Combining Tourism Revitalization with Environmental Regeneration Through the Restoration of Piano del Conte Lake in Lagopesole (Southern Italy)

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Abstract. Lake restoration improves a degraded lake ecosystem's ecological health and water quality. It typically involves a combination of physical, chemical, and biological interventions to reduce nutrient inputs, control erosion, restore shoreline and wetland habitats, and manage invasive species. Lake restoration can be a complex process requiring careful planning, stakeholder engagement, ongoing monitoring, and adaptive management. The ultimate goal of lake restoration is to restore a healthy and resilient ecosystem that supports a diverse array of plant and animal life and recreational and cultural activities. The Piano del Conte site, a rural area in Avigliano, extends over a broad terrace at about 770 m above sea level, not far from the Lagopesole Castle. A crown of gentle hills and dense woods delimit the plain to the northeast, while to the west, it ends in a steep slope that slopes down to the Salice Valley. Lagopesole Castle is a medieval castle in the Basilicata region of southern Italy. The castle is perched on a hilltop overlooking the surrounding landscape and is surrounded by a village that has grown up around it over the centuries. Today, it is a popular tourist destination and one of the symbols of the region's cultural heritage. A regeneration program has been planned in this area based on the Piano del Conte Lake restoration and connecting this area with the castle through a bike path.

Keywords: Lake restoration · tourism revitalization · environmental regeneration

1 Introduction

Lakes are valuable resources that offer a range of benefits. They are popular sources of recreation, providing opportunities for fishing, boating, and swimming, which are popular forms of outdoor recreation. Furthermore, lakes are essential in sustaining life by providing flood protection, electricity generation, and drinking water sources. Finally, lakes are appreciated for their aesthetic beauty, providing places of solitude and relaxation.

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Before human activities such as home construction, deforestation, and agriculture, the original state of a lake may not have been as pure as often assumed. According to natural geologic processes, lakes of moderate depth gradually fill and transform into wetlands over time. The degree to which a lake has transitioned along this geologic continuum, from deep to shallow, can affect its inherent water quality.

Climate, rainfall, morphology, soils, geology, and land use influence lake water quality and land use, varying across regions. To group regions with similar characteristics, ecoregions were defined based on these factors, as studied and identified by Omernik [1]. These ecoregions are based on causal and integrative factors, including land use, land surface form, potential natural vegetation, and soils. Ecoregions are based on the concept that ecosystems are spatially interconnected and that political or administrative boundaries do not necessarily define their boundaries. Ecoregions are helpful for conservation planning, biodiversity assessments, and natural resource management. They provide a framework for understanding the distribution of ecological systems across landscapes and can help guide conservation and management actions. Ecoregions are also studied in ecosystem geography, focusing on environmental systems' spatial patterns and processes and their interactions with the physical and human environments. It concerns ecosystems' distribution, structure, function, and the factors influencing their dynamics and resilience, such as climate, geology, topography, and human activities. Ecosystem geography [2] is a multidisciplinary field that draws on principles and methods from ecology, biogeography, geomorphology, hydrology, climatology, and social sciences. Its goal is to provide a spatially explicit understanding of ecosystems' functioning and support their sustainable management and conservation. To avoid the deterioration and early aging of lakes, it is essential to find an equilibrium between anthropic uses and preserving the environment [3–5].

2 Lakes Lifecycle, Restoration, and Management

The life of a lake refers to its natural lifecycle, which is influenced by various factors such as geology, climate, vegetation, and human activities. Generally, a lake is formed through natural succession, which starts with the accumulation of sediments in a depression or basin. Over time, the depression fills with water, and a new lake is born [6].

The life of a lake can be divided into several stages, including the oligotrophic stage, the mesotrophic stage, and the eutrophic stage.

During the oligotrophic stage, a lake is relatively deep, clear, and nutrient-poor, with low algae levels and aquatic plants. Depending on the lake's size and geology, this stage can last hundreds or thousands of years.

