





# Octopus Fishery Socioeconomic Survey Report

# Determining baseline information for the effective management of the Seychelles' small-scale octopus' fishery



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#### Introduction

Octopus fisheries in the Western Indian Ocean (WIO) present significant cultural and socio-economic value, supporting the livelihoods of men, women, and children in the region (Rocliffe & Harris, 2016). Globally, octopus fisheries have expanded exponentially in response to a growing market, shifting many operations from small-scale subsistence to large-scale commercial fishery (McCabe et al., 2024). This transition has been driven by a decline in finfish catches, leading to the overexploitation of invertebrates (Anderson, 2021), habitat destruction, and the impacts of emerging climate change challenges, such as increased sea temperatures, which impacts octopus growth and maturity (Chande et al., 2021). Consequently, octopus fishery practices have shifted from traditionally gleaning for octopuses in intertidal zones to diving in deeper waters, threatening octopus populations, ecosystems, and the livelihoods.

In the Seychelles, the octopus fishery has been traditionally practiced for many years and significantly evolved from a subsistence to commercial operation (McCafferty et al., 2023; Mees et al., 1998). The ease of exploitation, increased market demands, and the absence of effective management measures, has placed the octopus population under considerable fishing pressure. In recent decades, there have been growing concerns about the long-term sustainability of this resource. Various reviews assessed the state of the fishery and proposed potential management recommendations (Mees et al., 1998; Payet, 1996).

In contrast to octopus fisheries in the region, such as Madagascar, Comoros, Rodrigues, and Tanzania (Aina, 2010; Benbow et al., 2014; Guard, 2009; Guard & Mgaya, 2002a; Harris, 2007; Jhangeer-Khan et al., 2015; McCabe et al., 2024; Raberinary & Benbow, 2012; Rocliffe & Harris, 2015, 2016; Westerman & Benbow, 2013), there is a notable lack of governance, scientific information and monitoring effort for the fishery. This highlights the need for the Seychelles Fisheries Authority (SFA) to reconsider its management approach.

Despite ongoing reporting efforts, there is limited information on the socioeconomic and biology of the fishery. Data limitation presents a challenge in the region, where inadequate data collection hinders a comprehensive understanding of the fishery's status (UNEP & WIOMSA, 2015).

To improve monitoring efforts and understanding of the Seychelles octopus fishery, it is essential to implement baseline surveys to address critical knowledge gaps. With support from the Seychelles Climate Change Adaptation Trust (SeyCCAT) Blue Grants Fund 5, the SFA launched an Octopus Project titled "Determining Baseline Information for the Effective Management of the Seychelles' Small-Scale Octopus Fishery". This project seeks to provide insights into the fishery and offer informed recommendations for effective management strategies. Additionally, it seeks to foster a collaborative research approach with the local

fishing community, promoting co-management of the octopus resources identifying sustainable long-term solutions for the fishery.

# Aims & Objectives

This project aims to implement a comprehensive octopus' study on Mahé, Praslin and La Digue islands to establish baseline information on the biological, ecological, and socioeconomic aspects of the fishery. The results will inform and review potential management measures to ensure the long-term sustainability of the octopus fishery.

#### The main objectives are:

- 1. To gather robust data on the socioeconomic and biological aspect of the octopus fishery.
- 2. To identify the main species of octopus found around the inner Seychelles islands.
- 3. To produce recommendations for management measures to promote the sustainable management of the fishery.
- 4. To raise awareness on octopus fisheries monitoring efforts.

The overall outcome of the project is to support the establishment of an effective octopus fishery management plan for the small-scale artisanal fishery in Seychelles. The specific outcomes are:

- 1. An improved understanding of the socioeconomic and biological aspects of the octopus fishery.
- 2. Recommendations for the establishment of octopus fishery management measures.
- 3. Increased awareness of octopus fisheries monitoring efforts.

The objectives and outcomes are achieved through the successful completion of several surveys, including a socioeconomic survey, a catch and effort survey, and a habitat composition survey around the inner islands of Mahé.

# Socioeconomic Survey

The survey was designed to gather information on the socioeconomic dimensions of the Seychelles octopus' fishery, with the goal of informing potential management measures to ensure the long-term sustainability of the fishery.

