ensures access to safe and high-quality drinking water for the end users. Each of these stages is important to ensure reliable and efficient water supply in different regions. The main requirements for water supply systems include reliability, safety, water quality and efficient use of resources [11]. Automation technologies and monitoring systems are used to ensure the efficiency and control of water supply systems. In addition, the development and implementation of innovative approaches, such as the use of renewable energy sources for the operation of systems and the implementation of energy-efficient technologies, contribute to a sustainable water supply. Ensuring an efficient water supply system is an important component for ensuring the health, hygiene and general well-being of people, as well as for economic development and sustainable use of natural resources.

The development and optimization of the Albanian water supply system is an important task for ensuring sustainable water management and ensuring an adequate quality of life for citizens. To achieve this goal, the state government takes a number of measures, such as infrastructure development, improvement of wastewater treatment technologies, financial support of projects, environmental education, partnership with public organizations and innovative technologies. The application of an integrated approach and the joint activities of all interested parties will contribute to the provision of efficient water supply and the preservation of water resources. Steps already taken include: The government conducted an analysis of the state of the country's water resources, identified problems and challenges related to water supply and water management infrastructure. Based on this analysis, a long-term strategy aimed at sustainable, efficient and environmentally safe use of water resources was developed [12]. Action plans have been developed to improve water supply systems, which are based on the national strategy. Specific action plans were developed to improve and modernize the water supply and sewerage systems. These plans provide for the introduction of new technologies, improvement of the existing infrastructure, as well as the introduction of measures to optimize the use of water resources [13, 14].

Scientific studies have also been conducted for effective water management. Research was conducted aimed at studying hydrological processes, water balance, the impact of climate change on water resources, and the development of new water supply management technologies. The results of these studies became the basis for making informed decisions on water management issues [1-6]. Partnerships with international organizations and foundations were also established. The country's government cooperated with international organizations, such as the United Nations, the World Bank, the International Union for Conservation of Nature and others, to obtain financial and technical support in the implementation of projects in the field of water management. Such partnerships contributed to attracting additional resources, expertise and transfer of best practices in the field of water resources management [15, 16]. However, it must be emphasized that the development of the water supply system is a long-term process that requires constant efforts and long-term planning. The implementation of integrated strategies, the joint activities of government and public organizations, technological progress and environmental education, these factors will collectively contribute to ensuring a sustainable and efficient water management in Albania.

Hydroelectricity is one of the most common types of renewable energy that uses the movement of water, such as rivers or reservoirs, to generate electricity. This process is based on the use of water flow to drive hydro turbines, which in turn drive generators, converting mechanical energy into electrical energy. The main component of hydroelectric power stations are dams that create reservoirs for storing water and creating the required hydrostatic pressure [17]. Water from the reservoir is fed through turbines, while mechanical energy is converted into electrical energy in generators. Hydroelectric power is an ecologically clean source of energy, as it is not accompanied by emissions of harmful substances and does not contribute to the effect of greenhouse gases. In addition, hydroelectricity is relatively stable and can provide sustainable electricity production for a long period of time [18]. However, the construction of reservoirs can have a negative impact on river ecosystems and lead to the resettlement of the local population. Taking into account these factors, it is necessary to carry out effective management of hydroelectric power with the aim of balanced use of this energy source. Risk assessment is an important stage in ensuring ecological regeneration and preservation of biodiversity of aquatic ecosystems.

Identifying potential risks, analyzing their likelihood and consequences, assessing risk and developing risk management strategies are key steps. Taking into account scientific data, statistical data and the interaction of natural and anthropogenic processes helps to determine the level of risk and identify possible consequences of pollution and use of water resources [19]. The development and implementation of risk management strategies contribute to the reduction of negative consequences of the implementation of environmentally friendly technologies, pollution control and protection of aquatic ecosystems. Risk assessment helps determine priorities for protection and restoration of water ecosystems, implementation of environmentally friendly technologies and ensuring sustainable use of water resources [20]. It serves as a basis for making decisions and developing policies aimed at preserving biodiversity and ecological regeneration of aquatic ecosystems.

