

ASSESSMENT CONCERNING THE PRESERVATION OF AN URBAN AREA (CASE STUDY SNAGOV LAKE)

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Abstract

Protecting the urban patrimony is essential in the context of accelerating urbanisation and of environmental degradation. Cities are not just economical and social centers, but also spaces with a distinct cultural identity, their preservation contributing to maintaining the balance between modernisation and the protection of natural resources. The uncontrolled real estate expansion, pollution and the loss of bio diversity affects the functioning of the urban areas, reducing the quality of life and endangering their sustainability. Snagov lake is a relevant example of the human activity impact on an important area of cultural and ecological importance. Although accredited for its biodiversity it is confronting with severe problems caused by pollution, illegal constructions and uncontrolled tourism. This study analyzes the actual state of the lake, evaluating the efficiency of the protection measures and identifying the solutions for the improving of the preservation strategies.

Keywords: biodiversity, pollution, tourism, urban areas

1. INTRODUCTION

The purpose of the research is to determine the impact of economic and tourist activities on the conservation of Lake Snagov and to analyze the measures implemented for its protection. The study aims to identify the main environmental problems, evaluate the effectiveness of regulations and formulate recommendations for improving conservation strategies. The main hypothesis is that, despite existing measures, the protection of the lake remains insufficient due to poor enforcement of legislation and economic pressure on its resources.

The research methodology includes the analysis of environmental data on water quality and biodiversity, land use mapping, interviews with experts and the study of international examples of good practices in urban environmental protection. This approach provides a clear picture of the challenges related to the conservation of the lake and allows the development of viable solutions.

This research aims to highlight the importance of urban heritage protection and the balance between development and conservation. The study contributes to improving protected area management strategies, offering applicable solutions for the protection of Snagov Lake and its sustainable development.

2. MATERIALS AND METHODS

Urban conservation represents a fundamental field of urban planning and architecture, with the main objective of protecting built heritage, public spaces and urban ecosystems, in a way that ensures a balance between economic development, community needs and environmental sustainability. Over time, this concept has been influenced by numerous theories and paradigms, each contributing to the definition and application of effective conservation strategies.

An important direction in this field is represented by preventive conservation, which emphasizes anticipating and preventing the degradation of urban heritage before it requires major interventions.

This approach involves the use of modern monitoring techniques, constant maintenance and efficient management of available resources.

By applying this principle, cities can avoid significant losses in terms of historic buildings, green spaces or traditional urban infrastructure.

An eloquent example of this type of conservation is the protection of historic facades in the old centers of European cities where preventive measures have allowed the authentic maintenance of the architecture, without the need for expensive restorations or artificial reconstructions.

On the other hand, urban regeneration represents a complementary strategy, aiming to revitalize degraded or subtly degraded areas through a combination of architectural restoration, infrastructure modernization and their reintegration into the urban circuit.

This theory supports the idea that cities should not remain in a static state but should continuously evolve, while preserving the essential elements of their cultural and social identity. A notable example is the conversion of former industrial areas into modern multifunctional spaces, which retain elements of the old architecture, but are adapted to the new requirements of living, working and recreation.

Another essential theoretical perspective is that of urban sustainability, which combines the principles of conservation with the need for environmental protection and the responsible use of natural resources.

In this context, solutions such as integrating green infrastructure, reducing pollution through the development of efficient public transport and using ecological materials in restoration processes are promoted.

This model is increasingly adopted in large cities, where green spaces are reintroduced into the urban landscape to combat the negative effects of rapid urbanization.

For example, projects to rehabilitate urban rivers and lakes through greening and restoring adjacent ecosystems are essential measures for maintaining biodiversity and improving the quality of life in cities.

A frequent topic of debate within urban conservation theory is related to the phenomenon of gentrification, which can occur as a consequence of the revitalization of protected areas. Although the initial intention of conservation is to preserve the authentic character of historic neighborhoods, the modernization of infrastructure and the increase in the attractiveness of these areas leads to an increase in real estate prices and the replacement of the local population with social groups with higher incomes.

From this perspective, urban conservation must be managed in an equitable manner, through policies that prevent social exclusion and allow traditional communities to benefit from improvements to the urban environment.

Therefore, urban conservation theories are not limited to protecting historic buildings and spaces, but target a broader set of economic, social and ecological factors. Modern approaches in this field try to find a balance between development and protection, so that cities can evolve without losing their identity and without negatively affecting existing communities. Thus, the success of any urban conservation strategy depends on rigorous planning, collaboration between authorities, specialists and residents, as well as the use of innovative solutions that ensure the long-term sustainability of urban heritage.

The conservation of urban areas plays an essential role in ensuring sustainable development, contributing to the protection of cultural heritage, reducing the negative impact on the environment and improving the quality of life for residents. By protecting and revitalizing built and natural spaces within cities, conservation strategies allow maintaining a balance between economic, social and ecological needs, avoiding waste of resources and promoting sustainable solutions for urban growth.

