

# Socio-Economic and Environmental Impacts of Mangalavanam Bird Sanctuary, Ernakulam

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## Abstract:

Mangroves are ecologically significant coastal ecosystems that provide a wide range of environmental and socio-economic benefits. Mangalavanam Bird Sanctuary, located in Ernakulam, Kerala, is an important urban mangrove ecosystem that supports biodiversity, provides habitat for migratory birds, and contributes to climate regulation through carbon sequestration. However, rapid urbanisation, pollution, habitat encroachment, and other anthropogenic activities have adversely affected the sanctuary's ecological health. This study examines the environmental importance and socio-economic contributions of the mangroves in Mangalavanam Bird Sanctuary, while identifying the major challenges affecting their conservation and sustainability. The research is based on both primary and secondary data collected from local residents, tourists, and sanctuary officials, supplemented by information from books, journals, reports, and online sources. The findings reveal that mangroves play a vital role in supporting biodiversity, fisheries, shoreline protection, and environmental sustainability. At the same time, increasing urban pressure and pollution pose significant threats to the long-term survival of this ecosystem. The study emphasises the need for effective conservation measures, public awareness, and sustainable management practices to protect and restore the mangrove ecosystem of Mangalavanam Bird Sanctuary.

**Keywords:** Mangroves, Environmental Sustainability, Biodiversity Conservation, Urbanisation, Socio-Economic Impact, Wetland Ecosystem, Migratory Birds.

## 1. INTRODUCTION

Mangroves are unique coastal ecosystems that thrive in saline and waterlogged environments. They provide important ecological services such as shoreline protection, biodiversity conservation, carbon sequestration, and nursery habitats for fish and other aquatic species. Mangalavanam Bird Sanctuary, located in Ernakulam, Kerala, is a significant urban mangrove ecosystem known as the "Green Lung of Kochi." Despite its ecological importance, the sanctuary faces increasing threats from urbanisation, pollution, and habitat degradation. This study examines the socio-economic and environmental significance of the mangroves in Mangalavanam and the challenges affecting their sustainability.

## 2. REVIEW OF LITERATURE

- Previous studies have highlighted the ecological and socio-economic importance of mangrove ecosystems. Mangroves provide critical ecosystem services such as biodiversity conservation, carbon sequestration, shoreline protection, and nursery habitats for fish and shellfish. Research by **Adame et al. (2021)**, **Usha Kiranmai (2018)**, and **Barbier (2016)** emphasised the role of mangroves in climate change mitigation, carbon storage, and protection against coastal hazards and storm surges.
- Several studies have reported a significant decline in mangrove cover due to human activities and environmental pressures. **Krishna G. Promod et al. (2024)**, **Jayahari et al. (2020)**, and **Sreelakshmi et al. (2021)** observed substantial mangrove loss in Ernakulam and Kerala as a result of urbanisation, infrastructure development, pollution, land reclamation, and habitat destruction.
- Global studies by **Goldberg et al. (2020)** and **Hagger et al. (2022)** also identified anthropogenic activities as the primary drivers of mangrove degradation worldwide. The literature further emphasises the need for effective conservation and restoration measures.
- Studies by **Romanach et al. (2018)**, **Hema and Devi (2015)**, and **Dinesh et al. (2018)** highlighted the importance of community participation, environmental awareness, economic valuation, and policy interventions for sustainable mangrove management. These findings indicate that protecting mangrove ecosystems is essential for maintaining ecological balance, supporting local livelihoods, and ensuring long-term environmental sustainability.
- Studies by **Heema and Devi Indira (2014)** and **Hema and Devi Indira (2015)** found that mangroves support coastal livelihoods by providing resources such as fuelwood, fish breeding grounds, and other ecosystem services, while also contributing significantly to local economies.
- Research by **Das and Vincent (2009)** further demonstrated that mangroves act as natural barriers against cyclones and coastal disasters, reducing human and economic losses.
- Several studies have documented the rapid decline of mangroves due to urbanisation, industrialisation, pollution, and infrastructure development. **Jiji Paul (2014)** reported substantial mangrove loss in Ernakulam and Kochi regions, while **Maiti and Chowdhury (2013)** emphasised the damaging effects of anthropogenic pollution and heavy metals on mangrove biodiversity. Similar findings by **Goldberg et al. (2020)** and **Hagger et al. (2022)** identified human activities as the primary drivers of global mangrove degradation. The literature also stresses the role of mangroves in climate change mitigation and environmental sustainability.
- Studies by **Adame et al. (2021)**, **Akhand et al. (2012)**, and **Usha Kiranmai (2018)** highlighted the capacity of mangroves to sequester carbon and reduce greenhouse gas emissions, while warning that mangrove loss contributes to increased carbon release into the atmosphere. Most researchers recommend stronger conservation policies, community participation, habitat restoration, and sustainable management practices to ensure the long-term protection of mangrove ecosystems.

