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# SUSTAINABLE LOBSTER FISHING FACILITY

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## ABSTRACT

Lobster fishing faces environmental and economic challenges due to the use of predatory techniques that compromise the sustainability of fish stocks, such as the use of barrels, tires, iron, zinc, etc. To solve this problem, a sustainable lobster fishery was developed using mesquite wood (*Prosopis juliflora*), a fast-growing exotic species that is abundant in the region. The proposed structure seeks to reduce environmental impacts by providing a suitable refuge for the selective capture of lobster, minimizing the degradation of the marine habitat. It also incorporates a fixing system using biodegradable pegs and ropes, eliminating plastic waste in the ocean. The solution aims to combine sustainable practices with the enhancement of artisanal fishing, guaranteeing the maintenance of economic activity for coastal communities. The study assesses the effectiveness of the model compared to traditional methods, considering its durability at sea and environmental impact. The mesquite wood guarantees resistance to humidity and salinity. Its natural decomposition prevents marine pollution, unlike conventional structures. In addition, it allows for the selective capture of lobster, preserving fish stocks and ensuring the natural replenishment of the species. The sustainable use of mesquite strengthens the local economy and reduces pressure on other resources, promoting more balanced and responsible fishing.

Keywords: Sustainable fishing, lobster, mesquite, environmental impact, and marine preservation.

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## 1. INTRODUCTION

Lobster fishing is an economic activity of great relevance for Brazil, especially in the Northeast region, encompassing states such as Ceará, Rio Grande do Norte, and Pernambuco (AGRO EM CAMPO, 2024). This sector plays a crucial role in the livelihood of thousands of families and the local economy, in addition to contributing significantly to national exports (OCEANA, 2021). Brazilian lobster fishing holds a prominent position in the international market, ranking as one of the most valuable products of national extractive fishing.

In 2022, approximately 2,950 vessels were registered to catch lobster in the country, directly employing around 15,000 fishing families and generating more than R$400 million (US$ 71.548.670,00)[1] in revenue from exports, mainly to markets such as the United States, France, and Japan (OCEANA BRASIL, 2022). Brazil is one of the largest lobster exporters in Latin America, and this activity represents an essential economic pillar for several coastal communities, especially in the North and Northeast regions, where more than 100,000 people depend directly or indirectly on lobster fishing (BRASIL, 2023).

Based on the estimated production of 531,000 to 1,593,000 sustainable lobster attractors per year in the Northeast, 7,434,000 to 22,302,000 pieces of wood would be needed, considering that each lobster attractor uses 14 pieces, which would require 66,375 to 199,125 mesquite trees, since each tree, through pruning, provides enough material for up to 8 lobster attractors. This extraction is viable through sustainable management, as it uses only parts of the tree (without cutting it down completely), and the mesquite tree regenerates quickly, as well as being abundant in the semi-arid region. It is estimated that the areas invaded by the mesquite (*Prosopis juliflora*) (Sw.) DC. (FABACEAE) The semi-arid northeast already exceeds one million hectares (ANDRADE et al., 2010). This reinforces its viability as an ecological and accessible raw material. These figures represent the annual estimate for the entire Northeast, but for the time being, our main objective is to serve our region, considering the proximity to local fishermen, the logistical viability of production, and the immediate need for sustainable solutions for lobster fishing in our community.

Considering the vast amount of mesquite trees present in the Northeast, it would be entirely feasible to supply the annual demand for sustainable lobster attractors for the entire region, and there would still be a large volume available. This demonstrates that there is sufficient wood to support this market. In addition, this initiative contributes

[1] exchange rate on 06/06/25 R$5,59

directly to controlling the invasive species and mitigating the environmental impacts caused by its uncontrolled expansion.

For example, the state of Ceará is responsible for around 65% of national exports of this crustacean (BRASIL, 2023; BRASIL61, 2022). Despite its economic importance, the sector faces significant challenges, such as overfishing and the reduction of stocks of spiny lobster (*Panulirus argus*) and green lobster (*Panulirus laevicauda*), species that make up the bulk of production. Studies show that overfishing has caused stocks to fall by more than 80% since the 1960s (ICMBIO, 2018), compromising marine biodiversity and sustainability.

The use of inappropriate practices and the capture of lobsters below the minimum permitted size increases the pressure on lobster populations. Many fishermen use illegal methods, such as inappropriate trawl nets and unsuitable traps. These practices lead to the capture of juveniles and the destruction of lobsters' natural habitat.