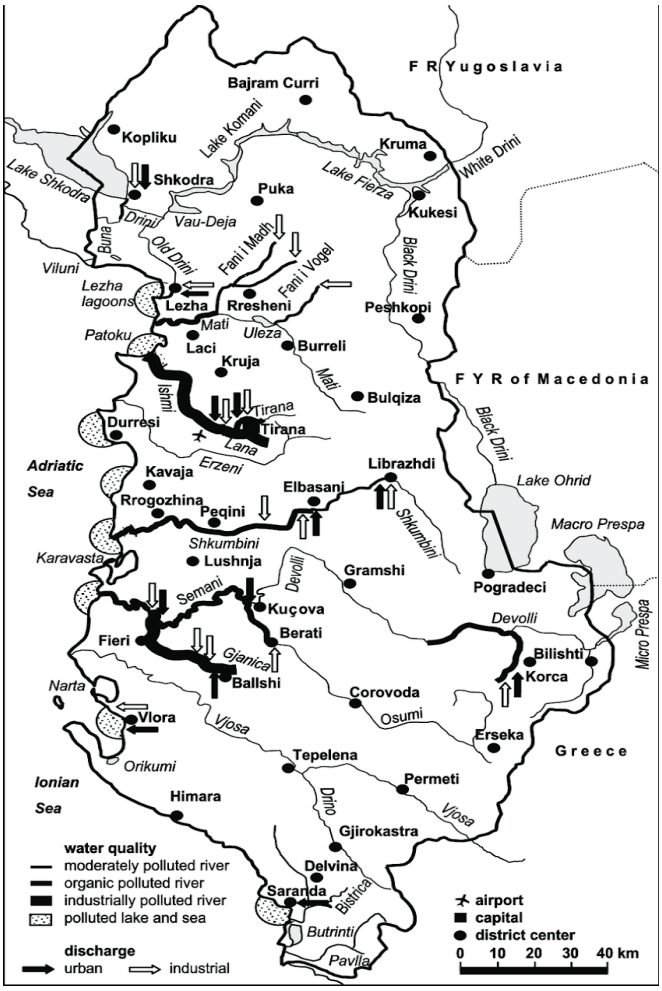

FIGURE 1. Hydrological map of Albania with main pollutants [15].

Solving the problems of wastewater treatment and improving the water supply system are indeed extremely important tasks for achieving sustainable water management. Each of these aspects has a major impact on the quality of water resources and our environment as a whole. Having an effective wastewater treatment system helps prevent pollution of natural bodies of water and groundwater. Untreated wastewater can contain harmful substances and bacteria, which poses a threat to human health and natural ecosystems [21]. The infrastructure of sewage treatment facilities and cleaning technologies must meet modern requirements and standards. The development and implementation of more efficient treatment methods, such as biological methods, can significantly improve the quality of wastewater before it is

returned to the environment. Conducting an environmental impact assessment before the construction of new water management projects is a mandatory procedure. It helps to identify possible negative consequences for nature, water resources, animals and plant species. Taking environmental aspects into account at the early stages of design allows for the development of plans to minimize the impact and implement compensatory measures. Such measures may include restoring ecosystems, creating new habitats for diverse species, and implementing green construction [22].

Improving the efficiency of the water supply system will help ensure a stable supply of clean drinking water and reduce the loss of water resources. It is important to develop and implement innovative technologies that will ensure optimal use of water and maintain a sustainable water balance. Involving the public and creating mechanisms for citizens' participation in decision-making regarding water resources management is key to ensuring the sustainability and efficiency of the water supply system. To achieve sustainable water management, collaboration between various parties such as government agencies, the private sector, academic institutions and the public is required. This comprehensive approach will preserve water resources, ensure high quality water for the population and support the diversity of natural ecosystems.

IV. DISCUSSION

According to the results of recent research by X. Xiang et al. [23], the management of urban water resources for sustainable environmental planning is an urgent task in modern urban situations. The use of artificial intelligence techniques can be a valuable tool to improve the efficiency of management and ensure the sustainable use of water resources in urban environments. One aspect of urban water resources management is forecasting and modelling of water systems. Artificial intelligence techniques, such as machine learning and data analysis, can help understand the complex relationships between different elements of the aquatic environment, including precipitation, run-off, water quality, and resource use. Artificial intelligence algorithms can analyze large volumes of data, recognize patterns and predict future water balance trends. In addition, artificial intelligence methods can be used to optimize water supply and sewage systems in cities. Algorithms can analyze water consumption data, usage patterns, and predict water demand [24]. This makes it possible to effectively manage the distribution of water resources and reduce losses. In addition, artificial intelligence can detect anomalies and malfunctions in water supply systems, which helps to ensure prompt diagnosis and repair. However, it is important to note that artificial intelligence methods cannot replace a human expert. Effective management of urban water resources requires the integration of technologies with the knowledge of specialists in the field of hydrology and ecology. The human factor remains an integral part of decision-making and development of management strategies.