## 3. SIGNIFICANCE OF THE STUDY

The study highlights the ecological and socio-economic contributions of mangroves in Mangalavanam Bird Sanctuary. It provides insights into the environmental benefits of mangroves, including biodiversity conservation and carbon storage, while also examining the challenges posed by urban development and pollution. The findings may support effective conservation and sustainable management strategies.

#### **4. STATEMENT OF THE PROBLEM**

Mangalavanam Bird Sanctuary is experiencing increasing pressure from urbanisation, pollution, and infrastructure development. These factors contribute to the degradation of mangrove habitats, adversely affecting biodiversity, migratory birds, fisheries, and ecosystem services. Understanding the causes and impacts of mangrove degradation is essential for ensuring the long-term sustainability of this urban wetland ecosystem.

#### **5. OBJECTIVES OF THE STUDY**

- To examine the environmental importance of mangroves in Mangalavanam Bird Sanctuary.
- To analyse the socio-economic and environmental benefits provided by mangroves.
- To identify the major challenges affecting mangrove conservation and sustainability.
- To suggest measures for the effective protection and management of mangrove ecosystems.

#### **6. SCOPE OF THE STUDY**

The study focuses on the mangrove ecosystem of Mangalavanam Bird Sanctuary in Ernakulam. It assesses the environmental and socio-economic importance of mangroves, identifies factors contributing to their degradation, and evaluates their role in supporting biodiversity, climate regulation, and ecosystem sustainability.

#### **7. RESEARCH METHODOLOGY**

The study is based on both primary and secondary data. Primary data were collected from 72 respondents, including local residents, tourists, and sanctuary officials, using a structured questionnaire and personal interviews. Secondary data were gathered from books, journals, reports, and online sources. Descriptive statistical tools such as percentages and charts were used for data analysis.

#### **8. DATA ANALYSIS AND INTERPRETATION**

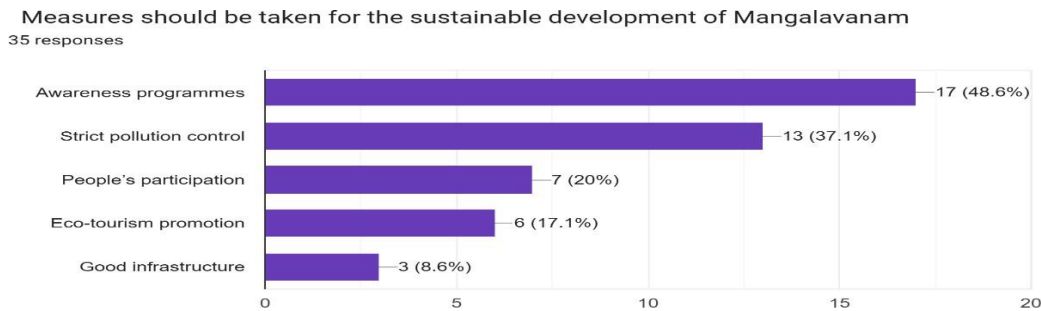
##### **A. RESPONSES OF RESIDENTS**

**Table 1: Measures Taken for Sustainable Development of Mangalavanam Bird Sanctuary**

Measures	Number of Respondents	Percentage
Awareness Programmes	17	48.6
Strict pollution control	13	37.1
People's participation	7	20
Eco-tourism promotion	6	17.1
Good infrastructure	3	8.6
<b>Total</b>	<b>35</b>	<b>100</b>

Source: Primary Data

**Figure 1: Measures Taken for Sustainable Development of Mangalavanam Bird Sanctuary**



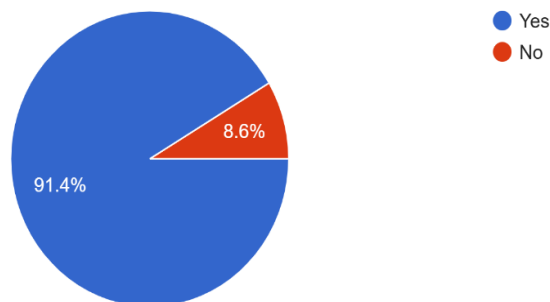
**Table 2: Employment Creation by Bird Sanctuary**

Category of Respondents	Number of Respondents	Percentage
Yes	32	91.4
No	3	8.6
<b>Total</b>	<b>35</b>	<b>100</b>