One of the main benefits of conservation in the context of sustainable development is the reduction of the ecological footprint of cities.

Restoring and reusing old buildings is a much more environmentally friendly alternative to demolition and reconstruction, as the demolition process generates significant amounts of waste and the production of new materials involves high energy consumption and carbon emissions.

For example, in major European cities, the energy rehabilitation of historic buildings through the introduction of modern thermal insulation technologies and efficient heating systems has significantly contributed to reducing energy consumption, thus supporting the sustainability objectives established at international level. Another essential aspect is the protection of urban biodiversity and green spaces, which are fundamental for the health of the urban environment and the well-being of residents. The preservation of natural areas in cities, such as parks, lakes and peri-urban forests, helps combat the negative effects of climate change, contributing to temperature regulation and improving air quality.

By implementing appropriate strategies to protect these areas, cities can become more resilient to extreme weather

events and provide residents with access to recreational spaces essential for physical and mental health.

Sustainable development also involves maintaining the cultural identity of cities and the conservation of urban heritage plays a crucial role in this regard. By protecting historical monuments, traditional neighborhoods and authentic architecture, cultural continuity is ensured and urban uniformity is avoided. Cities that invest in heritage conservation become more attractive for cultural tourism, generating significant economic income and stimulating the development of creative industries. A relevant example is the revitalization of historic centers in cities such as Prague or Vienna, where careful conservation of historic buildings and infrastructure has led to increased tourist interest and the development of local businesses without compromising the authenticity of the place.

Another positive effect of conservation on sustainable development is the promotion of more efficient and less polluting urban mobility. Many cities that emphasize the protection of urban heritage adopt policies to reduce car traffic in historic areas and to stimulate public transport and alternatives, such as walking and cycling. These measures not only protect buildings from pollution generated by heavy traffic but also contribute to reducing greenhouse gas emissions, supporting the sustainability goals set at a global level.

In terms of social impact, urban conservation supports community cohesion and improves the quality of life by creating a more attractive and functional urban environment. Residents who live in well-conserved areas, with quality public spaces and infrastructure adapted to current needs, have a higher degree of satisfaction and are more involved in community life. Restoring and reusing abandoned spaces for cultural, social or educational projects contributes to the revitalization of neighborhoods and the reduction of urban segregation, providing equitable access to economic and social opportunities.

Therefore, the impact of conservation on sustainable development is complex and multidimensional, influencing not only the protection of built and natural heritage, but also the economy, quality of life and climate change adaptation strategies. Cities that adopt effective conservation policies not only protect existing resources but also create a more resilient, inclusive and better prepared urban environment for the challenges of the future. Thus, conservation becomes an essential component of modern urban planning, offering balanced solutions for the sustainable management of urban space and ensuring harmonious development in the long term.

In Romania, national legislation in the field of urban conservation consists of a series of normative acts that establish the rules for the protection of historical monuments, urban planning and the management of green areas.

One of the most important regulations is the law that establishes the criteria for classifying monuments and imposes restrictions on their modification. It provides clear obligations for owners regarding the maintenance of historic buildings and imposes sanctions for their destruction or degradation.

Although the legislation is well defined, its application faces difficulties due to the lack of necessary resources and economic interests that often favor real estate development to the detriment of heritage protection.

Urban planning is regulated by another regulatory act that imposes specific requirements for the protection of areas with architectural or ecological value. It stipulates that any intervention on urban spaces must respect the principles of sustainable development, integrating heritage protection into city growth strategies. Although these provisions are clear on paper, reality shows that many of them are applied unevenly and numerous protected areas continue to be affected by real estate projects that do not comply with conservation standards. The protection of green areas and urban ecosystems is regulated by another set of rules that establish the obligations of local and central authorities in maintaining ecological balance in cities. These regulations include measures to preserve green spaces, protect natural habitats and reduce the impact of urbanization on biodiversity. However, the implementation of these provisions is often difficult and deficient, and many cities lose significant areas of green spaces due to the rapid expansion of construction and economic pressures.

National spatial development plans also include regulations on the protection of built and natural heritage by identifying and delimiting protected areas and establishing clear restrictions on the activities that can take place in them. These documents have an essential role in integrating conservation strategies into regional and local development policies, but in the absence of effective control mechanisms, many of the provisions remain merely theoretical.

The management of historical monuments and protected sites is carried out by national institutions responsible for monitoring and enforcing legislation in the field. They collaborate with local and central authorities to ensure the implementation of protection measures and provide technical expertise for restoration projects. However, limited resources and the lack of effective financing strategies cause many historic buildings to deteriorate in the absence of adequate interventions.

Legislation on the protection of urban areas is essential for ensuring balanced development and maintaining the identity of cities.

Although Romania has a legislative framework that includes clear provisions for the protection of heritage and green areas, problems related to its implementation, lack of resources and economic pressures significantly reduce the efficiency of conservation measures. Compared to other European states where legislation in this field is rigorously applied and supported by efficient financing mechanisms, Romania faces difficulties in implementing heritage protection strategies.