As a lake age, it gradually accumulates nutrients, such as nitrogen and phosphorus, from sources such as runoff from surrounding land or decomposing organic matter. This leads to the mesotrophic stage, in which the lake becomes shallower, with more algae and aquatic plants and abundant fish and other aquatic life.

If nutrient inputs continue to increase, the lake may enter the eutrophic stage, in which it becomes very shallow, with high levels of algae, aquatic plants, and nutrients. The water may be murky and green, and fish populations may decline due to oxygen depletion [7].

Human activities such as urbanization, agriculture, and industrialization can accelerate eutrophication and lead to premature aging and degradation of lakes. Therefore, lake management and restoration efforts often focus on reducing nutrient inputs and promoting sustainable land use practices to help preserve the life of lakes [8].

The use of a lake depends on how much people's desires align with the lake's ability to meet those desires. Limitations on desired uses of a lake, which can be prevented or rectified with appropriate management, define lake problems. This definition is crucial for creating lake management plans, as it identifies a lake problem as any restriction on desired uses by a specific group of users. To develop an effective management program, it is essential to clearly define desired uses, identify their limitations, and understand their causes. It is fundamental for preserving lake life to pursue a balance between human activities and environmental preservation [9–15].

Lake restoration, also known as lake rehabilitation, improves a degraded lake ecosystem's ecological integrity and overall health. Lake rehabilitation aims to restore the lake to a healthy, functional state that supports a diverse range of plant and animal life. This is typically achieved through a combination of techniques that address the underlying causes of degradation and improve the ecological conditions of the lake.

The specific methods used for lake rehabilitation depend on the particular needs of the lake ecosystem, which can vary widely depending on the characteristics of the lake and the surrounding watershed. However, several standard techniques are often used in lake rehabilitation efforts.

One of the primary goals of lake rehabilitation is to improve water quality [6, 16]. This can be done through various techniques, including reducing nutrient inputs, improving erosion control, and managing stormwater runoff. For example, reducing nutrient inputs may include reducing fertilizer use in the watershed, implementing best management practices on agricultural lands, or reducing wastewater discharges. Techniques to improve erosion control may consist of stabilizing shoreline areas, restoring wetlands and riparian zones, or implementing measures to reduce sedimentation.

Another critical aspect of lake rehabilitation is restoring or creating fish and wildlife habitats. This may involve adding submerged plants, creating fish spawning areas, and constructing shoreline structures to provide bird nesting areas. Techniques to improve fish and wildlife habitats may also include managing water levels and flows, controlling invasive species, and improving water quality.

Sediment removal is another technique that may be used in lake rehabilitation efforts. Sometimes, sediment buildup in a lake can significantly affect water quality and aquatic habitat. Lake rehabilitation may involve dredging or other techniques to remove sediment and restore the lake bottom to a more natural state.

Watershed management is also an essential component of lake rehabilitation. Since the health of a lake is often connected to the surrounding watershed, lake rehabilitation may involve managing land use practices and other activities in the watershed to reduce pollution and improve water quality. This may include implementing stormwater management practices, promoting sustainable agriculture practices, and reducing impervious surfaces in urban areas.

Finally, ongoing monitoring and adaptive management are essential components of lake rehabilitation efforts. Monitoring is used to assess the effectiveness of restoration

efforts and make adjustments as needed. Adaptive management involves changing the rehabilitation plan based on monitoring results to ensure the rehabilitation efforts achieve the desired goals.

In summary, lake rehabilitation is a complex and multifaceted process that requires a thorough understanding of the lake ecosystem and the underlying causes of degradation. By using a combination of techniques tailored to the specific needs of the lake, it is possible to restore degraded lakes to healthy, functional ecosystems.

The terms restoration and management must be evaluated based on the expectations of the lake users and the feasible options available. Regular upkeep may be necessary to preserve water quality even after restoration efforts. The path towards sustainable progress often requires several years, involving ongoing diagnostic and feasibility analyses and successive testing and implementation of restoration procedures. In any scenario, whether improvement is likely or unlikely, a diagnostic feasibility study should be conducted to decide on one or more lake restoration and management procedures.