In addition, the degradation of marine ecosystems is another concerning factor. The destruction of natural reefs and the uncontrolled exploitation of the ocean environment contribute to the loss of biodiversity, compromising not only lobster fishing but also the survival of several other marine species.

To mitigate these impacts and ensure the sustainability of the activity, in 2022, a catch limit of 6,192 tons was approved for both lobster species, establishing new parameters for responsible exploitation (AGÊNCIA GOV, 2024). However, regulatory measures alone are not enough to control environmental damage.

Lobster fishing is an important source of income for thousands of fishermen and their families along the northeastern coast. On average, each vessel operates with four fishermen (BRASIL, 2023). In many coastal communities, lobster fishing is the main source of employment and livelihood, and sometimes the only source.

The lobster attractor, also known as an artificial reef, is one of the main resources used in lobster fishing. According to Cecília (2024), in an article published on the portal (Habitability), “artificial reefs are made from scrap metal”. Traditional fishing zones, also known as artificial reefs, are made from scrap metal. This scrap metal includes materials such as car bodies, tires, stoves and other discarded materials. They are currently used by fishermen to attract and capture lobsters, simulating the natural habitat of crustaceans, offering shelter and favoring the reproduction of the species.

## 2. Objectives

### 2.1 General goal

Develop a sustainable lobster attractor that does not pollute the sea, using wood from Mesquite (*Prosopis juliflora*) to ensure the conservation of lobster populations and promote sustainability in fishing activities.

### 2.2 Specific goal

Meeting the Sustainable Development Goals - SDGs 1, 8, 12 and 14; Producing a sustainable lobster attractor using Mesquite wood; Preserving the lobster species; Contributing to the preservation of the environment; Reducing the environmental impacts caused by traditional fishing; Raising awareness among fishermen about sustainable fishing practices; Develop a sustainable peg and rope, using ecological materials, to complement sustainable lobster attractors.

## 3. METHODOLOGY

### 3.1. Identifying the problem

The starting point of the project was the identification of the great economic potential of fishing in the community of Praia do Rosado, in the municipality of Porto do Mangue, in the state of Rio Grande do Norte. Observing the relevance of this activity for the local economy and the environmental impacts caused by traditional fishing methods, the need to develop a sustainable solution that minimizes environmental damage and meets the socioeconomic needs of the fishing community was recognized. Therefore, the proposal for sustainable lobster attractors has emerged as a viable alternative to mitigate the negative impacts of lobster fishing and to encourage more conscious and eco-friendly practices.

### 3.2 Methodology Development Stages

#### 3.2.1 Bibliographical Research

To provide a scientific basis for the project:

- In-depth research was carried out on Google Scholar and reliable sources such as scientific articles, specialized magazines, theses, and dissertations.
- Periodicals, newspapers, and other complementary sources were consulted to understand the technical and socio-economic context of lobster fishing and the sustainable potential of mesquite wood (*Prosopis juliflora*). To obtain an up-to-date overview of fishing practices and explore previous studies that addressed sustainable solutions.

### 3.2.2 **Consultations with Experts**

As the idea was consolidated, it was possible to establish a network of contacts with specific professionals in the area, providing access to technical information and validating the proposed ideas. Among those consulted, some renowned professionals stand out, whose experience and technical knowledge were fundamental in providing precise guidance and contributing significantly to the foundation and development of the project.

For example: Environmental Manager of IDEMA (Institute for Sustainable Development and Environment) in Praia do Rosado; Fisheries Engineer; Secretary of Fisheries and Agriculture; President of the Fishermen's Colony; Professors of Fisheries Resources at IFRN (Federal Institute of Education, Science and Technology of Rio Grande do Norte) Macau; Rural Credit Manager at Banco do Nordeste(Northeast Bank); Professor Marcelo Tubarão – UFERSA (The Federal Rural University of the Semi-Arid Region) and Member of Lobster CPG (Standing Lobster Management Committee); Marine Biologist

### 3.2.3 **Field Research**

To understand the practical reality and perceptions of local fishermen: individual interviews and collective meetings were held with experienced fishermen from the Praia do Rosado community; two structured questionnaires were drawn up to collect relevant data and were applied individually to each fisherman; the questionnaires were applied exclusively in physical format, on paper, without the use of digital platforms or virtual media.