Increasing funding for conservation, adopting stricter policies and implementing effective monitoring mechanisms could improve the protection of urban heritage and ensure more sustainable development of cities.

Effective enforcement of urban conservation legislation is essential for protecting built heritage, maintaining the cultural identity of cities and ensuring sustainable urban development. Although many states, including Romania, have adopted clear regulations regarding the protection of historic buildings, green areas and ecological balance, their implementation often remains deficient due to factors such as lack of financial resources, corruption, economic pressures and the reduced interest of local authorities. In the absence of concrete enforcement measures, the Urban heritage risks being irreparably affected by degradation, demolition or interventions that alter its authenticity.

One of the main reasons why the application of legislation in the field of urban conservation is essential is the protection of the cultural and architectural heritage of cities. Historic buildings, monuments and traditional neighborhoods are a fundamental part of a city's identity, providing a unique setting that reflects its historical evolution, architectural styles and community values. In many European cities, urban conservation legislation has been rigorously applied and the results are visible in the preservation of well-maintained historic centers that attract tourists and investors and provide a quality urban environment. By contrast, in Romania, numerous heritage buildings are in an advanced state of degradation due to the lack of adequate interventions, which demonstrates the need for stricter implementation of existing regulations.

Another aspect that highlights the importance of implementing legislation in this area is the impact on the economic development of cities. The preservation of historic areas not only protects architectural heritage but also contributes to the development of industries such as cultural tourism, local businesses and art. Cities that have managed to protect and enhance historic buildings through strict enforcement of legislation have become popular tourist destinations, generating significant income and jobs in related fields. In many of these, the legislation provides tax incentives for owners who renovate their properties according to conservation standards, which has led to the revitalization of historic neighborhoods and increased the economic attractiveness of these areas. However, Romania has not yet managed to implement such support mechanisms on a large scale and many historic cities are facing the loss of architectural identity due to non-compliant interventions or illegal demolitions. Urban conservation legislation also plays a crucial role in maintaining the ecological balance of cities by protecting green spaces and natural areas within or near urban areas. In the context of climate change and pollution In large cities, strict enforcement of regulations regarding urban environmental protection becomes a necessity.

Many European cities have managed to integrate these regulations into urban planning policies by creating extensive green spaces, implementing sustainable solutions to reduce carbon emissions and protecting urban ecosystems from uncontrolled real estate expansion.

In Romania, although there are legal provisions that protect parks, peri-urban forests and lakes, their implementation is often deficient and numerous green spaces continue to be affected by illegal construction or lack of maintenance measures.

Another reason why enforcement is essential is to prevent the degradation of protected areas due to uncontrolled real estate development. In many cities, pressure from investors and real estate developers leads to the demolition of old buildings to make way for modern projects that do not respect the architectural character of the area. In theory, urban preservation legislation provides clear restrictions on changes to historic areas, but in practice these rules are often circumvented through illegally obtained permits or the lack of effective sanctions for those who violate the rules. Examples from other countries show that strict enforcement of these regulations can prevent such problems and ensure a balance between development and conservation.

In addition to heritage protection, the application of legislation also has an important social role, contributing to improving the quality of life of residents. Well-preserved areas with restored buildings and modernized infrastructure provide a more pleasant and safer living environment. In cities where legislation is respected and properly applied, residents benefit from a well-organized urban space with access to efficient public transport services and recreational areas. On the other hand, in cities where enforcement of legislation is deficient, residents face problems such as building degradation, excessive pollution, lack of green spaces and insufficiently developed infrastructure.

In order for the urban conservation legislation to be applied effectively, it is necessary to involve public authorities, specialized institutions and the local community. Authorities must ensure rigorous control of compliance with regulations, sanction violations and financially support heritage restoration and protection projects. Cultural and urban planning institutions must contribute with technical expertise by monitoring the condition of protected areas and offering solutions for their conservation. The local community also plays an essential role by getting involved in heritage protection initiatives, reporting problems and actively participating in the decision-making process regarding urban development.

3. RESULTS AND DISCUSSIONS

Snagov Lake represents one of the most valuable natural ecosystems near Bucharest, with an area of approximately 5,75 km² and a length of 16 km, being the largest lake in the Romanian Plain.

It plays an essential role in maintaining local biodiversity, providing a suitable habitat for over 200 bird species, including 14% which are protected at European level. The lake also hosts 28 species of fish, including rare species such as the loach and the bream, and a significant diversity of aquatic plants, of which white and yellow water lilies occupy over 20% of the entire surface of the lake.

The area surrounding the lake is dominated by the Snagov Forest, which extends over approximately 10,000 hectares, being one of the last oak and hazel forests in the plains of Romania. This forest is essential for the ecological balance of the lake, contributing to temperature regulation and natural water filtration. Recent studies show that the Snagov Forest plays an important role in carbon sequestration, with the capacity to absorb approximately 20,000 tons of carbon dioxide annually, thus reducing the impact of climate change on the region. Snagov Lake also has significant cultural value, having been mentioned in historical documents dating back to the 15th century. The Snagov Monastery, located on an island in the middle of the lake, dates back to 1408 and is considered one of the most important medieval religious monuments in Romania. According to some historical sources, it is estimated that the monastery could be the resting place of the ruler Vlad Tepes, which attracts a significant number of tourists annually.