Source: Primary Data

**Figure 2: Employment Creation by Bird Sanctuary**

Does the bird Sanctuary help create job opportunities for people  
35 responses



**Table 3: Economic Benefit for Mangalavanam Bird Sanctuary**

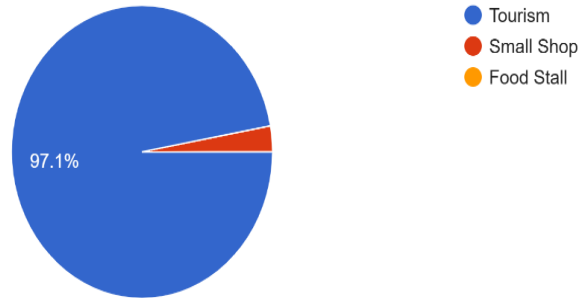
Main Activity	Number of Respondents	Percentage
Tourism	34	97.1
Small Shop	1	2.1
Food Stall	0	0
<b>Total</b>	<b>35</b>	<b>100</b>

Source: Primary Data

**Figure 3: Economic Benefit for Mangalavanam Bird Sanctuary**

Which of the following activities provides economic benefits to the mangalavanam bird sanctuary and residents

35 responses



**Table 4: Perception of Raising the Number of Birds in the Sanctuary**

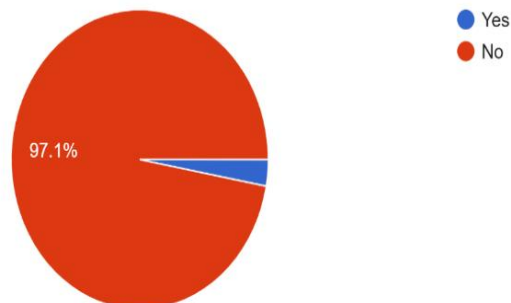
Responses	Number of Respondents	Percentage
Yes	1	2.9
No	34	97.1
<b>Total</b>	<b>35</b>	<b>100</b>

Source: Primary Data

**Figure 4: Perception of Raising the Number of Birds in the Sanctuary**

Did you notice any increase in the number of birds in the Sanctuary

35 responses



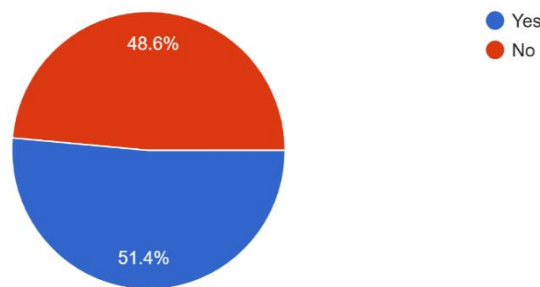
**Table 5: Impact of Mangroves on Local Economy**

Responses	Number of Respondents	Percentage
Yes	18	51.4
No	17	48.6
<b>Total</b>	<b>35</b>	<b>100</b>

Source: Primary Data

**Figure 5: Impact of Mangroves on Local Economy**

Does the local economy benefit from mangroves  
35 responses



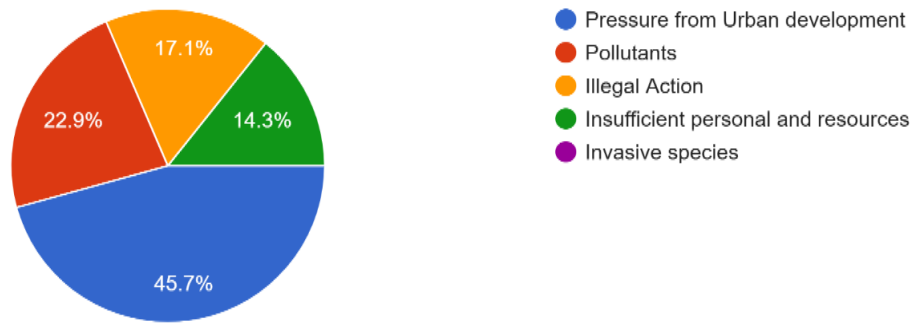
**Table 6: Obstacles Affecting the Protection of Mangroves in Mangalavanam Bird Sanctuary**

Responses	Number of Respondents	Percentage
Pressure from Urban development	16	45.7
Pollutants	8	22.9
Illegal Action	6	17.1
Insufficient personal and resources	5	14.3
Invasive species	0	0
<b>Total</b>	<b>35</b>	<b>100</b>

Source: Primary Data

**Figure 6: Obstacles Affecting the Protection of Mangroves in Mangalavanam Bird Sanctuary**

What obstacles affect the protection of mangroves in Mangalavanam  
35 responses



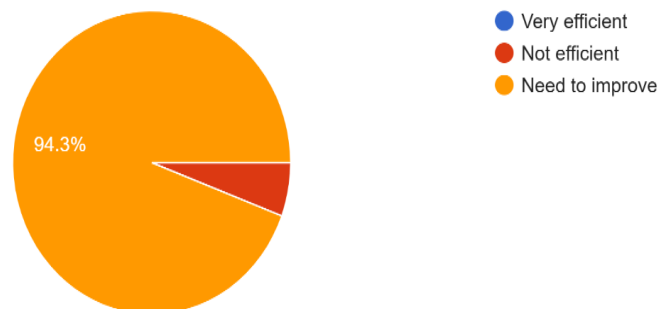
**Table 7: Effectiveness of Plastic Waste Management in the Mangalavanam Bird Sanctuary**