The main objectives are:

- Assess the socioeconomic aspect of the octopus fishery.
- Identify the constraints and challenges faced within the fishery.
- Outline the characteristics of the fishery operation.
- Document fishers' perception on the fishery trend and governance.

# Methodology

The survey was conducted from December 2023 to March 2024 on Mahé, Praslin, and La Digue islands. It specifically targeted commercial octopus fishers. To initiate the survey, communication with stakeholders was established through official media announcements, followed by visits to landing sites. One-on-one questionnaire interviews were then conducted based on fishers' consent and availability. Participation in the survey was voluntary, and responses were kept confidential throughout.

The interview questionnaires were structured into two main sections: one focusing on socioeconomic status and the other on the fishery status. These sections aimed to determine the demographic characteristics, economic conditions, fishery operators' perceptions and fishery governance. The survey data included both quantitative and qualitative information. Following the data collection, numeric responses were summarized using descriptive statistics (percentages) and visualized using graphs.

#### **Results and Discussions**

#### **Demographic Characteristics**

A total of 35 individuals were interviewed, with participants from Mahé (21), Praslin (9) and La Digue (5) islands. All participants were octopus fishers, with 97% identified as male and 3% as female. The survey highlighted the very low representation of females in active fishing roles within the fishery. Instead, many women contribute to the sector as boat owners, in administrative roles, or in post-harvest activities, while men predominantly engage in fishing operations. This gender distribution contrasts with regional trends observed in other countries. In Madagascar, for example, women traditionally dominate octopus harvesting, accounting for 86% of fishers compared to men (Westerman & Benbow, 2013). Similarly, in Mozambique and Rodrigues, both men and women harvest octopus using gender-specific fishing techniques (Rocliffe & Harris, 2026; Jhangeer-Khan et al., 2015). In Tanzania, octopus fishing has traditionally been practiced by women and children (Guard & Mgaya, 2002).

The age distribution of fishers ranged from 19 to 65 years old. The average age of fishers was 43 years old, with a great proportion (25 individuals) above 40 years of age, while a smaller group (10 individuals) were below 40 years (Figure 1). Notably, only three fishers were aged between 19 and 30 years old, indicating low recruitment of younger, full-time fishers in the fishery. Fishers reported an average of 21 years of fishing experience, suggesting that the fishery has been traditionally practiced and passed down across generations. On average, fishers reported a household size of 3 dependents. While a small proportion (1 individual) reported having no dependents, the majority (17 individuals) reported having of 2 to 3 dependents. This distribution highlights the importance of fishers' livelihood, given that many have family responsibilities.

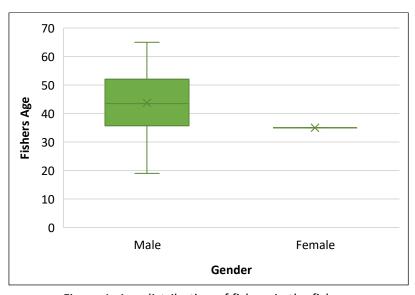


Figure 1: Age distribution of fishers in the fishery.

In terms of education, the majority of fishers held a professional certificate (20 individuals), followed by secondary (13 individuals) and primary (2 individual) education levels. The number of fishers involved only in octopus fishing and other professions alongside fishing were slightly equal, with 18 fishers exclusively engaged in octopus fishing and 17 fishers involved in other professions. This dual engagement reflects the seasonal variability of fishing activities due to changing weather and sea conditions, which necessitates alternative income sources.

The monthly income generated from the fishery varied among fishers; 31% of fishers reported that more than 80% of their monthly income are generated from the octopus fishery (Figure 2). Overall, a great proportion of fishers (66%) reported earning an average monthly income ranging between SCR 7,500 to SCR 25,000, depending on the fishing operation (Figure 3). In contrast, only 24% of fishers reported earning more than SCR 25,000.

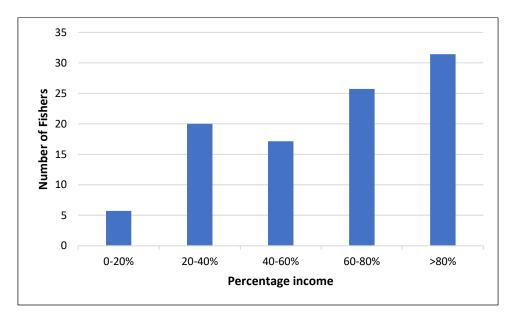


Figure 2: Reported percentage income from the octopus fishery among fishers.

