Thanks for all the Fish:
An Exploration of Exchange patterns Amongst the Artisanal fishers of Mahé, Seychelles.

Haden Harris

0000-0002-1657-336X

Submitted in fulfilment of the requirement for the degree of Master of Social Science in Anthropology.

Faculty of Humanities, Department of Anthropology

Rhodes University

Makhanda

(February 2025)

Abstract

The study sought to investigate the exchange patterns amongst the artisanal fishers of Mahé, Seychelles, using gift exchange as a framework to explore the exchange patterns of the fisher groups of Seychelles, and what role these patterns play in marine resource management. This thesis used gift exchange patterns as a representation of the community structure, which in turn informs the potential of cooperative behaviour between members. Following the Maussian concept of "The Gift," this research holds that these patterns are designed to fulfil the social obligations/norms that the participants hold with people based on their social relationships. Close-knit communities tend to have informally enforced social norms that foster cooperative behaviour. When structured on resource management, the social norms act as proxies to the potential for marine conservation compliance. This project took place over 30 days in May 2024 on the island of Mahé, Seychelles. Purposive sampling methods (cluster and convenience sampling) were used to find participants; data was gathered using exchange survey forms, semi-structured and informal interviews as well as participant observation. The results of this research found that the fisher's exchange patterns primarily focused on their own household and their crew. The likelihood of these exchanges occurring is directly influenced by the total amount the fishers caught, as fishers were found to be more generous only when they had a surplus of fish within their catch. The vast majority of participants held negative/indifferent opinions of the conservation strategies employed in Seychelles, which is a result of the inconsistency in the fisher's ability to provide for themselves through legal fishing activities. This paints a bleak picture for conservation within the Seychelles, as there is a lack of enforced social norms encouraging conservation practices with many motivators for non-compliance and ineffective formal law enforcement to dissuade potential poaching.

Key-words: Gift Exchange; Community; Compliance; Non-Compliance; Artisanal Fishers; Small-Scale Fishers; Mahé; Seychelles Marine Conservation.

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Acknowledgements

Thank you to my supervisor, Prof Shankar Aswani, for his work with the Negotiating Ocean Conflicts among Rivals for Sustainable and Equitable Solutions Project, which made this project possible.

Thank you to the Rhodes University Anthropology department staff and students, all of whom were happy to listen to my continuous rants about the highs and lows of this project.

Thanks must also be given to the Seychelles Fishing Authority and Lyn Arrisol of the University of Seychelles. Thank you to Ms Arrisol for helping me adjust to the island life and for making my fieldwork possible. Thank you to the Seychelles Fishing Authority, specifically Mr Rodeny Govinden, for their assistance with my fieldwork and for guiding me through the fisher communities of Mahé.

Finally, thank you to my friends and family for supporting me throughout this work.

1. Chapter 1: Introduction

For centuries, gifts have held an important function within human culture, with the exchange of gifts acting as a ritual process used to celebrate special occasions, solidify friendships, and even mark the beginning of trade between different groups. The anthropological study of the gift's role in different cultures and societies began with the publication of Mauss' (1954) theoretical framework in *The Gift: Forms and Functions of Exchange in Archaic Societies*. Since its publication, social and economic anthropologists have utilised the Maussian concept of "The Gift" and its exchange to explain the formation and maintenance of different social-cultural practices within various societies and cultures. If someone wishes to understand how a community maintains itself, studying the various types of relationships formed through exchange patterns and the networks created by the exchange would be an effective starting point. Perhaps the best example of this can be found in Malinowski's (1966) work *Argonauts of the Western Pacific,* and his study of the Kula Ring, a ceremonial exchange system practiced by the Trobriand islanders. Within his study, Malinowski (1966) puts great emphasis on the ceremonial exchanges of gifts that preceded trade activities and how the social relationships maintained through this exchange plays a pivotal role in maintaining the Kula Ring itself. This was a fundamental work within the study of exchange patterns and showed the importance of exchange within the maintenance of societies and cultural practices.

This thesis seeks to add to the body of work that Mauss (1954) inspired, and anthropologists such as Malinowski (1966) continued, by examining the exchange practices of artisanal fishers of Mahé, Seychelles, to understand patterns of social cohesion and dispersion. Seychelles is a series of islands off the East coast of Africa in the Indian Ocean whose economic sector relies heavily on its Blue Economy. Since the late 90s, marine tourism and fish exports have formed a large part of the island's foreign revenue, becoming the regional hub for industrial fishing (Jennings, Marshall & Polunin, 1996). While small-scale fishing is not a major economic sector in the islands, 30% of the population is directly affected by small-scale fishing practices, and 10% is indirectly affected (Etongo & Arrisol, 2021). The small-scale fishers are not alone in their reliance on the ocean, as Seychelles relies heavily on fisheries for its income. This provides a lot of potential for conflict between the small-scale

fishers, the industrial fishers, the tourist, and the conservation sectors, as they all try to utilise the marine environment as profitably as possible.

Using gift exchange patterns as a medium, the research seeks to answer the following question: What are the exchange patterns of the fisher groups of Seychelles, and what role do they have in fostering social cooperation for enhancing marine resource management? By examining these exchange patterns, we can establish to whom the fisher's catch is going, if exchange fosters fishers' cooperation, and how this affects marine resource conservation or not at all. The exchange patterns between members of the different communities of fishers, can illustrate the different relationships that maintain the way of life within these communities and the effects this has on the local natural environment. A key focus of this thesis is the maintenance of community structures as they play a pivotal role within the fisher's potential for success.

> "We may thus conclude that a fishing community is more than a landing site and a value chain within which goods, services, and money flow. It is also a moral system, where social norms and cultural values are building blocks." (Jentoft, 2020:391).

In order to understand how these patterns occur, the role they play in the community structure and how this affects the natural environment, several key questions need to be answered. They are:

1) To whom do the fishers distribute their "catch"?
2) Where do these people/groups fit in the fisher's social network?
3) Are there any people excluded from this network, and why?
4) What is the purpose of the exchange, and how does this relate to social cohesion?
5) What role does the exchange play in their resource management strategies?

This research seeks to use gift exchange patterns to indicate the state of intrapersonal relationships between community members, which in turn indicates the potential for cooperative behaviour between individuals. Following Mauss' (1954) conceptualisation of gift exchange, a more involved and close-knit community would have a high occurrence of gift exchange, with patterns that would spread between the various community members. Conversely, a more individualistic community would have fewer occurrences of gift exchanges, with greater occurrences of commodity exchange, and the overall network of gift

exchange would be quite small for each individual. The implications of this are that a close-knit community is more likely to have cooperative behaviour between members, as individuals have a vested interest in helping their neighbours and are more likely to follow social norms that benefit the community (Fiesler & Bruckman, 2019).[1] Meanwhile, individuals within more uninvolved communities are less likely to be involved in the behaviours and actions of their neighbours and are less likely to engage/participate within the social norms of that society. Within these types of communities, there is little potential for successful conservation strategies unless enforced top-down.

There is a vast body of anthropological and ecological research which supports the notion that the success of conservation strategies is greatly influenced by the efforts of the local communities, with examples of Cinner & Aswani (2007), Rohe, Aswani, Schlüter, & Ferse (2017) and Voyer, Gladstone & Goodall (2012). These efforts appear in the form of social norms that work alongside the conservation strategies and stigmatise non-compliant behaviour. This, with the belief that conservation strategies aid the community, dissuades possible poaching and other non-compliant behaviours. Within more individualistic communities, these social norms and stigmas cannot be effectively enforced, which allows for non-compliant behaviours to occur with little consequence from the community. *Chapter 2: Theoretical Framework and Literature Review* will examine this in greater detail. By examining the exchange network of the Mahé fishers, this research can begin to illustrate where the fish are coming from, who they are going to, and why they are being exchanged. These patterns can be used to indicate the overall involvement of individuals within the local community, which can act as an indicator of the presence or absence of cooperative behaviour. This potential for cooperative behaviours acts as a proxy for the potential of conservation compliance, with the hypothesis that a less co-operative community would have a potentially high occurrence of non-compliance.

This research falls under the larger project of Negotiating Ocean Conflicts among Rivals for Sustainable and Equitable Solutions (NO CRISIS) project. The goal of this project within Seychelles is to understand the conflict between the local fishers, the recreation/tourist industry and the conservation sector due to ongoing resource depletion. By creating a

[1] Geographic proximity is not required for social 'closeness' to occur, as social communities have developed even in online forums. See Fiesler & Bruckman (2019) for a more in depth explanation.

representation of the exchange networks, an understanding of how the local fishers support each other within the conflicts and if they support each other at all can be found. This can further illustrate patterns of behaviour that may adversely affect the Seychelles conservation initiatives. This research combined qualitative and quantitative data, used a purposive sampling methodology and followed a cross-sectional and non-experimental design. The fieldwork within this study took place from 24/05/2024 to 23/06/2024.

This thesis has been presented in accordance with standards set out by the Rhodes University Anthropology Department. *Chapter 1: Introduction* introduces the aim, goals and key questions the research seeks to answer and provides some explanation of the theories used to reach these answers. *Chapter 2: Theoretical Framework and Literature Review* provides further details on the theoretical framework this research is based on and provides literature surrounding the topics mentioned within academia as a whole. *Chapter 3: Methods* describes and illustrates the methodology followed for the sampling of participants and the gathering and analysis of data. *Chapter 4: Results,* providing illustration and explanation of the results observed within this study. *Chapter 5: Discussion* compares the results from Chapter 4 to the theoretical framework defined in Chapter 2 and discusses the implications this has within the study. *Chapter 6: Conclusion* summarises the entire thesis, presents its goals and results, and provides concluding remarks.

2. Chapter 2: Theoretical Framework and Literature Reviews

The framework of this thesis is formed from the foundational theories surrounding gifts and gift exchange and the role this plays in maintaining a community. Anthropologists such as Bronislaw Malinowski (1966), Marcel Mauss (1954), and Marshal Sahlins (1972) have all written on the function of exchange, both gift and commodity, in the formation and maintenance of societies. However, this study does not explore all aspects of gift exchange within these communities. The focus is instead placed on the exchange patterns regarding the fisher's catch and how this affects/indicates their potential cooperative behaviour. The role of Gift exchange within community maintenance is the foundation of this thesis but is not the only avenue that was consulted. As the sample population is from a fishing community, research surrounding fishing communities and contemporary conservation practices, such as Marine Protected Areas (MPA), were consulted to create a basis for how these fisher communities maintain themselves and the environment they rely on. To form an understanding of the decision-making process humans follow when committing acts that are non-compliant with conservation strategies and the social and formal rules of their society; economic and evolutionary ecology theories, such Utility Maximisation Theory, altruism and kin selection, are consulted, but are not the primary means of analysis. The concepts of marine conservation compliance, human decision making and the economics of crime, discussed within this chapter are used to help form a holistic understanding of the underlying structures within these communities but they are not the theoretical focus, and form no part of this thesis' hypothesis.

2.1 Gift Exchange

To a layman, the term gift often refers to an object someone gives to another person on a special occasion, like a birthday, graduation or a wedding. The gift is given to celebrate that person, with no expectation of getting anything in return and no other real motives behind it being acknowledged by the people involved, at least not outwardly. This is often as far as the definition goes, and very little is spoken about the real implications such an act has within society. This is an incomplete understanding and does little to show the true role the "gift" has in maintaining communities and culture. In the anthropological sense, gifts are

understood to form the foundation of social relationships within human cultures and are far more varied than something that can be wrapped in a box (Yan, 2012). The anthropological concept of a "gift" is understood as an object or action one person exchanges with another to maintain or adjust a social relationship (Wilk & Cliggett, 2007). A gift can be given to someone because of a simple altruistic desire; other times, it can be because a person feels morally obligated to repay a favour (Komter & Vollebergh, 1997). What is given can sometimes be a tangible object or a symbolic action (Cropanzano, & Mitchell, 2005). Many examples of gift-giving occur within our daily lives, often with the giver having an unconscious motive for the exchange. A person paying for their friend's food at a restaurant, parents buying their child their first car, or an employer hosting a pizza party for the office at the end of the year are all examples of a "gift exchange". In 1924, Marcel Mauss conducted an extensive ethnography on gift exchange, which he wrote about in his work *The Gift: Forms and Functions of Exchange in Archaic Societies.*

Mauss' ethnography presents gift exchange practices from various cultures ranging from Pacific Islanders to First Nations Native Americans. It expands upon the many behaviours, norms and practices accompanying these exchanges. Mauss et al. (1954) described many phenomena among the various groups and identified several key points relating to the reasons gifts are exchanged and their associated behaviours. One of the first things noted is that gifts are not separate from the givers, with gifts having a "spirit" which cannot be removed simply because it has been exchanged. This means that a gift is more than just "a thing"; it holds importance and value, based mainly on who exchanges it. This is why there is a difference between a wedding ring bought at a shop and Grandma's family heirloom wedding ring; even if Grandma's is technically worth less money, it can be considered more "valuable" to a family member. Mauss (1954) also states that both giving and receiving are required in many cases, and if one refuses to do either, they refuse friendship. This has several important implications and further illustrates that the modern-day explanation of gift exchange being entirely philanthropic is not wholly accurate. In fact, the point of giving is often to receive something back, as stated frequently in Marshal Sahlin's (1972) work, *Stone Age Economics.*

Sahlins (1972) states that reciprocity within exchange patterns allows for social solidarity to form between the two parties and that this is often the goal of the exchange. The gift exchange is, therefore, an act of giving to receive at some point in the future; there is only the question of how the reciprocation occurs. Sahlins (1972) names three distinct forms of

reciprocity: 1) generalised reciprocity, 2) balanced reciprocity, and 3) negative reciprocity, each stipulating the reasoning behind the exchange and the expected time to reciprocate.

1) Generalised reciprocity refers to an exchange in which the underlying reason is altruistic, and the desired time for reciprocation is undefined (Sahlins, 1972). This exchange form best relates to an example of parents gifting their child a car. The parents do not expect immediate repayment from the child for the car. Instead, the relative reciprocation would be one in which the child would express gratitude for this and the several other exchanges that occurred during their lifetime. This could take several forms, but one example would be the child caring for their parents in retirement. As such, any reciprocation on the child's part could be unrelated to this exchange and based on overall feelings of gratitude rather than the desire to repay a specific event.

2) Balanced reciprocity refers to an exchange with the motive that the reciprocation will be relatively quick and that a gift of equal -if not slightly greater- value will be given (Sahlins, 1972). This can be likened to a person paying for a friend's food. Within this exchange, the friend is helping someone they care about as an act of generosity but also expects their friend to return the favour somewhat soon. Failure to reciprocate in a timely manner can cause a relationship breakdown as the lack of trust in reciprocation creates little incentive to continue the exchange pattern (Wilk & Cliggett, 2007).

3) Negative reciprocity refers to an exchange where the goal is to receive as much as possible by giving as little as possible (Sahlins, 1972). Take the example of an employer throwing their staff a pizza party. By taking the expense of paying for the pizza and arranging the party, the boss may elicit an increased sense of loyalty from the workers, which could lead to continued profit for the business. This expense is relatively small compared to other options, such as increasing wages or giving the staff more paid vacation days. Due to this desire to receive more than give, this exchange can be seen as similar to commodity exchange, but there is one key difference.

In contrast, the concept of commodity exchange refers to the exchange of items or actions in which the parties involved have no social relationship and are alienated from each other (Carrier, 1995:20). This is similar to the exchange one might experience at the grocery store when buying food. None of the individuals involved in the exchange process- the person who

made the groceries, the person buying them, and the person selling them- have a relationship with the others involved. There are no 'expectations' of reciprocity within this commodity exchange, as all exchange happens within a clearly defined time frame with clearly defined objects being exchanged, such as groceries and money, to the exact value of the groceries (Carrier, 1995). These concrete expectations are defined by various factors- such as the labour involved in making the product and the general market value of said product- and leave no room for interpretation. This creates a lack of social relationships, as the expectation of reciprocation in gift exchange is based on the perceived social value of an exchange and is built from the interaction of a network of individuals.

While it can be tempting to assume that giving with the intention of receiving reciprocation may be selfish (because often this is unconsciously processed), this expectation is how social relationships are maintained. Each of the previous examples involves maintaining a social relationship through an often-unconscious expectation of reciprocity following the act of giving. "If friends make gifts, gifts make friends" (Sahlins, 1972:186). A gift can both create and signify the type of social relationship people have (Komter, 2005). This can be taken further, with exchange patterns signifying the social relationships and social structure of communities. Communities are formed from a series of interdependent relationships among several people. These relationships create a series of networks which allow a community to function. Amongst these people, several different types of relationships can all be illustrated through the reciprocation expected within the exchange.

Komter (2005) illustrates four types of social relationships based on models from Alan Page Fiske's (1991) psychological motivations underlying social life. The different social relationships that Komter (2005:21-25) describes are 1) communal sharing, 2) authority ranking, 3) equality matching and 4) market pricing. These relationships are based on the often-unconscious rules of a society. Within cultures and communities, there are "rules of exchange" that the people within that community understand and follow (Cropanzano & Mitchell, 2005). The models that Komter (2005) names each have a different type of relationship and will have specific rules and norms regarding the type of gift exchange, including the means of reciprocation.

1) Communal sharing refers to a relationship where individuals are understood as part of the same "kind" (Komter, 2005). Within this type of relationship, individuals are not marked;

exchange is based on sentiment and duty and is done to maintain relationships (Komter, 2005). This relates to the example of the parents and child. They are gifting the child a car because their role as parents within their culture and community dictates that they must do so. The underlying motive is that because they were effective parents by the social standards of their culture and community, the child will feel an obligation (most likely unconscious) to take care of the parents in the distant future and reciprocate the generosity they had been shown (Wilk & Cliggett, 2007). Coincidentally, the child would still be expected to reciprocate if their parents were ineffective. However, the level of reciprocation would be equal to that of their perceived effectiveness as parents by their culture and community standards.

2) Authority ranking refers to a relationship with an asymmetric sense of social power and ranking (Komter, 2005). Within this relationship, the goal of the exchange is to display and emphasise this inequality. Mauss (1954) provides examples in his ethnography of the Native American potlatch, where the chiefs were expected to give gifts almost excessively. This act of giving is not altruistic but rather a display of wealth designed to keep them in power. Through giving, the chiefs show that the spirits favour them due to the amount of wealth they have in excess. This act of giving also creates a social debt that needs to be paid through reciprocating the gift. If reciprocation is possible, it may take the form of a gift of greater value to display wealth, assert dominance, or hopefully receive something even better (Wilk & Cliggett, 2007). If the chiefs did not give, they would 'lose face' amongst their peers and those they presided over, leading to a loss of power and social status.