Rating	Number of Respondents	Percentage
Very Effective	0	0
Not Effective	2	5.7
Need to Improve	33	94.3
<b>Total</b>	<b>35</b>	<b>100</b>

Source: Primary Data

**Figure 7: Effectiveness of Plastic Waste Management in the Mangalavanam Bird Sanctuary**

Do you think plastic waste management is effective in a sanctuary or around a bird sanctuary  
35 responses



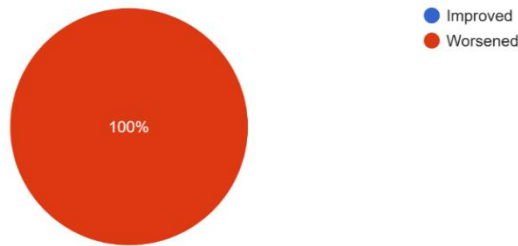
**Table 8: Quality of Water Bodies Near the Mangalavanam Bird Sanctuary**

Responses	Number of Respondents	Percentage
Improved	0	0
Worsened	35	100
<b>Total</b>	<b>35</b>	<b>100</b>

Source: Primary Data

**Figure 8: Quality of Water Bodies Near the Mangalavanam Bird Sanctuary**

Have you noticed the water quality of the water bodies near the Mangalavanam Bird Sanctuary  
35 responses



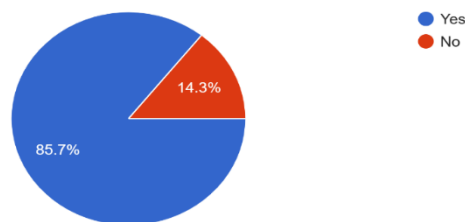
**Table 9: The Cutting or Destroying of Mangroves**

Responses	Number of Respondents	Percentage
Yes	30	85.7
No	5	14.3
<b>Total</b>	<b>35</b>	<b>100</b>

Source: Primary Data

**Figure 9: The Cutting or Destroying of Mangroves**

Have you seen the cutting or destroying of mangrove plants  
35 responses



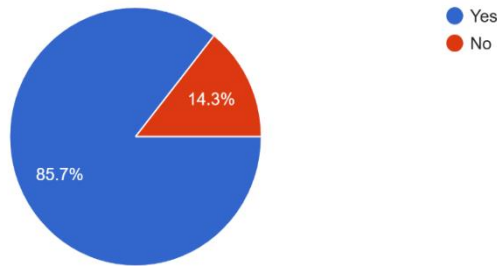
**Table 10: The Role of Mangroves in Reducing Floods**

Responses	Number of Respondents	Percentage
Yes	30	85.7
No	5	14.3
<b>Total</b>	<b>35</b>	<b>100</b>

Source: Primary Data

**Figure 10: The Role of Mangroves in Reducing Floods**

Have you observed mangroves help to reduce floods  
35 responses



**B. RESPONSES OF VISITORS**

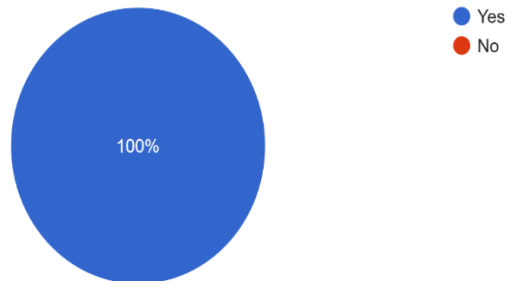
**Table 11: Mangalavanam Bird Sanctuary Helps to Improve Air Quality**

Responses	Number of Respondents	Percentage
Yes	35	100
No	0	0
<b>Total</b>	<b>35</b>	<b>100</b>

Source: Primary Data

**Figure 11: Mangalavanam Bird Sanctuary Helps to Improve Air Quality**

Do you think Bird Sanctuary helps improve air quality  
35 responses



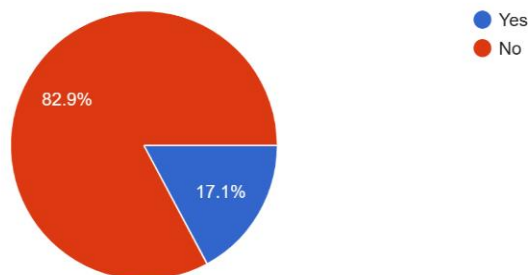
**Table 12: The Number of Birds Is Increasing in Mangalavanam Bird Sanctuary**

Responses	Number of Respondents	Percentage
Yes	6	17.1
No	29	82.9
<b>Total</b>	<b>35</b>	<b>100</b>

Source: Primary Data

**Figure 12: The Number of Birds Is Increasing in Mangalavanam Bird Sanctuary**

Did you notice any increase in the number of birds in the Mangalavanam bird sanctuary  
35 responses