Among the other questions in the two questionnaires, some of the ones with the greatest impact stand out:

• What is the annual average number of traditional lobster fishing grounds deployed by vessels?

• What are the environmental impacts of traditional fishing grounds as perceived by fishers?

• What is the importance of raising awareness about the environmental and socioeconomic impacts of traditional fishing?

### 3.2.4 **Awareness Process**

During the research process, awareness-raising was also promoted, addressing two main issues: the negative impacts of traditional fishing methods on the marine ecosystem; and the environmental, economic, and social benefits of using sustainable lobster attractors.

This process allowed for greater understanding and engagement among fishermen, since, by raising awareness individually, it was possible to observe and analyze each person's responses and opinions more deeply. Although many did not express themselves verbally, their perceptions and feelings about the proposed sustainable model were evident through their reactions and body language.

### 3.2.5 **Construction and Testing of Sustainable Lobster Attractor**

In the final stage of the process, after obtaining the support of experts in the field and carrying out a questionnaire with the fishermen, as well as analyzing relevant documents and articles, the crucial moment of developing the sustainable lobster attractor was reached.

With the guidance acquired and a solid knowledge base, the mesquite wood was cut, and the materials needed for construction were prepared. As shown in image 1, the fishermen are taking the lobster attractor onto the boat, so it can then be deployed into the sea, where it will be tested under real conditions of use.

Figure SEQ Figure *ARABIC 1 - fishermen from the community of Praia do Rosado transporting sustainable lobster attractor to the boat. Source: own authorship 2023.

### 3.3 Construction Process

I- Cutting and preparing the wood; the pieces of mesquite wood were cut; II- Holes were made in each piece, with 3 holes per unit, using a hand drill; III- Assembling the base: We positioned the 3 pieces of ⌀10 cm wood parallel to each other, forming the base of the lobster attractor; Fitting the wood: IV- We fixed the 11 pieces of ⌀5 cm wood on the base, using the previously cut wooden pins; V- Adding weight and rope: The stones were tied strategically to stabilize the fishing boat on the seabed; The sustainable rope, made from the mesquite bark, was attached to facilitate handling.

## 4. Results

The implementation of sustainable lobster attractors has brought significant advancements, both in economic and environmental terms. Throughout the development of the project, it was possible to prove the viability of the solution, highlighting its efficiency in reducing costs and its contribution to responsible fishing.

### 4.1 Efficiency and Cost Reduction

The methodological approach for developing the sustainable lobster attractor focused on the use of natural resources that are abundant in the region, with emphasis on mesquite wood. This choice allowed the construction of a resistant, efficient, and low-cost attractor.

**4.2 Cost-benefit:** While a traditional lobster attractor costs between R$75.00 (US$13,98) and R$130.00 (US$23,30), the sustainable lobster attractor was produced with an investment of between R$10.00(US$1,79) and R$15.00(US$2,69), already including labor. Although mesquite wood is collected directly from nature and has no purchase cost, there is a physical effort involved in extraction, which can be considered an indirect cost, as demonstrated in the Figure. This represents a significant saving, considering that fishermen use between 400 and 600 units per boat every year.

| Diferencial do pesqueiro tradicional para o sustentável de madeira velha | | | | |
|---|---|---|---|---|
| ITEM | Valor | Pesqueiro Sustentável | Diferencial em valor; | porcentual; |
| Tambor (Tonel) | R$75,00 | R$15,00 | R$60,00 | 80,00% |
| Tampão | R$116,00 | R$15,00 | R$101,00 | 87,07% |
| Pneu | R$20,00 | R$15,00 | R$5,00 | 25,00% |
| Carcaça de carro | R$136,00 | R$15,00 | R$121,00 | 88,97% |
| Capô de carro | R$135,00 | R$15,00 | R$120,00 | 88,89% |
| Teto de carro | R$76,00 | R$15,00 | R$61,00 | 80,26% |
| pedaços de geladeira | R$120,00 | R$15,00 | R$105,00 | 87,50% |
| pedaços de fogão | R$90,00 | R$15,00 | R$75,00 | 83,33% |
| Marambaia de ferro | R$100,00 | R$15,00 | R$85,00 | 85,00% |

