



## Mangrove services of Sagay marine reserve (SMR) among community residents of Sagay City, Philippines

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### Abstract

This study was conducted to determine the extent of Mangrove Services of Sagay Marine Reserve (SMR) among Sagay Community Residents. The services are ecotourism, socioeconomic, and fisheries. This study employed the use of descriptive research design with qualitative approach for the richness of the data. Frequency counts and percentage was utilized in determining the respondents' socio-demographic profile when grouped according to age, sex, civil status, address, educational attainment and occupation. Mean was utilized in determining the extent of mangrove services of Sagay Marine Reserve in terms of ecotourism, socioeconomics, and fisheries. To determine the significant difference on the extent of mangrove services of Sagay marine reserve in terms of ecotourism; socioeconomics and fisheries when grouped according to respondents' profile, T-test/ANOVA was utilized. The study revealed that there were high extent of mangrove services Of Sagay Marine Reserve in terms of socioeconomics, ecotourism and fisheries. There was a significant difference on the extent of mangrove services of Sagay Marine Reserve when grouped according to respondents' age, sex, civil status, address, and occupation. There was no a significant difference on the extent of mangrove services of Sagay Marine Reserve when grouped according to respondents' educational attainment.

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## Introduction

Mangroves are trees that grow primarily in the coastal community. These trees protect the coastal communities against strong winds and soil erosion. The mangroves' forest also protects against tsunamis (Teh *et al.*, 2008). Mangrove trees thrive in saline and are considered halophytes because they can survive in different levels of salinity, aridity, inundation, and different levels of temperature (Lovelock *et al.*, 2016). These trees serve as a nursery ground for fish. Mangrove forests have diverse varieties of animals and plants, and it supports a breeding ground for various organisms (Jusoff and Taha, 2008).

Mangrove forests are one of the more valuable natural tourist attractions since they not only preserve the biological riches there, but also secure the survival of the local population for future generations when used as a sustainable tourism attraction (Danaparamita and Safitri, 2020).

In some countries like the Philippines, mangrove forests boost ecotourism because it attracts more tourists. Locals are getting more benefits out of it. One of the examples of mangrove ecotourism is the mangrove trails. It is very evident in the coastal portion of Negros Island and some other parts of the Visayas. This kind of ecotourism boost income among locals and restaurant owners because of the tourists. In fact, in Bohol alone, Carandang *et al.* (2012) revealed that mangroves' recreation/ecotourism value, the estimated values in Banacon, Bohol, and Kamuning, Palawan, were PHP 83,079 and PHP 2769, respectively.

Aside from the socioeconomic benefit that people derive from mangrove forests, which boosts income through activities like ecotourism, one of the direct sources of income generated is through fishing, as these unique ecosystems serve as essential nursery grounds for fishes and a niche for other crustaceans, resulting in an undeniable abundance of seafood and contributing significantly to the preservation and sustainability of our highly valued seafood resources (Hutchison *et al.*, 2014).

In Sagay City, the people living in the Sagay Marine Reserve areas, especially in the mangrove forests benefit directly. The reserve has been instrumental in providing a myriad of benefits and services, including serving as crucial breeding and spawning grounds, acting as a food bank, and supporting livelihoods for nearly 98% of the population in Sagay City (Manejar *et al.*, 2019). With the sustained effort in protecting and rehabilitating the approximately 32,000 hectares with the mangroves are part, this study is directed to assess the benefits of mangroves to people through its services in ecotourism, socioeconomics, and fisheries.

The motivation behind this study is to comprehensively understand the various benefits provided by mangrove forests in the Sagay Marine Reserve (SMR) to the local community residents. Mangrove forests have been recognized for their critical role in safeguarding coastal communities from natural disasters like tsunamis, strong winds, and soil erosion. They are also known to support a diverse range of flora and fauna, providing a breeding ground for various organisms and acting as a nursery for fish. Moreover, these mangroves have become a significant natural tourist attraction, promoting ecotourism and generating income for locals and businesses in the region.

The findings of this study are expected to contribute to a better understanding of the importance of mangrove conservation and sustainable management for both ecological and socio-economic reasons. Furthermore, the study may inform policymakers and stakeholders about the potential opportunities for enhancing ecotourism, socioeconomics, and fisheries in the region through the preservation and proper utilization of mangrove ecosystems.