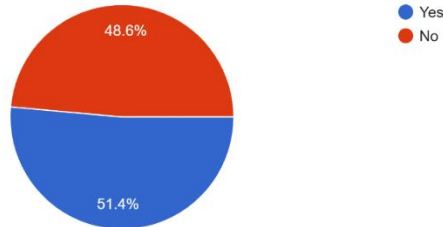
**Table 13: The Importance of Mangroves and Bird Conservation**

Responses	Number of Respondents	Percentage
Yes	18	51.4
No	17	48.6
<b>Total</b>	<b>35</b>	<b>100</b>

Source: Primary Data

**Figure 13: The Importance of Mangroves and Bird Conservation**

Are you aware of the importance of Mangrove and Bird conservation  
35 responses



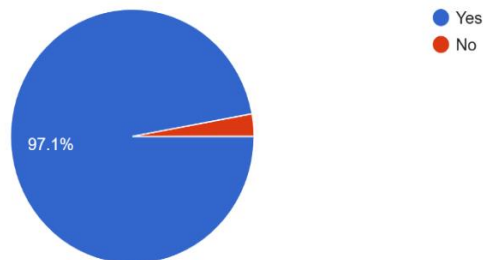
**Table 14: The Mangrove Area Is Beautiful and Attractive**

Responses	Number of Respondents	Percentage
Yes	35	100
No	0	0
<b>Total</b>	<b>35</b>	<b>100</b>

Source: Primary Data

**Figure 14: The Mangrove Area Is Beautiful and Attractive**

Does the mangrove area provide more beautiful and attractive  
35 responses

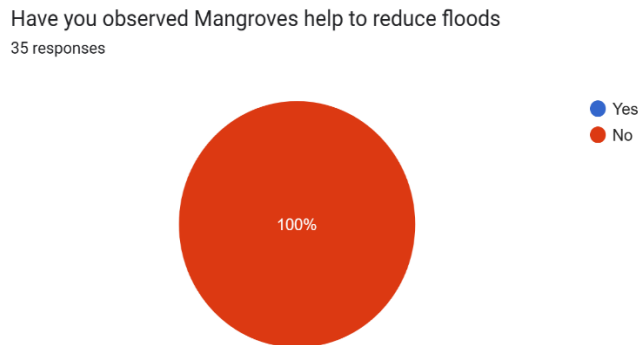


**Table 15: The Mangrove Helps to Reduce Floods**

Responses	Number of Respondents	Percentage
Yes	0	0
No	35	100
<b>Total</b>	<b>35</b>	<b>100</b>

Source: Primary Data

**Figure 15: The Mangrove Helps to Reduce Floods**

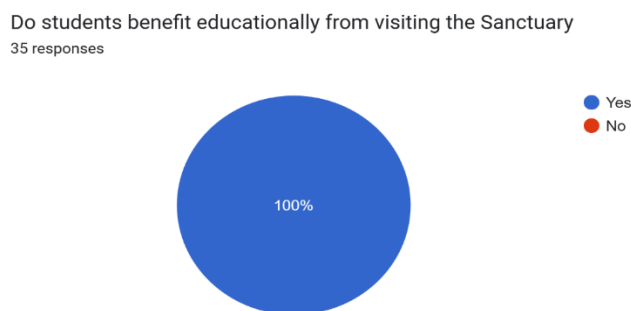


**Table 16: The Educationally Beneficial Value of Students from Visiting the Mangalavanam Bird Sanctuary**

Responses	Number of Respondents	Percentage
Yes	35	100
No	0	0
<b>Total</b>	<b>35</b>	<b>100</b>

Source: Primary Data

**Figure 16: The Educationally Beneficial Value of Students from Visiting the Mangalavanam Bird Sanctuary**



**C. RESPONSES OF MANGALAVANAM OFFICER**

**Table 17: Importance of Mangroves in Mangalavanam Bird Sanctuary**

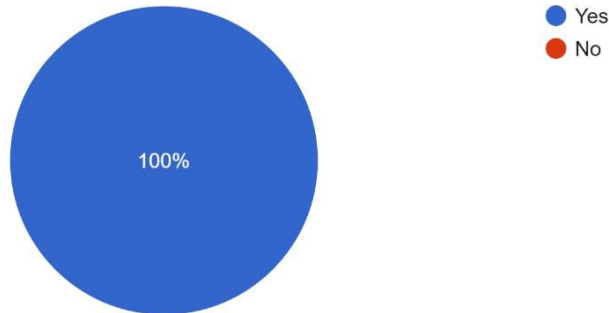
Respondents	Number of Respondents	Percentage
Yes	2	100
No	0	0
<b>Total</b>	<b>2</b>	<b>100</b>

