

محور السياحة الجيولوجية

Enhancing Local Economies through Marine Conservation: The Case of Ain Al-Ghazala Marine Reserve

Reema Salem¹, Hisham Alnaji Saed Haroun², Amani Fitori Ali^{3*}

¹Department of Economic, Tobruk University, Libya

²Department of Economic, Tobruk University, Libya

³ Department of Marine Resource, Faculty of Natural Resource, Tobruk University, Libya.

Corresponding author: amanifitori1@gmail.com

المخلص

تعد المحميات البحرية، المعروفة أيضًا باسم المناطق البحرية المحمية (MPAs)، أدوات أساسية للحفاظ على البيئة البحرية والتنمية المستدامة. تناولت هذه الدراسة التأثيرات الاقتصادية لمحمية عين الغزالة البحرية على الاقتصاد المحلي. أظهرت النتائج أن 80% من المشاركين يعتقدون أن المحمية يمكن أن تجذب السياح، مما يزيد من الإنفاق المحلي على الإقامة والمطاعم والجولات السياحية. بالإضافة إلى ذلك، أشار 65% إلى أن الصيد المستدام يعد نشاطًا اقتصاديًا رئيسيًا، بينما أشار 35% إلى دور المحمية في السياحة البيئية. وأكد 95% بشكل كبير أن المحمية يمكن أن تخلق فرص عمل جديدة. التحدي الرئيسي الذي تم تحديده كان نقص التمويل، كما أشار إليه 24% من المستجيبين. علاوة على ذلك، أكد 60% على الحاجة إلى تدريب المجتمع على الفوائد الاقتصادية للمحميات. لتحقيق الدعم الفعال والتعاون. أكدت المقابلات مع إدارة المحمية على ضرورة وجود خطط لتعزيز المساهمة الاقتصادية للمحمية من خلال توسيع السياحة وتحسين البنية التحتية وعلى وجود تعاون بين الأطراف القائمة على المحمية وأصحاب المصلحة كما أشار 90% من المستجيبين. توصي الدراسة بزيادة الدعم المالي، وتحسين البنية التحتية، وتدريب المجتمع المستمر لتعزيز الفوائد الاقتصادية والبيئية للمحمية.

الكلمات المفتاحية: المحمية البحرية، التأثير الاقتصادي، الاقتصاد المحلي، عين الغزالة، ليبيا.

Abstract

Marine protected areas (MPAs) are essential tools for marine environmental conservation and sustainable development. This study examined the economic impacts of the Ain Al-Ghazala Marine Reserve on the local economy. The results revealed that 80% of participants believe the reserve has the potential to attract



tourists, thereby increasing local spending on accommodation, dining, and tours. Additionally, 65% noted that sustainable fishing is a major economic activity, while 35% highlighted the reserve's role in ecotourism. A significant 95% agreed that the reserve could create new job opportunities. The primary challenge identified was a lack of funding, as indicated by 24% of respondents. Furthermore, 60% emphasized the need for community training on the economic benefits of MPAs to achieve effective support and collaboration. Interviews with the reserve management underscored the necessity of plans to enhance the reserve's economic contribution by expanding tourism and improving infrastructure, with 90% of respondents agreeing on the importance of collaboration between the reserve management and stakeholders. The study recommends increasing financial support, improving infrastructure, and providing ongoing community training to bolster the economic and environmental benefits of the reserve.

Key words: Marine Reserve, Economic Impact, Local Economy, Ain Al-Ghazala, Libya.

Introduction

The ocean hosts Marine Protected Areas (MPAs) that impose restrictions on human activities. These zones vary widely globally in their design and implementation, encompassing less than 10% of the ocean's surface despite being fundamental to international marine conservation efforts[1]. Marine ecosystems are crucial for supporting biodiversity and provide essential services such as food production, energy generation, and maintaining global carbon and oxygen cycles, thus supporting human well-being[2].