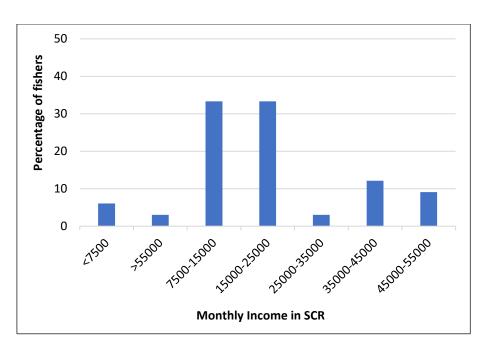


Figure 3: Average reported monthly income of fishers from the octopus fishery.

## **Fishery Operation**

The majority of fishers (91%) primarily use motorized boats, while a smaller proportion (9%) rely on a combination of boats and gleaning on foot to access off-reef and inter-tidal fishing grounds around Mahé and the inner islands. Fishers who access fishing grounds on foot are limited to fish from the shore, which explains why most fishers either exclusively use boats or combine methods to access more distant areas.

Fishing activities are predominantly conducted by snorkeling (57%), with fewer fishers (3%) using only self-contained underwater breathing apparatus (SCUBA) or a combination of both methods (40%), with steel harpoons at average depths ranging from 5 to 18 meters (minimum: 1m; maximum: 30m). Historically, gleaning, snorkeling, traps and fishing lines were the main methods used for octopus fishing (Payet, 1996b). While gleaning was not reported among surveyed fishers, it is believed to occur as a subsistence activity on a recreational basis.

Globally, octopus fishing methods vary depending on traditions, target species, and the scale of the fishery (Emery et al., 2016). In the Western Indian Ocean (WIO), fishing practices are often gender-specific, with women primarily harvesting octopus on reef flats through gleaning, while men dive at deeper depths using harpoons (Guard & Mgaya, 2002; Jhangeer-Khan et al., 2015; Westerman & Benbow, 2013). In other regions, octopus is commonly fished using fishing lines, trawl nets, or modified baited traps or pots of various sizes. However, these methods can be highly destructive to the surrounding environment (Sauer et al., 2019).

Although, fishing activities occur year-round, fishers reported peak periods from October to April (Figure 4). While the species catch composition is not known, *Octopus vulgaris* (Cuvier, 1797) and *Octopus cyanea* (Gray, 1849) are the primary species in the region (Rocliffe et al.,

2014). 71% of fishers identified weather conditions as the primary factor influencing how often they fish, followed by lunar phase (46%) and the tidal conditions 46%. Demand for octopus and financial need were each selected by 17% and 14% of fishers, respectively. These findings highlight that environmental factor, play a dominant role in determining fishing frequency, while economic considerations are less commonly cited but remain relevant for some fishers.

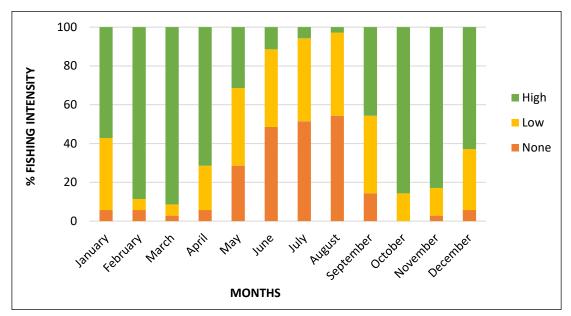


Figure 4: Fishers' perceptions of the monthly octopus fishing effort.

Among the fishers surveyed, 89% reported engaging in other fishing activities besides octopus harvesting. Handlines were used by 69% of fishers and traps by 54%, to target a variety of species, while 37% utilized SCUBA or snorkel to target octopus. In addition, 31% of fishers engaged in gillnet fishing to target mackerel. Despite the variety of activities, 89% of fishers reported that they exclusively target octopus species when fishing for octopus, while 11% target other species as well.