Referring to the definition by H.V. Oral et al. [25], natural solutions for urban water management in European circular cities are increasingly important in efforts to ensure sustainable water supply and environmental sustainability in urban environments. Circular cities are a concept of urban development that aims to ensure the balanced use of natural resources and minimize the negative impact on the environment. One of the key aspects of natural solutions for water management is the creation and maintenance of natural water systems in urban environments. This may include the restoration and conservation of rivers, streams and reservoirs, the creation of wetlands, marshes, natural reservoirs and other aquatic ecosystems. These natural systems help conserve water resources, treat wastewater, control flood levels, and provide important ecosystem services. The use of natural solutions for urban water management in European circular cities allows for the creation of balanced, sustainable and ecologically clean urban environments. They contribute to the preservation of water resources, improvement of the quality of life of residents and the development of environmentally sustainable urban infrastructure. Continuation of research, cooperation and development of innovative approaches in this field is important for achieving the goal of sustainable urban development and ensuring the long-term viability of our cities.

Researchers B.K. Mishra et al. [26] determined that water security in a changing environment is an important challenge that arises as a result of climate change, population growth, and changes in the use of natural resources. This context requires attention to the effective management of water resources, ensuring access to safe drinking water, protection from floods and droughts, ensuring the ecological sustainability of

aquatic ecosystems and ensuring sustainable water supply for all. One of the main aspects of water security in a changing environment is adaptation to climate change. Climate change is leading to unpredictable changes in water cycles, an increase in extreme weather events, and an increased risk of floods and droughts [27, 28]. Effective adaptation involves developing strategies for balanced water management, including water conservation, increasing reservoir capacity, developing infrastructure for rainwater storage and use, run-off management, and river basin regulation.

I. Zahoor and A. Mushtaq [29] determined that one of the main causes of water pollution by agricultural activities is the removal of pesticides and mineral fertilizers from the fields to surface and underground waters. During irrigation or rainfall, these substances can mobilize and enter water sources. High concentrations of pesticides and fertilizers can have a harmful effect on aquatic ecosystems and human health. Waste from animal husbandry is also important, in particular excess fertilizers and feed residues, which can enter rivers and lakes through sewage or improper storage. This leads to the pollution of water sources, the growth of algae and a negative impact on the fish stock and other aquatic organisms. Effective control and management measures are needed to reduce water pollution from agricultural activities. For example, a good variant for applying fertilizers and pesticides is point systems, which will reduce their costs and minimize their potential run-off into water sources. It is also important to implement green technologies and use natural methods of soil and plant management, such as crop rotation, the use of compost and biological agents.

K. Chojnacka et al. [30] have shown through his work that the transition from traditional irrigation to fertigation with regenerated wastewater is an important step in agriculture, which can have significant prospects and problems. Fertigation is a method in which fertilizers and water are applied to plants together through a drip irrigation system or other special systems, allowing for more efficient use of resources and increased yields. One of the main benefits of switching to fertigation with reclaimed wastewater is a reduction in the use of freshwater in agriculture. In a world with limited freshwater resources, this is critical for food security and agricultural sustainability. Reclaimed wastewater is treated wastewater that can be reused for irrigation after appropriate treatment. This allows to reduce the pressure on natural water sources. Thus, the transition from traditional irrigation to fertigation with reclaimed wastewater is a significant prospect for increasing the sustainability of agriculture and the efficient use of water resources. However, it also faces certain technical, economic and environmental challenges that require attention and comprehensive solutions for the successful implementation of this approach.

As T. Luna et al. [31] note, increasing the energy efficiency of water supply systems by optimizing the schedule of pumps is an important step in modern water resources management. Optimizing the operation of pumps allows reducing energy consumption and operating costs, ensuring a more stable and efficient functioning of the water supply system. The analysis and forecast of water consumption allow determining the optimal periods of pump operation, taking into account peak and minimum demand, which helps to avoid excessive operation of pumps in periods of low consumption [32]. The use of variable-speed pumps and the integration of renewable energy sources also help reduce energy consumption and contribute to a greener operation of water supply systems. The interrelationships between these concepts remind of the need for an integrated and coherent approach to solving problems related to the environment and resources.