| Diferencial do pesqueiro tradicional para o sustentável de madeira nova | | | | |
|---|---|---|---|---|
| ITEM | valor | Pesqueiro Sustentável | Diferencial em valor; | porcentual; |
| Tambor (Tonel) | R$75,00 | R$10,00 | R$65,00 | 86.67% |
| Tampão | R$116,00 | R$10,00 | R$106,00 | 91.38% |
| Pneu | R$20,00 | R$10,00 | R$10,00 | 50% |
| Carcaça de carro | R$136,00 | R$10,00 | R$126,00 | 92.65% |
| Capô de carro | R$135,00 | R$10,00 | R$125,00 | 92.59% |
| Teto de carro | R$76,00 | R$10,00 | R$66,00 | 86.84% |
| pedaços de geladeira | R$120,00 | R$10,00 | R$110,00 | 91.67% |
| pedaços de fogão | R$90,00 | R$10,00 | R$80,00 | 88.89% |
| Marambaia de ferro | R$100,00 | R$10,00 | R$90,00 | 90,00% |

figure SEQ Figure * ARABIC 2 - Comparison between the costs of traditional lobster attractors and sustainable lobster attractors made of mesquite wood (new and old). highlighting the economic difference. Source own authorship. 2024.

**4.3 Financial impact:** For small vessels, which use an average of 200 to 600 lobster attractors per year, the annual cost of traditional models (ranging from R$75.00 (US$13,98) and R$130.00 (US$23,30) per unit) is between R$15,000.00(US$ 2.688,41) and R$81,600.00.(US$ 14.624,97) For larger vessels, this amount can exceed R$163,200.00(US$ 29.249,93) per year. With the sustainable alternative, which costs between R$10.00(US$1,79) and R$15.00(US$2,69) per unit, the annual cost drops to between R$2,000.00(US$ 358,46) and R$9,000.00(US$ 358,46), generating savings of up to 88%. This reduction makes fishing more accessible, sustainable, and less dependent on high financial resources.

**4.4 Raw Material Availability:** Considering the abundance of mesquites in the region and their rapid growth, it is possible to hypothesize that a single tree can provide enough raw material to build approximately 10 to 20 sustainable lobster attractors.

Moreover, the difference between young and old wood can directly influence the durability of the equipment at sea. Young wood has a greener color, moist texture, and less resistance, while old wood is drier, brownish, and rigid, ensuring a longer service life. Mesquite is widely found in the region, eliminating the need to purchase wood, which reinforces the economic viability of the project by using an available and underutilized natural resource for sustainable purposes.

**4.5 Proper selection of lobsters**: The sustainable lobster attractor is designed to catch only lobsters of the ideal size for sale, avoiding fishing for lobsters below the permitted size. This guarantees the sustainability of the fishery and prevents the reduction of natural stocks.

**4.6 Use of sustainable pegs and ropes**:

The structure of the lobster attractor is made of mesquite wood, which is resistant and biodegradable, reducing the environmental impact. In addition, the rope made from mesquite bark replaces synthetic materials, reducing costs and ensuring a more environmentally friendly option.

**4.7 Duration and Positive Environmental Impact:**

The time that sustainable lobster attractors can be used varies depending on the type of mesquite wood used. Younger wood, because it is greener, has a higher moisture content and natural resins, is more susceptible to the action of salt water and microorganisms, accelerating its decomposition, lasting between 6 and 8 months.

In contrast, older wood, because it is drier and has a lower concentration of volatile resins, is more resistant to deterioration, lasting between 8 and 10 months. This durability was confirmed in practical tests, in which, after 10 months submerged, the lobster attractor had already decomposed, allowing the formation of well-developed coral reefs in the area. After this period, the lobster attractors begin to decompose naturally, preventing the accumulation of waste in the ocean.

Furthermore, it becomes a substrate for the formation of coral reefs, promoting biodiversity and benefiting marine fauna. This factor differentiates sustainable fishing from traditional fishing, which remains at sea for years, contributing to pollution and degrading the ecosystem.

### 4.8 Practical Tests at Sea:

After the construction phase, practical tests were conducted to evaluate the effectiveness of the sustainable lobster attractor in catching lobster. The results were positive, demonstrating that the proposed solution is functional and effective.

First test phase (27 days at sea): Total catch: 1,465 kg of red lobsters; second test phase (1 month and 22 days at sea): Total catch: 3,017 kg of red and green lobsters.