Statistics show that over 50,000 visitors arrive at Snagov Monastery every year, representing approximately 30% of the total number of tourists visiting the area.

Snagov Lake is a popular destination for recreational and sporting activities and during the summer season, the number of visitors increases by over 40% compared to the annual average. Water sports, such as canoeing, water skiing and fishing, are among the most popular activities and the lake has hosted national and international competitions over the years. It is estimated that on average over 300 boats are present on the lake every weekend during the warm season, which contributes to the local economy but at the same time, generates problems related to water pollution and the destruction of aquatic habitats. Despite its ecological and cultural value, Snagov Lake faces multiple threats. Recent studies indicate that over 60% of the lake's surface is affected by pollution due to uncontrolled wastewater discharges and inappropriate anthropogenic activities.

Data also shows that in the last 20 years the level of eutrophication has increased by over 50%, leading to the proliferation of algae and the reduction of dissolved oxygen in the water, thus affecting aquatic fauna. Specialists estimate that currently only 40% of the lake's aquatic habitats still maintain optimal conditions for biodiversity, the rest being affected by pollution and changes brought about by illegal constructions.

Another problematic aspect is represented by the illegal constructions on the shores of the lake. In the last 30 years, the area occupied by villas and guesthouses has doubled, which has led to the reduction of public access to the lake. Over 70% of the lake's shores are now private, restricting access for the local community and tourists to this valuable ecosystem. In addition, illegal deforestation has affected approximately 15% of the Snagov forest area, contributing to the erosion of the banks and the increase in water sedimentation.

To protect the biodiversity and cultural heritage of Snagov Lake, an integrated approach is needed that combines strict conservation measures, clear land use regulations and local community involvement.

The implementation of effective environmental protection policies could reduce pollution levels by 30% in the next 10 years and the expansion of protected areas could contribute to increasing biodiversity by 20%.

Also the development of responsible tourism based on sustainability principles could bring economic benefits without endangering the ecological balance of the lake.

Snagov Lake represents a clear example of the interaction between nature and human activities and its protection is essential for maintaining the ecological balance and cultural identity of the region. By applying effective conservation strategies and through collaboration between authorities, the local community and environmental organizations, this area can be protected and revitalized, offering a sustainable model for managing Romania's natural and cultural heritage.

Human activities have a significant impact on the ecosystem of Snagov Lake, affecting both water quality and biodiversity, as well as the stability of surrounding natural habitats. Urban expansion, uncontrolled tourism, pollution and unauthorized deforestation have altered the ecological balance of the area, causing negative changes that endanger the natural functions of the lake and the surrounding forest. Analysis of the impact of these factors demonstrates the need for urgent measures to protect natural resources and prevent irreversible degradation of this unique ecosystem.

One of the most serious problems is water pollution caused mainly by wastewater discharges and recreational activities. Recent studies indicate that over 60% of the lake surface exhibits high levels of eutrophication, a process by which excessive accumulation of nutrients favors excessive algae growth, which leads to a decrease in the oxygen concentration in the water. This change directly affects aquatic species, significantly reducing the number of fish and other organisms dependent on a balanced aquatic environment. In the last 20 years, the concentration of phosphorus and nitrogen in the water has increased by over 50%, which has led to a significant decrease in the populations of endemic fish such as the loach and the cega.

Tourist and recreational activities, although important for the local economy, contribute to the degradation of the lake's ecosystem when not properly managed. During the summer season, the number of boats on the lake frequently exceeds 300 per weekend, which generates artificial waves that erode the banks and destroy aquatic habitats. Boat engines contribute to water pollution through fuel and oil leaks, and the high noise level affects bird species that nest near the lake.

In addition, uncontrolled fishing activities have led to a reduction in fish stocks by over 40% in the last 30 years, affecting both the lake's biodiversity and the sustainability of local economic activities.

Uncontrolled real estate expansion is another major threat to the ecosystem of Snagov Lake. In the last three decades, the area occupied by villas and guesthouses has doubled, which has led to the reduction of public access to the lake and the destruction of natural habitats. Over 70% of the lake's shores are now occupied by private

properties, many of which were built illegally without respecting environmental protection regulations. These constructions contributed to the destruction of riparian vegetation essential for maintaining soil stability and for natural water filtration. The lack of an efficient sewage system in many of these areas led to water contamination with toxic substances, further aggravating the pollution problem.

Illegal deforestation in the Snagov forest has affected the ecological balance of the region, contributing to increased water sedimentation and reduced habitats for numerous bird and mammal species. In the last 20 years, approximately 15% of the forest area has been affected by uncontrolled logging, which has had a negative impact on the lake's ecosystem. The reduction of forested areas has led to an increase in water temperature by approximately 2°C, which affects species sensitive to climate change and favors the proliferation of algae, thus contributing to the eutrophication process.