Depending on market demand, most fishers (60%) sell their catch at various landing sites immediately upon landing, while a small proportion (23%) prefers to store their catch or do both (17%). Octopus catches are primarily sold fresh or frozen, with prices varying based on size and season. 30 out of the 35 fishers provided information with regards to the sale of octopus (Figure 5). 37% of fishers reported that they sell 50% or more of their catch directly to hotels or restaurants. In contrast, 30% of fishers sell 50% or more of their catch directly to individual buyers. Similarly, 30% of fishers sell 50% or more of their catch directly to fishmongers or retailers. The price of octopus (per kg) varied across the different buyer categories. For individual buyers, prices ranged from SCR 75 to SCR 250 (average: SCR 153). In contrast the price ranged from SCR 100 to SCR 300 for fishmongers/retailers (average: SCR 174), hotels/restaurants (average: SCR 175) and processors (average: SCR 163). Unlike other

octopus' fisheries in the WIO region, Seychelles is one of the countries that does not export octopus (Rocliffe & Harris, 2016).

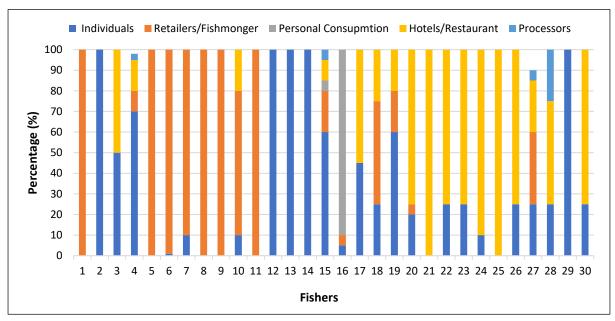


Figure 5: Percentage distribution of octopus sales by buyer categories.

#### **Fishery Perceptions**

Overall, 43% of fishers perceived a decline in the octopus population, while 51% believed it had remained stable (Figure 6). This result aligns with findings from a value chain study conducted in 2023, in which 49% of stakeholders reported a decrease in octopus supply (McCafferty et al., 2023). Moreover, these responses mirror findings from previous studies, including Payet (1996), which also indicated a decline in octopus stocks.

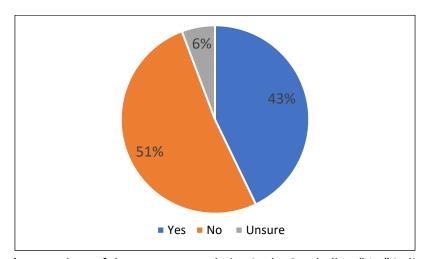


Figure 6: Fishers' perceptions of the octopus population in the Seychelles. "Yes" indicates a declining population, "No" indicates not declining, and "Unsure" reflects uncertainty.

## **Fishery Governance**

Despite past efforts to develop a draft octopus fishery management plan, including proposed measures such as a licensing framework, minimum size limit, annual catch quota, and seasonal closures, the fishery remains open access (SFA, 2024). Although no formal management strategy has been implemented, the SFA has been monitoring and reporting octopus' landings across Mahé, Praslin, and La Digue islands since 1985 through its Catch Assessment Survey (CAS).

The survey revealed that 94% of the participants are registered as full-time artisanal fishers with the authority. Among them, the majority (60%) are affiliated with fisher associations on Mahé, Praslin and La Digue, some of which play an active role within the association while others are not active. A small proportion (40%) are not affiliated with any association, citing various reasons. Participation in associations is voluntary, and some fishers view it as non-essential. However, this lack of participation poses challenges for promoting co-management of artisanal fisheries, particularly since bottom-up approaches are mainly employed in the region. Fisher associations serve as a platform for members to engage in fisheries governance and contribute to sustainable fisheries initiatives and decision-making, fostering inclusion, compliance, transparency, and accountability in fisheries management (Rangel et al., 2019).

The fishers proposed several ways to enhance participation. 27.5% of fishers believed that being part of an association is a personal choice, while 17% suggested that incentives for artisanal fishers should be restricted to association members only to encourage greater participation. Additionally, some fishers emphasized the need for stronger unity among fishers, improved organization and proactivity within associations. They also emphasized the importance of raising awareness, enhancing fishers' role in decision-making, securing stronger support from authorities, and ensuring good governance as key factors for increasing participation (Figure 7).