3) Equality matching is a relationship in which the parties involved are considered equals (Komter, 2005). Within this relationship, exchange occurs as a continuous reciprocation where the motivation of exchange is to repay the previous exchange (Komter, 2005). This form of reciprocation often occurs among people who know each other well enough to have a sense of trust that the other person will reciprocate (Wilk & Cliggett, 2007). One of the best ethnographic examples of this is found in the Kula Ring, from Malinowski's (1966) study of the Trobriand islanders. Within this example, the islanders involved are part of a lifelong inter-tribal relationship which is based on a cycle of exchange. The objects involved would be arm shells (*mwali*) and necklaces (*soulava*), with each individual having either one of the objects (Malinowski, 1966). This exchange would involve several other rituals and acts as a ceremony to open trade between the parties. These exchanges occur at specific times of the

year and serve to create a high degree of mutual trust between participants. If this exchange were to not occur at the designated time, then this trust would be broken, and trade would not occur at all.

4) Market pricing has the furthest social ties of these four relationships. Within this relationship, what is exchanged is based on a standard that reflects the market-pricing value within that community, which includes money, time and utility (Komter, 2005). The motivation of the exchange is to benefit as much as possible, and any relationship formed involves a direct benefit (Komter, 2005). Within this exchange pattern, there is not much of a social relationship between the members involved, as very little trust can occur when both parties try to help themselves at the expense of the other (Wilk & Cliggett, 2007). This does not necessarily mean that parties dislike one another, but they do not hold close social ties. This relationship can be seen most commonly in barter markets, as people who do business together regularly have this type of relationship, much like a fisher and fishmonger.

From these different models one can understand that exchange patterns, specifically gift exchange, are important to understanding the structure of communities and cultures as the relationships that maintain society are sustained through these exchange patterns. However, the exchange patterns are not exclusively responsible for establishing these relationships. In some cases, the relationship is formed long before any acts of exchange occur at all, and it is instead the relationship that enforces the expected pattern. A key driving force behind this is the concept of kinship; many anthropologists utilise the works of Malinowski (1966) and Mauss (1954) in studies of the correlation between community structures and kinship relations. What these studies typically show is that there is a complex relationship between the structures of kinship within a culture and the relationships that they form. This definition of kinship, and the relationships based on it, changes from culture to culture but there are several evolutionary mechanisms that are universally applicable.

According to evolutionary ecology all the actions of an organism should be done with the intention of to increasing its potential fitness or reproductive success with no actions taken that would disadvantage this potential (Eberhard, 1975). An individual's goal would then be to secure the future of their gene pool with no unnecessary cost to their energy or potential chances of reproduction. However, people rarely behave in such simplistic and logical manners. Rather, they frequently break this rule by undertaking actions and making decisions

that could potentially hurt them and their potential reproductive success through the possible loss of life or limb for the benefit of someone else. This act is known as altruism, defined as an action undertaken to benefit another individual to the detriment of the performer's fitness (Eberhard, 1975). According to Hamilton (1963), these acts occur based on three factors:

1) How genetically related the actor and beneficiary are, as unreciprocated aid is more likely to occur when the individuals are more closely related.

2) How beneficial the aid will be to the aided individual. This benefit is to their reproductive output and fitness, and the greater the potential benefit is, the more likely aid will occur.

3) How this will cost the altruist. This cost is also measured through their fitness and reproductive success; the greater the potential fitness cost, the less likely the act is to occur. These altruistic acts are not done out of the goodness of the actor's heart. They serve an evolutionary function that aids in the potential for the actor's gene pool to be secured. This is known as ‘kin selection’.

Kin selection refers to the evolutionary process in which altruistic behaviour is provided to individuals genetically and non-randomly related to the actor (Michod,1982). By practising these altruistic behaviours, the actor secures the success of their gene pool through that of their relatives, thus increasing their ‘inclusive fitness’. However, the line between near and distant relatives is unclear when people live in large groups of different families, as humans cannot tell how distantly or closely related, they are to any singular person biologically by just knowing them. So, they rely on the family structure they were raised in to signal the closeness of relatedness. In these cases, altruism would occur with anyone in unknown relations, as if they had an above-average biological relation (Eberhard, 1975). This provides an evolutionary explanation for cooperative behaviour between community members, as communities with close social networks foster a system where individuals perceive their fellow members as biologically similar to them. However, altruistic behaviour does occur between individuals who are almost guaranteed to have no genetic relatedness.

In cases where there is low or no relatedness, altruism occurs based on three factors: In cases of great benefit to the beneficiary, the aid has little cost to the altruist, or the altruist is incredibly efficient at giving aid, or the beneficiary is incredibly efficient at using it (Eberhard, 1975). This can be related to an example of a lifeguard saving a child from

drowning. The lifeguard is incredibly effective at providing this act of altruism, and there is very little cost to their fitness compared to the benefit to the child who has their entire future ahead of them. There is much debate about the theoretical legitimacy of Hamilton's (1963) theory of kin selection,[2] but it serves to underline the degree in which people will go to help one another, even at a cost to themselves. The caveat is that in order to cooperate, people need to have a vested interest in helping the other and need some assurance that their actions will have a tangible benefit.

By understanding the pattern of exchange and the structure of kinship one can discern the types of relationships within a community and between whom they form. From this, a social network can be mapped and used to understand a community at a 'macro' level, with potential cooperative behaviour between unrelated members being more likely when there is a high occurrence of gift exchanges. A community with more instances of commodity exchange tends to have far fewer or far more distant social relations among its members (Bell, 1991). Within these societies people tend to be more individualistic and are unlikely to engage with the social norms of their group (Strahilevitz, 2003). This can be a dangerous scenario for small-scale fishing societies as they rely heavily on cooperation and assistance from the community.

Fishing communities are described by Jentoft (2020:391) as "a moral system, where social norms and cultural values are building blocks." These communities are formed through a series of interdependent relationships that create a series of social norms that allow for a support system through which many of the fishers and their families can live. This not only extends to the community's survival but also to that of the environment. By understanding the patterns of exchange, an understanding of the state the community is in can be determined; fishers rely not only on boats and fishing gear to survive but also on the community to which they belong. Often, the community members cooperate (or not) to ensure the environment they subsist from is kept healthy so they can continue to harvest resources from it. In some cases, this creates social norms or traditions that act as conservation strategies in the culture and community. In other cases, it helps dissuade people from non-compliant behaviours as they are aware of their actions' negative effect on their

[2] These debates are beyond the scope of this paper. For a consideration of these debates, see Birch & Okasha 2015.

extended community (Fiesler & Bruckman, 2019). The presence of this cooperation can be directly correlated to the potential success of marine conservation strategies as these strategies require the people within the nearby communities to obey the restrictions put in place to allow the environment to recover. If any part of the population were to ignore these restrictions, the strategies would be unsuccessful or inefficient (Cinner & Aswani, 2007). It is in this manner that the factors contributing to the success of marine conservation can be tied to gift exchange.

2.2 Marine Conservation

As stated, fishing communities rely heavily on the natural environment to survive, specifically the marine environment. This means that they will have frequent and varying interactions with it, with much of the interactions being the harvesting of resources. If left unchecked, the people in the community could very easily deplete their local environment of its resources. However, this would not happen without consequences, as the reduction of any environmental resources will have a ripple effect on the rest of the natural environment, which would eventually come back to affect the community (Liu et al., 2007*a*). This creates a relationship between the people of the community and the natural environment, in which the people affect the natural environment, and the environment reciprocates with an equivalent response. These push-pull systems that develop as a result of the effects of continuous interactions are known as 'Coupled Human and Natural Systems' (CHANS) (Liu et al., a 2007*a*:1513). These effects can occur cross spatially and cross temporally. More traditional societies that are not urbanised or industrialised tend to have a close tie to the natural environment, allowing the local people to be more acutely aware of the changes that occur within them and respond accordingly. For example, if they see fewer fish in the local lagoon than usual, they can reduce the fishing frequency to allow the fish population to regrow. Through generations of this, certain practices that maintain the resources of their natural environment develop to maintain what could be considered homeostasis.[3] These traditions and practices are referred to as "Customary management".

[3] True homeostasis is not possible and rarely occurs in reality. With the industrial revolution sparking a massive increase in the overall area of effect of many different societies' interactions with nature as well as a significant fluctuation in the time for the effects to be felt, it is very difficult for anyone community to be unaffected by the actions of another (Liu et al., 2007*b*).

Customary Management (CM) is a term used to describe local practices that are designed to regulate the use of, access to and transfer of resources (Cinner & Aswani, 2007). As stated, these practices are crafted over generations of interaction between humans and the natural environment and informed by indigenous ecological knowledge. These practices are embedded within the communities' land and sea tenure systems but continuously evolve with the introduction or loss of knowledge. Many studies have been done on the possible effectiveness of combining CM with Western conservation strategies. The key question raised in these studies is whether or not CM is an effective means of conservation when compared to Western methods. In some cases, CM can be considered more effective than its Western Counterparts and in Cinner & Aswani's (2007), they state that this combination is not only effective but necessary.

> "The failure of conventional inshore resource management and conservation programs in much of the Indo-Pacific region, and the vulnerability of customary management institutions to socioeconomic transformations in the region, are increasingly demonstrating that the best hope for resource conservation in the region may lie in an amalgamation of customary management systems and contemporary conservation initiatives." (Cinner & Aswani, 2007:210)

An example of the effectiveness of this combination can be found in the work of Aswani, Albert, Sabetian, & Furusawa (2007). They found a relationship between the effectiveness of the Marine Protected Areas (MPA) in the Western Solomon Islands and the presence of CM in the local communities. MPAs are a contemporary conservation method; they define clear ocean zones where resource access is controlled. In some cases, extraction is only permitted to a select group of people; in others, any extraction of resources would be considered poaching (Clifton, Etienne, Barnes, Barnes, Suggett, & Smith, 2012). The goal is to increase marine biodiversity by providing an area where marine life can grow relatively undisturbed, but this is only effective if they are consistently left undisturbed. Aswani et al. (2007) found that the more effective MPAs were located near communities where members were actively participating in anti-poaching efforts. As a result of the success, these communities had higher food security than those near unsuccessful MPAs, with many community members stating that the MPA had increased their food yields (Aswani et al., 2007). Within this case, the local people actively cooperated to reduce poaching activities within the MPA maintenance because they believed it was working to support their community. The close kinship ties and religious beliefs in the communities within this study helped discourage

potential poaching, as acting against the wishes of your fellow community members or committing a taboo that would invoke spiritual retribution are incredibly serious actions (Cinner & Aswani, 2007). However, the consequences of these actions are only effective deterrents if a strong sense of community exists.

Within the study of CM's effectiveness, a great emphasis is placed on the cooperation between community members to ensure traditions and rules are followed (Rohe, Aswani, Schlüter, & Ferse, 2017). If there were to be a breakdown in this community structure, this system would collapse. The hypothesis this thesis follows is that the occurrence of this community breakdown would be indicated by the gift exchange patterns. Communities with closer social ties between members would have a higher rate of gift exchange between one another, and members would be more likely to cooperate, allowing for effective CM and other conservation systems. The presence of smaller gift exchange networks, high occurrence of commodity exchange and more distant social ties between members would indicate a low potential for cooperative behaviour. CM is unlikely to be effective within these communities, and contemporary conservation laws are unlikely to be followed, as there is very little motivation for the individuals to cooperate with their fellow community members. The decision to act uncooperatively is ultimately based on the idea that the individual is unwilling to risk their own livelihood and food potential to aid people they have no social relationship with. This decision is not a simple one, and several emotional and economic factors are considered before the final choice is made, specifically based on the legal consequences of acts of non-compliance.

While the meaning can be considered obvious, the definition of the term "non-compliance" is relative and refers to behaviours that do not conform to formal or informal rules, which change depending on the context (Rohe et al., 2017). Not all non-compliance acts are classified as illegal, such as when dealing with Customary Management systems, but they are highly stigmatised based on the norms and values of the community. However, when following contemporary conservation strategies set out by governmental bodies, acts of non-compliance are considered criminal offences. These offences are not done out of a simple desire to disregard laws, as a wide variety of factors lead a person to not comply with the rules or laws set out by their community or government.

"Economic analyses of fisheries compliance have stressed that an individual's decision to comply or not with a rule is mainly based on a consideration of the potential economic costs (related to the certainty and severity of sanctions) and benefits of doing so. More norm-based perspectives on compliance have emphasised internal and social incentives for (non-) compliance, such as normative values, morality, perceptions of legitimacy and social justice." (Rohe, Aswani, Schlüter & Ferse, 2017:2)

Rohe et al. (2017) studied the drivers of non-compliance in the Solomon Islands and Fiji. They found that a variety of factors affect whether or not people comply with resource management strategies. These include the age of the individuals, with younger fishers in Fiji being more likely to poach, especially if they had no stable source of income. Other factors include a lack of belief in the MPAs' legitimacy, created through an absence of communication and participation with the younger Fijian individuals in its establishment, and general distrust of village leadership amongst the Solomon Islanders.[4] From this research, non-compliance with conservation regulations, in the form of criminal acts, can be seen as a decision of cost-versus-gain rather than one of morality. Unfortunately, conservation areas, like MPAs, tend to be based in areas with very high yields of fish, which provide extra incentives for fishers to catch there, as they are more likely to get something from it.

Fishers will often attempt to optimise the number of fish they catch by using the most effective gear available, fishing in high-yield areas and fishing at higher-yield periods, such as at night or during specific seasonal periods. The origin of this behaviour can be explained by Optimal Foraging Theory (OFT), which has been applied to human foraging strategies by Aswani (1998), Begossi, Clauzet, Hanazaki, Lopes, Ramires, & Silvano (2009) and Lopes, Clauzet, Hanazaki, Ramires, Silvano, & Begossi (2011). This theory states that when any organism searches for food, its ultimate goal is to maximise how much energy it gains from each foraging/hunting bout (Charnov, 1976), whether the forager is conscious or not about it. Very often, energy in the form of food is found in 'patches', with each patch having a potentially larger or smaller quantity than the next, with variances in the distance from one another. The organism searching must expend energy travelling between the patches, and by being in the patch and consuming food, they reduce the potential energy they can gain from

[4] Rohe et al. (2017) cites many more factors contributing to non-compliance, both from the Solomon Islands and Fiji. These are not all included, as the specifics of this case study are not necessary for the overall argument of this text.

said patch. Eventually, finding food in that patch will take more energy than travelling to another. This creates a scenario in which an organism searching for food consistently must decide how long to stay in the patch before it is no longer optimal to hunt (Charnov, 1976). Applying this logic to fishers shows that conservation laws actively try to reduce the fisher's effectiveness to allow fish populations to increase, which creates a clash in goals.

On the one hand, there are fishers who wish to extract as many resources from the marine environment as they can in as effective a way as possible. On the other, the conservation strategies actively work to make the fishers less effective, allowing the low resources to be replenished and helping the environment return to a balanced state. This would ultimately help the fishers, as it would provide more potential resources in the future; however, it requires them to reduce their potential for successful extraction in the present. The decision to reduce their resource extraction provides the best possible outcome for the fishers - sacrifice a little now to receive more later- but this rarely occurs within reality (Alvard, 1994). If the fishers were to believe the conservation was ineffective or not in their interest, there would be very little motivation for them to do so, especially if they are unwilling to cooperate with their community. All of these factors play a role in the final decision on whether or not to comply with the conservation systems.

2.3 Resource Economics

Every day, a person can be faced with thousands of decisions; some of them could be relatively insignificant, like what socks to wear, while others could be incredibly important, like whether or not to put in an offer for a new house. Regardless of the significance, the final decision will be made based on several factors the person needs to consider. When making any decision, people will make choices that increase the probability of a desired outcome, and for this to be accomplished, they would have to consider the probability of each possible outcome so they could understand the potential consequences of their decision (Edwards, 1954). It is tempting to assume that these decisions are based purely on logic and mathematical reasoning, but when observed, human beings simply do not think like this. Instead, decisions are made to maximise what is known as ‘utility’ (Edwards, 1954). Utility is the perceived pleasure or pain an action would create for the actor. As such, the result of any given action could be considered to have a certain level of pleasure or pain-giving properties. These properties are referred to as utility, and it can be said that desirable or ‘pleasurable’

actions have positive utility, and undesirable or 'painful' actions have negative utility (Edwards, 1954). The Utility Maximisation Theory (UMT) holds that the goal of any human action is to seek pleasure and avoid pain or, in other words, to maximise utility. However, a key factor that plays into utility maximisation is the risk of making the wrong decision.

There is no singular answer when trying to understand what a person would view as a positive or negative utility. Even when faced with the same set of choices, different people could view the final outcome entirely differently. Similarly, no two people will perceive a risk in the same way, even when presented with the same event. Factors such as who the person is, their emotional state, past experiences with similar events and where the event is taking place contribute to their final choice (Figner & Weber, 2011). This leads to the question of who would take risks, where would they take them, and why. To answer these questions, the Domain-Specific Risk-Taking (DOSPERT) scale was formed (Figner & Weber, 2011).

In this case, a risk is defined as the probability of an unwanted event occurring (Edwards, 1954). The DOSPERT scale defines six domains in which risk-taking may occur: gambling, investing, ethical choices, behaviours related to health and safety, social interaction, and recreation. None of these areas are mutually inclusive or exclusive, and individuals may be willing to partake in risky behaviours in one domain but not in another (Figner & Weber, 2011). Many people may willingly partake in risky recreational behaviours -such as rock climbing or motocross- where the chance of serious injury or death is relatively high but then be very risk averse in regard to their finances and social interactions. This comfortability with risky behaviours is because people perceive the risks differently and understand the resulting utility from each event based on their perception (Figner & Weber, 2011). This perception is built from their familiarity with the events and their emotional and mental state when making the decision. A person who has participated in risky behaviours before and gained positive utility from it is more likely to do so again, provided the perceived utility and risk remain the same. This logic can help explain the decision process behind criminal offences, such as poaching and non-compliance with marine conservation laws.

2.4 Economics of Crime

While there are always exceptions, most people do not want to become criminals, and many take no enjoyment from the criminal acts they commit. Instead, crimes are committed because they provide something that is very difficult to or cannot be gotten through legal means. Crime can then be seen as a choice of utility rather than morality for the overall population.

> "The approach taken here follows the economists' usual analysis of choice and assumes that a person commits an offence if the expected utility to him exceeds the utility he could get by using his time and other resources at other activities. Some persons become 'criminals.' therefore, not because their basic motivation differs from that of other persons, but because their benefits and costs differ." (Becker, 1968:46)

It must be stated that the UMT does not impose any sense of morality on the decision-making process and does not define actions as moral or immoral (Leightner, 2005). This means that UMT can be used to explain why people engage in criminal activities but only on the spectrum of the crime providing a higher utility potential to them than alternative legal acts. Part of this potential utility is influenced by the punishment assigned to them if they are caught and convicted (Becker, 1968).