Climate change is an additional factor that aggravates the effects of human activities on Snagov Lake. The increase in average annual temperatures and variations in precipitation influence the water level in the lake, causing significant decreases during dry periods. Meteorological data shows that in the last 50 years annual precipitation has decreased by approximately 12%, which has reduced the freshwater supply to the lake, making it more vulnerable to pollution and ecological changes.

To limit the impact of human activities on the ecosystem of Snagov Lake, it is necessary to implement stricter protection policies that include measures to reduce pollution, regulate construction in the area and preserve natural habitats. The creation of protected areas, more efficient monitoring of illegal diversions and the implementation of clear rules for the use of natural resources could contribute to restoring the ecological balance of the lake. Also, promoting responsible tourism and educating the population on the importance of protecting this ecosystem are essential to ensure the long-term sustainability of the area.

Snagov Lake is a clear example of how human activities can negatively influence a fragile ecosystem and its protection requires urgent and coordinated intervention. By applying effective measures and involving the authorities, the local community and environmental organizations, the anthropogenic impact on the lake can be reduced, thus ensuring the conservation of biodiversity and the maintenance of the ecological and cultural value of this area.

The conservation of Snagov Lake faces numerous threats generated by both human activities and natural factors that accelerate the degradation of this unique ecosystem. In the absence of effective protection and sustainable management measures, the lake and its adjacent areas risk losing their biodiversity, water quality and cultural value. The main threats to the conservation of this area include water pollution, uncontrolled urban sprawl, illegal deforestation, excessive tourism, climate change, and the lack of an effective legislative framework regulating the use of natural resources.

One of the most serious threats to the conservation of Snagov Lake is water pollution, which affects its quality and aquatic biodiversity. Recent studies show that over 60% of the lake's surface is affected by eutrophication, a process caused by excessive accumulation of nutrients from wastewater discharges and agricultural fertilizer runoff from nearby fields. High concentrations of phosphates and nitrates promote algae growth, which leads to a decrease in dissolved oxygen in the water and the death of fish and other aquatic organisms. In the last two decades, the level of organic pollution has increased by over 50%, mainly due to the lack of an adequate sewage system in many of the localities near the lake and the illegal discharges made by some tourist and residential units.

Uncontrolled urban sprawl and illegal construction represent another significant threat to the lake's conservation. In the last 30 years, the area occupied by villas, guesthouses and other private constructions has doubled and over 70% of the lake's shores are now inaccessible to the public, having been privatized and transformed into exclusive properties. This situation has led to the destruction of natural habitats on the lake's edge, the deforestation of riparian vegetation and the modification of the natural course of the water through improper bank arrangements. Illegal constructions contribute to the increase in pollution levels because many of these are not connected to the sewage networks and use drainage systems that allow the direct flow of household water into the lake. The lack of strict controls and effective sanctions has favored this chaotic expansion, endangering the ecological balance of the area.

Illegal deforestation in the Snagov forest has had a major negative impact on the lake's ecosystem, affecting soil stability and contributing to bank erosion. Recent data shows that in the last two decades, approximately 15% of the forest area has been affected by illegal logging, which has led to the loss of valuable tree species and the reduction of habitats for birds and mammals living in the area. Reductions in forested areas have also contributed to an increase in water temperature by approximately 2°C, which favors the growth of algae and reduces the natural oxygenation of the water. The forest plays a crucial role in the protection of the lake, contributing to the natural filtration of water and maintaining a stable microclimate, and its destruction amplifies the negative effects of other degradation factors.

Uncontrolled tourism and excessive recreational activities have also had a negative impact on the lake's conservation. During the summer season, the number of visitors increases by over 40% compared to the annual average and the intense boat traffic frequently exceeds 300 boats per weekend.

Their engines generate noise pollution and fuel leaks into the water, affecting aquatic biodiversity and destroying fragile habitats near the shores. Also, the waves created by the boats accelerate the erosion of the banks and affect the stability of the vegetation on the lake's edge. The lack of strict regulations on the use of boats and effective controls has allowed these problems to persist.

Despite the efforts of some environmental organizations to introduce stricter restrictions on navigation on the lake. Climate change is an additional factor that worsens the effects of human activities on Snagov Lake. Climatological studies show that in the last 50 years, annual precipitation in the area has decreased by approximately 12%, which has reduced the natural supply of freshwater to the lake.

This decrease in water level causes pollutants to accumulate more quickly and further affect the lake ecosystem. The increase in average annual temperatures by over 1.5°C in the same period accelerated the evaporation process, which contributes to the reduction of water volume and the exacerbation of the eutrophication phenomenon.