The results indicate that sustainable fishing not only reduces environmental impacts but also ensures that fishermen's productivity is maintained. In addition, the sustainability of the project strengthens awareness of the responsible use of natural resources, contributing to the preservation of marine ecosystems.

### 4.9 Challenges and lessons learned

During the execution of the project, some challenges were identified and successfully addressed:

Acceptance by fishermen: There was initial resistance from local fishermen, who were accustomed to traditional models. However, after proving the economic and environmental benefits, acceptance increased significantly.

Buoyancy of lobster attractors made from older mesquite wood: During the tests, we realized that the lobster attractor made from older mesquite wood did not have the necessary weight to remain adequately submerged on the seabed. This could compromise its efficiency in catching lobster, since it could be displaced by sea currents.

To solve this problem, we adopted the strategy of tying a rock to the lobster attractor using sustainable rope made from mesquite bark. This simple and ecological solution ensured that the fishing gear remained stable on the seabed, maintaining its efficiency in catching and preserving the sustainable proposal of the project.

## 5. CONCLUSION

Through the development of this research, we have proven the viability of building a sustainable lobster attractor using mesquite wood, a widely available and rapidly growing resource in the semi-arid region of the Northeast. In addition to being an economically viable alternative, this solution reduces environmental impacts and contributes to the preservation of the marine ecosystem, promoting more sustainable and conscious fishing.

The development and implementation of the sustainable lobster attractor has proven to be an effective, viable, and environmentally responsible alternative for lobster fishing. Its simple structure, fixed to the seabed, allows lobsters to shelter naturally, facilitating the direct and selective capture of only individuals of reproductive age. This factor is essential for the renewal of the species' natural stocks and for maintaining ecological balance.

The use of mesquite wood (*Prosopis juliflora*), which is abundant in the semiarid Northeast and considered an invasive species, reinforces the sustainable nature of the project. By using a natural, biodegradable, and accessible resource, the use of polluting materials, such as plastics and metals, present in traditional models, is significantly reduced.

Sustainable fishing not only helps conserve marine ecosystems but also serves as an innovative and cost-effective solution that can generate positive outcomes for both the environment and fishing communities. This approach promotes more mindful, selective, and long-lasting fishing practices.

Mesquite wood has an ideal decomposition time for lobster fishing, ranging from 6 to 8 months for younger wood and 8 to 10 months for aged wood. This interval coincides perfectly with the lobster fishing cycle, which occurs in 6 months of fishing followed by 6 months of closed season. In this way, lobster attractors are naturally degraded within an appropriate interval, without compromising the marine environment in the long term.

Another relevant aspect of this study was the creation of a sustainable peg and rope; both also developed from the bark and wood of the mesquite tree. These elements not only maintain the strength and functionality of the structure but also ensure that all the material used is natural and biodegradable, eliminating the need for synthetic or polluting components.

Furthermore, we observed that, after the decomposition period, the waste from the fishing grounds begins to play a fundamental ecological role, serving as a substrate for the development of coral reefs and providing a favorable environment for the proliferation of various marine species.

This process favors biodiversity and contributes to maintaining ecological balance, transforming the fishing grounds themselves into a beneficial element for the marine ecosystem.

The implementation of sustainable lobster attractors also stands out for its significant economic impact. The reduction in costs for manufacturing and maintaining lobster attractors represents significant savings for fishermen, who must invest large amounts of money each year in replacing their fishing structures. While traditional lobster attractors are made up of materials such as drums, plugs, tires, car bodies and hoods, pieces of refrigerators, stoves, and iron slats — all obtained as scrap — sustainable lobster attractors, built with wood from the Mesquite tree (*Prosopis Juliflora)*, offer a more economically viable alternative. According to a comparative survey, sustainable lobster attractors have an average cost reduction of 78.44% when compared to traditional scrap attractors, and this savings reaches 86.17% when compared to the sustainable model made with new wood. These numbers highlight the potential of this alternative to positively transform the economic reality of fishing communities.

To ensure the reliability of the results, the research was conducted through theoretical studies, practical tests, and questionnaires applied directly to fishermen in the region. The data collection made it possible to gain a detailed understanding of the economic reality of lobster fishing, the challenges faced by workers, and the feasibility of adopting a sustainable alternative.