The present or intended utilization of the lake may not be suitable for executing specific restoration methods or may not be in line with attainable enhancements. For instance, careful consideration must be given to water supplies intended for human consumption. Using most herbicides in such supplies is prohibited, and specific restoration techniques, such as sediment removal, may necessitate costly specialized equipment to preserve the raw potable water quality.

3 Sustainable Uses of Lakes

Sustainable uses of lakes aim to balance the ecological, economic, and social benefits of the lake while protecting its natural resources and maintaining its health. Some examples of sustainable uses of lakes include:

- Recreational activities: Sustainable recreational activities such as swimming, boating, fishing, and hiking that promote appreciation of the natural environment while minimizing damage to the area.
- Ecotourism: Sustainable tourism activities that showcase the region's natural beauty and cultural heritage while supporting local businesses and communities.
- Water supply: Using the lake as a source of drinking water for local communities while protecting water quality and minimizing impacts on the lake ecosystem.
- Irrigation: Using the lake water to irrigate crops and farmland while managing water usage and preventing pollution.
- Aquaculture: Sustainable aquaculture practices that promote the conservation of fish populations and respect for the aquatic ecosystem.
- Energy production: Using the lake to generate hydroelectric power while minimizing impacts on the lake ecosystem [17, 18] and ensuring water quality.

– Scientific research: Conduct scientific research to understand better the lake's ecology, biology, hydrology, and surrounding area while supporting conservation and management efforts.

Sustainable uses of lakes require careful management to ensure that ecological, economic, and social benefits are maintained over the long term. By promoting sustainable uses of lakes, we can protect and preserve these important resources for future generations.

Some fundamental principles of sustainable lake management can be summarized in the following points:

– Comprehensive planning: Developing a comprehensive management plan that addresses the ecological, economic, and social aspects of lake management, including water quality, recreational opportunities, economic development, and cultural heritage.
– Watershed management: Managing the entire watershed that feeds into the lake, including agricultural, industrial, and urban areas, to prevent pollution and erosion.
– Water quality monitoring: Regularly monitoring the lake's water quality to detect changes in nutrient levels, pH, and temperature and implement appropriate measures to prevent or mitigate any negative impacts.
– Habitat protection: Protecting the natural habitat of the lake and surrounding area, including wetlands, shorelines, and riparian areas, to maintain biodiversity and ecological health.
– Sustainable tourism: Encouraging sustainable tourism practices that promote appreciation of the natural environment and support local businesses and communities.
– Stakeholder involvement: Engaging stakeholders, including local communities, businesses, and government agencies, in managing the lake and encouraging participation in decision-making.
– Adaptive management: Continuously evaluating the effectiveness of management strategies and adjusting them as needed to ensure the long-term sustainability of the lake.

Collaboration between various parties, including lake users, local communities, governmental organizations, and conservation groups, is necessary for the sustainable management of lakes. Lakes can be safeguarded and preserved for future generations by employing sustainable management practices.

Sustainable tourism activities for lakes aim to preserve the region's natural environment and cultural heritage while providing visitors with enjoyable and educational experiences. Several instances of environmentally friendly touristic activities for lakes include:

– Nature walks and hiking tours: Guided or self-guided tours that showcase the natural beauty of the lake and surrounding area while promoting physical activity and an appreciation for the environment.
– Wildlife watching: Opportunities to observe the diverse flora and fauna that inhabit the lake and surrounding ecosystem while encouraging visitors to respect and protect the natural environment.

- Kayaking, canoeing, and paddleboarding: These low-impact activities provide visitors with a unique perspective of the lake while minimizing disturbance to aquatic life and reducing pollution.
- Cultural tours: Tours that highlight the region's local cultural heritage and traditions while supporting local businesses and communities.
- Educational programs: Programs that provide visitors with information about the ecology, history, and management of the lake and surrounding area while promoting environmental awareness and stewardship.
- Fishing: Sustainable fishing practices that promote the conservation of fish populations and respect for the aquatic ecosystem.
- Camping and picnicking: Low-impact recreational activities that promote the enjoyment of the natural environment while minimizing damage to the area.
- Interpretive centers and museums: Educational facilities that provide visitors with information about the natural and cultural history of the region while promoting environmental awareness and conservation.