The structural and functional health of these ecosystems and their ability to provide a wide array of ecosystem services locally and globally depend on marine biodiversity. From oxygen production and seafood supply to shoreline protection and medical discoveries, marine biodiversity, from microscopic organisms to large whales and kelp forests, plays a vital role in these ecological and economic benefits[3]. Marine protected areas (MPAs) have long been used to conserve biodiversity. However, critics argue there is little evidence of their economic benefits, particularly for fisheries. This resistance to MPAs hinders conservation progress and threatens the long-term ecological and economic health of the oceans[4]. Spatial management, especially within MPAs, is gaining popularity to ensure population sustainability and prevent fishery failures[5]. Key goals for fisheries management and conservation include promoting socioeconomic



development while minimising conservation impacts and distributing conservation measures to reduce socioeconomic effects on nearby fishing communities[5].

Fisheries management and conservation primarily aim to promote socioeconomic development with minimal conservation impact and distribute conservation measures to reduce socioeconomic effects on local fishing communities[5]. While designing marine reserves, the potential benefits to fisheries and conservation are often considered, but potential tourism revenue is usually overlooked. Neglecting tourism objectives in planning can lead to suboptimal results, as tourism can be a major economic benefit for many marine reserves globally. A bioeconomic model was developed to track tourism and fisheries income over time for various management options and geographic characteristics, showing that considering tourism benefits can enhance ocean protection[6]. Given that there is a clear plan in place to construct a hatchery and aquafarming complex at Ain Al-Ghazala lagoon, it is imperative that any further large-scale capacity expansion for the national aquaculture sector be carefully considered before moving further [7]. Over the past decade, marine reserve research has significantly advanced beyond individual reserve studies and disciplinary perspectives. This progress is highlighted through integrated social and ecological research, long-term changes within reserves, and comprehensive studies of reserve networks[8]. The study aims to provide insights and recommendations to maximise the economic benefits of the Ain Al-Ghazala Marine Reserve while promoting sustainable development and conservation.

Material and methods

The study was conducted in the Ain Al-Ghazala Marine Reserve in March 2023. The study included the creation of surveys and involved fishermen in the reserve, local residents, and decision-makers.

Study area

Ain Al- Ghazala reserve is located west of Tobruk, about 60 km along the eastern extension of the Libyan coast in the Mediterranean Sea, with coordinates 32° 10' 42.49334" N, 23° 18' 37.80131" E. The shore is rocky, with sandy beaches interspersed. It is about 6 km long and 1.5 km wide, with depths ranging from 3.5 to 5 m and an area of 180 hectares. Almarakeb (Ulbah) island, located in front of the entrance, protects the bay from wave action and northern winds[9].



Methods of Data Collection

1. Questionnaires

To determine the main goals, a survey was created, including knowing how the protected area affects employment, tourism, and fishing. There were several categories in the survey: general information, fisheries, tourist, and economic and social repercussions. To get qualitative answers, a range of questions were employed, including open-ended and closed-ended (yes/no, multiple choice) questions.

2. Survey Distribution

Interviews with members of the target groups including tourists, locals, and fishermen were done in person. These groups were then given the survey.

3. Information Gathering and Evaluation

To guarantee accuracy and completeness, the study's targeted participants' responses were methodically collected and examined. The key themes and trends in the data were found through subjective analysis. Direct economic data from the protected area was gathered by contacting the area's management.

4. Examination of Statistics

Statistical analysis and data presentation were conducted using Spss (version 23).

Result and discussion

This study constitutes the cornerstone and foundational nucleus for conducting social and economic studies of other protected areas in Libya. Researching the economic value of marine reserves is a significant accomplishment as it safeguards biodiversity by keeping rare and endangered species alive, enhances management and policy by creating efficient measures to preserve reserves, and boosts support and funding by drawing investments for environmental initiatives. It also helps local communities by bringing in revenue from sustainable tourism and fishing, strikes a balance between development and conservation by showing that environmental preservation and economic expansion are compatible, and increases public awareness of the significance of marine reserves. In this way, the study contributes to enhancing conservation efforts, supporting economic sustainability, and providing long-term benefits to communities and marine environments.

During this study, the questionnaire included several questions about the economic impacts and how the marine reserve could contribute to improving the local economy. The results showed that 80% of the participants believe that the Ain Ghazala Reserve could attract tourists who would contribute to the local economy



through spending on accommodation, restaurants, and tours. Additionally, 65% of the participants indicated that sustainable fishing is the primary economic activity that could enhance the local economy. Moreover, 35% of the participants affirmed that the reserve plays a significant role in ecotourism (Table 1, Figure 1).