Source: Primary Data

**Table 17: Importance of Mangroves in Mangalavanam Bird Sanctuary**

Do you think mangroves are essential to Mangalavanam 's natural balance

2 responses



**Table 18: Role of Mangroves in Providing Ecosystem**

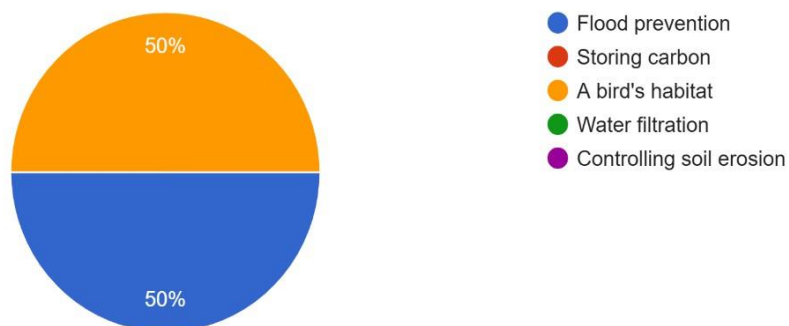
Respondents	Number of Respondents	Percentage
Flood Prevention	1	50
Bird Habitat	1	50
Storing Carbon	0	0
Water filtering	0	0
Controlling soil erosion	0	0
<b>Total</b>	<b>2</b>	<b>100</b>

Source: Primary Data

**Figure18: Role of Mangroves in Providing Ecosystem**

Which of the following describes how mangroves primarily provide ecosystem services

2 responses



**Table 19: Presence of Local Plant or Animal Species Supported By Mangroves**

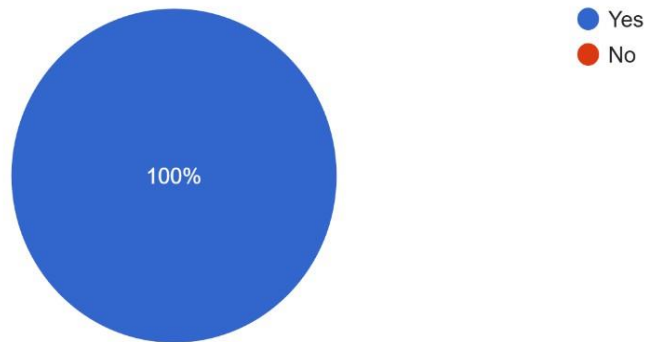
Respondents	Number of Respondents	Percentage
Yes	2	100
No	0	0
<b>Total</b>	<b>2</b>	<b>100</b>

Source: Primary Data

**Figure 19: Presence of Local Plant or Animal Species Supported By Mangroves**

Are there any local plant or animal species that are supported by mangroves

2 responses



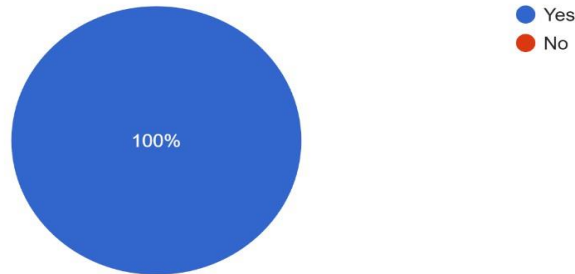
**Table 20: Economic Benefit from Tourism in Mangalavanam Bird Sanctuary**

Respondents	Number of Respondents	Percentage
Yes	2	100
No	0	0
<b>Total</b>	<b>2</b>	<b>100</b>

Source: Primary Data

**Figure 20: Economic Benefit from Tourism in Mangalavanam Bird Sanctuary**

Does Mangalavanam profit economically from tourism centered around mangroves  
2 responses



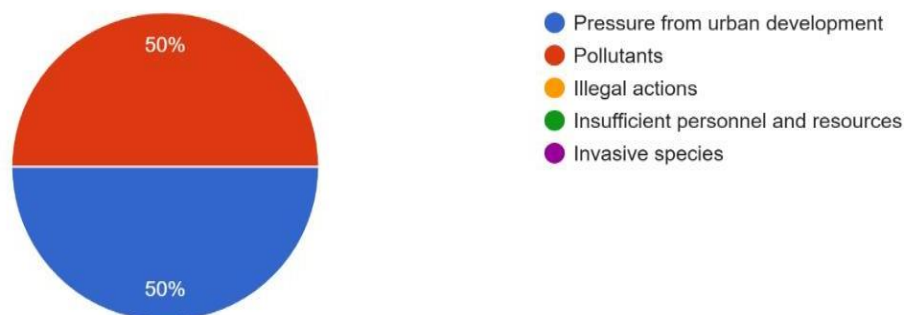
**Table 21: Obstacles Affecting the Protection of Mangroves in Mangalavanam Bird Sanctuary**

Obstacles	Number of Respondents	Percentage
Pressure from urban development	1	50
Pollutants	1	50
Illegal Actions	0	0
Insufficient personnel and resources	0	0
Invasive Species	0	0
<b>Total</b>	<b>2</b>	<b>100</b>