Throughout history, many punishments have been assigned to crimes depending on the culture and society from which they are formed. These include imprisonment, restriction of movement or occupation, banishment, torture and sometimes death with the severity of the punishment being assigned according to the crime's perceived social and economic impact on society. Within the Western system, the economic impact is calculated based on how the crime negatively affected the local economy (Becker, 1968). However, measuring the social impact is not as clear, as it is much harder to gauge how or who the crime would socially affect. Crimes that fall into the 'white collar crime' category have a significant economic impact but not a very large social effect.[5] This impact is especially small compared to the emotional damage of a crime like murder on the victim's family (Becker, 1968). As such, it is not always possible to make the punishment fit the crime, as various factors are involved.

[5] "White Collar Crime" refers to non-violent crimes designed to gain or avoid losing money. While there is a social impact to the loss of money, depending on the context of the crime, very few people may be affected in a significant way.

However, whether or not the punishment is appropriate is ultimately meaningless if it is never carried out.

In order to reduce the chance of any offences occurring an offender's capture would either have to be very likely or guaranteed, in order to convince potential criminals that the act is not worth it (Becker, 1968). It would be easier to apprehend criminals if there were more means of enforcement, such as police officers, court personnel, and equipment. However, these forms of enforcement make up most of the expenses in enforcement budgets and so would be incredibly expensive, both economically and socially (Becker, 1968). The level of enforcement for any law is based on the cost of catching and convicting the offender compared to the effect of the crime. If the economic cost of enforcement is greater than the loss from the crime, then it is not worth the extra costs. This means that crimes with a lower social and economic impact will not be strictly enforced as they are not considered a high priority (Becker, 1968). This is why many petty crimes are not properly dealt with because they are not viewed as worth the effort, as is often the case with enforcement of marine conservation laws.

When a fisher is faced with the decision to abandon fruitful fishing grounds to help with a conservation effort they don't believe is legitimate, the desire to feed themselves and their families often outweighs the desire to comply. Presumably, being caught and punished would have a negative effect on the individual committing the acts of non-compliance, regardless of the systems formality. However, compared to the positive utility gained from the act - guaranteed food and income in most cases - and the low probability of getting caught and convicted, the decision to commit the crime of poaching becomes fairly easy for the fisher. Without effective enforcement, the only deterrent the fishers face is that their actions will have a negative impact on their community. For this to function as a deterrent, it requires the fishers to cooperate with their fellow community members, which only happens when there are close social ties between them. It is here that this research places itself. By examining the gift exchange patterns of Mahé's small-scale fishers, their economic state and the social state of their community can be used as indicators for the consistent acts of non-compliance towards Seychelles' conservation efforts.

2.5 Marine Conservation in Seychelles

Small-scale fishing refers to both artisanal and semi-industrial fishers.[6] The main difference is that semi-industrial fishers utilise large vessels focused on large pelagic fish such as swordfish, with much of their catch being exported (Robinson & Shroff, 2020). In comparison, artisanal fishers utilise a variety of vessels and target large varieties of fish, including demersal, reef-associated and pelagic fish species, plus several invertebrate species such as lobsters, sea cucumbers and octopus (Robinson & Shroff, 2020).[7] Both fishing industries contribute heavily to the daily protein of the Seychellois[8], with artisanal fishers alone catching between 4000-5000 metric tonnes of fish annually, much of which is sold to the local restaurants and people (Robinson & Shroff, 2020). This reduces the reliance on imports and provides food security for the locals, with an estimated annual consumption of 75kg of fish per capita. While this industry does a lot of good for the local people and economy, the potential damage they can do alongside the industrial fishing sector can be catastrophic. Often, the goal of the artisanal fishers is simply to catch as many fish as they can to make a living and to feed themselves. These goals often clash with the tourism and conservation industry, which rely on the illusion of an "untouched" environment for income.

The tourist sector directly and indirectly contributes 65% of Seychelles' GDP, whilst 66% of the total workforce in Seychelles is employed in the tourism sector (Clifton, Osman, Suggett, & Smith, 2021). This massive financial contribution is achieved by making the tourists believe they are "the only person on the island" (Kothari & Wilkinson, 2010:1406). This often causes the locals to be excluded from some areas to maintain the image of a deserted island. Exclusion also occurs in the name of conservation, as several MPAs exist in the Seychelles islands. The MPAs are run by the Seychelles National Park Authority (SNPA), which manages all land and ocean classified as controlled areas.[9] Seychellois citizens are allowed access through the controlled areas at no charge, but natural resource extraction is not allowed (Clifton et al., 2012). The emphasis placed on marine resources by the tourism and conservation sectors, and the reliance of the small-scale fishers on them as a means of

[6] This study is only concerned with artisanal fishers, as all data was gathered from fishers fitting this criterion.
[7] These vessels and gear types are discussed within the Results chapter.
[8] A term used to refer to the citizens of Seychelles.
[9] There are 8 areas of marine conservation in Seychelles (6 national parks and 2 special reserves), covering a total of 29.8km². The St. Anne Marine National Park is the only one that was found relevant for this research.

subsistence creates several possibilities for conflict. This conflict is formed from a clash of interests between the short-term resource extraction of the locals and the longer-term goals of the tourism and conservation sectors. This conflict is compounded by the fact that the local Seychellois' non-compliance with the conservation laws is a massive issue, specifically with the MPA of St. Anne Marine National Park (SAMNP) (Cockerell & Jones, 2021).

SAMNP encompasses six islands, two of which MPA residents, restaurants and resorts inhabit: the St. Anne and Cerf Islands. St. Anne Island was the first island the European settlers landed upon in 1770, and the SAMNP was also Seychelles' first MPA after being opened in 1973 making the site incredibly important both ecologically and historically (Cockerell & Jones, 2021). Despite this importance, Cockerell & Jones (2021) report that it is frequently poached and that fish, turtles, octopi and sharks that live within the MPA are all targets. There is little literature on the ecological effectiveness of the MPA, but it is widely recognised that many of the habitats have degraded, and several species have disappeared within it.[10] This lack of effectiveness can be attributed to a combination of factors, which are the lack of enforcement of regulations by the SNPA, which is compounded by low prosecution rates, and the fact that the local people cannot/do not see the benefits of the MPA (Cockerell & Jones, 2021). It is reasonable to assume that the fishers/poachers' non-compliance is not intentionally designed to disrupt or damage the natural environment but instead out of a desire to provide for themselves and their families.

[10] It must be stated; there appears to be a lack of literature on the ecological state of the SAMNP which is further substantiated by Cockerell & Jones (2021) as they also state that literature is scarce.

3. Chapter 3: Methods

Many of the methods utilised in the fieldwork had to be adjusted from the proposed methodologies. Some of these changes were due to the unpredictable nature of fieldwork and were expected, but the leading cause for the adjustments was the amount of time allocated for fieldwork. At the time of the proposal, the expected time for fieldwork was a minimum of 45 days and a maximum of two months in the field, depending on the costs. However, due to issues with arranging the appropriate paperwork and other bureaucratic speed bumps, the fieldwork was only able to take place between 24/05/2024 and 23/06/2024 for a total of only 30 days. Any sampling and data-gathering methods that were not time-efficient had to be adapted or excluded to fit the shortened timeline. The final research combined qualitative and quantitative methods of data collection, which were daily exchange surveys, informal and semi-structured interviews, and participant observation. The research followed a purposive sampling methodology, specifically cluster and convenience sampling, and followed a cross-sectional and non-experimental design (Kumar, 2011).

3.1 Study Site

Seychelles is an archipelago made up of 115 islands located off the East coast of Africa in the Indian Ocean (Etongo & Arrisol, 2021). Despite the many islands under its flag and an exclusive economic zone of 1.35 million km², it only has 452 km² of land area, with the majority of the 96 000 citizens occupying the three largest islands of Mahé, Praslin and La Digue (Benzaken, Voyer, Pouponneau & Hanich, 2022). While Seychelles is often considered a small-island-developing nation, it is ranked as a high-income country with a gross national income per capita of US$ 16,870 in 2019 (Benzaken et al., 2022). Due to its location, history, geography and the development of the Indian Ocean's industrial tuna fisheries from the 1980s, Seychelles became the regional hub for industrial fishing (Robinson & Shroff, 2020:52). However, industrial fishing is not the only source of economic income for the Seychellois.

Within these islands, the fishery sector employs roughly 17% of the total population, including small-scale and industrial-scale fishing practices (Etongo & Arrisol, 2021). About 30% of the population is directly affected by small-scale fishing practices, and 10% is indirectly affected (Etongo & Arrisol, 2021). However, tourism is the main contributor to the

Seychelles economy, with 65% of the country's GDP being attributed to the industry (Clifton, Osman, Suggett & Smith, 2021). The country's beautiful ocean views and tropical climate are the leading attractions for tourists, providing the perfect backdrop for an island holiday. However, this ideal standard requires heavy maintenance by the Seychelles government.

Despite many efforts from the government, the Seychelles tropical climate has been undergoing consistent changes, with many caused by climate change. Changes in the air and sea temperatures and the increase in annual rainfall have brought many negative effects to the islands, with the ocean warming leading to episodes of coral bleaching in 1998 and 2016 (Etongo & Gill, 2022). The higher rainfall has increased the chances of flash floods and landslides, with an extended dry season impacting the water resources and allowing the proliferation of invasive plant species, which is not helped by the coastal erosion from the rising sea level (Etongo & Gill, 2022). This has created a lot of strain on the natural environment and could lead to serious issues if left unchecked. Due to this reliance on the fisheries and tourism, the Seychelles government goes to great lengths to maintain their islands' natural landscape and seascape. This involves several conservation initiatives with the largest being the Seychelles Marine Spatial Plan (SMSP) initiative.

The SMSP is an ongoing initiative where the Seychelles government plans to place 50% of their terrestrial areas and 30% of the Exclusive Economic Zone under protection, with 15% of this being fully protected areas (SMSP, 2024). This initiative is ongoing, with several MPAs and zones still being established. The driving force behind this initiative is a debt-for-nature swap (DFNS) agreement that the Seychelles government has made with The Nature Conservancy. The DFNS is a means by which part of a country's debt is forgiven in exchange for committing to concessions to conserve its natural environment (Booth & Brooks, 2023). Through the implementation of Marine protected areas, the Seychelles government hopes to meet this goal and have placed the jurisdiction of these conservation initiatives onto the Seychelles National Park Authority (SNPA) (Clifton et al., 2021). Several MPA’s have been active for the last few decades, the most relevant for this study being the St. Anne Marine National Park (SAMNP). This MPA is a restricted or “no-take” zone, meaning no resource extraction of any kind is allowed (Clifton et al., 2012). Not even the locals can fish from this zone. They are, however, allowed access, with several boats travelling through as part of the marine park tourism.

Fig. 1. Arial View of Mahé NE, taken from The Seychelles Islands: Another World (2024) Website

Mahé is the largest and most populated island of the Seychelles archipelago, with an estimated 85% of the country's population permanently living on it (Allen, 2022). Mahé is the most urbanised of the islands but still holds many supposedly untouched forests and has 60 beaches where “the only footprints you will find will be your own” (The Seychelles Islands: Another World, 2024). The capital city, Victoria, and the more urbanised areas are located near the island's Northern part, with the Southern part consisting mostly of small villages. The study was initially planned for the Mahé, La Digue, and Praslin Islands, as these have the highest populations and fall within the NO CRISES research project (Clifton et al., 2012). However, travelling and establishing separate research zones on each island was deemed too time time-consuming for this project, and as such all research was focused on the island of Mahé.

Fig. 2. Mahé, Seychelles by Haden Harris. Google Earth.

3.2 Sampling

This study's sample group was drawn from the local fishers of the Mahé artisanal fisher community. There is no data to show the exact number of artisanal fishers active in Mahé, but there are indications of the overall size of the sample population in Seychelles. In 2023, 552

Artisanal fishing licences were issued to local fishers by the Seychelles Fishing Authority (SFA), which was an increase from the 534 that were issued in 2022 (Seychelles Fishing Authority, September 2024). Artisanal fishing licences are only valid for one person, which indicates that 552 licensed artisanal fishers were active within the Seychelles in 2023. There would also be an overlap of fishers from 2023 to 2024, as a license is valid for one year from the time of payment (Seychelles Fishing Authority, 2022). This estimation does not include the possible unlicensed fishers who partake in fishing illegally and does not specify where in the Seychelles the fishers resided. However, 85% of the total population lives on Mahé, leading to an estimated sample population of approximately 469 licensed artisanal fishers in 2023, following this ratio. While this is an estimation, any increase or decrease in the number of fishers from 2023 to 2024 would be linear, and there is no indication that excessive changes would occur from this estimation presented here.

3.2.1 Sample Methods

The research followed the purposive sampling methodology of convenience and cluster sampling.

3.2.1.2 Cluster Sampling

Using cluster sampling, eight different areas were established and were named according to the district in which they are located. These are:

1) Anse Royale,
2) Anse Aux Pins,
3) Cascade,
4) Roche Caiman,
5) Port Victoria,
6) La Retraite,
7) Glacis Beach,
8) Bel Ombre.

These clusters were the marine access points that the fishers launched from and, in the case of Anse Royal, Anse Aux Pins, Cascade and La Retraite, were where the fishers would clean

and sell their catch.[11] The factors in choosing the different zones were ease of access, fishing intensity and the willingness of the area's populace to participate.

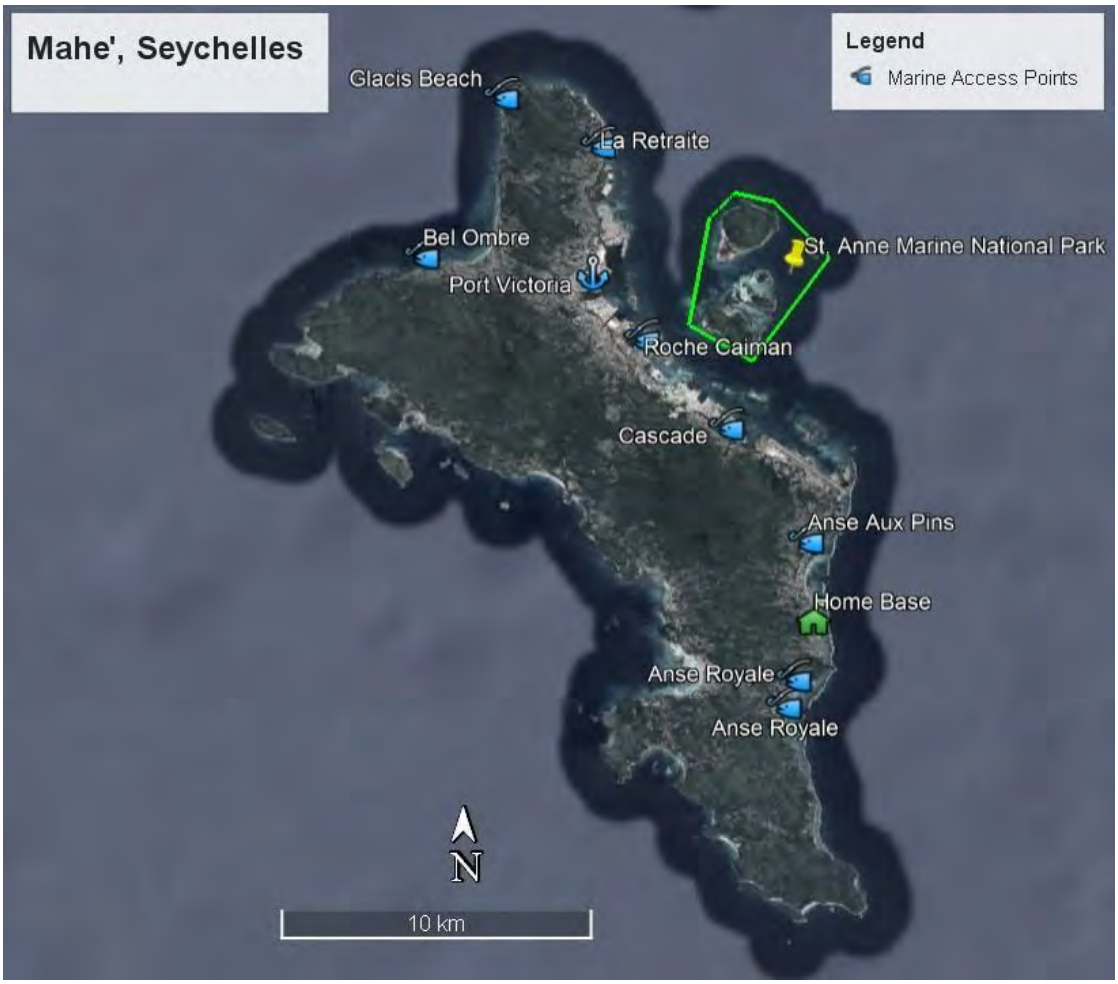

Fig 3. Marine Access Points, Mahé by Haden Harris. Google Earth.Profile

Some areas were investigated based on the SFA's recommendations. Many of these are areas where the SFA gathers data on the size and number of fish caught at each site (Seychelles Fishing Authority, 2024). Sometimes, the SFA is informed by locals or field technicians when the fishers return with their catch. This assisted in finding areas of frequent activity and more accommodating individuals. Investigation into the marine access points was also done without SFA assistance or personnel, with one day a week for the first three weeks of fieldwork being solely dedicated to travelling around the island searching for marine access

[11] Clean in this case, refers to the fishers washing the fish, descaling them and attaching the smaller one's together in what were known as "packets". Besides the fish market in Victoria, none of the fishers seemed to gut the fish before they were put on display to be sold.

points that could have potential participants. Several regions not listed above were visited but either did not have enough fishing activity, or the populace was largely not willing to participate and, as such, did not warrant the time taken to get to them. The advantage of cluster sampling was its efficiency in finding willing participants (Rahman, Tabash, Salamzadeh, Abduli & Rahaman, 2022). Once the different areas were established, convenience sampling was utilised to find willing participants.

3.2.1.3 Convenience Sampling

Initially, the sample population for this research was to be gathered through probability sampling. This was to be done by utilising the SFA's and the University of Seychelles' (UniSey) data on the fishers of the Seychelles. Once the established population was found, a representative sample would be chosen, and data would be gathered from them. This was unrealistic for the time frame and resources available and was abandoned before fieldwork began. However, attempts were made to emulate this method by calling fishers from the SFA's database to arrange interviews. Few fishers answered the phone calls, and fewer were able to meet at agreed-upon times. UniSey and the SFA advised to seek a different method. Convenience sampling then became the best option as it is specifically designed for scenarios where access to participants is a limiting factor (Golzar, Noor & Tajik, 2022).