According to the study's findings, one of the greatest methods for preserving the sustainable exploitation of marine resources is the establishment of Marine Protected Areas, or MPAs. Opponents argue that there isn't enough proof of economic benefits, especially when it comes to fisheries. However, Costello, (2024) study offered substantial proof in support of this claim. Without presenting any proof of the net costs of MPAs on fisheries, the study showed 48 instances of economic benefits connected to fishing and 31 cases of benefits associated to tourism in 25 and 24 countries, respectively. Increased fish size, catch size, catch per unit effort, fertility, and export of larvae were among these advantages. The study's conclusions demonstrated that fishing communities can benefit sustainably from well-designed and successfully implemented MPAs [4].

The study revealed that 95% of the participants agreed that the reserve could provide new job opportunities for the local community. The questionnaire also included questions about the main challenges facing the reserve in terms of economic development, with 24% of the participants pointing to a lack of funding from governmental or private entities as the biggest challenge. Furthermore, 60% of the participants emphasized the need to provide opportunities for training the local community on the role of reserves in economic development and improving livelihoods (Table.2, Figure.1).

Regarding support and cooperation between the reserve and the local community, 90% agreed that cooperation should be conducted through joint local committees and training and awareness programs, including training on sustainable fishing, reducing overfishing. Interviews with reserve management stressed the need for plans to enhance the reserve's economic contribution through expanded tourism and improved infrastructure.

A complicated web of interactions between institutional, economic, and biological factors determines how effective a protected area is. Protected areas may help maintain biodiversity, save significant habitats, and conserve sites of cultural significance, but it's not certain how effective they will be as a tool for better fisheries management. There is uncertainty since protected zones only address the external manifestations of overfishing and fisheries waste rather than the underlying causes [10].



TABLE1. Percentage Metrics for Evaluating the Impact of Marine Protected Areas on Tourism, Job Creation, and the Importance of Collaborative Efforts.

	Answers	Frequency	Percent	Cumulative Percent
Impact on Tourism	Yes	80	80.0	80.0
	No	20	20.0	20.0
	Total	100	100.0	100.0
Job Creation	Yes	95	95.0	95.0
	No	5	5.0	5.0
	Total	100	100.0	100.0
Importance of Collaboration	Yes	90	90.0	90.0
	No	10	10.0	10.0
	Total	100	100.0	100.0

Interviews conducted with the reserve's management and stakeholders, they highlighted the necessity of developing future plans to enhance the reserve and increase its contribution to economic development through expanding tourism programs, increasing investment in infrastructure, and boosting awareness.

This study recommends that policymakers increase financial support for coastal marine reserves in Libya, improve infrastructure, and provide continuous training for the local community. Additionally, enhancing the marine environment will lead to increased fish populations and improve the area's attractiveness to tourists, thereby boosting economic activities and contributing to biodiversity improvement, attracting more tourists, and increasing opportunities for sustainable fishing. There is a call for environmentally friendly practices, highlighting the oceans' potential for innovation and economic growth, but cautioning against over-exploitation that can impede the advancement of society and the economy. Achieving sustainable development goals and safeguarding maritime habitats require addressing critical



challenges such digital technology.

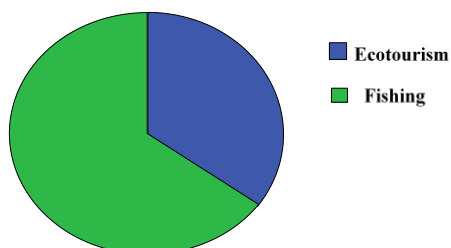
TABLE2.The challenges facing the protected

	Frequency	Percent	Valid Percent	Cumulative Percent
Funding Deficit	24	24.0	24.0	24.0
Effective Governance	16	16.0	16.0	40.0
Providing Training	60	60.0	60.0	100.0
Total	100	100.0	100.0	