These activities can be designed to meet the needs of different types of visitors and accommodate varying physical ability levels. Promoting sustainable tourism activities makes it possible to protect lakes for future generations and produce benefits for local communities economically.

4 The Case Study

4.1 The Study Area

A lake restoration activity combined with tourism enhancement actions has been implemented in a project concerning Piano del Conte Lake close to Lagopesole castle in Avigliano municipality (Southern Italy).

The intervention area is located in the Piano del Conte locality in the municipality of Avigliano at an altitude of approximately 780 m above sea level. The fraction of Lagopesole is situated on the watershed between the Ofanto and Bradano rivers, in the municipality of Avigliano (PZ), on a hill around 829 m above sea level. Dominating the hilltop is the castle known as "Lagopesole." Frederick II built Lagopesole castle between 1242 and 1250 on a Saracen and then Norman architectural layout, as evidenced by numerous findings. The castle, constructed using ashlar stones, remains intact in its original form. It underwent restoration in the 1990s, showcasing the alterations made by Charles I of Anjou to the original Norman-Swabian design. This modification was primarily done to transform the castle into an opulent prison. Lagopesole Castle is the last castle commissioned by Frederick II and serves as a testament to his talent for selecting sites of extraordinary natural splendor. From a historical and environmental point of view, the castle represents the most visually privileged element of the surrounding landscape. Because of this, it has profoundly influenced historical, cultural, religious, and hiking tourism (Figs. 1 and 2).

The site of Piano del Conte is a rural area falling within the municipality of Avigliano and Filiano, covering a wide terrace at an elevation of about 770 a.s.l. not far from Lagopesole Castle.



Fig. 1. Location of Lagopesole castle and Piano del Conte lake in Avigliano municipality.



Fig. 2. Piano del Conte lake in Avigliano municipality.

Piano del Conte site remains hidden from the panoramic views offered by the Potenza- Melfi highway, unlike the Lagopesole castle, located on the opposite side of the valley and clearly visible from the road axis. The site preserves the remains of the ancient "Lacus Pensilis," from which the current name of the village Lagopesole derives.

4.2 The Project

The fundamental point regarding Piano del Conte Lake recovery and environmental requalification is represented by the respect for the morphological and vegetational structure and, consequently, the restoration of the original environmental conditions.

The lake is an articulated element of environmental reconstruction in developing a methodological achievement in landscape restoration. It involves the reconstitution of a natural element that redefines the landscape and environmental framework of the Piano del Conte territory.

The first intervention to be carried out will be cleaning the lake area using appropriate means. This will be followed by cutting and removing all invasive vegetation and arranging the soil and deposits to create new lake banks. These banks have been designed based on the geological characterization of the land and the hydrological study of flood-prone areas with a return period of 1,000 years. After lake rehabilitation, the remaining portion of the municipal-owned land will be interested in regeneration interventions.

In order to make the area more accessible, a parking lot accommodating approximately 60 cars, including at least three spaces for disabled individuals, and a bicycle parking area will be created upon arrival from the provincial road.

Biking near the lake offers an exhilarating and scenic experience for outdoor enthusiasts. With the shimmering lake as a backdrop, cyclists can enjoy the fresh air and stunning views while exploring the surrounding trails and pathways. Whether it's a leisurely ride along the lakeside promenade or a more challenging off-road adventure through the nearby forests and hills, biking near the lake provides a fantastic opportunity to immerse oneself in nature and engage in a physically active and sustainable activity. Cyclists can pedal along designated bike paths, take in the beauty of the lake's shoreline, and perhaps even discover hidden gems and attractions along the way. It's a great way to combine outdoor recreation, appreciation of natural landscapes, and the joy of cycling.