The sampling occurred by going to the identified clusters and approaching fishers to ask if they were willing to participate in the research. If the fishers were willing, the exchange forms would be brought out, and conversation would occur. If the fishers seemed forthcoming, they were asked to participate in a formal interview. Depending on their availability, two SFA interns accompanied me to the sites; they assisted with data capture, acted as translators to make participants more comfortable and took on the role of my guides in the areas I was unfamiliar with. If they were unavailable, I would conduct the research in the same fashion by myself. Thankfully, the Seychellois are well-versed in English and used to talking to foreigners, so communication was rarely an issue, and I did not need to speak in French. This allowed me plenty of opportunities to conduct research. I tried to keep the days when no fieldwork was done to a minimum, but this was not always possible, as public holidays and Sunday church made travel difficult. Regardless of the efforts, there was no way to guarantee any data as different results occurred depending on the area and time of day.

In some cases, I would arrive at a port and find no one there or no one who had caught any fish recently. After two weeks of research, the best times for each area began to emerge, and a research pattern was developed. It was found that in the morning before 07h00s was the best time to spend at Anse Royale and Anse Aux Pins, as many fishers would either be prepping to leave, selling their catch or could recount the previous day's catch. Mid-day was the best period for the central areas of Cascade, Roche Caiman and Port Victoria. Many fishers in these areas would spend the middle of the day either cleaning their boats or prepping fish for sale. The Northern region, La Retraite, Glacis Beach, and Bel Ombre, were only effective in the late afternoon and evening as I would find them on their return from sea with their catch. These areas were too difficult to get to in the morning due to severe traffic, and this, compounded with very few people in the midday, meant that late afternoon to early evening was the best period for research. While these times were established as the most likely times for fishers to be present, they were not always guaranteed to provide participants or data.

When arriving at the ports, there was no guarantee of any fishers being present or willing to participate in the research. Occasionally, I would arrive in an area to find no one there, either because I had just missed them launching or they had already finished up for the day. Other times, there would be several fishers, but very few were willing to talk with me, and I would be ignored. While these were not everyday occurrences, there were several days when finding one participant from any of the sites was challenging. However, more often than not, the fishers were willing to speak with me and addressed me with a friendly demeanour.

3.3 Data Collection

Data was collected through exchange forms, participant observation, and semi-structured and informal interviews.

3.3.1 Exchange Survey

The exchange forms were the quantitative aspect of this project and formed a foundation to substantiate the qualitative data by providing empirical observations that could inform the line of questioning, investigation and analysis. An example of this form can be found in the Appendices. These forms were used to obtain the data surrounding the fisher’s catch and the basic census data of the participants. This included name, sex, age, living area, occupation,

number of people living in their household, and the economic role they play within their household. The data surrounding the catch included the total amount caught, the total amount sold, the total amount that was kept or given, who it was given to, how many crew members participated and how far the fishers travelled for their catch; the fishers provided this information in various ways.

Some fishers estimated the overall weight of their catch based on prior events and then made further estimates of the weight they gave away; this tended to occur when the fishers caught upwards of a tonne of fish on a trip. Unfortunately, this method leaves a lot of possibility for error; it was incredibly difficult to substantiate the fisher's claims as the SFA does not keep the exact by weight nor numbers of fish caught by their fishers. It is also impossible to verify the total number or weight of fish without a scale, especially when the amount is near a tonne. However, many of these fishers were highly experienced and regularly had to provide the same data to the SFA. They also had little reason to inflate or deflate the number of fish they caught, as they were not legally restricted in the total number of fish they could catch. So, their estimations of the weight can be seen as somewhat accurate. Thankfully, not all data gathered was so general as many other fishers provided more exact quantities in the form of "packets" or provided the exact number and species of fish they caught, sold and gave away.[12]

When asked who the fishers gave their catch to, they were asked to explain their biological and classificatory relationship with the individual. This data formed the basis on how the social networks were defined in this study. By examining who the fishers were giving their catch to, and what they classified their relationship as, I was able to illustrate the structure of the social network of that particular fisher. The terms "aunt" or "uncle" are common examples of terms used for both biologically and non-biologically related individuals, which can create confusion. For cases outside of biological relations, the terms "friend" and "employee" are examples of classificatory terms. Regardless of the terminology used, all relationships were classified based on their biological and classificatory relations to the fisher providing the data and were specified as much as possible. It is important to note that the particular relationship, as described in chapter 1, was not stated by the participants, but rather

[12] Packets refer to a group of fish that bound together by a rope through the gills and mouths. Smaller fish are often sold in this manner, with the average packet being between 5kgs and 10kgs.

inferred from the gathered data surrounding biological and classificatory relationships, and the patterns of exchange that occurred between the individuals.

Besides from the number of fish caught, the exchange surveys also collected data on the methods of catch. This includes data surrounding how far the fishers travelled for their catch, where they travelled to, how many people took part in the trip, and how they were associated with the boat owner. The data on the distance travelled was fairly straightforward and the participants provided distances in nautical miles and the cardinal direction in relation to Mahé. The number of crew referred to the number of individuals on the boat who assisted the interviewed fisher with catching the fish. However, regardless of the size of the crew, the unit of analysis was always the boat owner/captain of the crew as it ultimately this was 'his' catch.

The census data was gathered by asking the participants the relevant questions when filling in the exchange forms. Name, age, sex, living area and occupation are all unambiguous questions with clear answers. The number of people within their household and the economic role they hold within their household required more explanation for the participants. The definition of household used for this study refers to individuals who live together and share in "domestic activities" like food production and consumption or are involved in reproduction and child-rearing (Messer, 1983). These groups are colloquially associated with biological kin, but this is not a requirement to constitute a household. It was explained to participants, when answering how many people live within their household, to answer based on the number of people currently living there who partake in food consumption and/or who play an economic role in food production and/or have a relationship revolved around child-rearing or sexual reproduction. The economic role within the household refers to whether or not the participant was the household breadwinner and required its own explanations for the participants.

The term breadwinner refers to the individual within the household who provides either all or most of the economic income the household subsists on (Schmink, 1984). The role of the breadwinner within the concept of the modern "Nuclear family" is usually assigned to the lead male of the house as the sole income provider, with his wife taking a non-working position and the children being dependent on both for their daily needs (Schmink, 1984). In reality, women often work to provide a supplementary income for the household, and it is not

uncommon for the wife/woman to be the main breadwinner of a household (Schmink, 1984). For this study, the term breadwinner is defined as the sole income provider for the household, with no one else providing supplementary income. If the fisher reported that anyone in the household provided supplementary income, they were not classified as the breadwinner, regardless of how much they contributed. This was designed to create an unambiguous set of criteria and to show whether the fisher could support their household on their income through fishing.

The exchange survey's primary goal was to provide data that could be used to establish a socio-centric and ego-centric network map through identifying who the fishers distribute their catch to and how much they distribute (Bernard, 2018). When analysed, this could provide an indication of the gift and commodity exchange patterns within the artisanal fisher communities. The census data provided categorical variables that could be analysed for correlation, and the quantity of Total Catch, Total Sold and Total Given provided ratio data to further contribute to this analysis.

3.3.2 Interviews

Semi-structured and informal interviews were conducted throughout the research to provide context for much of the quantitative data. Through direct communication with the participants on topics relevant to both the research and the fisher, context can be provided for conclusions made from the quantitative data analysis. This allows for a more nuanced understanding of the mechanisms surround gift exchange, cooperation and conservation.

3.3.3 Informal Interviews

Informal interviews are often used at the beginning of fieldwork when a rapport has yet to be made and the ethnographer is still settling into the field (Bernard, 2018). These interviews are simple and casual conversations with participants, which are only recorded at the end of the day or the first opportunity the researcher has to write down all they can remember from the conversations (Bernard, 2018). The advantage of this approach is that it allows topics that may not have been considered before to appear due to the unplanned nature of the conversation. This was the most employed interview method, as the fishers were often unwilling to participate in the 15 to 30-minute semi-structured interviews. Ironically, all of these informal interviews lasted nearly half an hour, some even longer. Many of the fishers

seemed to find the formality of the interviews unappealing; however, the casual environment created through simple conversation, and a shared cigarette was more than suitable.

The topics of the informal interviews would vary between participants, as is the nature of such a method. The main goal was to build rapport between the participants and myself and create a sense of ease for future interviews. A secondary benefit was that the casualness led many participants to engage in topics they might not have discussed in a more formal environment. The give-and-take involved in a conversation creates an atmosphere where the participants feel they are communicating with a person who is interested in what they are saying rather than a scientist trying to get data out of them. These conversations were under the participants' control, but careful note was taken if the participants mentioned something in line with the semi-structured interview topics. Very often, the conversation would relate to these topics without any prompting on my part, leading to some of the informal interviews unintentionally providing the same data as the semi-structured interviews.

3.3.4 Semi-structured interviews

The semi-structured interviews were used to provide a consistent line of questioning for anyone who participated in them. The advantage of this method of interviewing is the combination of structure and freedom it provides (Bernard, 2018). There is a clear set of questions that need to be answered in each interview, but the interview can still change course based on the information provided by the participant. This allows for comparisons between participants' answers and for new avenues of research to appear. The semi-structured interviews within this study were focused on expanding upon the fishing practices and economic states many of the fishers found themselves in.[13] This was divided into four sections, and each section included questions designed to provide data on the fisher's opinion/status of that particular topic.[14] These sections were:

1) Fishing patterns
2) Economic valuation
3) Economic sources

[13] See appendices x for the interview sheet.

[14] All questions within these interviews were delivered in a manner the participant would understand and were phrased as questions. They were not read out verbatim.

4) Conservation Awareness and Conformity

The 1) fishing patterns included questions about the fisher's overall fishing practices. This included when they began fishing as a career, where they often fish, how long they tend to fish for, and their main target fish. These questions allowed for multiple answers from the participants.

The 2) economic valuation included questions designed to provide a picture of the fisher's economic status of the fisher's household. The questions included were:

1) You are the main breadwinner in your household.
2) Your household relies primarily on the fish you catch as a source of meat protein.
3) Your household has enough food to eat every day.
4) Your household makes enough money to buy all groceries.
5) You have shifted to other occupations (i.e., tourism, service work, construction, etc.) to compensate for food and/or income.

All of the questions were posed as yes/no answers but allowed for extra commentary by the participant. This topic then continued into the 3) economic sources section. This section provided a list of possible sources of income that the fishers could be involved in outside of fishing. These sources were:

1) Selling fish at market
2) Selling alternative ocean tenure
    a) If so, specify what.
3) Selling crafts
4) Selling fruits and vegetables
5) Retailing goods (i.e. tobacco, fishing gear, clothes etc.)
6) Remittances
7) Tourism (activities)
    a) If so, specify what.
8) Wage labour (i.e. public sector, construction, finance, etc.)
    a) If so, specify what.
9) Renting boat
10) Renting home

11) Other:

The fishers were asked to select all activities they were involved in. This indicated how effective fishing was as the participants' sole source of economic income.

The final section, 4) Conservation Awareness and Conformity, was designed to establish how aware the fishers were of the Seychelles conservation programs and laws, whether they saw these as effective or not, if they believed others were following them and if they ultimately respected them. The questions were also posed as yes/no statements, but the participant was encouraged to provide extra commentary when they deemed necessary. They were:

1) Are more fish closer to shore than before (ten years or so)?
2) Are there more fish out at sea than before (ten years or so)? If so, how far is that from shore?
3) The individual is supportive of the conservation efforts.
4) The conservation effort effectively controls the resources.
5) Is there poaching within the MPAs?
6) The MPA/conservation efforts cause conflict with fishers in your community.
7) The MPA/conservation efforts have created conflict with the neighbouring communities.
8) The conservation efforts have increased the amount of fish you consume and sell.
9) The conservation efforts create economic problems for you by not permitting you to fish in productive areas.
10) The conservation efforts have increased the fish consumed/captured for your household.
11) You are willing to sacrifice short-term benefits for long-term goals (i.e. catch less now so that you can still catch more tomorrow).

After this section, the participant was asked if they had any further comments they wanted to add or mention anything they believed the interview had missed.

3.3.5 Observation

Participant observation was used within this research to discover further avenues of study, form opinions surrounding the data from the exchange forms and interviews and create a

more emic understanding of the fishers' daily lives. The spaces of observation were the marine access points that the fishers used to launch their vessels and did not include the fishers' homes or the St Anne Marine Protected Area. Access to these spaces was limited due to time and funding constraints.

One of the most important methods any anthropologist can use is Participant observation. This method involves the researcher inserting themself into the community they wish to study to allow them to understand the community as a member would (Laurier, 2010). Many anthropologists have followed this approach, with Malinowski (1966) utilising it heavily in his study of the Trobriand islanders. There is no set method to conduct participant observation, so the process relies on the stages and processes the studied community would follow (Laurier, 2010). Much as Malinowski (1966) did in his study, the observer's goal is to either become an unnoticed/peripheral presence or an accepted/integrated one. There are several forms of participant observation, the most relevant in this study being the method of "Observer-as-Participant", as described in Takyi's (2015) work.

Within this observation method, the researcher observes far more than they participate and maintains a professional distance from the participants (Takyi, 2015). This does not exclude the possibility of friendly conversation or a relationship similar to friendship, but this is not the participant's goal. One of the key advantages of this method is that it keeps the researcher from affecting the situation they are observing, which allows for a more natural state (Takyi, 2015). This is only possible once the participants have become accustomed to the observer's presence.

> "It must be remembered that as the natives saw me constantly every day, they ceased to be interested or alarmed, or made self-conscious by my presence, and I ceased to be a disturbing element in the tribal life which I was to study, altering it by my very approach, as always happens with a new-comer to every savage community. In fact, as they knew that I would thrust my nose into everything, even where a well-mannered native would not dream of intruding, they finished by regarding me as part and parcel of their life, a necessary evil or nuisance, mitigated by donations of tobacco." Malinowski's (1966)

Once a sense of familiarity is formed between the participant and the researcher, the participant is far more likely to open up to the researcher and also far more likely to act as they normally would (Schwartz & Schwartz, 1955). This is only possible after long

periods of consistent interactions, something that was very difficult to achieve in only a month. However, the day-to-day visits allowed for a sense of familiarity to form between myself and a select group of participants, with many of them recognising a sense of routine as I engaged with them.

3.4 Data Analysis

The data gathered through the exchange forms, interviews and observations were all analysed to formulate the thesis for this research. Analysis was done by coding data into various categories. Coding is the process where data is broken down, compared and then placed into a category based on the variables of that data (Walker & Myrick, 2006). Similar data was placed into similar categories, with comparisons occurring across the categories. This process was done inductively to allow the data to determine the research themes. The data gathered through the exchange surveys was placed through statistical analysis to provide an illustration of how much the fishers were catching, how much they were keeping, exchanging and/or selling and then comparisons were made based on the sociodemographic data.

3.4.1 Exchange Data

Before any analysis or coding was done, the data was cleaned and standardised. Initially the ratio data provided was irregular, with multiple values being represented with different formats, such as in 'packets' or simply represented by the number of fish that were caught. To standardise this, all data provided was represented as weight in kilograms. In cases where this was not provided a weight was calculated based upon observational data. In the case of packets, it was found that the average weight of the packets was approximately ten kilograms (10kgs). From this, any data that was represented as '*x* packets' was expressed by multiplying the value of *x* by ten kilograms. This provided an approximate weight in kilograms of *x**10kgs. In the cases where data was represented by the number and species of fish caught, the average weight of the species was found (represented as kgs) and then multiplied with the total number of fish caught (represented as *x*). Creating an approximate total weight of *a*kgs**x*. If multiple different species had been caught, then the approximate total caught of each species was added together to represent the total catch in kilograms. Creating an approximate total weight of *a*kgs**x* + *a*kgs**x* +... for each species. This occurred for the values of the Total Catch, Total Sold and Total Given data. During the analysis of this data,

each individual case where data was provided was referred to as a “unit of data”. This unit of data was treated as the unit of analysis. Categories for the data were then formed based on the nominal data of age, location, fisher profile and household economic role.

The age categories were separated by decadal age groups, beginning from 18-29, continuing with 30-39, 40-49, 50-59, and ending at the 60+ category. The locations were separated into their respective clusters. The frequency of data within each category was then represented in the total percentage of all data. However, these categorisations did not allow for sufficient comparison, as the amount of data gathered from each category was inconsistent. As such, the clusters were further categorised into general geographic locations based on Mahé’s relative geographic space and the total percentage of data they represented. As such, the clusters were grouped into Northern Section, Central Section, Southern Section and Port Victoria. The Northern Section includes La Retraite, Glacis Beach and Bel Ombre data. The Central Section includes Cascade and Roche Caiman. The Southern section includes Anse Royale and Anse Aux Pins, and the Port Victoria section contains data only from Port Victoria. Further categorisation was then conducted through the establishment of a fisher's ‘Profile’, and the economic role the participant played within their household.

The Fisher Profile category refers to the length of time the fishers would take for each individual fishing trip. This created the category of Multi-Day Fishers (MDF) and Day Fishers, and the criteria for each category was based on the time the fishers reported having fished for. The MDF’s are categorised as fishers who have, in one fishing trip, spent over 24 hours at sea. The Day Fishers are categorised by any fishing period under 24 hours. These trips were frequently under 12 hours, with many also being “half-day trips”, which constituted a trip of four hours or less. There were too few of these trips to constitute their own category, so they were grouped into the category of Day Fisher. The household economic role category refers to the fisher's status as the household breadwinner. The breadwinner is classified as the sole economic provider for the household. All ratio data was separated into these four categories and analysed.

For the statistical analysis, a Chi-squared test was used to analyse the data for any links between data categories between variables. All statistical analysis was conducted using non-parametric statistical procedures as the data was collected non-randomly and was not

designed to represent the normal distribution of the sample population. The statistical package ‘R’ was used to conduct this analysis, alongside Microsoft Excel.

3.4.2 Statistical Analysis

Descriptive statistics was initially utilised to organize the data, followed by a Chi-square, and Spearman correlation tests. All statistical analysis was conducted using non-parametric statistical procedures as the data was collected non-randomly and was not designed to represent the normal distribution of the sample population.

Descriptive statistics are a method used to describe the central tendency of a set of data by calculating aspects of the data such as the mean, mode, median, range, standard deviation and kurtosis. These calculations help illustrate what the data would look like if represented, and provides indications the data’s overall tendency (Vetter, 2017). This method was applied to the Total Catch, Total Sold and Total given values across the various categories. After this was completed, the Chi-squared tests were used to examine whether or not any two of the categorical variables were independent from one another, or to assess how well a sample fits the distribution of the data. This is often referred to as testing the ‘goodness of fit’ (Franke, Ho, & Christie, 2012). The Spearman’s correlation test was used to find if there were any associations between the data categories due to it being specifically designed to analyse monotonic data (MacFarland, Yates, MacFarland & Yates, 2016).