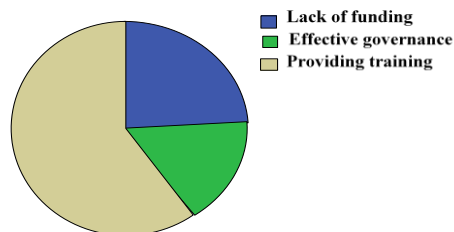
Current research papers emphasise the need for efficient governance and updating to properly exploit ocean resources by focusing on marine economics, resource management, technologies, and environmental implications [11]

Using the survey method in this study is considered important in understanding the economic role of marine protected areas. This method involves gathering data and opinions from various participants regarding potential economic activities within these protected areas. Discussions regarding the possible economic effects of sustainable tourism, sustainable fishing, research endeavours, and other coastal projects that might be possible inside marine protected areas can benefit from the use of surveys. Using this information, academics and economists may assess economic patterns and trends in marine protected areas and offer policy suggestions that strengthen the function of these places in fostering sustainable development and bolstering regional economies.

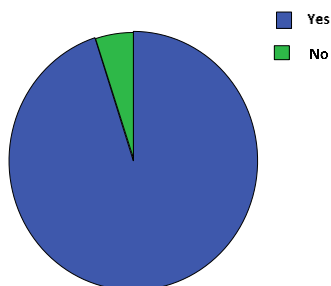
Key activities that benefit the protected area



Challenges faced by the protected area



Are new job opportunities being provided ?



Does the Ain Al-Ghazala Marine Reserve attract tourists?

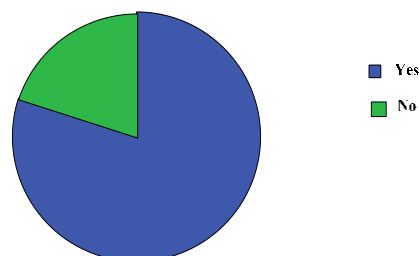


Figure 1. Analysis of Survey Respondents' Responses on the Economic Impacts and Local Benefits of Marine Protected Areas

Conclusion

Researching the economic value of marine reserves offers numerous benefits that encompass biodiversity preservation, management enhancement, increased public support, and economic sustainability. This study highlights that marine reserves such as the Ain Ghazala Reserve can significantly contribute to local economies through sustainable tourism and fishing. A substantial percentage of participants acknowledged the potential economic benefits, with many recognizing the role of marine reserves in creating job opportunities and promoting ecotourism. The study underscores the necessity for policymakers to increase financial support, improve infrastructure, and provide continuous training to local communities. By addressing these areas, the marine environment can be enhanced, leading to greater fish populations, increased tourist attraction, and more sustainable fishing practices.

Future efforts should focus on integrating effective governance, sustainable development practices, and innovative technologies to exploit ocean resources responsibly. This comprehensive approach will ensure that marine reserves continue to support both ecological conservation and economic growth, benefiting local communities and contributing to the global goals of sustainable development and marine resource management.

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توصيات المؤتمر

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2. الاهتمام بالمؤسسة المعنية بالمياه.
3. إنجاز المشاريع المائية المعتمدة والجاهزة للتنفيذ.
4. استغلال مادة المكثفات التي تقوم المؤسسة بتصديرها لإنتاج البنزين للاكتفاء الذاتي.
5. الاهتمام بصحة وسلامة العاملين بقطاع إنتاج الطاقة.
6. يوصي المؤتمر بتبني تطبيق الطاقات المتجددة في ليبيا.
7. الاهتمام بمصادر الطاقة الغير تقليدية الصديقة للبيئة والتي من ضمنها الهيدروجين الأبيض والاقتصاد الأخضر.
8. إجراء المزيد من الدراسات الجيوفيزيائية خاصة الزلزالية لمعرفة وتحديد التراكيب الجيولوجية المختلفة التي يمكن العثور على غاز الهيدروجين بها.
9. الاستفادة من الحجر الجيري بمنطقة الجبل الأخضر في صناعة الأسمنت.
10. الدعوة إلى تشكيل فريق عمل يختص بالدراسات الجيولوجية للحدود الفاصلة وخاصة بالمنطقة الغربية ويكون ضمن اختصاصات الجمعية الليبية لعلوم الأرض ومركز البحوث الصناعية.