The bicycle lane around the lake provides a dedicated and safe route for cyclists to enjoy the scenic beauty of the lake while engaging in their favorite activity. This designated lane, separate from vehicular traffic and pedestrian paths, allows cyclists to ride comfortably and freely, taking in the panoramic views of the water and surrounding landscapes. The bicycle lane is well-marked and designed to accommodate various skill levels, from casual riders to more experienced cyclists. The lane follows the lake's shoreline, providing continuous access to stunning vistas and recreational areas. The bicycle lane around the lake promotes a healthy and eco-friendly mode of transportation, encouraging people to cycle and enjoy the outdoors while reducing traffic congestion and carbon emissions. It also enhances safety for cyclists, separating them from motorized vehicles and providing a dedicated space for their enjoyment.

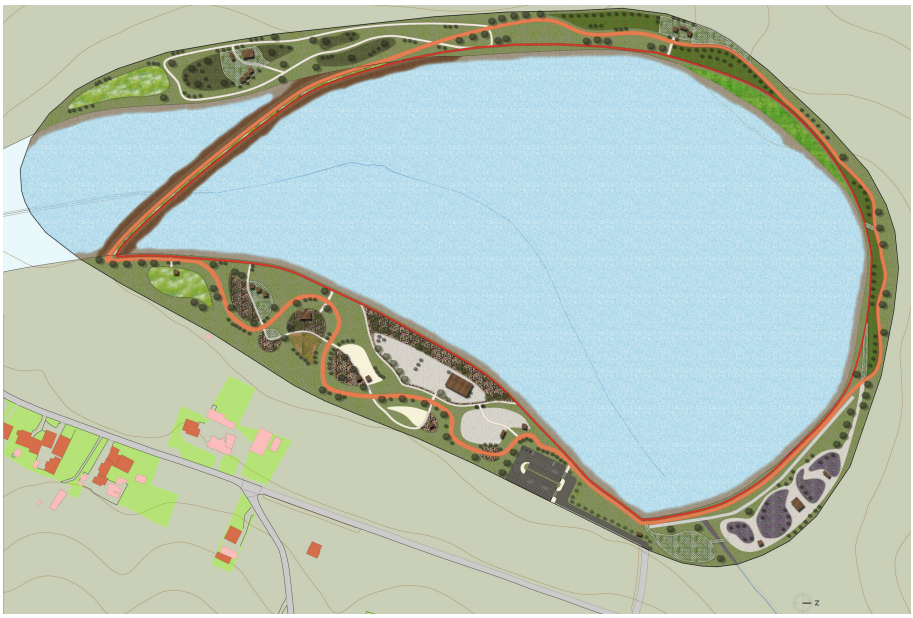

Fig. 3. Piano del Conte lake project.

The paths are divided into three types:

- Bicycle lane (orange in Fig. 3) with a width of 3.50 m and a length of approximately 2 km, made of colored permeable asphalt. It follows the catchment basin and, in some areas, deviates slightly from it to enter the sensory garden, allowing this type of user also to enjoy it.
- Main pedestrian path (red in Fig. 3) with a width of 2.50 m and a length of 2 km, which follows and defines the newly identified basin based on the conducted studies.
- A secondary pedestrian path with a width of 2.00 m connects the two aforementioned paths with various rest areas.

Within the area accessible to all users, specific areas have been identified where people can rest and take advantage of the different services and facilities. The main elements can be summarized as events, educational, playground, dog park, picnic, and outdoor fitness areas.

Events Area

This area, paved with washed stone, is equipped with steps immersed in greenery, creating a natural arena with a lake backdrop. It can host small performances, projections, outdoor parties, and exhibitions, provided they are kept within limits and compatible with the surroundings. This area also has a prefabricated wooden restroom containing facilities for men, women, and people with disabilities. A small pergola is also installed, accommodating two wooden benches, a bicycle rack, and a waste bin (Fig. 4).



Fig. 4. Events area.