3.4.2.1 Interviews

In the case of the semi-structured interviews, the categories were stipulated via the specific questions, each representing its own category. Answers were compared by each individual interview acting as the unit of analysis. Common themes were identified between each category and represented via the frequency of answers.

3.4.2.2 Observation

The observational data was analysed using the same coding process as the exchange forms and interview data. The data was investigated and coded, and similar points of data were compared and categorised using data from both the exchange forms and interviews. The informal interviews were examined using the same criteria, if the same themes were present.

3.5 Ethical Considerations

All participants were adults over the age of 18. The participants are non-vulnerable individuals with the subject matter not providing any cause for mental or emotional harm. If any of the participants experienced any mental or emotional trauma, the interview process would have stopped.

The participants were not part of any government organisation, and as such, they were the only individuals whose consent was required for the research to continue. In the case of informal interviews and exchange forms, all participants were made aware of the parameters of the study in a language they understood. During the informal interviews and exchange form process, all participants gave verbal consent to participate. For the formal interviews, consent was established through written forms and then reiterated verbally before and after interviews. The consent forms and verbal information made the conditions of the participant's participation clear and were presented in a language they understood.

The participant's identities are protected. All data collected was initially stored on paper and then transferred to the digital format of an independent device such as a flash drive or hard drive, where passwords were applied by the researcher. The participants were made aware that they may withdraw from the study at any point for whatever reason and, if they so choose, any data given will be removed from the study. At this point, no participants have reached out to remove data.

This research was given ethical clearance by the Rhodes University Human Research Ethics Committee (**2021-5096-6424**), and the study has followed the university's code of conduct in conducting this research.

3.6 Methodological Framework

The sampling methods of cluster and convenience were designed to seek participants who were both willing to participate and who had knowledge relevant to the research. Identifying clusters allows for clear zones to find participants, streamlining the selection process, and convenience sampling allows for a time effective means of finding willing participants. The exchange forms, observations and interviews worked in combination to provide data that addressed different aspects of the research question. The exchange forms were designed to

collect the participants' sociodemographic data, which could be compared and contrasted against all other data. These methods provided data on the fishers' catch and who they exchanged it with. The observation and interview data were designed to substantiate the trends found within the exchange forms. The interviews, both semi-structured and informal, provided insight into the fishers' perspective of the conservation programmes and their relationships with their fellow fishers. When combined, these methods paint a picture of how much the fishers are catching, who they are sharing/selling it to and how this affects their ability to continue their way of life.

4. Chapter 4: Results

The research had a total of 58 individual participants. All of these participants were men from the age of 18-71, with 55 as full-time fishers and 3 as part-time fishers. These 58 individual participants provided 83 entries to the exchange surveys, including data on the fisher's catch and the census data of each participant. Over the 30 days of dedicated field work (24/05/2024 - 23/06/2024), 19 interviews occurred; 12 were informal, and 7 were semi-structured. Observations occurred every day and took place over the same period. Within this chapter, the terms “data units” or “units of data” refers to the entries provided by the participants into the exchange forms. Each “unit” can be seen as a singular recording of the participants Total Catch, Total Given and Total Kept of that day.

4.1 Exchange Surveys

Exchange data was gathered from all the individual participants, with some participants providing multiple entries. As stated previously, the exchange forms were the medium for the quantitative data within this study and provided the foundational data for this project.

4.1.1 Census Data

4.1.1.2 Age

Data was gathered from participants within the age ranges of 18 to 29, 30-39, 40-49, 50-59, and +60. The most represented age category was the 40-49 category with a frequency of 21 units, representing 25.3% of all 83 data units. The next largest group was the 60+ category with a frequency of 17, which represented 20.5%. This was followed by the 18-29, 30-39 and 50-59 categories which all had a frequency of 15 and each represented 18.1% of the data. This category and its sub-categories are represented in *Table 1.*

4.1.1.3 Location

All data gathered came from the geographic categories of Northern Section, Central Section, Southern Section and Port Victoria. The Central Section provided the most data with 28 units of data coming from this category for a total of 33.8% of all data. Port Victoria followed this with 22 units of data for 26.5% of all data. The Northern and Southern Sections provided the least data. The Northern Section provided 18 units of data while the Southern Section

provided 15 units, for a total of 21.6% and 18.1% of all data. During the data analysis, it was found that the location had association with several other categories. However, once this was considered in tandem with the qualitative data, it was found that there were little classificatory differences between the different locations. As such, this category was deemed unnecessary for overall analysis. This category and its sub-categories are represented in *Table 1*.

4.1.1.4 Household Economic Role

Of the 83 data units, 21 were provided by breadwinners and 62 by non-breadwinners. Non-breadwinners are the most frequently represented within the data at 74.7%, and the breadwinners (household heads) at 25.3%. While some data was collected regarding the total number of individuals within the household, most fishers were unwilling to disclose this information. It is unclear if this was out of a sense of privacy or if the question was actually inappropriate. Out of the 83 total units of data, only 30 units of data have associated household numbers. This is less than half, making comparisons very difficult across categories. As such, the total number of individuals within a household was excluded from analysis and comparisons. This category and its sub-categories are represented in *Table 1*.

4.1.1.5 Fisher Profile

The fishermen were categorised into two profiles: Multi-Day versus Day Fishers. The Day Fishers were represented the most in the data with a frequency of 52 units, comprising 62.7% of the total data. The MDF only provided 31 units of data and comprised 37.3% of all data provided. This category and its sub-categories are represented in *Table 1*.

Category		Sub-Category	Frequency of data (Total 87)	Percentage of data (Total 100)	
Age		18-29	15	18.1	
		30-39	15	18.1	
		40-49	21	25.3	
		50-59	15	18.1	
		60+	17	20.5	
Location	Northern Section	Bell Ombre	7	8.4	21.6
		Glacis Beach	7	8.4	
		La Retraite	4	4.8	
	Central Section	Cascade	15	18.1	33.8
		Roche Caiman	13	15.7	
	Southern Section	Anse Aux Pins	3	3.6	18.1
		Anse Royale	12	14.5	
	Port Victoria	Port Victoria	22	26.5	
Fisher Profile		Day Fisher	52	62.7	
		Multi-Day Fisher	31	37.3	
Household Economic Role		Breadwinner	21	25.3	

	Non-Breadwinner	62	74.7

Table 1: Summary of Frequencies

4.1.2 Catch Data

The exchange forms also provided data on the fisher's catch, specifically on the total amount caught, the total amount sold, the total amount given/kept, the number of crew aboard the vessel, the distance travelled for that outing and who the fishers exchanged/ sold their catch with/to. Unfortunately, the distance travelled was provided inconsistently throughout the research, and there are no means of verifying the claims, so they cannot be compared fairly. It was noticed during data capture that the crew were often allowed to take some fish from the day's catch home. The person providing the data was the boat captain or the main fisher. It was found that part of the "given/kept" amount also included the amount taken by the crew. As such, the crew was considered one unit when analysed so the total crew is not included in this analysis. The numerical data for the Total Catch, the Total Sold, and the Total Given/Kept were analysed using descriptive statistics, Chi-Squared Tests and Spearmans Correlation tests.

4.1.2.1 Descriptive Statistics

As with the census data, a total of 83 units of data were analysed. The range of the total catch was a minimum of 22kgs and a maximum of 8000kgs. The mean was 594.67kgs, with a standard deviation of 999.209kgs. This data has a high positive skew (skewness = 5.266) and a high kurtosis level (36.816).[15] The high skew illustrates that most of the data falls below the mean, and the high kurtosis indicates multiple outliers.[16] This trend continues with the total sold category, which had a minimum of 12kgs and a maximum of 7600kgs with a mean of 533.52kgs and a standard deviation of 936.767kgs. This category also had a strong skewness (5.538) and kurtosis (39.702). However, there is a slight change in trend with the total given/kept category. This category had a minimum of 0kgs and a maximum of 450kgs, with a mean of 61.16kgs, a standard deviation of 99.41kgs and a moderate level of skewness (2.095) and kurtosis (4.249). This indicates many of the values within this category fall below the

[15] Skewness refers to the degree of asymmetry within the data distribution, specifically referring to where the mean is in relation to the median (Chen, 2025). A bell curve has a skewness of 0, with positive skewness indicating a mean greater than the median, and a negative skewnness indicating a mean less than the median.
[16] Kurtosis refers to the "shape" of the distribution of data, specifically referring to the "tails" (Kenton, 2025). A kurtosis of 3, refers to a normal distribution or "bell curve". A kurtosis over 3 indicates a greater tendency of outliers whereas a kurtosis less than 3 indicates a lower tendency of outliers.

mean but with far less outliers in comparison to the other categories. This data has been represented in Table *2*.

Variable	N	Minimum (kgs)	Median (kgs)	Maximum (kgs)	Mean (kgs)	Std. Deviation (kgs)	Skew-ness	Kurtosis
Total Catch (kgs)	83	22	220	8000	594.67	999.209	5.266	36.816
Total Sold (kgs)		12	200	7600	533.52	936.767	5.538	39.702
Total Given/ kept (kgs)		0	20	450	61.16	96.954	2.331	5.495

Table 2. Summary of Descriptives

While it has been mentioned previously, it was only after analysing the data shown above, that the categories of the MDF's and Day Fishers were formed. It was found that the data created significant skewing, as the quantities varied to such a high degree when all catch data was examined together. This is why the categories were created, to allow for a fair comparison of data within each category. As such, descriptive statistics were done on the data within the Multi-Day and Day Fishers categories.

The MDF's had a minimum Total Catch value of 135kgs and a maximum of 8000kgs. The mean Total Catch was 1263.16kgs with a standard deviation of 1395.75kgs. The data is moderately skewed (skewness = 0.57) and has a very high level of kurtosis (kurtosis = 17.60), which indicates that most of the data values are below the mean and there are multiple outliers. This trend continues with the Total Sold data, with a minimum value of 118kgs and a maximum of 7600kgs. The mean Total Sold was 1129.23kgs, with a standard deviation of 1334.04kgs. This data was also moderately skewed (0.52) with a very high level of kurtosis (17.94), once again illustrating that most of the data is below the mean and that there are multiple outliers. The Total Given deviates slightly from this trend. The range for the Total Given data was a minimum of 0kgs and a maximum of 450kgs. The mean was 133.61kgs with a standard deviation of 210.29kgs. The data was moderately skewed (0.48) with

relatively low kurtosis (0.38). This implies that most data fell below the mean, but there are few outliers.

When comparisons were conducted between the Multi-Day and Day Fishers, it was decided that it would be fair to have some representation of the MDF's catch per day. If the MDF's average Total Catch were to be represented by the average amount of fish they caught each day -assuming that each day provided the same number of fish- it would be 157.9kgs. This was found by taking the average Total Catch (1263.16kgs) and dividing it by the average amount of days spent at sea (8 days). Applying this method to the other categories provided an average Total Sold of 141.15kgs/day and an average Total Given of 16.7kgs/day. All data, excluding the per-day calculations, has been represented in *Table 3.*

Variable	N	Minimum (kgs)	Median (kgs)	Maximum (kgs)	Mean (kgs)	Std. Deviation (kgs)	Skew-ness	Kurtosis
Total Catch (kgs)	31	135	1000	8000	1263.16	1395.75	0.57	17.60
Total Sold (kgs)		118	900	7600	1129.23	1334.04	0.52	17.94
Total Given/ kept (kgs)		0	100	450	133.61	210.29	0.48	0.38

Table 3: Summary of Multi-Day Fisher Descriptives

The Day Fishers had a minimum Total Catch of 22kgs and a maximum of 700kgs. The mean Total Catch was 196.15kgs with a standard deviation of 162.91kgs. The data is moderately skewed (skewness = 0.85) with a relatively high kurtosis of 5.14. This indicates that most of the data is below the mean and that there are multiple outliers among the data. The Total Sold mimics this trend again. The range of the Total Sold was a minimum of 12kgs and a maximum of 644kgs. The mean was 178.38kgs, with a standard deviation of 140.65kgs. This data was also moderately skewed (0.61) with a high level of kurtosis (5.12). The Total Given/Kept had a minimum value of 0kgs and a maximum of 210kgs. The mean was 17.77kgs, with a standard deviation of 34.06kgs. This data was moderately skewed (1.08)

with an extremely high level of kurtosis (kurtosis = 20.33), indicating that most data fell below the mean but with significantly more outliers than the other categories. This data has been represented in *Table 4.*

Variable	N	Minimum (kgs)	Median (kgs)	Maximum (kgs)	Mean (kgs)	Std. Deviation (kgs)	Skew-ness	Kurtosis
Total Catch (kgs)	52	22	150	700	196.15	162.91	0.85	5.14
Total Sold (kgs)		12	150	644	178.38	140.65	0.61	5.12
Total Given/ kept (kgs)		0	5.5	210	17.77	34.06	1.08	20.33

Table 4: Summary of Day Fisher Descriptives

4.1.2.2 Event 0

While analysing the data, an interesting phenomenon was seen. This was dubbed “Event 0”; and its implications will be discussed in *Chapter 5: Discussion*. The term “Event” in this case refers to the occurrence within a Unit of data where the fishers gave/kept 0kgs of their catch and sold 100% of it. The categories in which this occurred were analysed. Out of 83 data units, Event 0 occurred 28 times for a 33.73% occurrence across all categories. The rate of occurrence within each category was then calculated.

The age category with the highest occurrence of Event 0 was the 40-49 category, with an occurrence of 42.86%. The next were the 18-29 and 50-59 categories, each with a 33.33% occurrence. The 60+ category had a 29.41% occurrence. The lowest occurrence was the 26.67% in the 30-39 category.

The geographic section with the highest occurrence was the Central Geographic section, with 60.71% of all data from this section having an Event 0. Followed after this was the Southern section with 26.67% and the Northern Section with 22.22. The Port Victoria section had the

lowest occurrence, with 13.64% of all data from this category containing Event 0. Event 0 occurred with the MDF's only 9.68% of the time and 48.01% for the Day Fishers.

For the Household Economic role, Event 0 occurred with the Breadwinners 52.38% of the time and 27.42% for Non-Breadwinners. All of this data has been represented in *Table 5.*

Category	Sub-Category	Frequency within category (Total 28)	Percentage of occurrence within sub-category
Age	18-29	5	33.33
	30-39	4	26.67
	40-49	9	42.86
	50-59	5	33.33
	60+	5	29.41
Location	Northern Section	4	22.22
	Central Section	17	60.71
	Southern Section	4	26.67
	Port Victoria	3	13.64
Fisher Profile	Day Fisher	25	48.01
	Multi-Day Fisher	3	9.68
Household Economic Role	Breadwinner	11	52.38
	Non-Breadwinner	17	27.42

Table 5: Summary of Event 0 descriptives.

4.1.2.3 Chi-Squared Test

Categorical variables include Age group, location, multiday fishers and whether they are family breadwinners. The chi-square test revealed no significant association between age and being a MDF (chi2 = 6.866, p = .143). However, a significant association was found between age and family breadwinners (chi2 = 11.427, p=.022). This means that age groups differ in their likelihood of being family breadwinners. There was also a highly significant association between location and being a MDF (chi2 = 60.004, *p<.001*). This means that certain locations had a significant difference in the distribution of MDFs. There was also a significant association between location and being a family breadwinner (chi2 = 56.393, *p<.001*). This suggests that the likelihood of being a family breadwinner varies by location. Lastly, there is a significant association between location and Event 0 occurrence (*p < 0.001*). This information is illustrated in *Table 6.*

Variable	Compared Group	Chi-Square Value	df	*P-value*	Significant?
Multi-Day Fisher	Age	6.866	4	.143	No
Family Breadwinner	Age	11.427	4	.022	Yes
Multi-Day Fisher	Location	60.004	7	<.001	Yes
Family Breadwinner	Location	56.393	7	<.001	Yes
Event 0	Age	1.261	4	.868	No
Event 0	Location	19.529	7	.007	Yes

Table 6: Chi-Square Results for Associations Between Variables (Age, Location) and Multi-Day Fishers, Family Breadwinners and Event 0

4.1.2.4 Spearman Correlation

Many significant trends emerged when analysing using Spearmans Correlation. Total Catch (kgs) and Total Sold (kgs) have a very strong positive correlation (0.992, p < .001). This suggests that as the total catch increases, the total sold amount also increases. Total Catch (kgs) is also strongly correlated with Total Given/Kept (kgs) (0.764, p < .001). Total Sold (kgs) is positively correlated with Total Given/Kept (kgs) (0.696, p < .001) but has a strong negative correlation with MDFs (-0.706, p < .001). This means that those who fish more

frequently tend to give less. As anticipated, the Total Given/Kept (kgs) has a strong positive correlation with Event 0 (0.824, $p < .001$). This suggests that as more is given or kept, the likelihood of Event 0 increases. Lastly, MDFs show a negative correlation with Total Catch (-0.730, $p < .001$), Total Sold (-0.706, $p < .001$), and Total Given/Kept (-0.666, $p < .001$). This means that those who fish more often catch, sell, and give/keep less. This data is illustrated in *Table 7*

*Significance: p < .001** and p < .05. **

Variable	Total Catch (kgs)	Total Sold (kgs)	Total Given/Kept (kgs)	Multi-Day Fishers	Event 0
Total Catch (kgs)	1.000	.992**	.764**	-.730**	.465**
Total Sold (kgs)	.992**	1.000	.696**	-.706**	.403**
Total Given/Kept (kgs)	.764**	.696**	1.000	-.666**	.824**
Multi-Day Fishers	-.730**	-.706**	-.666**	1.000	-.415**
Event 0	.465**	.403**	.824**	-.415**	1.000

Table 7: Spearman's Rho Correlation Findings

4.2 Interviews

The semi-structured interviews followed an interview guide with four specific sections. A total of 7 interviews took place across the 30 days of fieldwork. The interviews, along with the observations, formed the qualitative aspect of this research and were designed to substantiate the results from the quantitative data. The informal interviews followed no particular structure and played more of a role as observations. The data from them has thus been included in the Observation section below. The results of these semi-structured interviews are illustrated below.

1. Fishing patterns

This section's focus was to evaluate how fishers usually fish and create a comparison across this. This was done by asking the fishers four specific questions. They were:

1.1 When did you start fishing?

This question refers to when the fishers began to learn the skill of fishing and how they began to learn it. The answers were as follows: 8, 12, 12, 14, 15, 16, and 40.

In all cases, the fishers stated that they learned by getting involved with the local fishers and being taught by older cousins, uncles, and, in one case, their father. It must be stated that all participants were over 30 years old (the participant who started at 40 years was 60 at the time of the interview) when being interviewed, implying a minimum of 20 years of experience in fishing for each.