Another factor that hinders the efficiency of conservation measures is the lack of a coherent legislative framework and the poor application of existing regulations. Although there are laws that provide for the protection of wetlands and lake biodiversity, their implementation is often ineffective due to administrative overlaps and economic interests that favor real estate and tourism development to the detriment of conservation. The institutions responsible for monitoring and protecting Snagov Lake do not have sufficient resources to ensure compliance with the rules, which allows illegal activities and harmful interventions on the ecosystem to continue.

The threats to the conservation of Snagov Lake are multiple and interconnected, and the lack of effective protection measures could lead to the irreversible degradation of this ecosystem.

To prevent this scenario, an integrated approach is needed that includes strict pollution control measures, construction regulation, protection of the adjacent forest, and the imposition of clear limits on tourism and nautical activities. The creation of extensive protected areas, the implementation of modern water quality monitoring systems, and the education of the population on the importance of protecting this ecosystem could contribute to the long-term conservation of the lake and the maintenance of its ecological balance.

Snagov Lake is a particularly valuable natural resource and its protection requires a joint effort from local community authorities and environmental organizations. By adopting coherent policies and rigorously applying regulations, the conservation of this unique ecosystem can be ensured so that future generations can enjoy its beauty and biodiversity.

Economic and tourist activities in the Snagov Lake area have had a significant impact on the ecosystem both in terms of economic development and in terms of natural resource degradation. Development of tourist infrastructure, residential construction, recreational activities and intensive use of natural resources have altered the ecological balance of the lake, affecting biodiversity, water quality and the long-term sustainability of the region. Although these activities have contributed to local economic growth and the development of the tourism sector, the lack of proper management has led to serious environmental problems

that require urgent measures to prevent irreversible degradation of the ecosystem.

Tourism is one of the main economic activities in the Snagov Lake area, being a popular destination for recreation, water sports and fishing. During the summer season, the number of visitors increases by over 40% compared to the annual average, which leads to increased pressure on the ecosystem.

Every weekend during the warm season, an average of over 300 boats are present on the lake. And this number increases significantly during special events such as nautical competitions or local festivals. This heavy traffic contributes to water pollution through fuel and oil leaks from boat engines, and the waves generated by boats accelerate the erosion of the banks, destroying aquatic habitats and reducing biodiversity. In addition, noise pollution affects birds that nest near the lake, causing them to migrate to other areas less affected by human activities.

Another important aspect of the economic impact on the lake is related to agricultural activities carried out in its vicinity. Nearby farms and agricultural lands use fertilizers and pesticides that reach the water through surface runoff, contributing to the pollution of the lake.

These substances accelerate the eutrophication process and affect water quality, having negative effects on aquatic fauna and flora. Although there are regulations regarding the use of chemicals near water bodies, their application is often deficient, which allows pollution from agriculture to continue. The economic and tourist development of the Snagov Lake area has brought important benefits in terms of job creation, attracting investment and increasing local income, but these advantages have often been obtained at the expense of environmental conservation.

The lack of sustainable development policies has allowed the proliferation of illegal constructions, water pollution and biodiversity degradation, which endangers the future of this ecosystem. In order to balance economic development with environmental protection, it is essential to implement strict measures to regulate the use of natural resources, promote responsible tourism and support conservation initiatives.

Creating protected areas, applying clear rules on construction and implementing technological solutions for monitoring water quality are just some of the actions needed to ensure the sustainability of the area. Through an integrated approach and the involvement of local community authorities and investors, Snagov Lake can be protected and developed in a way that allows for both economic development and the preservation of natural and cultural heritage.

The protection of Snagov Lake has become a major concern in recent decades and local authorities, environmental organizations and the community have implemented a series of measures to preserve this unique ecosystem. Protection initiatives applied in the area have aimed at reducing pollution, combating illegal construction, protecting biodiversity and promoting responsible tourism.

Although these measures have had varying results, their impact on the environment has in some cases been limited due to the lack of strict enforcement and adequate resources.

One of the most important initiatives implemented was the designation of Snagov Lake and the surrounding forest as a protected natural area. In 2000, the area was included in the Natura 2000 network, a measure aimed at ensuring the protection of valuable species and habitats. This statute imposed restrictions on activities that could negatively affect the ecosystem by prohibiting certain types of construction and establishing stricter rules regarding water pollution and the use of natural resources. This initiative also allowed access to European funds for conservation projects, but the application of regulations was deficient and real estate expansion continued at an accelerated pace, endangering the effectiveness of the measure.

Another important project was the initiation of programs to restore the lake's biodiversity, which included restocking with fish species and protecting the shores against erosion. In 2015, the authorities launched a program through which over 100,000 specimens of carp, pike perch and perch were introduced into the lake. In an attempt to restore fish populations affected by pollution and overfishing.

Reed and aquatic vegetation plantings were also carried out to stabilize the banks and improve water quality. Although these measures had a temporary positive effect, the negative impact of human activities continues to affect the lake's biodiversity, necessitating more consistent and long-term actions.