V. CONCLUSION

Sustainable water management, based on an integrated approach to solving the problems of wastewater treatment, assessing their impact on the environment and improving the water supply system, is an important strategy for the sustainable development of modern society. The demand for water resources is growing every year, requiring more efficient and ecologically balanced solutions in the field of water management. The study showed that the absence or ineffective treatment of wastewater leads to negative consequences for the environment. Accumulation of pollutants in reservoirs contributes to a decrease in water quality, a threat to public health and loss of biodiversity. In this context, the development and implementation of effective wastewater treatment technologies is a necessary task that will help ensure high water quality and create a stable water supply. An integrated approach to water management aims to ensure that all actions are directed towards the balanced use of water resources, rational planning and coordination of all activities. It involves the involvement of all stakeholders, including government bodies,

academic institutions, civil society organizations and the private sector, for joint decision-making and implementation of innovative practices. The use of renewable energy sources and the rational use of resources help to reduce energy costs in the process of wastewater treatment and water supply, which contributes to increasing the efficiency of these processes and reducing the negative impact on the environment. Application of modern water management technologies, including automation of systems and monitoring of water parameters, contributes to prompt response to changes in the water balance and ensures improvement of water quality and efficient use of water resources. In order to successfully solve the problems of water management, it is necessary to ensure constant monitoring of water quality and water condition, which will allow timely detection of pollution and take appropriate measures. Also, it is important to involve the public in the process of water management, which will contribute to increasing public awareness and active influence on decision-making. The results of this study provide a scientific basis for the development of strategies, policies and practices aimed at conserving water resources, improving water quality and reducing the negative impact on the environment.

REFERENCES

1. L. Shumka; A. Papastefani; S. Shumka; and S. Mali. The potentials for the ecological management of landscape connectivity including aquatic ecosystems in Northeast Albania. *Hydrobiology* **2023**, *Volume 2*, no. 1, pp. 44-54.
2. S. Knez; S. Strbac; and I. Podbregar. Climate change in the Western Balkans and EU Green Deal: Status, mitigation and challenges. *Energy Sustain Soc* **2022**, *Volume 12*, no. 1.
3. E. Jorgji; and A. Gjika. Determinants of green innovation: Firm-level evidence from Albania", in: *International Conference "Circular Economy: Opportunities and Challenges"*; Galati: Danubius University Press, 2022; pp. 812-825.
4. F. Widing. *Water and conflict – A case of hydropower, justice and water rights in Albania*; Stockholm: Stockholm University, 2021.
5. M. Preisner; M. Smol; M. Horttanainen; I. Deviatkin; J. Havukainen; M. Klavins; R. Ozola-Davidane; J. Kruopiene; B. Szatkowska; L. Appels; S. Houtmeyers; and K. Roosalu. Indicators for resource recovery monitoring within the circular economy model implementation in the wastewater sector. *J Environ Manag* **2022**, *Volume 304*, article no. 114261.
6. K. Xhexhi. An approach from ecovillages and ecocities to Tirana, Albania. *Ecovillages and Ecocities. The Urban Book Series;* Cham: Springer, 2023.
7. I. Myskovets; Ya. Molchak. Environmental problems from rainfall runoff. *Sci Horiz* **2023**, *Volume 26*, no. 8, pp. 109-116.
8. A. G. Olabi; K. Obaideen; K. Elsaid; T. Wilberforce; E. T. Sayed; H. M. Maghrabie; and M. A. Abdelkareem. Assessment of the pre-combustion carbon capture contribution into sustainable development goals SDGs using novel indicators. *Renew Sustain Energy Rev* **2022**, *Volume 153*, article no. 111710.
9. X. Peng; Y. Jiang; Z. Chen; A. I. Osman; M. Farghali; D. W. Rooney; and P. S. Yap. Recycling municipal, agricultural and industrial waste into energy, fertilizers, food and construction materials, and economic feasibility: A review. *Environ Chem Lett* **2023**, *Volume 21*, pp.765-801.
10. R. Narmanova; A. Tapalova; R. Zhapparbergenov; and N. Appazov. Biological products for soil and water purification from oil and petroleum products. *Evergreen* **2023**, *Volume 10*, no. 2, pp. 688-695.
11. G. Sargsyan; P. Gukasyan; H. Sargsyan; and R. Poveda. Diffusion flames and a semi-empirical method for estimating the distribution of hydrogen molecules in propane flames. *Sci Her Uzh Univ Ser Phys* **2023**, *Volume 53*, pp. 42-52.
12. M. Deineha; and V. Marinich. Natural resource and resource-based relations: the hierarchy of industries and the relationship between subjects. *Law Human Environ* **2021**, *Volume 12*, no. 3, pp. 60-74.
13. A. Cullaj; A. Hasko; A. Miho; F. Schanz; H. Brandl; and R. Bachofen. The quality of Albanian natural waters and the human impact. *Environ Int* **2005**, *Volume 31*, no. 1, pp. 133-146.
14. L. Pavliuk. Electron modelling in conjunction witch vacuum modelling. *Sci Her Uzh Univ Ser Phys* **2022**, no. 52, pp. 27-35.
15. Z. Spirkowski; O. Avramovski; and A. Kodzoman. Watershed management in the Lake Ohrid region of Albania and Macedonia. *Lakes and Reservoirs: Research and Management;* Hoboken: Wiley-Blackwell, 2001; pp. 237-242.
16. Hydrological map of Albania with the main polluting sites, drawn modified from UNEP, 2000. https://www.researchgate.net/figure/Hydrological-map-of-Albania-with-the-main-polluting-sites-drawn-modified-from-UNEP_fig8_8121855
17. T. Mazakov; S. Jomartova; G. Ziyatbekova; and M. Aliaskar. Automated system for monitoring the threat of waterworks breakout. *J Theor Appl Inf Technol* **2020**, *Volume 98*, no. 15, pp. 3176-3189.
18. A. Kuriqi; A. N. Pinheiro; A. Sordo-Ward; and L. Garrote. Influence of hydrologically based environmental flow methods on flow alteration and energy production in a run-of-river hydropower plant. *J Clean Prod* **2019**, *Volume 232*, pp. 1028-1042.
19. S. Ivanova; A. Vesnina; N. Fotina; and A. Prosekov. Influence of coal mining activities on soil's agrochemical and biochemical properties. *Qubahan Acad J* **2023**, *Volume 3*, no. 4, pp. 387-399.
20. K. Khavikova; and A. V. Ivanchenko. Improvement of Wastewater Treatment Technology with Sediment Disposal at Coke-Chemical Enterprises. *Bull Cherkasy State Technol Univ* **2021**, no. 4, pp. 54-67.
21. R. Andryani; E. Surya Negara; R. Syaputra; and D. Erlansyah. Analysis of academic social networks in Indonesia. *Qubahan Acad J* **2023**, *Volume 3*, no. 4, pp. 409-421.
22. M. Osintseva. Assessment of soil properties in technogenically disturbed lands of Kemerovo Oblast – Kuzbass. *Qubahan Acad J* **2023**, *Volume 3*, no. 4, pp. 77-92.