1.2 Where do you normally fish?

This question was to ascertain the fishers' most frequented fishing location. The answers varied, but the favourite direction for many of the fishers was to the North.

1.3 How long do you tend to fish for?

The fishers provided various answers to this question. Overall, the minimum period tended to be five days for the fishers who spent multiple days at sea and three hours for the Day Fishers.

1.4 What fish are you normally trying to catch?

The fish named within this answer were parrotfish which were named once (1), rabbitfish (1), grouper (3), red snapper (4), jobfish (4), jackfish (2) and Varvara (1).[17] The most common fish targeted were red snapper and Jobfish.

2. Economic Valuation

This set of questions was designed to provide a picture of the economic status of the fisher's household. Notes of the participant's answers were taken and have been included within this analysis. The questions and answers have been illustrated in *Table 8.*

Question	Frequency		Notes
	Yes	No	
2.1) You are the main Breadwinner in your household.	1	6	In all cases where the participant is not the breadwinner, their wife or girlfriend provides supplementary income.
2.2) Your household relies primarily on fish you catch as a source of meat protein.	5	2	*"Chicken is cheaper than fish."*
2.3) Your household has enough food to eat every day.	7	0	*"If I need fish, a friend will give."*
2.4) Your household makes enough money to buy all groceries.	7	0	"It's not always easy."
2.5) You have shifted to other occupations to compensate for food and/or income.	0	7	

Table 8: Economic Evaluation Interview Answers

[17] Number in parentheses indicate frequency.

3. Economic Sources

This section was designed to show if the fishers had an alternative source of income outside of fishing. None of the fishers who participated in the semi-structured interviews participated in an alternative source of income, as such, this section has not been included in the analysis.

4. Conservation Awareness and Conformity

This set of questions was designed to establish how aware the fishers were of the Seychelles conservation programs and laws, whether they saw these as effective or not, if they believed others were following them and if they ultimately respected them. As done in question 2, the questions involved yes/no answers but allowed for notes further explaining the participant's answers. The questions and answers have been illustrated in *Table 9*.

Question	Frequency		Notes
	Yes	No	
4.1) Are more fish closer to shore than before? (Ten years or so)	0	7	*"The coral in the reefs are dead."* *"The engines make it worse."* *"Used to be able to fish right from shore."*
4.2) Are there more fish out at sea than before (ten years or so)?	1	6	
4.3) The individual is supportive of the conservation efforts.	4	3	*"Size limits are important."* *"The SFA don't make plans. There are too many different decisions being made. The guys who don't fish make the decisions."* *"They say they'll do stuff and help us, then they don't."*
4.4) The conservation effort effectively controls the resources	1	6	*"If it's working, I haven't seen it."* *"The SFA is lazy."*
4.5) Is there poaching with the MPAs?	4	3	*"I've never seen poaching."* *"They go at night."*

			"Money is money."
4.6) The MPA/conservation efforts cause conflict with fisher in your community	3	4	
4.7) The MPA/conservation efforts have created conflict with neighbouring communities	2	5	*"Some guys get away with it. It's unfair."*
4.8) The conservation efforts have increased the amount of fish you consume and sell		7	*"They're not having any effect."* *"Can't always follow the rules."* *"Not actually talking with the fishermen."*
4.9) The conservation efforts create economic problems for you by not permitting you to fish in productive areas	1	6	*"I can't really see a difference."*
4.10) The conservation efforts have increased the fish consumed/captured for your household		7	*"There's less fish everywhere."* *"I mostly eat chicken."*
4.11) You are willing to sacrifice short-term benefits for long-term goals (i.e. catch less now so that you can still catch more tomorrow)	1	6	*"Only if the government actually helps us."* *"I don't expect more fish."* *"Only if they make the fish cost more."* *"Once it's gone, it's gone."*

Table 9: Conservation Awareness and Conformity

4.3 Observations

The observations and interviews form the qualitative aspect of this research, which is designed to substantiate and provide context for the data expressed within the quantitative part of this work. This data was collected from what I observed and my conversations with the fishers. The observations took place every day over the 30 days of fieldwork. Several points of relevance were found which have been illustrated below.

It didn’t take me long to realise that the fishers didn’t particularly like being part of any research. The fishers at Port Victoria seemed indifferent, but that may have been because they were right on the SFA Research Team’s doorstep and were used to answering questions about their fishing trips. However, the other fishers made it quite clear they didn’t enjoy this, and as soon as the clipboard came out, the atmosphere seemed to change. I tried to make the situation as informal as possible to offset this. Offering a cigarette seemed to soften some of their dispositions, and having a smoke with them helped put us on equal grounds. The conversation became less of a researcher talking to a participant and more of two fishermen discussing their woes. This didn’t always work, as it appears many of the fishers were suffering from research fatigue after being the subjects of several ecological studies. Regardless, I always tried to focus the conversations on the fishers themselves rather than the fish, a sentiment that, apparently, wasn’t shown very often. One fisher commented that in ten years of being the subject of research, I was the first person to focus my research on him rather than the fish. I found it hard to believe that there has been no research done on fishers before, especially as the NOCRISES project had recently concluded research in Seychelles, but the sentiment was still interesting and affected alot of my observations of the participants.

4.3.1 The Catch

The data collection in this project required a lot of travel up and down the coast of Mahé. All this travel was to get to the clusters I used for my sampling. These clusters were the marine access points that the fishers used to launch their boats, and these sites were the focal point of my research. It is no exaggeration to say that they were the source of all my data.

I found some of these sites by recommendation from the SFA and others by travelling around the island. When I found one of these launch sites, the goal was to find anyone who would be willing to talk to me. This wasn’t always successful, but it allowed a lot of time to observe the surrounding areas. One of the first things I noticed was that no matter the time of day, there were always an incredible number of boats anchored. Throughout the fieldwork, I went to each site at as many different times of the day as possible to allow for the fact that there may be busy and slow periods. However, regardless of the time, there were often dozens of boats anchored, many of them in the exact position they were in days before. When I asked the fishers about this, they said that many people can’t always afford the fuel, bait or ice required to go fishing, so they don’t go out. In 2023, an average of 262 licensed boats were

active per month, which was a decrease from 2022's 308 monthly active (Seychelles Fisheries Authority, 2023). While this was considered the low season for fishing, it was hard for me to believe how many boats were simply not being used.

"Okay. Around five years ago it was not really that bad… but starting this last three years, it's been downhill, man. Okay. I mean, not even before, now you just have to break even. Just to break even! Just so you can have enough money to buy your fuel, to buy your food. And I've been driving on an old truck for five years now. Can't buy a new one. It's been breaking every time, man. So, it's just, yeah. So the last three years have made it really, really hard to actually carry on with this kind of stuff." – Participant 1

There were many different types of boats anchored there. The Seychelles' fishers have six types of vessels that can be licensed by artisanal fishers. They are the Pirogue, Whaler, Mini Mahé, Lekonomie, Lavenir and Schooner (Seychelles Fisheries Authority, 2023). The Lekonomie and Lavenir are the vessels I saw used the least. The Pirogue and Whaler are unmotorised boats that fishers move under their own power. The Whalers are the more common of the two and are used to traverse the reefs on the island's coast. The Mini Mahé was one of the most common crafts I saw. It is an outboard engine vessel that is around five metres long.[18] The fishers reported going as far as 20 nautical miles out using them. The Schooner was the most used vessel for the Mult-Day fishers. These inboard motor vessels can be nearly ten metres long and have enough space to fit several tonnes of fish and several crew members.[19] The fishers use these vessels to go reportedly two hundred nautical miles from Mahé and spend an average of 8 days at sea.[20] These fishers utilise handlines as their main gear for catching fish. Regardless of the vessel used, once the fishers have caught enough fish or are nearing the end of fuel reserves, they return to their launch site, where they begin cleaning and selling their fish.

An important note of these launch sites is that many of them doubled as the area in which the fishers sold their catch. The Cascade, Anse Royale, Bel Ombre and La Retraite sites had market-like stalls near where the fishers launched. The other sites, such as Port Victoria,

[18] Outboard engine vessel refers to the fact that the motor control the vessel is mounted externally from the actual craft. This allows it to be removed for maintenence or replaced far easier.
[19] Inboard engines vessel refers to the fact that the motor controlling the vessel is internally attached to the vessel.
[20] The longest reported period was 15 days and the shortest was 5 days.

Anse Aux Pins and Roche Caiman, would often sell their fish to third parties, which, in the case of Port Victoria, were often restaurants. Something that struck me as interesting was that the fishers who caught the fish were very rarely the ones selling them. Often, a trusted individual, usually a friend or family member of the main fisher, would clean and sell the fish. They were allowed to keep some of the money earned, but the lion's share went to the boat owner. This also affected how often the fishers went out, as many wouldn't launch until most, if not all, of their fish had been sold. I had some conversations with the people selling the fish, but the majority of my conversations were with the fishers themselves who were able to tell me about what fish they catch and how they sell it.

The MDF's main target was large pelagic fish, such as the Bourzwa (Emperor Red Snapper), Zob Gri (Green Jobfish) and Groupers.[21] The Bourzwa was the most sought-after fish amongst the fishers and is an island favourite. It had a wholesale value of USD 15.00/kg in 2016 (Seychelles Fishing Authority, 2019). The Zob Gri, while not as luxurious, is one of the most common fish served within the Seychelles restaurants, and Jobfish was available at every restaurant I visited. Nearly all of the MDF's catch was Zob Gri and Grouper, with Bourzwa being a very desirable extra. The fishers would spend anywhere between 5 to 15 days, sleeping and eating on the boat the entire time. Once they had caught enough fish or began to run out of supplies like food and fuel, they would return to Port Victoria where they would sell their fish immediately upon arrival. They would often sell to restaurants and hotels, and the trucks of the organisations would pick them up from the dock. The Day Fishers had a far less 'routined' system and had a larger variety of fish to target.

> "Like, for example, you will get … say, 500 kilos of this Varara, and a small boat will get around 200 of (Emperor) Red Snappers. I'm pretty sure the small boat will make way more money than this guy coming back with a tonne of Varavara, and he spent less money getting that fish as well … we burn less fuel just to get those red snappers, because you don't have to go as far. Then for the next trip, we don't have to go for like 3000 more rupees. We can cut it in half and yeah, pay 1500 maybe to fill the tank. ... So we didn't burn that much." – Participant 1

The Day-Fishers targeted a combination of reef and pelagic fish. While the pelagic fish were the same species the MDFs targeted, these often didn't form the bulk of the catch. More reef-

[21] The name "Bourzwa" is pronounced similarly to the French word "bourgeois", which denotes some of the reasoning behind the name.

associated fish, such as the Vara-Vara (Two-spot red snapper) and Trevally (Barcheek trevally), were the more common fish the Day Fishers caught and are considered cheaper than the pelagic fish species. Many of the fishers would begin selling their fish as soon as they returned to shore or, at the latest, the next morning. All of their fish were sold to local people who would head through to the market to purchase the fish. Unfortunately, there was not a consistent demand and very often, the fishers would have to sell their catch for days at a time. There were several events where I returned to a site to see the same fish being sold from the day before. This created some issues, as often the fishers would not head back to sea until they sold out.

This lack of consistency provided an explanation as to why there so many boats simply sitting in the water whenever I arrived on site. Many of the fishers had either not sold all of their fish yet, and so were still waiting, or had not made enough money to justify heading back out. This sentiment was repeated multiple times and provided a rather bleak outlook on the potential patterns of exchange.

4.3.2 Exchange within the Community

Before I began fieldwork, I believed my research would involve a complex set of socio- and ego-centric network maps. These would be based on the many different people that the fishers gave their catch to, and I would have to track the complex social and biological relationships that influenced these networks. This was not the case, and I quickly found that the fishers rarely partook in gift exchanges of their catch with anyone who did not live with or work with them. Outside of the crew, who played a role in catching the fish, the fishers shared only with the people within their households and excluded almost everyone else. The fishers' social networks found within this study can, therefore, be illustrated as between themselves, their family, and their employee/employer. In some cases, these networks overlapped, such as the case of familial working relationships, and each involved its own unique relationship dynamic, which was defined through the gift exchange.

Many of the participants were unwilling to provide details of the structure of their households, but those who did provided a varied set of results. The majority of the households fit the typical Western idea of the ‘Nuclear Family’, in which two parental figures and children occupy a household. However, several participants stated that they lived in

extended family households in which grandparents, cousins etc. occupied the same household. Within these cases, regardless of the biological relationship, all household members were placed within the same category and gifted equally. None of the fishers reported gifting any of their catch to people they might have been socially close to, such as neighbours or relatives, if they did not live with them. The only recorded occurrence of gift exchange outside of the household was between the fishers and the crew.

The biological and social relationships between the main fisher/boat owner and the crew that assisted in the fishing varied from case to case. In some cases, they were closely related biologically as brothers or father and son, and other times, they had a non-biological relationship. The social relationships would also vary, as often the fishers could be good friends who would regularly partake in recreational activities like drinking and barbeques together, and other times, the relationship was one of an employer and an employee. Within these scenarios, there was often a main fisher who tended to be the owner of the boat that was used in the fishing trip. This fisher would take on fuel, bait, and ice expenses to subsidise the outing. If the fishers returned from their outing with a surplus, the main fisher would often allow the crew members to take a small portion of the catch home. These were the only cases in which gift exchange occurred between non-related individuals who did not share a household. However, there were several cases where gift exchange did not occur at all.

Within the statistical data, the event in which the value of Total Given is 0kgs has been dubbed ‘Event 0’. This event occurred fairly regularly throughout the fieldwork, which created an interest into why. When asked, the fishers stated that Event 0 occurs because they simply did not catch enough fish to cover the expenses of the trip. When venturing out on a fishing trip, fuel to power the boat engines, ice to keep the fish cool, and bait to attract the fish all have to be purchased ahead of the trip. Fishing is an activity famous for having inconsistent results, which was no different for the Mahé fishers. If the fishers did not catch enough fish to comfortably exceed the costs of the outing, then they could not afford to give any of it away for free. This meant that all fish were then viewed as commodities, allowing little opportunity for any gift exchange to occur.

Outside of these gift exchange patterns was the commodity-based exchange that formed between the fisher selling the fish and the person buying the fish. The main fishers or boat owners would either have a trusted friend or family member handle selling the fish to the

local people, or a business representative would buy the fish straight from the boat owner. The Day Fishers tended to have trusted crew members act as third parties to sell the fish. In the case of the MDFs, the boat owner tended to sell fish to a representative of a business, such as a restaurant. Overall, the general sense of the relationships between the fishers was a distant one, with more occurrences of commodity exchanges occurring than gift exchange, with seemingly little desire to cooperate outside of relationship of direct benefit to both parties.

"We see like five boats coming, and we check we say, "Mmm, they did not get a good catch", and I can ask a fisherman, "Where were you?" "You see, man, I've been out. I was West." Okay, right, and the other one says, "I was South." So I'm like, okay, I'm hoping so we got North and East. So one of us must go North, and the other somewhere will go East. See what catches, but you must be very careful. Some of them lie. Yeah, the fishermen lie to each other most of the time. I also do that sometimes. We never tell people where our fishes are." - Participant 2

4.3.3 Conservation Compliance and Enforcement

It does not take an eagle-eyed observer to notice that the Seychelles has a problem of non-compliance with their conservation laws. This was a topic I found relatively frequently in my readings before I even began fieldwork. So, when making observations and conversing with the local fishers, I tried to bring the topic of conservation up as often as possible. I found that overall, the attitude surrounding poaching was one of awareness and a resigned acceptance. Some of the fishers stated that they know that a lot of people poach but don't see anything being done about it, with some even admitting that they do it themselves.

Within Seychelles, the laws of fishing are relatively clear. A license issued by the Seychelles Maritime Safety Administration is required for anyone who wishes to partake in any type of fishing (Seychelles Fishing Authority, b2024). These licences stipulate the type of fishing they may partake in (i.e. recreational, artisanal, or semi-industrial), which includes the type of gear they can use and the species of fish they may catch. The Seychelles Government set out these regulations in the *Fisheries Act* of 2014, along with the punishments for them.[22] The artisanal fishers are restricted from catching any turtles and may not fish for sharks using nets. They have no limit on the number of fish they catch, but they are not allowed to fish

[22] These punishments are all separated based on the offense, but can range from a heavy fine, vessel seizure or imprisonment.

within the MPAs, like the St. Anne Marine National Park. If they catch any Bourzwa (Emperor Red Snapper) or Zob Gris (Green Jobfish), they must be over 30 cm from nose to tail. This size restriction seemed to be the most common law that was broken.

"Some of the older fishermen doesn't like throwing the fish. They say they do, but they don't. Yeah, we all know they don't. … everybody will come say "Oh yeah, let them go. Don't worry. Yes, I release them every time," but it's not true…" – Participant 3

All the fishers knew about the laws but regarded breaking them as an everyday occurrence. The fishers said that they know people who go fishing in the MPAs at night and said that sometimes they don't even do that, they just wait for the gap between the patrols.[23] None of the fishers I spoke to admitted to partaking in these acts, and I was inclined to believe them, but they did admit to catching and selling fish that were under the size limit. They were not exactly worried about being caught either, as they very rarely got thoroughly searched, so the fish were very easy to hide.

"But I tell you why many of fishermen are not really following these rules is because they (law enforcement) try to target the fish market. Seychellois will buy Red Snapper, but a very small Red Snapper at a very low price, because nobody has money nowadays, life is expensive. … So they know we will sell these red snapper around, maybe 100 rupees for one, not per kilo, but one. … Why? Because the big red snappers we have is not covering enough." – Participant 1

When asked why they continued to catch and sell fish under the legal size, I was told they often can't afford to throw them back. It was the low season for fishing within Mahé, and many fishers were selling their entire catch and barely breaking even. Each fish caught requires bait, which costs money, and when ice and fuel are included in the expense, many fishers simply don't have the luxury of throwing a fish away. Often, they would sell the smaller fish to the local people, who don't mind having a slightly smaller fish as it's also cheaper, or would take it home and eat it themselves. I found this to be an incredibly interesting perspective, and after analysing much of my data, I found that it explained much of the fisher's behaviour.

[23] Apparently, this wasn't even the biggest problem; it was the drug trafficking that occured around the same time.