Source: Primary Data

**Figure 21: Obstacles Affecting the Protection of Mangroves in Mangalavanam Bird Sanctuary**

What obstacles affect the protection of mangroves in Mangalavanam  
2 responses



**Table 22: Initiatives for Mangrove Restoration and Replanting**

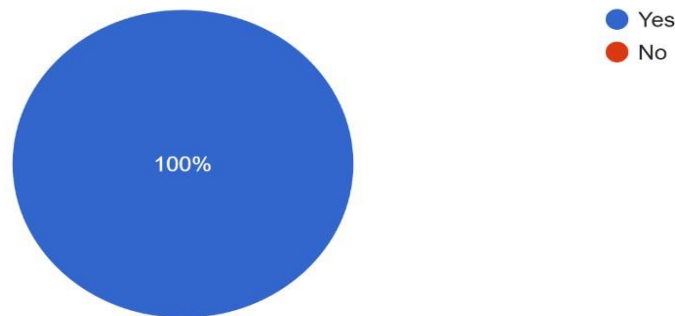
Respondents	Number of Respondents	Percentage
Yes	2	100
No	0	0
<b>Total</b>	<b>2</b>	<b>100</b>

Source: Primary Data

**Figure 22: Initiatives for Mangrove Restoration and Replanting**

Is there an initiative in this area to restore or replant mangroves

2 responses



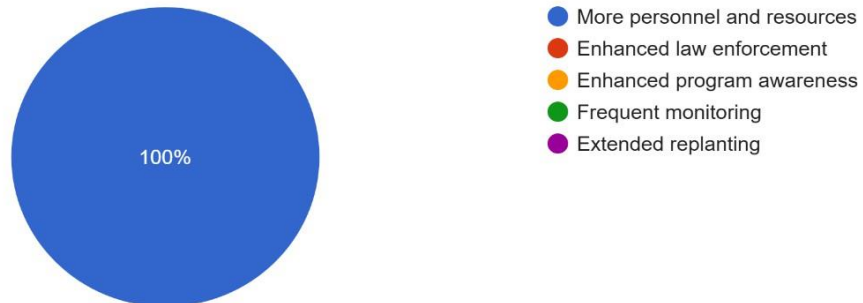
**Table 23: The Actions Required for Long-Term Sustainability of Conservation of Mangroves**

Action	Number of Respondents	Percentage
More Personnel and Resources	2	100
Enhanced Law Enforcement	0	0
Enhanced progress awareness	0	0
Frequent Monitoring	0	0
Extended Replanting	0	0
<b>Total</b>	<b>2</b>	<b>100</b>

Source: Primary Data

**Figure 23: The Actions Required for Long-Term Sustainability of Conservation of Mangroves**

What other actions are required for long-term sustainability  
2 responses



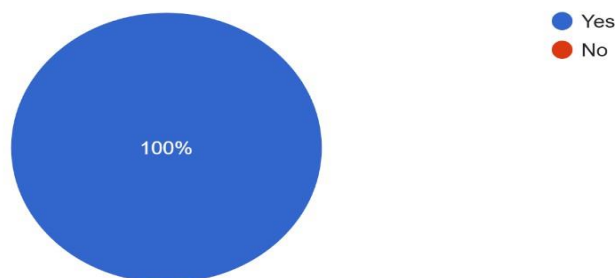
**Table 24: Rating For Mangalavanam System in Mangalavanam Bird Sanctuary**

Respondents	Number of Respondents	Percentage
Yes	2	100
No	0	0
<b>Total</b>	<b>2</b>	<b>100</b>

Source: Primary Data

**Figure 24: Rating For Mangalavanam System in Mangalavanam Bird Sanctuary**

Do you think the existing management system is satisfactory  
2 responses



**Table 25: Initiatives By The Forest Department In Mangalavanam Bird Sanctuary**

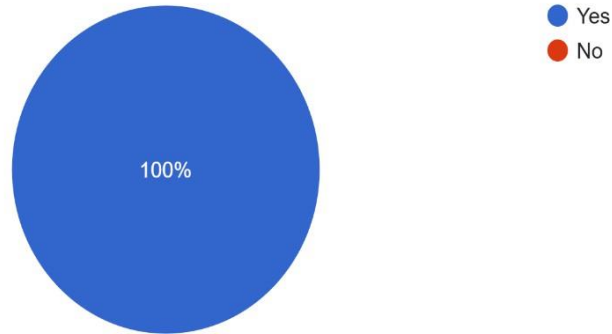
Respondents	Number of Respondents	Percentage
Yes	2	100
No	0	0
<b>Total</b>	<b>2</b>	<b>100</b>

Source: Primary Data

**Table 25: Initiatives By The Forest Department In Mangalavanam Bird Sanctuary**

Does the Forest Department run public awareness initiatives

2 responses



## 9. LIMITATIONS OF THE STUDY

1. The study is limited to Mangalavanam Bird Sanctuary and its surrounding area.
2. The sample size is relatively small, consisting of 72 respondents.
3. Time and resource constraints limited the extent of field investigation.
4. The findings may not be fully representative of other mangrove ecosystems in Kerala.