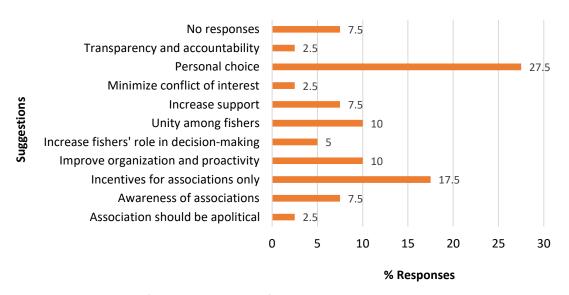


Figure 7: Fishers' recommendations for enhancing participation in associations.

Overall, only a small proportion of fishers (14%) were very satisfied with the current open-access fishery. In contrast, a larger proportion reported being just satisfied (29%), unsatisfied (26%), or very unsatisfied (11%), while 17% remained neutral (Figure 8). Regarding engagement between the SFA and octopus fishers, 54% of fishers stated that they have never been consulted before decisions were made, and 57% reported never being informed about decisions after they were made concerning the fishery. However, 20% of fishers indicated that they are occasionally consulted prior to decision-making, while 14% are occasionally informed after decisions are made. This is understandable, as specific octopus management initiatives have not yet been implemented in Seychelles. Additionally, 46% of fishers indicated that they had never interacted with the SFA for catch reporting, as many fishers either store their catch or sell it directly upon landing. Only 20% of fishers indicated that they interacted with SFA for catch reporting (Figure 9).

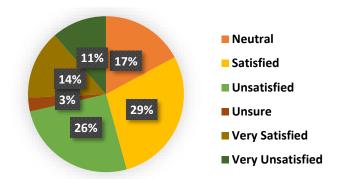


Figure 8: Fishers' level of satisfaction with the current octopus fishery management.



Figure 9: Percentage of fishers' responses to SFA engagement.

## **Fishery Constraints**

The shift from a subsistence to a commercial fishery, driven by increasing development and demand, has introduced several constraints that threaten the long-term viability of the fishery. Key issues identified by fishers (Figure 10) include the excessive number of fishers in the fishery, as the open-access nature of the fishery allows any individuals to operate at subsistence, recreational or commercial levels. This, coupled with increasing social ills, has led to considerable fishing pressure. Additionally, fishers also cited the lack of support from authorities, especially as seafood companies continue to increase octopus imports. As a result, fishers argue that these factors limit market demand and contributes to price instability.

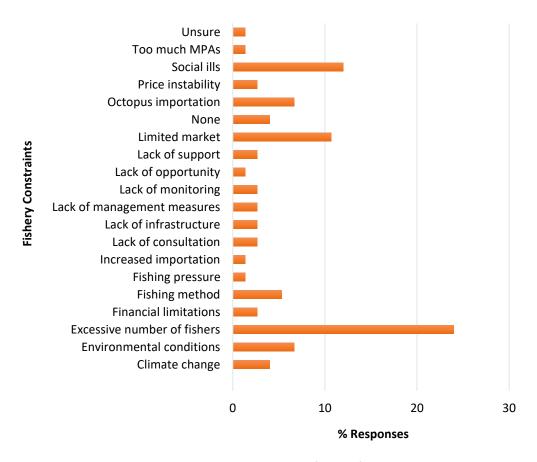


Figure 10: Constraints identified by fishers.

Overall, fishers view the current governance of the fishery as a major constraint, citing inadequate consultation, lack of management measures, insufficient monitoring, and limited infrastructure to sustain their livelihoods. Additional issues highlighted include fluctuating environmental conditions and climate change, which affect octopus recruitments and fishery outcomes, as well as detrimental fishing practices targeting undersize octopus. Financial limitations, the excessive number of Marine Protected Areas (MPAs), and limited opportunities for expanding fishery operations were also noted. However, some fishers expressed satisfaction with the current state of the fishery and did not perceive any constraints.

## Fishery Management

The majority (97%) of fishers recommended introducing management measures for the octopus fishery to safeguard both their livelihood and the resource. Several management approaches were identified, with 89% supporting the introduction of fishing licenses, 86% advocating for size limits, and 69% favoring restrictions on recreational fishing. In contrast, a significant number of fishers opposed spatial closures (91%), daily catch limit (80%), exclusive access rights (71%), and limited access licenses (69%) (Figure 11). Some fishers also expressed reluctance to disclose their views on management measures, citing the need to establish further biological research and discussion between authorities and fishers.