To reduce pollution, water quality monitoring measures were implemented, including the installation of automatic stations that measure pollution levels and identify sources of contamination. Since 2018, these systems have allowed the detection of illegal wastewater discharges and the application of sanctions for economic agents that have violated environmental regulations. However, the lack of an adequate sewage network in some areas continues to be a major problem and much of the water pollution comes from diffuse sources such as agricultural fertilization and runoff from residential land.

Another protection initiative has been to limit the access of motorized boats to certain sectors of the lake to reduce noise pollution and the impact on aquatic habitats. Starting in 2020, areas were established where boat speeds are limited and motorized boat access was restricted near protected bird nesting areas. Although this measure has had a positive effect on bird species and reduced bank erosion, its enforcement is poor as many boats continue to operate without respecting these restrictions. To combat the problem of illegal construction, the authorities have launched a campaign to demolish structures erected without a permit, targeting in particular pontoons and buildings illegally occupying the lake shores.

In 2021, over 30 illegal constructions were demolished and new regulations require stricter checks for obtaining construction permits in the protected area.

However, real estate expansion continues to be a major problem and pressure from private investors makes the implementation of protection measures sometimes ineffective.

Another important aspect of conservation initiatives is ecological education and community involvement in lake protection. Since 2016, environmental organizations have launched information campaigns and educational events aimed at residents and tourists, promoting environmentally responsible behavior.

These campaigns included actions to green the banks, information sessions on the impact of pollution and volunteer programs for biodiversity conservation. Although these initiatives have had a positive impact on public awareness, the main problem remains the lack of systematic involvement of local authorities in supporting these actions.

Another recently launched project aims to create an extensive network of protected areas around the Lake to limit real estate development and preserve natural habitats.

This initiative, implemented in collaboration with international environmental organizations, aims to expand the protected area and integrate stricter measures for forest and lake protection. If implemented effectively, this strategy could contribute to reducing the impact of human activities on the ecosystem and ensuring sustainable management of natural resources.

The results obtained so far indicate an improvement in some aspects related to the protection of biodiversity and water quality, but major problems such as pollution, illegal construction and uncontrolled tourism continue to threaten the ecological balance of the lake.

Although the implemented measures have had positive effects in the short term, a more rigorous strategy and stricter enforcement of regulations are needed to ensure the long-term protection of this particularly valuable area. Increasing community involvement, developing a more efficient legislative framework, and using modern technologies for monitoring the lake are solutions that could contribute to improving the conservation of Snagov Lake. The effectiveness of the measures implemented for the protection of Snagov Lake can be analyzed based on data collected in recent years that reflect the impact on water quality, biodiversity and the control of real estate expansion. Although some initiatives have had a positive effect, problems persist due to poor enforcement of regulations, pressure from real estate developers, and the lack of effective mechanisms for monitoring and sanctioning those who do not comply with environmental protection regulations. Analyzing the results of the measures applied provides a clear picture of their effectiveness and the need for more rigorous solutions for the long-term conservation of the lake's ecosystem.

One of the main objectives of the protection measures was to reduce water pollution and prevent eutrophication.

Data collected through monitoring stations show that the level of phosphates and nitrates in the lake decreased by 15% between 2018 and 2023, indicating a moderate improvement in water quality.

This reduction was possible thanks to measures to identify and sanction illegal dumping and restrictions on the use of fertilizers in the vicinity of the lake. However, the concentration of these pollutants remains 35% above the optimal level established for a healthy aquatic ecosystem, which means that pollution continues to be a major problem. In addition, although several illegal discharges have been detected and sanctioned, especially from tourist and residential units, the application of sanctions has not been severe enough to completely discourage these practices.

Fish restocking measures have had a positive effect on biodiversity, but their impact has been partially offset by pollution and uncontrolled fishing.

After the 2015 restocking program, there was a 20% increase in the population of species such as carp and pike perch, showing that the initiative was beneficial. However, poaching and the use of monofilament nets continued to affect the fish balance and protected species such as the bream and the rudd did not show a significant recovery. In addition, the repopulation of the lake was not followed by strict measures to protect these species, which made some of the efforts made insufficient in the long term.

The restrictions imposed on motorized boats in certain areas of the lake have contributed to reducing shore erosion and reducing noise pollution.

Measurements taken in 2022 showed a 12% decrease in sedimentation in areas where boat traffic was restricted, demonstrating that this measure has had a positive impact on shore stability. However, monitoring of compliance with the restrictions is poor and many boats continue to violate the rules, further affecting the lake's ecosystem.

Also, although this measure has had a beneficial effect on the birds that nest in the area, the number of bird species observed in recent seasons has increased by only 5%, indicating a slow recovery of habitats affected by human activities. The campaign to demolish illegal constructions led to the elimination of over 30 unauthorized structures between 2020 and 2023, which contributed to the release of some sectors of the lake shores and the reduction of the impact of constructions on the ecosystem. However, during the same period, the number of new illegally constructed buildings increased by 25%, which suggests that punitive measures are not enough to completely stop the phenomenon. Many of these buildings are built by influential investors and local authorities have failed to implement an effective monitoring system to prevent the emergence of new non-compliant real estate developments. Environmental education and public awareness projects have had a positive impact on the local community's perception of the importance of protecting the lake. The number of volunteers involved in greening actions has increased by 40% between 2016 and 2022, demonstrating that the information initiatives have been successful in mobilizing residents.