"Like for example, say in five days we get us like 300 of kilos of red snappers, yes? 300 kilos of red snappers is not a good catch, but it's not a bad catch either, right? So we can sell this and have money for me, my boat, and my men. Not much money because we don't spend much time on land anyway, three, or four days… Then we'll go out again. So we're not really spending a lot of money, yes? But nowadays I got to go eight to nine days just to get half of this, 150 kilos. Yeah… It's not easy… And then the problem is the nine days that you go, you're using much more resources, burning much more fuel, eating more food with a lower income… So you're spending more to get less than you would have done." – Participant 2

The overall sensation I felt while conducting my research was incredibly pessimistic. I was consistently talking to people who, while being very polite, didn't seem to have a great deal of optimism. Many conservation efforts require multiple people to follow a designed set of behaviours to accomplish the final goal, but this places everyone participating in a prisoner's dilemma. If they were to take the risk and follow the protocol, what would happen if no one else did? If they're the only one, then what's the point? They might as well take care of themselves as best they can. While there were many people trying to help and many people playing an active role in conservation practice, it felt as though everyone else I spoke to had resigned themselves to the fact that they needed to help themselves and their families over anyone else.

"We don't care what your problem is. We don't care if you're bringing small fish that you're not supposed to, that's that's your problem to deal with. You and the government. … I will not come and "Blah blah blah," you know? Yes, about this. That's that's your problem between you and the government. … it's not my job to tell this guy he's supposed to use this fish. It's the SFA. They should have made a survey on this guy." – Participant 1

This lack of cooperation is further compounded by the perception that the fish populations are dwindling. In Woods' (2004) work, 94% of their 33 participants stated that it was harder to catch fish that year than it had ever been before. In 2024, twenty years later, all of my own participants expressed the same sentiment, which has overall created very negative perception of the conservation efforts.

"Okay, when I first started, five days max… And now I got to go from eight to nine days to catch half of what I used to catch before…You have to go eight to nine days just to meet the same amount. I will not make it. Yeah. Yeah, I will not make it. I will be in debt, man." – Participant 1

Before arriving in Mahé, I arranged a meeting time with Mr. Rodney Govinden, the Head of the Department of Fisheries Research for the SFA, who agreed to aid me with my research. Part of this was them allowing me to accompany the SFA on several survey trips to help get my bearings and have someone introduce me to the fishers. Initially, everyone we met was very agreeable, polite, and willing to contribute to my exchange forms. While conducting this research, one of the first things I noticed was the fishers' overall attitude towards the SFA and its members.

When I was conducting field work, I noticed a distinct difference when I introduced myself as working with the SFA compared to when I said I was working with the University of Seychelles (UniSey). On the occasions when I said I was working with UniSey, the fishers seemed indifferent. However, when I said I was with the SFA, some fishers would take on an almost hostile attitude. On two occasions, the fishers were outwardly rude to the interns acting as my assistants because of their association with the SFA. It didn't take many occurrences of this before I realised the better option was to introduce myself as working with UniSey and not include the SFA unless asked. This created a point of interest, though, and I had several informal interviews where I brought up this phenomenon.

Many of the fishers had a fairly negative view of the SFA as an organisation. This was not a universal attitude, but the fishers who had it were quite unabashed about it. When I asked the fishers why they had such disdain, all the answers revolved around the SFA's supposed ineffectiveness and overall lack of dedication to their cause. According to their webpage, the SFA is tasked with managing, developing, and sustainably exploiting Seychelles' marine resources (Seychelles Fishing Authority, a2024). However, many of the fishers stated that the SFA does not do their job and that many of the regulations set out are not enforced fairly. One fisher claimed that "knowing the right people" meant that you didn't have to pay any fines. Another stated that nobody actually gets caught because no one properly monitors the fishers.

> "... we have a massive ocean and a small island. I think the government is really trying on this, but they are losing. …. if they're protecting from the West, then somebody comes from the South. Yeah, it can't be everywhere." – Participant 3

I was told that the SFA has field technicians stationed at the marine access points. They are tasked with recording information on the fisher's catch, such as the total amount and species

caught. This was later corroborated by the Seychelles Fishing Authority's (September 2024:26) *SFA Annual Report 2023*. However, I only encountered one technician during my 30 days of fieldwork, going to almost eight marine access points nearly every day. There could be several reasons for this, and this is not to say that they are inactive, but it does lend some credence to the fishers' attitudes towards the SFA. This is also not helped by a supposed lack of communication between the fishers and the SFA. One fisherman stated that the SFA only talk to the older groups of fishers or boat owners, representing a very small group of the fisher population. Many of these fishers do not actually fish themselves and, therefore, provide a misinformed opinion.

"I'm not saying I'm not hoping for the future, right? But I need to survive the present to make it to the future. I got to eat now. Right? I need to survive the present to make it to the future. … So, if you're making me think five to ten years from now if these things will help. I will say: Yes, but what about now?" – Participant 1

It is not unheard of for people to have a poor outlook on government organisations. My observation of the SFA within Mahé was one of an organisation designed to complete an important but difficult task. It is evident that many of the Mahé fishers do not believe the SFA is up to this task and do not hold them in very high regard as a result.

5. Chapter 5: Discussion

This research examined the exchange patterns of artisanal fishers of Mahé, Seychelles. Using gift exchange patterns as a medium, the research sought to answer the following question: What are the exchange patterns of the fisher groups of Seychelles, and what role do they have in marine resource management? By examining these exchange patterns, we were able to establish to whom the fishers' catch is going, if the fishers cooperate, and how this affects marine resource conservation. The key questions that guided this research were:

1) To whom do the fishers distribute their “catch”?
2) Where do these people/groups fit in the fisher's social network?
3) Are there any people excluded from this network, and why?
4) What is the purpose of the exchange, and how does this relate to social cohesion?
5) What role does the exchange play in their resource management strategies?

This caused a shift in the focus of the research from the exchange networks to why the fishers seemed so reluctant to share outside of their own households. Phenomena such as Event 0 and the indifferent attitude many of the fishers shared towards poaching also provided points of interest. Ultimately, the results of this research only provided some answers to these questions, and it was found that overall, how successful a fisher was greatly influenced their level of generosity. The tendency for the Total Catch to be inconsistent provided little opportunities for many to engage in gift exchange with their fellow fishers, which created a very small community network with little cooperation happening outside of the household or crew. This lack of cooperative behaviour, coupled with frequently small catches, created an indifferent attitude towards poaching and other behaviours that acted against the interests of the conservation efforts.

5.1 Success & Exchange

From examining the ratio data of the fisher's exchange, it was found that the variable with the greatest influence on the total amount a fisher would catch was whether or not they were a Multi-Day or Day Fisher, which directly affected their altruistic tendencies. The MDFs had a higher average Total Catch and a significantly lower occurrence of Event 0 than the Day Fishers. While age and location were considered, these classifications' overall effect on the

fisher's catch and altruistic behaviour was minimal. There was, however, a correlation between location and the MDF category. This is attributed to the fact that nearly all of the MDFs were found in Port Victoria. This area was the only area where the Schooners used for the multiple-day fishing trips could be docked. Therefore, it was determined that the location did not affect the likelihood of having a higher Total Catch, but rather that the fishers with an average higher Total Catch had to culminate within the same area. The high rate of Total Catch, combined with how they sold their fish, played a very large role in the MDF's success.

It was found that the MDFs consistently caught more fish than their Day Fisher counterparts. This was an expected result, as greater effort theoretically creates a greater potential reward when extracting resources. The MDFs would spend between five to fifteen days at sea, which requires more expenditure in the form of fuel, bait, and energy, but provides a higher chance of catching more fish. However, the high skewness and kurtosis levels for the Multi-Day and Day Fisher's Total Catch values imply significant variation in how much the fishers would usually catch. Both categories of fishers tended to have more values below the average. This shows that, more often than not, the fishers were catching less than their category's average. [24] This, combined with the high kurtosis of both fisher categories, represents a lack of consistency in the total amount each fisher caught.

This lack of consistency is at its worst with the MDF. The Day-fishers had a significantly lower kurtosis than the MDFs, implying that while both have outliers, the Day-fishers have far fewer, and all data tends to stay in the same relative area.[25] While the MDFs put more effort and energy into fishing, this did not guarantee that they would have a high yield. This is a trend that occurs globally. Technology has made fishing more efficient, but the dwindling fish stocks mean that fishers have to put in greater effort than before and are still catching significantly less than the previous generation (Jones, 2014). However, this raises the question of why the Day Fishers had a greater occurrence of Event 0 than the MDFs if time spent fishing is not the deciding factor.

Event 0 represents the scenario where a fisherman sold 100% of their catch, kept none of it for themselves and gave none to the crew. When analysing the observational data, it was found that this event occurred when the fishers had not caught enough fish to cover the cost

[24] Refer to Table 3 & 4.
[25] Refer to Table 4.

of fuel, bait and ice used on that trip. This meant that every fish caught had to be sold to break even. This was not guaranteed, and sometimes, the best the fishers could do was reduce the loss from the trip. This event appeared nearly a third of the time within all the data. However, among the MDFs, this Event 0 rarely happened, especially when compared to the Day Fishers, in which it occurred in nearly half of all data. This was initially confusing, considering that the Day Fishers caught more fish on average.[26] However, it was found that the MDFs could sell their catch more efficiently and at a higher rate than the Day Fishers.

The MDF's main target was large pelagic fish, such as the Bourzwa (Emperor Red Snapper), Zob Gri (Green Jobfish) and Groupers.[27] The Bourzwa was the most sought-after fish amongst the fishers and is an island favourite and Zob Gri is a common fish served within the Seychelles restaurants. These high value fish were also sold very quickly, as the MDF were able to sell their fish immediately upon arrival, and the trucks of the restaurants and organisations buying the fish would pick them up from the dock. This is why Event 0 occurred so infrequently amongst the MDFs compared to the Day Fishers. They secured a relatively large number of fish, all of which were of high value and sold them as quickly as possible, which was not the case for the Day Fishers.

While the Day Fishers did also target Bourzwa and Zob Gri, these often didn't form the bulk of the catch. Instead, the Day Fishers catch tended to be the reef-associated fish, like the Vara-Vara (Two-spot red snapper) and Trevally (Barcheek trevally). These fish are considered cheaper than the pelagic fish species and tended to only be bought by the local people. While the fishers would begin selling their fish as soon as they returned to shore or, at the latest, the next morning, they would very often not be able to sell out for days at a time. This creates issues, as the fishers would not head back to sea until they sold all of their catch. This created a scenario in which the Day Fishers had no clear guarantee of how much money they would make from each catch and how long it would take to make it. This, combined with the lack of guarantee that they would catch enough to cover their expenses, creates a very poor system of income and provides little surplus from which to be altruistic.

[26] Refer to Table 4.

[27] The name "Bourzwa" is pronounced similarly to the French word "bourgeois", which denotes some of the reasoning behind the name.

The MDFs were the most successful in terms of economic benefits from their total catch. This allowed them to be more altruistic, as they consistently had a surplus to draw from. The Spearman Correlation test showed a positive correlation between the Total Catch category and the Total Sold and Total Given/Kept categories. This means that the value of the Total Catch significantly influences the value of the Total Sold and Total Given. Essentially, the more the fishers caught, the more they could give away, and so they were more likely to do so. In the case of the Day-Fishers, the inconsistency in their Total Catch value and the amount of monetary gain it would provide created scenarios where they simply could not be altruistic. They were barely making enough for themselves, so they couldn't just give the fish to someone else. This heavily influenced how involved the fishers were with their local community.

5.2 Exchange Networks and Community

It was found that, on average, the fishers would give/keep a very small portion of their total catch.[28] This is unsurprising as acts of altruism regarding resource exchange can only be done when there is a surplus of said resource (Eberhard, 1975). As such, giving any portion of their catch is a symbol that the fisher has a surplus of fish. Who they give to, and the reasoning behind this is the point of interest for this research. The act of gift exchange provides an insight into the relationship between the giver and the receiver and illustrates part of the fisher's social network. Within this study, the participants only gave gifts to two types of individuals. These were the people within their own households and the crew who helped gather the resources.

The gift exchange between the fishers and the people of their household was expected. Households are typically spaces where multiple individuals assist in food production and child-rearing, with one of the key links between them being biological kinship. Within these situations, the most common relationship is one of communal sharing, where individuals see themselves as part of the same 'kind' and have a vested interest in caring for one another (Komter, 2005). This relationship is marked by the pattern of generalised reciprocity, in which acts of gift-giving and reciprocation are considered altruistic obligations (Sahlins, 1972). As such, the fisher taking a portion of their catch home to their family falls quite

[28] Refer to Table 4.

convincingly into this category. However, there was reason to believe that these fishers have no, or at least very few, communal sharing relationships with individuals outside of the household; none of the fishers reported gifting any of their catch to people who didn't live with them that they might have been socially close to, such as neighbours or relatives like cousins. Although many of the fishers didn't provide much information about their household, the data from those who did show that extended family households were not uncommon.

Some of the fishers had households of the typical nuclear family, with two parental figures and their children, but there were also several in which extended family members, such as grandparents, cousins, aunts and uncles made up the household. Within these cases, regardless of the biological relationship, all household members were placed within the same category and gifted equally. This implies that individuals outside the immediate household, regardless of biological relation, are not considered socially close enough to receive these gifts. Alternatively, this could indicate that the fishers do not have enough of a surplus of resources to express the pattern of generalised reciprocity for those outside the small network of people living within their household. Based on the findings of this research, the lack of resources is a probable cause, but it does not account for why crew members were also included in these acts of altruism.

The biological and social relationships between the main fisher/boat owner and the crew that assisted in the fishing varied from case to case. In some cases, they were closely related biologically as brothers or father and son, and other times, they had no biological relationship. The social relationships would also vary, as often the fishers could be good friends who would regularly partake in recreational activities like drinking and barbeques together, and other times, the relationship was one of an employer and an employee. This made it challenging to apply a general relationship analysis to the population of participants, but some patterns did emerge. In the case of close biological relatedness, the relationship could be one of communal sharing, much like in the household. If the relationship was considered friendship, the gift exchange pattern could be one of balanced reciprocity within a relationship of equality matching. This refers to a relationship in which the parties involved define themselves as equals, and the exchange is based on a mutual agreement of timely and equal reciprocation (Wilk & Cliggett, 2007). These fishers would give to maintain friendship

with each other. This is decidedly different compared to the pattern between the employer and employee.

Within these scenarios, there was often a main fisher who tended to be the owner of the boat that was used in the fishing trip. This fisher would take on fuel, bait, and ice expenses to subsidise the outing. If the fishers returned from their outing with a surplus, the main fisher would often allow the crew members to take a small portion of the catch home. Within this scenario, the fisher would be entirely justified in selling all the fish and only keeping the surplus for themselves, yet this rarely occurred. This was not done out of purely philanthropic desire; instead, these acts of generosity benefited the boat owner more than the more selfish but justifiable alternative. This exchange may form part of an authority-ranking relationship that aims to emphasise the asymmetric sense of power (Komter, 2005). Within these types of exchanges, sharing this surplus establishes favour between the giver and receiver. This creates a social debt in which the debtor needs to reciprocate with a gift of equal value, which, in this case, could be a greater effort of labour. I believe that in these cases, the main goal of the fisherman's gift-giving is to foster a sense of loyalty from his crew, which may bring greater yields in the future. It could also signify the boat owner's level of success by displaying that they often catch a surplus of fish. This acts as proof to the crew that they will consistently catch fish with this boat owner and possibly attract new potential crew members as well, similar to Mauss' (1954) example of the Native American potlatch.

Outside of these gift exchange patterns was the more commodity-based exchange that formed between the individual selling and the individual buying the fish. The fishers would either have a trusted friend or family member handle selling the fish to the local people, or a business representative would buy the fish straight from the boat owner. Both of these scenarios involve the market-pricing relationship (Komter, 2005). Individuals who have this type of relationship can be considered to have quite a distant social relationship, as the value of an exchange is based on a standard that reflects the market-pricing value within that community, which includes money, time and utility. These relationships are formed as each individual involved has a direct benefit from the other, and the goal is to benefit as much as possible. The Day Fishers tended to have trusted crew members act as third parties to sell the fish. In the case of the MDFs, the boat owner tended to sell fish to a business representative, such as restaurants. In both of these scenarios, the third party holds a market-pricing relationship with anyone who would purchase the fish. This is not necessarily a negative

relationship; often, these relationships can become friendly, but they do indicate a distant social tie.

The fishers of Mahé do not have a community of fishers working together and assisting each other to keep their communities afloat. Mahé is an urbanised environment within the high-income state of Seychelles. These fishers seem to hold far more individualistic ideas of community that are focused heavily on the household and those who provide direct benefits to their ability to gather resources. Jentoft's (2020:391) conceptualisation of fishing communities as "a moral system, where social norms and cultural values are building blocks" does not seem to be the case amongst the artisanal fishing community within Mahé. Which may contribute to why there are such non-compliance issues.

Conservation efforts often require multiple people to follow a designed set of behaviours to accomplish the final goal. These goals are often impossible to achieve unless everyone involved is willing to follow the rules, but this places everyone involved in a prisoner's dilemma. These behaviours are encouraged within a community where each individual knows and has a vested interest in aiding the other members. However, within individualistic communities with distant social ties, it is much harder to convince someone to act for the benefit of a stranger when the act ultimately reduces the actor's ability to feed and provide for their own family.

5.3 Resource Management and Non-Compliance

There is an issue within the Seychelles of non-compliance with marine conservation laws. There are multiple factors surrounding why this occurs, such as the poachers not believing that the conservation efforts are working or are in such a position that they cannot wait for the effects to begin to show. Following the economic logic surrounding crime, the decision to commit illegal acts rather than follow the law is made because the crime provides a higher utility potential to the criminal than the alternative legal act. This research holds that an indicator for this is the inconsistency of the fisher's total catch combined with a lack of enforcement to dissuade potential criminals and a lack of consideration/care for the effects these actions have on their community.

The fishers very logically wish to increase the number of fish they catch. The Seychelles government restricts the type of gear used, the fishing areas, the species of fish caught, and the size of the fish. All of these are designed to reduce the number of fish caught by the fishers, and violating any of them can be seen as an illegal act. If they barely catch enough to pay for their fuel, which has been seen very often, then it would be unlikely that they would willingly partake in activities that further reduce this. The data surrounding the total catch shows a significant variation among the fishers, with several cases of fishers catching significantly below the average, regardless of how much effort they put into fishing. This creates little incentive to reduce the number of fish they catch because they barely make enough as is, which is further compounded by the fact that they are unlikely to be caught if they disobey the laws.

None of the fishers spoken to in the formal or informal interviews reported ever having been caught for illegal practices. Yet, all those in the informal interviews admitted to catching fish that were legally too small. When faced with little threat of punishment for the potential reward of more fish to sell, it becomes very easy to understand why the fishers would commit these acts, as they are incredibly easy to get away with. Within the small population of Mahé, it is incredibly easy for a relative to help make evidence disappear or for an informant to be threatened with violence (Cockerell & Jones, 2021). If poachers are caught, the chance of them being processed and convicted is highly unlikely. This is not helped by the fact that many fishers don't think the conservation efforts are actually helping put more fish in the ocean.