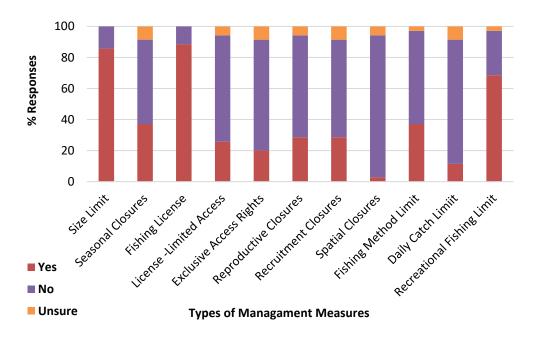


Figure 11: Percentage of fishers' responses to various fishery management approaches.

Managing octopus fisheries presents challenges due to the species' complex biological traits, which includes short lifespan, rapid growth, semelparous reproduction, and natural mortality driven by environmental variability (Guard, 2009). These factors contribute to annual fluctuations in abundance, which influences spawning and recruitment rates. Nevertheless, with the right management approach, octopuses are well suited for interventions since they can recover rapidly (Harris, 2007).

Regionally, various input controls have been introduced as precautionary measures, including licensing systems, seasonal closures, and minimum size limits. Minimum size limits are informed by studies on sexual maturity. This management approach allows the species time to mature and spawn, thereby reducing the capture of juveniles, as observed in Tanzania (Guard, 2009). Minimum size limits adopted in the region varies, for example, Madagascar has set a minimum weight of 350g, Tanzania at 500g, Kenya has set a mantle length of 10.5cm,

and Rodrigue at 7cm (Rocliffe & Harris, 2016). However, enforcing minimum size limits remains challenging due to the non-selective nature of the fishery (Benbow et al., 2014).

Fishery closures provide octopus populations with an opportunity to grow and reproduce without fishing pressure. This strategy often implemented in areas with high juvenile abundance or during peak brooding periods, has been shown to increase landings, as observed in Madagascar (Benbow et al., 2014). Annual two-month closures are common in the region, including in Rodrigue and Madagascar (Jhangeer-Khan et al., 2015). Additionally, some fisheries regulate gear types and fishing methods to control fishers' efficiency and harvest rates (Emery et al., 2016).

The successful implementation of these management strategies depends on stakeholder buyin, which has been shown to improve compliance, increase landings and enhance profits in the region (Rocliffe & Harris, 2015).

#### Conclusion

The survey results provided valuable insights into the fishery, including its socio-economic aspects, fishers' perceptions, and the challenges they face; an area that had not been previously explored. The current state of the fishery raises significant concerns regarding both the stock health and fishers livelihoods. The open-access nature of the fishery, coupled with the lack of comprehensive monitoring, underscores the need for a structured management approach. To address these challenges, the following recommendations are proposed:

#### 1. Stakeholder consultations

Extensive consultations with stakeholders are essential to ensure inclusive decision-making. It is crucial to raise awareness and promote inclusion to strengthen collaborative octopus fishery management efforts. This could be achieved through the creation and formalization of an Octopus Fishery Committee, consisting of representatives from SFA and fisher associations, as well as meaningful exchange programs between regional countries and public outreach.

#### 2. Introduction of Management Measures

The open-access nature of the fishery has led to increased fishing pressure and unsustainable practices. To mitigate these issues, the fishers have recommended the introduction of precautionary measures, such as licensing framework to facilitate monitoring and a minimum size limit to prohibit the capture of undersized octopus. Although, seasonal closures were unfavored, it is recommended to allow the stock to recover during peak reproductive periods, specifically in October and January (Jhangeer-Khan et al., 2015).

#### 3. Improve Monitoring

The limited available data on the octopus fishery highlights the need for further biological studies to better inform the development of effective management strategies. This includes biological studies to determine size, sex ratios, age at maturity, brooding, and recruitment peaks. Although octopus' landings are reported, there is a need to improve the quality and accuracy of catch and effort data reported for future assessment purposes.

# **Next Steps**

A notable outcome of this survey was the willingness of fishers to participate in a 12-month collaborative catch monitoring initiative and a habitat survey. Both surveys efforts aim to establish baseline biological data for the fishery.

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