This study was conducted in coastal Barangays of Sagay City using researchers' made questionnaire. These coastal Barangays are Himogaan-Baybay, Bulanon, Molocaboc, Old Sagay, Taba-ao, and Vito. This study is a quantitative and qualitative design with a total of 397, of whom 211 were female and 186 were male. Stratified sampling was utilized in the study. Frequency count and percentage distribution,

mean, and t-test/ANOVA were used in this study. Meanwhile, Focused Group Discussion (FGD) and Key Informant Interview (KII) were utilized to obtain qualitative data.

## Materials and methods

### *Research Design*

This study employed a descriptive research design with a qualitative approach for the richness of the data. Descriptive since it examined the mangrove services of mangrove forest in Sagay Marine Reserve.

This study was focused on the extent of Mangrove services of Sagay Marine Reserve (SMR) among Sagay community residents. Specifically, this seeks to answer the following questions:

1. What is the respondents' socio-demographic profile when grouped according to:
  - a. age;
  - b. sex;
  - c. civil status;
  - d. address;
  - e. educational attainment; and
  - f. occupation?
  
2. What is the extent of mangrove services of Sagay Marine Reserve in terms of:
  - a. ecotourism;
  - b. socioeconomics; and
  - c. fisheries?
  
3. Is there a significant difference on the extent of mangrove services of Sagay marine reserve in terms of ecotourism; socioeconomics and fisheries when grouped according to respondents' profile?

### *Locale of the Study*

This study was conducted in the seven coastal Barangays of Sagay City. These Barangays were Himogaan-Baybay, Bulanon, Campo Himoga-an, Molocaboc, Old Sagay, Taba-ao, and Vito. The city of Sagay is best known for its 32,000-hectare Sagay Marine Reserve, established in 1999 through Republic Act 9106 or Sagay Marine Reserve Law. The Reserve is located at 11°0'59"N and 123°29'E, which is

composed of the Molocaboc Islands, Molocaboc Diut, Matabas, and Suyac, as well as the reefs of Carbin, Macahulom, and Panal, and the coastal Barangays of Himoga-an Baybay, Old Sagay, Taba-ao, Bulanon, Molocaboc, and Vito.

### *Respondents of the Study*

The study's respondents were the coastal community residents of Sagay Marine Reserve, particularly in the Barangays of Himoga-an Baybay, Old Sagay, Taba-ao, Bulanon, Molocaboc, and Vito, all in the City of Sagay, Province of Negros Occidental. The researcher uses a stratified sampling in choosing the respondents.

### *Research Instrument*

This study utilized a researcher-made questionnaire to determine the perception of Sagay Community Residents' perception of mangrove services in Sagay Marine Reserve. It contained the demographic profile of the respondents. The instrument had questions from three areas in Ecotourism, Socioeconomic, and Fisheries that the respondents were required to answer. In addition, it contained open-ended questions about the three regions to substantiate the data.

### *Validity of the Instrument*

The researcher made open-ended research instruments subjected to validation under the examination of three jurors considered experts in the field of study. They validated the questionnaire using the criteria set forth by Carter V. Good and Douglas E. Scates. The questionnaire obtained a score of 2.9, which was considered good and valid.

### *Reliability of the Instrument*

The instrument of the study was subjected to reliability. The researcher selected 30 respondents in Barangay Plaridel, a coastal Barangay near Barangay Bulanon. The results garnered a score of 0.803, thus interpreted as highly reliable.

### *Data Analyses*

This study's data analysis followed the sequence set in the objectives. Each question was associated with a statistical tool for descriptive and inferential interpretation.

To determine the respondents' demographic profile when grouped according to age, sex, civil status, address, educational attainment, and occupation, frequency counts and the percentage were utilized. Mean was used to determine the extent of mangrove services of Sagay Marine Reserve in terms of ecotourism, socioeconomics, and fisheries.

T-test/ANOVA was utilized to determine the significant difference in the extent of Sagay marine reserve mangrove services in the areas of ecotourism, socioeconomics, and fisheries when grouped according to respondents' profiles T-test/ANOVA was utilized.

**Results and discussion**

This chapter presents the analysis and interpretation of the data and their respective discussion gathered from the three hundred ninety-seven (397) respondents who answered the questionnaire on the extent of Mangrove services of Sagay Marine Reserve (SMR) among Sagay community residents.