The questionnaires were essential to understand the fishermen's perception of the costs, durability, and efficiency of traditional lobster attractors compared to the new sustainable lobster attractors. Moreover, they allowed for a detailed analysis of the financial impacts of fishing, reinforcing the need for solutions that reduce operational costs without compromising productivity.

The results obtained demonstrate that this alternative not only reduces costs for fishermen, making fishing more accessible, but also plays an essential role in preserving natural resources and ensuring the long-term sustainability of lobster stocks.

In addition to providing significant savings, sustainable lobster attractors directly contribute to the preservation of marine resources, promoting a balance between fishing

activity and environmental conservation.

With the support of the relevant authorities and the awareness of fishermen, sustainable lobster attractors can be expanded to other fishing communities, serving as a reference for the implementation of more sustainable practices throughout the sector.

With this research, we have confirmed that it is possible to combine economic efficiency, environmental sustainability, and social development, offering an alternative that benefits not only the fishing community of Porto do Mangue, RN, but also the environment. In this way, this study not only proposes a viable solution for lobster fishing but also paves the way for new sustainable initiatives that can be applied in different sectors of fishing activity and marine conservation. Ensuring that lobster fishing continues to be a viable and sustainable activity for future generations.

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# 1. APPENDIX A – QUESTIONS

1. **What are the major contributions expected from the implementation of this project, considering society, the economy, the environment, and especially water resources?**

The implementation of sustainable lobster attractors brings several social, economic, and environmental benefits. Socially, it strengthens artisanal fishing, making it more accessible to low-income fishermen. Using materials available in the region itself, the project encourages the use of local and sustainable solutions. Economically, sustainable fishing significantly reduces fishing costs. While a traditional model costs between R$75.00 (US$13,98) and R$130.00 (US$23,30), a sustainable model can be produced for just R$10.00(US$1,79) and R$15.00(US$2,69). This generates significant savings for fishermen, increasing their annual profitability.

In terms of the environment, the use of mesquite wood prevents the deforestation of native species and contributes to the control of an exotic tree. In addition, at the end of its useful life, the lobster attractor decomposes naturally and serves as a substrate for coral reefs, helping to recover marine ecosystems. In terms of water resources, the project reduces ocean pollution by replacing traditional fishing gear that remains at sea for years.

The use of biodegradable materials maintains water quality and preserves habitats essential for sustainable fishing. In this way, sustainable fishing combines sustainability, economy, and environmental conservation, ensuring benefits for both fishermen and the balance of marine ecosystems.

2. **What is the innovation being proposed? How does it relate to existing solutions?**

The innovation of this project lies in the creation of a sustainable lobster attractor made from mesquite wood, pins made from the same material, and a biodegradable rope made from the tree's bark. Unlike traditional models, which use polluting materials such as plastic and metal, our fishing net is biodegradable and, at the end of its useful life, decomposes naturally, serving as a substrate for coral reefs. Compared to existing solutions, the sustainable lobster attractors drastically reduce production costs. While conventional models cost between R$75.00(US$13,40) and R$130.00(US$23,22), our alternative can be manufactured for just R$10.00(US$1,79) to R$15.00(US$2,68), making it affordable for local fishermen. In addition, it was designed to catch only lobsters of the ideal size, preventing predatory fishing.

Another difference is that traditional lobster attractors remain at sea for years,

polluting the oceans.

Our model, however, has controlled durability: 6 to 8 months when made with new wood and 8 to 10 months when made with aged wood. This prevents the accumulation of waste and minimizes environmental impacts. However, this innovation is related to existing solutions by presenting an alternative that maintains fishing efficiency, but with several additional benefits. While conventional lobster attractors fulfill their basic function, sustainable lobster attractors go further, bringing significant positive impacts.

**3. What region or situation does the project apply to? Can it be replicated? Does it serve developing and developed countries?** Sustainable lobster attractors have global applicability, provided it is used in coastal regions where artisanal lobster fishing is an important economic activity. In Brazil, it is especially useful in the Northeast, where mesquite is abundant and lobster fishing drives the local economy. The project can be replicated in other countries with similar characteristics, such as nations in Latin America, Africa, and Southeast Asia, where artisanal fishing is vital for community livelihoods.

Furthermore, in developed countries, it can be adopted as a sustainable alternative, aligned with policies to preserve the oceans and reduce marine pollution. The simplicity of the materials and manufacturing process makes sustainable lobster attractors accessible and adaptable, allowing fishermen from different regions to use local resources for their production. It is a viable and environmentally responsible solution for global fishing when applied in coastal areas.