## 10. SUGGESTIONS

1. Conduct regular awareness and environmental education programmes on mangrove conservation.
2. Strengthen waste management systems and strictly control plastic pollution around the sanctuary.
3. Enforce regulations to prevent illegal encroachment and unplanned construction activities near mangrove areas.
4. Undertake large-scale mangrove restoration and replantation programmes.
5. Promote sustainable eco-tourism to generate income while ensuring environmental protection.
6. Increase the number of staff and resources available for sanctuary management.
7. Conduct periodic monitoring of bird populations, water quality, and mangrove health.
8. Encourage educational institutions to organise study visits and conservation activities at Mangalavanam Bird Sanctuary.

## 11. CONCLUSION

The study reveals that Mangalavanam Bird Sanctuary plays a vital role in maintaining biodiversity, improving environmental quality, and providing educational and recreational benefits. However, mangroves within the sanctuary face increasing threats from urbanisation, pollution, and habitat degradation. Although conservation initiatives are underway, greater public awareness, effective policy implementation, improved waste management, and active participation by local communities and government agencies are essential to the long-term sustainability of the mangrove ecosystem. Protecting Mangalavanam's mangroves is crucial for maintaining ecological balance and ensuring environmental sustainability in Ernakulam.



## REFERENCES:

- [1] Adame, M. F., Connolly, R. M., Turschwell, M. P., Lagomasino, D., Goldberg, L., Holdorf, J., . . . Brown, C. J. (2021). Future carbon emissions from global mangrove forest loss. *Global Change Biology*, 27(12), 2853–2867.
- [2] Aha, C., Suresh, S. H., Murthy, K. I., & Ravindranath, H. N. (2015). Mangrove area assessment in India: Implications of the loss of mangroves. *Journal of Earth System Science*, 124(4), 729–741.
- [3] Akhand, A., Mukhopadhyay, A., Chanda, A., Mukherjee, S., Das, A., Das, S., . . . Rao, K. H. (2012). Potential CO<sub>2</sub> emissions due to loss of above-ground biomass from the Indian Sundarbans mangroves. *Journal of Environmental Management*, 100, 1–9.
- [4] Barbier, E. B. (2016). The protective service of mangrove ecosystems: A review of valuation methods. *Review of Environmental Economics and Policy*, 10(1), 66–85.
- [5] Blankespoor, B., Dasgupta, S., & Lange, G. M. (2016). Mangroves as a protection from storm surges in a changing climate. *Ambio*, 45(2), 157–168.
- [6] Das, S., & Vincent, J. R. (2009). Mangroves protected villages and reduced death toll during super cyclone. *Sustainability Science*, 4(2), 273–284.
- [7] Dinesh, K., Chinchu, R. E., & Geeji, T. M. (2018). Attitude and protection of local inhabitants towards mangrove ecosystems. *Asian Journal of Environmental Studies*, 10(3), 98–105.
- [8] Francis, M. C., Somasekharan, T. M., & Mariya, M. A. (2025). Problems and challenges faced by rural women entrepreneurs in Ernakulam District: A case study of SDG units in Pallipuram and Kuzhuppilly villages. *International Journal of Research and Analytical Reviews (IJRAR)*, 12(1), 238- 244.
- [9] Goldberg, L., Lagomasino, D., Thomas, N., & Fatoyinbo, T. (2020). Global declines in human-driven mangrove loss. *Global Change Biology*, 26(10), 5844–5858.
- [10] Mariya, M. A., & Somasekharan, T. M. (2025). Challenges and opportunities for women entrepreneurs in Kudumbashree units. *Emperor Journal of Economics and Social Science Research (EJESSR)*, 8(1), 148- 149.
- [11] Sahadevan, P., Cheruvat, D., & Suma, C. C. (2017). On the mangroves and mangrove associates of Puthuvypin, Ernakulam district, Kerala. *Indian Journal of Marine Sciences*, 46(5), 987–995.
- [12] Sandilyan, S. (2014). Impacts of climate change on Indian mangroves: A review. *International Journal of Biodiversity and Conservation*, 6(12), 849–856.
- [13] Sandilyan, S., & Kathiresan, K. (2014). Decline of mangroves: A threat of heavy metal poisoning in Asia. *Ocean & Coastal Management*, 102, 161–168.
- [14] Sreelakshmi, S., Bijesh, V. K., Nandan, B. S., & Harikrishnan, M. (2021). Mangrove forests along the coastline of Kerala: Current status and future prospects. *Wetlands Ecology and Management*, 29(4), 609–623.