Educational Area

Adjacent to the area designated for public events, a single-story building has been located for the educational area. The building is exterior wooden exterior but a reinforced concrete structure. The internal partitions have been designed to be movable, allowing the spaces to be adapted for different functions. The building also includes restrooms, with access not only from the interior but also from the exterior for general use. The café is closely connected to an external wooden pergola set amidst a grassy area. On the other side, there is a spacious interior space where tables and small gazebos will be placed to facilitate café activities. The outdoor spaces are defined by hedges that mark their boundaries. The workshops, with large windows, provide direct access to the outside, which is developed as a botanical garden consisting of twenty-two native plant species, each accompanied by informative signs placed near each plant. It represents a primary educational facility that can be modified and expanded through the activities carried out by the workshop.

Playground Area

The playground is designed for children to engage in outdoor and recreational activities. It has various play structures and amenities to promote physical activity, creativity, and social interaction.

Two equipped areas are furnished with wooden benches, waste bins, and bicycle racks. There are also two small pergolas under which two wooden benches are placed. This zone, dedicated to entertainment for young children, is slightly different from the typical playground projects, but it has been carefully crafted to integrate harmoniously with the surrounding nature.

Dog Park Area
A dog park area is a designated space specifically designed for dogs and their owners to exercise, play, and socialize in a controlled and safe environment. It offers a range of amenities and features tailored to the needs of dogs, promoting their physical and mental well-being. The dog park area aims to create a positive social experience for dogs and their owners. It allows dogs to exercise, socialize, and have fun in a controlled environment while fostering responsible pet ownership.

Picnic Area
Three pergolas with covered benches will be built in this area. Other services will be realized: a larger service box that accommodates restrooms and facilities such as a medical room, an information point, and a small bar. A prefabricated restroom block for men, women, and people with disabilities will also be included in the project. Additionally, there are other picnic benches present. An optimal design of the picnic area includes not only tables but also other essential elements. The installation of drinking fountains and the environmentally friendly choice of providing waste bins and ashtrays to combine the enjoyment of the space with full respect for the environment, avoiding the littering of bottles, packaging, and meal residues in the greenery.

Outdoor Fitness Area
The outdoor fitness area is a designated space where individuals can engage in various physical activities and exercise outdoors. It provides opportunities for people to improve their fitness, strength, and overall well-being while enjoying the natural environment. The outdoor fitness area has various fitness equipment designed for outdoor use. This includes cardio machines like ellipticals or stationary bikes, strength-training equipment such as pull-up bars, resistance stations, and balance or agility equipment. The equipment should be strategically placed to allow for proper circulation and flow of users. Fitness trails have been included in outdoor fitness areas to provide a dynamic and engaging exercise experience in natural surroundings. These trails consist of a series of fitness stations or stations that are strategically placed along a designated path or trail. Each station is equipped with exercise equipment or apparatus that targets different muscle groups and promotes various types of physical activity.

The trails cater to individuals of different fitness levels and abilities. They may offer options for beginners and advanced users, allowing individuals to progress and challenge themselves as they improve their fitness levels. Clear signage or instructions are usually provided at each station to guide users on performing the exercises correctly and safely. One of the advantages of outdoor fitness trails is the opportunity to exercise in a natural and open environment. Users can enjoy the benefits of fresh air, natural sunlight, and

the beauty of the surrounding landscape while engaging in their workout routines. Its location in a beautiful area provides a refreshing and inspiring backdrop for exercise.

Sensory Garden

The project will also include a sensory garden. A sensory garden, also known as a therapeutic garden, is specifically designed to engage and stimulate the senses, providing a unique sensory experience for visitors. The garden is carefully planned and curated to incorporate various elements that appeal to the senses of sight, smell, touch, taste, and sound. Its purpose is to create a harmonious environment that promotes relaxation, healing, and well-being.

The sensory garden typically features various plants and flowers with vibrant colors, interesting textures, and captivating fragrances. These plants are selected to engage the sense of sight and smell, offering a visually appealing and aromatic experience. The garden may include visually striking elements such as colorful flower beds, blooming shrubs, and visually contrasting foliage.

The garden may incorporate different tactile elements such as soft grass, smooth stones, textured pathways, and plants with unique leaf textures to engage the sense of touch. These elements encourage visitors to interact with the garden by touching and feeling the different surfaces, fostering a sensory connection with nature.