**4. How Much will the Project cost to implement?**

The implementation cost of the sustainable lobster attractor project is low and affordable, as it uses natural materials available in the region, such as mesquite wood, pegs made of the same material, and a biodegradable rope made from the bark of the tree. While a traditional lobster attractor costs between R$75.00(US$13,40) and R$130.00(US$23,22), the sustainable lobster attractor can be produced for just R$10.00(US$1,79) to R$15.00(US$2,68).

Considering that fishermen use between 400 and 600 lobster attractors per year per boat, according to a survey conducted with fishermen, this savings translates into a significant reduction in costs over time.

In addition, large-scale implementation does not require high investments, as

production can be done by hand by the fishermen themselves, using simple techniques and local labor.

This makes the project highly viable, without the need for large infrastructure or sophisticated equipment. Thus, the implementation cost is minimal, and the economic return is rapid, making the sustainable lobster attractor an efficient and affordable alternative for artisanal fishing.

5. **What would you say were the biggest issues in developing and implementing the project?** The greatest challenges in developing and implementing the sustainable lobster attractors were mainly related to the acceptance of fishermen, who were accustomed to traditional methods and initially showed resistance to change. Many had doubts about the efficiency and durability of the new model, as well as concerns about its adaptation to the fishing process. Another challenge was the suitability of the materials. During testing, we realized that the lobster attractors made from old mesquites were very light, which made it difficult to fix them to the seabed. To solve this problem, we added a stone tied to our sustainable rope, ensuring greater stability. Despite these difficulties, the significant cost reduction and environmental benefits convinced fishermen to adopt the new model, showing that innovation can positively transform artisanal fishing.

6. **Which Sustainable Development Goals (SDGs) and targets do your work most relate to?** Sustainable lobster attractors are directly aligned with several UN Sustainable Development Goals (SDGs), positively impacting the economy, the environment, and society. SDG 1 No Poverty: The project contributes to improving the income of artisanal fishermen, reducing their operating costs by up to 90%. This enables greater profitability and encourages financial independence for families that depend on fishing, especially in low-income coastal communities. SDG 8 Decent Work and Economic Growth: By reducing fishing costs, the project stimulates local economic development, allowing fishermen to invest in improvements to their vessels and infrastructure, ensuring more dignified and sustainable work. SDG 12 Responsible Consumption and Production: The use of mesquite wood, a renewable and abundant resource in the region, prevents the deforestation of native species and promotes the sustainable reuse of natural resources.

**SDG 14** Life in Water: The project reduces pollution in the oceans, as traditional lobster attractors can remain in the sea for years, while sustainable lobster attractors decompose naturally in 6 to 10 months and serve as a substrate for coral reefs,

benefiting marine biodiversity.

7. **How does the work relate to the annual theme of World Water Week promoted by SIWI in 2025?** The sustainable lobster attractors relate to the theme of World Water Week 2023 by promoting an innovative and sustainable solution for lobster fishing, reducing environmental impacts, and favoring the preservation of water resources. The proposal contributes to reducing marine pollution because, unlike traditional lobster attractors, which can remain in the ocean for years, sustainable lobster attractors decompose naturally between 6 and 10 months, without generating long-lasting waste. In addition, its decomposition helps to form coral reefs, benefiting marine biodiversity. By using mesquite wood, a liberal, renewable, and abundant resource, and a biodegradable rope, the project promotes the responsible use of natural resources, in line with the need for innovative solutions for a water-conscious world, as proposed by the event. In this way, the work demonstrates how it is possible to balance productivity and environmental preservation, guaranteeing sustainability for fishermen and marine ecosystems.

8. **What motivated you to choose this topic?** The theme was chosen because it represents a sustainable solution that combines environmental preservation with the empowerment of artisanal fishing in my community and in other coastal communities where lobster fishing is practiced:

• **Attractor:** Structure used to capture lobsters and other crustaceans, designed to be efficient and selective.

• **Sustainable:** Something capable of being maintained over time without compromising the environment or natural resources, promoting ecological balance.

• **Fishing:** Activity of capturing aquatic organisms, carried out in a controlled and responsible manner to ensure the preservation of the species.

• **Lobster:** Marine crustacean of high commercial value, whose capture must be carried out sustainably to ensure the maintenance of natural stocks.