**Table 1.** Respondents' Age.

Age	Frequency	Percentage
Young adulthood (18 to 35 years)	119	30.0
Middle age (36 to 55 years)	225	56.7
Older adulthood (56 years and older)	53	13.4

Based on the results of the study, it was revealed that most of the respondents were in the middle age with an age range from 36 to 55 years old were 225 or 56.7% of the population, followed by the young adult ranging age from 18 to 35 years old which 119 or 30% of the population and older adulthood with age 56 years and older which 53 or 13.4% of the population respectively. According to Frumkin (2012), older people may be a resource for addressing climate change because they are concerned for legacy—for leaving values, attitudes, and an entire world to their children and grandchildren. We review the theoretical basis for “legacy thinking” among older people.

**Table 2.** Respondents' Sex.

Sex	Frequency	Percentage
Female	211	53.1
Male	186	46.9

The study results revealed that most of the respondents were female, 211 or 53.1% of the population, and 186 or 46.9% were male respondents. Fortnam *et al.* (2019) concluded that a holistic, gendered understanding of ecosystem services is essential not just for how ecosystem services are conceptualized but also for the development and implementation of sustainable and equitable policy and interventions.

**Table 3.** Respondents' Civil Status.

Civil Status	Frequency	Percentage
Single	234	58.9
Married	94	23.7
Widowed	38	9.6
Separated	31	7.8

It was revealed that most of the respondents were single which is 234 or 58.9% of the population followed by the married respondents which 94 or 23% of the population, widowed respondents which 38 or 9.6% of the population, and separated respondents which is 31 or 7.8% of the population respectively. Gonzales (2019), revealed that majority of the wives are engaged in non-income-generating activities. The respondents view mangrove forests and trees as important and need protection, because it give materials for housing and charcoal to the community.

**Table 4.** Respondents' Address.

Address	Frequency	Percentage
Old Sagay	137	34.6
Vito	51	12.8
Molocaboc	37	9.3
Bulanon	73	18.4
Taba-ao	39	9.8
Himoga-an	60	15.1

It was revealed that most of the respondents were a resident of Old Sagay, which is 137 or 34.6% of the population, followed by the residents of Bulanon, which 73 or 18.4% of the population, Himoga-and residents, which 60 or 15.1% of the population, Vito residents who are 51 or 12.8% of the population, Taba-ao residents who are 39 or 9.8% of the population, and Molocaboc resident who is 37 or 9.3% of the population This implied that most of the respondents were a resident of Old Sagay which is a coastal barangay that is near at the seaside with a densely to the mangrove

forest area. Moreover, since these areas were coastal, mangrove changes in the study area negatively affecting to their mangrove dependency for livelihood activities whereas positively improving their living quality (Sarmin *et al.*, 2018).

**Table 5.** Respondents' Educational Attainment.

Educational Attainment	Frequency	Percentage
Elementary Level	140	35.3
Elementary Graduate	94	23.7
High School Level	98	24.7
High School Graduate	40	10.1
Vocational Grad	2	0.5
College Level	12	3.0
College Graduate	11	2.8

It was revealed that most of the respondents attained an elementary level of education which is 140 or 35.3% of the population, followed by high school level of education which is 98 or 24.7% of the population. This implied that most of the respondents attained an elementary level of education. However, Quevedo *et al.*, (2019) posited that the utilization of mangrove ecosystem services is influenced by social demography and the level of awareness of the locals. In this sense, the level of education places a role in the understanding of mangrove services.

**Table 6.** Respondents' Occupation.

Occupation	Frequency	Percentage
Fisherman	157	39.5
Vendor	42	10.6
Driver	22	5.6
Security Guard	1	0.3
House Keeper/Maid	2	0.5
Laborer	75	19
None	3	0.8
Housewife	34	8.6
Teacher	4	1.0
Businesswoman/man	18	4.6
Eco-Park Attendant	4	1.0
Barber	2	0.5
Store Cashier	5	1.3
Call Center Agent	5	1.3
Carpenter	4	1.0
Mechanic	1	0.3
Cook	1	0.3
Electrician	1	0.3
Pastor	1	0.3
Barangay Worker	12	3.1
Construction Worker	3	0.8

It was revealed that most of the respondents worked as a fisherman 157 or 39.5% of the population, followed by laborers 75 or 19% of the population, vendors who are 42 or 10.06% of the people,

housewives, 34 or 8.6% of the population, drivers who are 22 or 5.6% of the population, businesswomen/ man who is 18 or 4.6% of the people, barangay worker who is 12 or 3.1% of the population, cashier and call-center agent which both obtained the frequency of 5 or 1.3% of the population, teacher, eco-park attendant, and carpenter which both received the frequency of 4 or 1% of the people, construction worker and no work respondents both obtained the frequency of 3 or 0.8% of the population, housemaid and barber which both received the frequency of 2 or 0.5% of the people, and security guard, mechanic, cook, electrician, and pastor obtained 1 or 0.3% of the population. Most of the respondents were fishermen. However, occupations not directly related to fishing can also have high utilization. Like housewives could use their time to fish or collect sea foods (Quevedo, 2019).