In terms of sound, the sensory garden may include features such as wind chimes, gentle water fountains, or strategically placed plants that produce rustling sounds in the breeze. These auditory elements create a calming and soothing atmosphere, promoting relaxation and mindfulness.

Some sensory gardens also incorporate edible plants, allowing visitors to engage their sense of taste. These gardens may feature herbs, fruits, or vegetables that visitors can sample and enjoy, providing a unique sensory experience and fostering a connection to nature's bounty.

The sensory garden design considers accessibility, ensuring it is easily navigable for individuals with disabilities or mobility challenges. It may include wheelchair-accessible paths, raised beds for easy reach, and braille or tactile signs to provide information for visually impaired visitors.

Overall, a sensory garden is a carefully crafted space that offers a multi-sensory experience, promoting relaxation, stimulation, and a deeper connection with nature. It provides a therapeutic and enriching environment for individuals of all ages and abilities, allowing them to immerse themselves in the beauty and sensory delights of the natural world.

5 Conclusions

The ecological approach to the project of lake regeneration has demonstrated the significance and effectiveness of implementing sustainable practices to restore and preserve the health and functioning of the lake ecosystem. Through careful planning, scientific research, and collaborative efforts, the project has achieved its objectives and brought about positive outcomes for the lake and its surrounding environment. Incorporating ecological engineering techniques, such as establishing submerged macrophytes and

creating habitat structures, has proven instrumental in enhancing the lake's environmental functions and promoting biodiversity. These measures have provided valuable habitats for various organisms, improved water clarity, and contributed to the overall health and resilience of the ecosystem.

The project has highlighted the importance of addressing key issues, such as the potential to enhance the tourism attractiveness of the area significantly.

By restoring the lake's ecological health and aesthetic appeal, these projects create a more desirable destination for tourists seeking natural beauty, recreational opportunities, and unique experiences. Clean and clear waters provide enjoyable experiences for visitors and contribute to the overall perception of the lake as a pristine and inviting environment.

Restoring diverse aquatic habitats and promoting biodiversity through ecological projects can enhance the natural and scenic values of the lake. This attracts nature enthusiasts, birdwatchers, and wildlife photographers interested in observing and interacting with the rich flora and fauna that thrive in the rehabilitated lake ecosystem.

Incorporating sustainable tourism practices and infrastructure within the lake area can further enhance its attractiveness [19, 20]. Developing well-designed biking and hiking trails, picnic areas, and viewpoint locations allows visitors to explore and appreciate the lake's surroundings while minimizing the environmental impact. Interpretive signage and educational programs can provide insights into the lake's ecological significance and foster a deeper understanding and appreciation among tourists.

Moreover, the combination of lake regeneration and tourism can have positive economic impacts on the local community [21–25]. A revitalized lake can attract more tourists, increasing visitor spending on accommodations, dining, recreational activities, and local products. This, in turn, stimulates local businesses, generates employment opportunities, and boosts the overall economy.

However, ensuring that tourism activities are managed sustainably is crucial to prevent negative impacts on the rehabilitated lake ecosystem. Implementing appropriate regulations, monitoring visitor numbers, and promoting responsible tourism practices can help maintain the lake's ecological integrity while maximizing its tourism potential.

Overall, the ecological project of lake regeneration is a successful model for promoting sustainable practices and restoring the ecological integrity of lakes. It demonstrates the effectiveness of multidisciplinary approaches, scientific research, and community engagement in achieving positive outcomes for the lake ecosystem and the surrounding communities. Continued monitoring and adaptive management will be crucial in maintaining the achieved ecological improvements and ensuring the project's long-term success.

In conclusion, lake regeneration projects have the potential to enhance tourism attractiveness by creating a healthier and more visually appealing environment, providing a range of recreational activities, and supporting local economies. By combining ecological restoration with sustainable tourism practices, lakes can become popular destinations that offer memorable experiences for visitors while preserving and showcasing their natural heritage.

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