Also, over 60% of the area's residents participated in at least one environmental awareness activity, which indicates a high level of interest in environmental protection.

However, the effect of these initiatives is limited if they are not supported by strict legislative measures and effective sanctions for those who violate the lake's protection rules. The expansion of protected areas around the Lake, which was initiated as part of an international collaboration, has had a positive effect on preserving biodiversity and restricting uncontrolled development. Protected areas increased by 30% between 2018 and 2023 and this measure has contributed to maintaining essential habitats for bird and mammal species. However, pressure from real estate developers and the lack of strict controls continue to represent a major risk and without additional measures this initiative may be compromised by economic interests that prioritize profit over environmental conservation. The collected data shows that the implemented measures have had positive effects on some aspects of the conservation of Snagov Lake, but many of the major problems persist due to insufficient enforcement of regulations and economic interests that prevent effective protection. Reducing pollution, restocking fish and expanding protected areas are important steps forward, but they are not enough to offset the negative impact of illegal construction, uncontrolled tourism and illegal deforestation. The effectiveness of these measures could be improved by implementing stricter controls, applying more severe sanctions and developing advanced technological solutions for monitoring water quality and biodiversity. The conservation of Snagov Lake requires a more rigorous approach that combines clear regulations, community involvement and the use of modern technologies to protect this ecosystem. Without additional measures and stricter enforcement of protection rules, the benefits achieved through existing initiatives risk being nullified by economic pressures and the ongoing impact of human activities on the environment.

4. CONCLUSIONS

Snagov Lake, known for its biodiversity and cultural importance, faces numerous challenges generated by human activities and poor management of its natural resources. The research carried out highlighted the main problems affecting the ecological balance of the lake, including water pollution, uncontrolled real estate expansion, biodiversity reduction, overfishing and unorganized tourism. Although various measures have been implemented to protect the area, their impact remains limited due to the ineffective application of regulations and the lack of effective control and sanctioning mechanisms. An important aspect of the research was to identify the effect of pollution on water quality, which, although slightly improved following control measures, continues to be a major problem. Wastewater discharges, agricultural runoff and tourist activities constantly contribute to the accumulation of pollutants, which affects the balance of the lake ecosystem. Excessive growth of algae, reduced oxygen levels and changes in the conditions necessary for the survival of aquatic species are just some of the consequences of this phenomenon.

The impact of illegal construction on the lake's ecosystem is also significant, although actions have been taken to demolish unauthorized structures and limit real estate development in protected areas, this phenomenon continues to affect natural habitats and public access to the lake's resources. The destruction of vegetation on the banks, the modification of the natural water course and the fragmentation of essential habitats for local species have contributed to the acceleration of environmental degradation. Biodiversity protection measures such as restocking with fish species and the creation of special areas for protected birds have had a beneficial effect but have not been sufficient to compensate for the losses caused by human activities.

Restrictions on the use of motorized boats have also reduced to a certain extent the impact on the banks and the excessive noise affecting bird species in the area, but the implementation of these measures has not always been properly respected. The research highlighted that educational initiatives and public awareness campaigns regarding environmental protection had a positive impact on community involvement in conservation actions.

Greening and information events led to an increase in awareness of environmental issues, but without the support of the authorities and the application of stricter regulations, these efforts remain insufficient to produce significant changes.

The analysis of the impact of the Research on the Field of Environmental Protection shows that this study contributes to understanding how the interaction between economic activities and natural resources can influence the ecological balance. The findings highlighted can serve as a basis for improving lake protection strategies in Romania through recommendations aimed at stricter enforcement of regulations, the use of advanced technologies for monitoring water quality and the development of a sustainable model for the use of natural resources.

Research limitations are related to the difficulties encountered in accessing detailed official data on water quality and biodiversity evolution. The lack of constant monitoring and well-organized databases made it difficult to analyze the real impact of protection measures. Also, the lack of strict supervision of the application of regulations made it difficult to evaluate the long-term effects of conservation initiatives.

For the future, the research could be expanded by a more detailed analysis of the factors influencing water quality and by identifying more effective solutions to combat pollution. An assessment of how climate change affects the water level and biodiversity of the lake would also be necessary in order to develop strategies adapted to the new environmental conditions. Extending the study to other protected wetlands could provide a comparative perspective on the effectiveness of different conservation policies and could contribute to the development of more effective measures at national level.

The conservation of Snagov Lake requires a more complex approach that involves both the authorities and the local community and environmental organizations so

that the implemented measures are applied effectively and produce sustainable results. By integrating modern monitoring technologies, applying stricter regulations and developing policies that balance economic needs with environmental protection, the conservation of this valuable ecosystem can be ensured for future generations.

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