**Table 8.** Extent of mangrove services of Sagay Marine Reserve.

	Mean	Interpretation
Ecotourism	2.8564	High Extent
Socioeconomics	2.7854	High Extent
Fisheries	3.2438	High Extent

The table presents the extent of mangrove services of Sagay Marine Reserve in terms of ecotourism, socioeconomics, and fisheries.

Table 8 revealed the extent of mangrove services of Sagay Marine Reserve in terms of ecotourism, obtaining the mean result of 2.8564, 2.7852 in socioeconomics and 3.2438 in fisheries, respectively, which all were descriptively interpreted as a great extent. This implied that there was a great extent of mangrove services in Sagay Marine Reserve. This means that the mangrove services of Sagay Marine Reserve were beneficial to the life living of Sagay residents. Furthermore, mangrove forests as natural resources have potential value as natural tourism (Syahrin and NP, 2020). Mangrove forests, as natural resources, have biodiversity that provides benefits for human life. The utilization of these products and services has provided additional income and is even a major income in meeting the needs of people's lives.

**Table 9.** Significant Difference on the Extent of Mangrove Services of Sagay Marine Reserve in Terms of Ecotourism; Socioeconomics And Fisheries When Grouped According To Respondents' Profile.

Extent of Mangrove Services of Sagay Marine Reserve	T/F-value	P-value	Decision	Interpretation
Age	3.436	0.033	Reject Ho	Significant
Sex	-43.392	0.000	Reject Ho	Highly Significant
Civil Status	2.871	0.036	Reject Ho	Significant
Address	65.831	0.000	Reject Ho	Highly Significant
Educational Attainment	1.200	0.305	Failed to Reject Ho	Not Significant
Occupation	4.034	0.000	Reject Ho	Highly Significant

The table presents the significant difference in the Extent of Mangrove Services of Sagay Marine Reserve in Terms of Ecotourism, Socioeconomics, and Fisheries when grouped according to Respondents' Profile. The table revealed a significant difference in the extent of mangrove services Of Sagay Marine Reserve when grouped according to respondents' age, sex, civil status, address, and occupation. The extent of mangrove services Of Sagay Marine Reserve, when grouped according to respondents' sex, obtained the T/F-value of -43.392 and p-value of 0.000, 65.831, and 0.000 in terms of address, and 4.034 and 0.000 in terms of occupation, respectively, which were all descriptively interpreted as highly significant. This implies that mangrove services are evident as perceived by the respondents regardless of gender, location, and occupation. It this also be noted that a holistic and gendered understanding of ecosystem services is important not just for how ecosystem services are conceptualized but also for developing and implementing sustainable and equitable policy and interventions (Fortnam, 2019).

Meanwhile, the extent of mangrove services Of Sagay Marine Reserve, when grouped according to respondents' age, obtained the F-value of 3.436 and p-value of 0.033, and 2.871 and 0.036 in terms of respondents' civil status, respectively, which were descriptively interpreted as significant. On the other hand, the extent of mangrove services Of Sagay Marine Reserve, when grouped according to respondents' educational attainment, revealed a insignificant result which obtained the F-value of 1.200 and a p-value of 0.305. The results revealed that age, sex, civil status, address, and occupation were significant in the extent of mangrove services Of Sagay Marine Reserve.

Sagay Marine Reserve provides different mangroves services in terms of socioeconomics, ecotourism, and fisheries to Sagay residents, which benefits their daily living. These mangrove services differ depending on the respondent's preferences and needs regarding age, sex, civil status, address, and occupation. Quevedo (2019) posited that the utilization of mangrove ecosystem services is influenced by social demography and the level of awareness of the locals. The trends of the locals' utilization and perceptions of the diverse ecosystem services may provide evidence for their active involvement in protecting these resources.