There is an ongoing sentiment amongst the fishers of Seychelles that there are significantly fewer fish in the water than in previous years. This paints a very poor picture of the conservation efforts for the local people, as it is nearly impossible to convince them to follow conservation strategies when they don't see the benefit of them. A vast body of research shows that some of the key driving forces behind non-compliance worldwide are a lack of economic stability, the absence of resource guardians, and a perspective of conservation as being illegitimate/unsuccessful. Works such as Rohe et al. (2017), Smith & Anderson (2004) and Collins, Nuno Broderick, Curnick, De Vos, Franklin, Jacoby, Mees, Moir-Clark, Pearce, & Letessier (2021) have shown this. When fishers have to decide to adopt behaviours that reduce their potential catch for a conservation effort they don't believe is legitimate, the desire to feed themselves and their families often outweighs their desire to comply. This is

further reinforced by the fact that the probability of being caught and punished for these acts of non-compliance is incredibly low. Until the fishers gain more from following the law than they would by breaking it, it will be incredibly difficult to enforce conservation strategies effectively. It is also incredibly difficult to enforce these laws when the communities they are designed to help do not believe in them and don't care about the effect of its failure.

5.4 Implications and Limitations

This research can serve as a preliminary study to indicate possible trends that could be investigated in future research. If this study were to be conducted over a longer period of time across the populated islands, a greater representation of the Seychelles fishers could be achieved. This could provide a greater understanding of the economic state of the Seychelles' commercial fishers, which in turn could provide an indication of the future state of Seychelles' Blue Economy. If the trends within this study were to be consistent across spatial and temporal areas within Seychelles, then the potential implications for the Seychelles fisheries sector are profoundly negative. However, this paper has several limitations that must be addressed for future research.

This research was conducted over a relatively short period of 30 days within a very small area. This resulted in a very small data set that could not account for temporal or spatial factors that could have influenced the data. This research took place during the low season of fishing in Mahé. If it had been conducted in the high season or on another island within the same season, the results may have differed. The pool of participants was also very small, which affects the paper's applicability outside of its own work. This research included only a fraction of the sample population (58 people out of a possible 500), all of whom were sampled non-randomly. As such, the research cannot make any claims surrounding the overall trends of the population it studies, as the participants do not represent the entire population. Rather, this research must be examined similarly to a case study of a select group of participants.

6. Chapter 6: Conclusion

This research sought to contribute, in small part, to the vast literature within the anthropological study of gift exchange. To accomplish this goal, the research examined exchange patterns amongst the artisanal fishers of Mahé, Seychelles, to uncover the exchange patterns of the fisher groups of Seychelles and their role in marine resource management. The key questions that guided this research were:

1) To whom do the fishers distribute their "catch"?
2) Where do these people/groups fit in the fisher's social network?
3) Are there any people excluded from this network, and why?
4) What is the purpose of the exchange, and how does this relate to social cohesion?
5) What role does the exchange play in their resource management strategies?

It was ultimately found that there is a relatively small gift exchange network within the fisher community, with most exchanges being commodity-based. The gift exchanges that did occur tended to be between close relatives/kin and individuals who work together to catch fish. Within the case of kin, these exchanges are believed to form part of a pattern of behaviour in which individuals are biologically and socially obligated to care for an individual they perceive as closely related to them. The closeness of this perceived relatedness was based on who lived within the same household, with members of the same household partaking in various roles of household management, such as providing economic income and assisting in food preparation and consumption. These relationships were found to fall into the category of communal sharing relationships. The biological reasoning behind these actions can be related to the theories of kin selection and altruism's role in human decision-making. Outside of the household, social relationships were believed to fall into the category of authority-ranking and market-pricing relationships.

These relationships formed between the boat owners and the crew that assisted with the fishing trip, and between the boat owners and the third parties that would sell the fish for them. The most common form of gift exchange outside of the household was between the boat owner and his crew. When enough fish were caught to create a profit, the boat owners would often allow the crew to take home a small portion of the fish they helped to catch. This act of goodwill maintains a social debt between the crew, creating a sense of loyalty to the

boat owner; alternatively, it could act as a signifier of the captain's overall success, helping to advertise to potential crew. These are not mutually exclusive and form a pattern that is often seen within authority-ranking relationships. Market-pricing relationships were believed to have formed between boat owners and the third parties that sold the fish for them. It was found that the boat owners and fishers often did not actively sell their fish to the public. Third parties, such as trusted friends or family at the markets, tended to handle this, or the fish was sold directly to businesses like restaurants and hotels; the relative economic success of the fishers was significantly affected by which method the fishers used.

The most economically successful fishers were those who fell into the category of MDFs, even though they caught fewer fish per day than their Day Fisher counterparts. These fishers would spend multiple days at sea, often catching over a ton of fish with each trip, they would then return and almost immediately sell their entire catch to a business. This meant that the boat owner could gift fish to his crew, as he was almost guaranteed to make a profit on each trip, with only three occurrences of Event 0 in all data gathered from MDFs. In comparison, the Day Fishers had no guarantee of how economically successful each trip would be. The Day Fishers usually spent less than twelve hours at sea and returned to sell their catch to the local people in the evening or the morning after their trip. There was no guarantee that the fishers would be able to sell their catch, with frequent occurrences of the fishers selling part of the same catch three days in a row. The Day-Fishers very often did not make enough of a profit to gift their fish with twenty-five occurrences of Event 0 within all Day Fisher data. This inconsistency in economic income through fishing is a signifier of the fishers' attitude towards the conservation practices of Seychelles and their resource management strategies.

This research cannot represent the entire small-scale fishing community of Mahe, as it was conducted over thirty days of fieldwork with non-randomly selected participants. However, if the patterns shown within this research were consistent throughout this community, and research were to be conducted to represent this, then it paints a bleak future for conservation efforts within Seychelles. The fishers do not care for the conservation strategies or those who seek to enforce them. A feeling compounded by the belief that there are significantly fewer fish in the ocean now than in previous years. This sentiment has been reported for twenty years and has been seen in multiple studies outside of this work. This, combined with a lack of enforcement, has fostered an attitude of indifference towards the regulations designed to conserve the natural environment. Many fishers held an individualistic attitude towards their

predicament, focusing on providing for themselves and their families over a potential economic loss for the sake of a conservation effort they do not believe would work. Due to the nature of this research, only limited recommendations can be provided to address this. The recommendations are that future research, focusing on the causes of indifference and the lack of enforcement, could provide more concrete data on the key factors of non-compliance. If this is conducted amongst the overall fisher populace and focused on their relationship with conservation and the marine environment, it could provide suitable answers on how to mitigate this indifference.

This research demonstrates that the conservation efforts on Mahe will continue to be met with indifference if the fishers are not permitted to be more involved in their management. I believe, based on this fieldwork, that until the fishers are made to feel that they have a stake in the conservation of their ocean, they will have no desire to take care of it. Simultaneously, the fishers who have no desire to cooperate/comply with the conservation programs need to be made aware that they cannot do so with impertinence. Part of the indifference appears to have formed out of a lack of respect for the law enforcement within the region. None of the fishers believed they would be caught, and until they are made to believe they can and will be, they will continue to disregard the regulations. I recommend that rigorous research be conducted on the institutions tasked with monitoring and enforcing these regulations.

This fieldwork has demonstrated that the involvement and support of the people most affected by the conservation is paramount to its potential for success. With the ongoing global crises surrounding conservation practices and ecological apathy, the key to success can be found in convincing the fishers that these regulations will ultimately help them and making them aware of their role in the potential success. However, if results cannot be shown, the organisations leading these initiatives will continue to be seen as ineffective, and there will be very little reason for people to believe in them. Bringing in the local fishers and including them in the management will allow them to have an active role in their potential success. Clear displays of success, through clear displays of enforcement, will reinforce these efforts and provide a tangible reason to cooperate.

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Appendices

Appendix A: Template of Exchange Survey Form

Area of Research																								
	Giver							Catch Distribution					Receiver											
Date	Name	Age	Sex	Occupation	Living Area	Stakeholder group	Total Catch	Amount given	Amount Sold	Notes on Catch	Classificatory relation to giver	Biological relation to giver	Name	Age	Sex	Living Area	Occupation/sta keholder group							

Appendix B: Participant Consent Form (English)

PARTICIPANT INFORMED CONSENT DECLARATION

(To be signed by research participant/s)

Project Title: ***Exchange Patterns amongst Seychelles Small-Scale Fishers: Does it foster social cohesion for resource management?***

Haden Harris from the Department of Anthropology, Rhodes University has requested my permission to participate in the above-mentioned research project.

The nature and the purpose of the research project and of this informed consent declaration have been explained to me in a language that I understand.

I am aware that:

1. The purpose of the research project is to examine what the exchange networks between the fisher groups of the Seychelles are, and what purpose they serve in the context of marine resource management.

2. Rhodes University has given ethical clearance to this research project **2021-5096-6424,** and I have seen/may request to see the clearance certificate by contacting the Ethics Coordinator (ethics-committee@ru.ac.za).

3. By participating in this research project, I will be contributing towards understanding the social networks of local fishers and how this relates to their marine resource management.

4. I will participate in the project by answering questionnaires and participating in interviews.

5. My participation is entirely voluntary and should I at any stage wish to withdraw from participating further, I may do so without any negative consequences.

6. I will not be compensated for participating in the research, but my out-of-pocket expenses will be reimbursed.

7. There are no perceived risks associated with my participation outside of my day-to-day lifestyle.

8. The Researcher intends to publish the research results in the form of journal articles and a master's thesis. However, confidentiality and anonymity of records will be maintained. My name and identity will not be revealed to anyone who has not been involved in the conducting of the research ***unless I indicate to the contrary/recognise that as a public figure, my identity will inevitably be/become known, in which case I agree to accept the loss of anonymity.***

9. In terms of the Protection of Personal Information Act (No. 4 of 2013), it remains my right to request the Researcher to provide me with a detailed explanation of exactly how confidentiality and anonymity of the data I provide will be achieved. I may also request to know exactly how my personal information will be stored securely for how long it will be stored.

10. If any data collected from me for this research project is to be used by the Researcher for any further study, I am to be informed in writing, and my written consent is requested again. I need not give consent for the new research if it is incompatible with the initial purpose of the present study (POPIA, s15(3)). Equally, I can simply reject the request. In such cases, a formal request needs to be made to me by the researcher via the Ethics Coordinator (ethics-committee@ru.ac.za).

11. In terms of the POPI Act 2013, I possess the right to receive feedback about this research. This will take the form of emails to my provided address, or communication through a third party as requested unless ***I elect not to receive this feedback.***

12. Any further questions that I might have regarding the nature of the research and/or my participation in it will be answered by **Haden Harris**, email 19h3780@campus.ru.ac.za

13. By signing this informed consent declaration, I am not waiving any legal claims, rights, or remedies. A copy of this informed consent declaration will be given to me, and the original will be kept on record by the Researcher.

14. I ***agree/disagree*** (circle applicable) to the Researcher's request to take photographs or video me as part of this research project, recognising that agreement here is likely to raise the risk of compromising my anonymity and that steps will be taken to ensure this will not happen it my consent is given.

15. I ***agree/disagree*** (circle applicable) with the Researcher's use of voice recording of my comments and opinions during interviews, the purpose of which is to ensure the accurate recording of my views/responses. Furthermore, I have the right to request a copy of the interview transcriptions to confirm that my opinions are accurately recorded.

I, ……., have read the above information / confirm that the above information has been explained to me in a language that I understand, and I am aware of this document's contents. I have asked all questions that I

wished to ask, and these have been answered to my satisfaction. I fully understand what is expected of me during the research.

I have not been pressurised in any way, and I voluntarily agree to participate in the above-mentioned project.

…….	……	…….
Participants signature	**Witness**	**Date**

Appendix C: Participant Informed Consent Form (Seychelle Creolle)

Form konsantman pou bann partisipan

(pou ganny sinnyen par bann partisipan dan sa proze resers)

Tit proze: Sanzman parmi bann peser artisanal dan Sesel: Eski I ankouraz linite sosyal dan lamenazman resours?

Hadden Harris I en etidyan sorti dan Departman Antropologi, Liniversite Rhodes, Sid Afrik and I pe demann ou permisyon e konsantman pou partisip dan son proze

Monn ganny esplike sa proze ek son bann lobzektif e osi sa form konsantman dan en langaz ki mon konpran.

Mon konsyan ki:

1. Lobzektif sa proze resers I pou ekzamin bann sanzman rezyon ant bann group peser dan Sesel and dan ki fason I ede dan konteks lamenazman resours maren

2. Liniversite Rhodes in revwar e donn son konsantman etik pou sa proze (kod referans 2021-5096-6424) e monn war ouswa monn kapab demande pou vwar sa sertifika par kontakte sa Kordinater pou Etik kot liniversite (ethics-committee@ru.ac.za)

3. Par partisip dan sa proze resers, mon pou ede kontribye dan konprenezon dan bann relasyon sosyal ant bann peser local dan zot kominote and sosyete e ki manyer sa I relye avek lamenazman resours maren.

4. Mon aksepte pou partisip dan sa proze par reponn bann kestyon e partisip dan bann entretyen.

5. Mon partisipasyon I konpletman volonter e si mon deside a okenn moman pou re-tir mon partisipasyon, mon kapab fer li san okenn konsekans negativ.

6. Mon pa pou ganny okenn konpansasyon pou partisip dan sa proze resers, me selman okenn depans ki monn fer dan mon pos, mon pou ganny rann mon larzan.

7. Napa okenn risk asosye avek mon partisipasyon dan sa proze andeor mon lavi.

8. Sa Reserser pou pibliy rezilta sa resers dan form bann lartik e son tez. Sepandan, tou rikod pou reste konfidansyel e anonim. Mon non e lidantite pa pou ganny devwale avek person ki pa ti enkli dan sa resers, a mwen ki mon ganny idantifye konman en zofisye piblik e inevitab ki mon lidantite i ganny devwale e dan sa ka, mon aksepte pou nepli reste anonim.

9. An referans avek Lalwa Proteksyon pou lenformasyon personnel (№ 4 of 2013), I reste ou dwa pou enformen e demann sa Reserser lesplikasyon detaye ki manyer ekzakteman konfidansyalite e anonimite sa bann lenformasyon ki ganny kolekte pou ganny mentenir. I osi mon dwa pou demande ki manyer mon bann lenformasyon personnel pou ganny garde and pou konbyen letan.

10. Si okenn lenformasyon ki ganny kolekte avek mon pandan sa proze resers par sa Reserser e I pou servi sa pou okenn letid adisyonel, fodre ki mon ganny enformen an ekri e mon konsantman an ekri i ganny demande ankor.

11. An regard Lalwa Proteksyon pou lenformasyon personnel, mon annan dwa resevwar lenformasyon lo progre sa resers. Sa pou posib antraver email or kominikasyon antraver en lot dimuon, anka mon averti ki mon pa enterese pou resevwar okenn lenformasyon.

12. Oken kestyon adisyonel ki mon annan lo natir sa proze ouswa mon partisipasyon dan sa proze, pou ganny adrese par Hadden Harris (19h3780@campus.ru.ac.za).

13. Par sinny sa form konsantman, mon pa pou rod okenn rekour legal, dwa or remedyer. Mon pou ganny en kopi sa form konsantman e form orizinal pou ganny garde par sa Reserser.

14. Mon dakor/ pa dakor (anserkle sa ki pli aplikab) avek demann sa Reserser pou tir mon portre ouswa fer video dan sa proze, e mon realize ki sa lagreman pou riske konpromi mon anonimite.

15. Mon dakor/ pa dakor (anserkle sa ki pli aplikab) pou sa Reserser servi rikord mon lavwa, avek mon bann konmanter e lopinyon eksprimen pandan antretyen. An plis, mon annan dwa pou demann en kopi sa antretyen pou konfirmen si mon lopinyon eksprimen in ganny byen rikorde.

Mon, …… in lir byen sa bann lenformasyon anler e anvi konfirmen ki sa bann lenformasyon anler in ganny byen esplike dan en langaz ki mon konpran and mon konsyan konteni sa dokiman. Monn demann tou kestyon mon ti avar swete demande e mon satisfe ek bann larepons ki mon resevwar. Mon konpran byen ki lespektasyon I annan sorti kot mon an partisipan dan sa resers.

Mon pann ganny forse dan okenn fason e monn volonterman partisip dan sa resers.

……. ……..
……

Sinyatir partisipan Temwen Dat

Appendix D: Semi-Structured Interview Guide

Household economics and MPA satisfaction DATE: _____

Numbers of individuals in household: _____

Name:	Gender	Age	Occupation	Living Area/Community

1. Fishing Patterns

1	Question	Answer
1.1	When did you start fishing?	
1.2	Where do you normally fish? (Distance and rough area)	
1.3	How long do you tend to fish for?	
1.4	What fish are you normally trying to catch?	

2. Economic valuation

2	Question	Yes/No	Thoughts
2.1	You are the main breadwinner in your household.		
2.2	Your household relies primarily on the fish you catch as a source of meat protein.		
2.3	Your household has enough food to eat every day.		
2.4	Your household makes enough money to buy all groceries.		
2.5	You have shifted to other occupations (i.e., tourism, service work, construction, etc.) to compensate for food and/or income.		

3. <u>Economic sources (check all that apply)</u>

1	Selling fish at market	
2	Selling alternative ocean tenure	
2.1		
3	Selling crafts	
4	Selling fruits and vegetables	

5	Retailing goods (i.e. tobacco, fishing gear, clothes etc.)	
6	Remittances	
7	Tourism (activities)	
7.1		
8	Wage labour (i.e. public sector, construction, finance, etc.)	
9	Renting boat	
10	Renting home	
11	Other:	
11.1		

4. Conservation Awareness and Conformity

4	Question	Yes/No	Thoughts
4.1	Are more fish closer to shore than before (ten years or so)?		
4.2	Are there more fish out at sea than before (ten years or so)? If so, how far is that from shore?		

4.3	The individual is supportive of the conservation efforts.		
4.4	The conservation effort effectively controls the resources.		
4.5	Is there poaching within the MPAs.		
4.6	The MPA/conservation efforts cause conflict with fishers in your community		
4.7	The MPA/conservation efforts have created conflict with the neighbouring communities.		
4.8	The conservation efforts have increased the amount of fish you consume and sell.		
4.9	The conservation efforts create economic problems for you by not permitting you to fish in productive areas.		
4.10	The conservation efforts have increased the fish consumed/captured for your household.		
4.11	You are willing to sacrifice short-term benefits for long-term goals (i.e. catch less now so that you can still catch more tomorrow).		

Notes