23. X. Xiang; Q. Li; S. Khan; and O. I. Khalaf. Urban water resource management for sustainable environment planning using artificial intelligence techniques. *Environ Impact Assess Rev* **2021**, *Volume 86*, article no. 106515.
24. V. Levchenko; O. Pogosov; and V. Kravchenko. Cobalt application in repair tools for maintenance and modernisation of NPP equipment. *Sci Her Uzh Univ Ser Phys* **2023**, no. 53, pp. 31-41.
25. H. V. Oral; P. Carvalho; M. Gajewska; N. Ursino; F. Masi; E. D. V. Hullebusch; J. K. Kazak; A. Exposito; G. Cipolletta; T. R. Andersen; D. C. Finger; L. Simperler; M. Regelsberger; V. Rous; M. Radinja; G. Buttiglieri; P. Krzeminski; A. Rizzo; K. Dehghanian; M. Nikolova; and M. Zimmermann. A review of nature-based solutions for urban water management in European circular cities: A critical assessment based on case studies and literature. *Blue Green Syst* **2020**, *Volume 2*, no. 1, pp. 112-136.
26. B. K. Mishra; P. Kumar; C. Saraswat; S. Chakraborty; and A. Gautam. Water security in a changing environment: Concept, challenges and solutions. *Water* **2021**, *Volume 13*, no. 4, pp. 490.
27. O. Bahatska; V. Melnyk; and O. Snarovkina. Assessment of drought resistance in plants of the genus Aristolochia L. *Ukr J For Wood Sci* **2023**, *Volume 14*, no. 3, pp. 8-20.
28. V. Ostanin. Effects of repulsion and attraction between rotating cylinders in fluids. *Sci Her Uzh Univ Ser Phys* **2022**, no. 51, pp. 39-47.
29. I. Zahoor; and A. Mushtaq. Water pollution from agricultural activities: A critical global review. *Int J Chem Biochem Sci* **2023**, *Volume 23*, no. 1, pp. 164-176.
30. K. Chojnacka; A. Witek-Krowiak; K. Moustakas; D. Skrzypczak; K. Mikula; and M. Loizidou. A transition from conventional irrigation to fertigation with reclaimed wastewater: Prospects and challenges. *Renew Sustain Energy Rev* **2020**, *Volume 130*, article no. 109959.
31. T. Luna; J. Ribau; D. Figueiredo; and R. Alves. Improving energy efficiency in water supply systems with pump scheduling optimization. *J Clean Prod* **2019**, *Volume 213*, pp. 342-356.
32. O. Buzhyn. Environmental safety management – classification method of solid combustible fossils. *Ecol Saf Balanc Use Resour* **2023**, no. 27, pp. 33-42.