However, regarding respondents' educational attainment,, the extent of Sagay Marine Reserve mangrove services does not differ. Both professionals and not professional's residents of Sagay have the same amount of mangrove services received from Sagay Marine Reserve. They had the same viewpoints about the services provided by Sagay Marine Reserve in their daily living.

*Responses of the respondents*

According to the response of respondent P03, P18, and P27 as revealed from their answers on an open-ended question, they claimed that (P03) "*Ok man di ma'am sa Brgy. Vito. Damo man di kuha ang mga tawo nga isda. Amon panginhas damo pa man makuha kag nakabulig gid sa amon pang adlaw-adlaw nga ginakaon kag income.*" There were abundant fish that they can get in Brgy. Vito. We can also get an abundant sea shells in the shore and it helped us in providing food and income.

(P18) "*Maayo man diri ma'am sa Molocaboc damu kami mapangitaan ubra labi na sa dagat. May lain-lain man kami di nga asosasyon kag pwede gd ka*

*maka-training pareho sa shell craft kag goso culture. Dugang sa mapangitaan income ang gasulod namga torista magpaligo kag magamit sa floating cottage. Mapaluto kag mabakal silamga shells pareho sa scallops, binga, goso, lukot, lato kag iban pa.*" In Molocaboc Island, respondents can earn with the help of the sea. Associations are present in training the locals in shell craft and seaweeds production. Tourism helped them earn through renting floating cottages and seafood.

*(P27) "Dire sa Himogaan, panginhas ang isa sa amon gina ubra dire. May makuha kami nga nagka lain-lain ngamga shells ginabaliqya namon ukon gina sud-an."* In Himogaan, seashells and crustaceans helped us in generating income and for food.

#### *Summary and Findings*

Based on the result of the study, the researcher summaries of findings were the following:

Based on the study, most respondents were female, single, and middle-aged. Most of the respondents who participated in the study were from Barangay Old Sagay, who were fishermen and mostly were elementary level. The results of the study revealed that there was a high extent of mangrove services Of Sagay Marine Reserve in terms of socioeconomics, ecotourism, and fisheries. Moreover, there was a significant difference in the extent of mangrove services of Sagay Marine Reserve when grouped according to respondents' age, sex, civil status, address, and occupation. It was further revealed that there was no significant difference in the extent of Sagay Marine Reserve mangrove services when grouped according to respondents' educational attainment.

#### **Conclusion**

Based on the result of the study, it was concluded that there was a significant difference in the extent of Sagay Marine Reserve mangrove services when grouped according to respondents' educational attainment and their profile, except in educational attainment, which was obtained not significant result. Moreover, the extent of mangrove services of Sagay Marine Reserve varies on respondents' age, sex, civil

status, address, and occupations. The Sagay Marine Reserve provides different mangroves services in terms of socioeconomics, ecotourism, and fisheries to Sagay residents, which benefits their day-to-day living. These mangrove services differ depending on the respondent's preferences and needs regarding age, sex, civil status, address, and occupation. However, regarding respondents' educational attainment, the extent of Sagay Marine Reserve mangrove services does not differ. Both professionals and not professional's residents of Sagay have the same amount of mangrove services received from Sagay Marine Reserve. They had the same viewpoints about the services provided by Sagay Marine Reserve in their daily living.

#### **Recommendation**

Based on the conclusion made by the researcher, the following recommendations were given:

Based on the result of the study, it is recommended to the fisher folks to upkeep and cultivate the prosperity of the mangrove forest as it is the nursery ground of the fishes. Tourists must be aware of the benefits that mangrove forests give. Through this, the tourists may no longer litter when visiting mangrove parks. The LGU should further promote and nurture mangrove forests for tourism and community. Science teachers should educate their students on the importance of mangroves in sustaining life. Teachers may incorporate mangrove planting as part of the culminating event. The schools should keep educating young minds about the role of mangroves and their benefits to the people and fisher folks. Mangrove planting may be implemented in schools as part of their extra-curricular work. The local government of Sagay should maintain the sustainability of the mangrove forest in Sagay. Strong implementation of environmental ordinances and security measures should be practiced. The Department of Environment and Natural Resources should create a continuity and recovery plan for mangroves, and rules must be strictly implemented to help the mangrove forest. Future researchers may include the ecosystem services of mangrove forests such as supporting, regulating, cultural, and provisioning.

**Abbreviation**

Sagay Marine Reserve (SMR)

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