CITIZEN SCIENCE TO PROMOTE COASTAL RESOURCE MANAGEMENT STRATEGIES: WILLINGNESS AND ABILITY OF RESORT GUESTS TO PAY FOR CITIZEN-BASED REEF MONITORING ACTIVITIES IN BINUKBOK POINT, PHILIPPINES

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Faculty of Management and Development Studies

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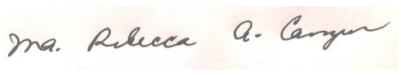
Signature of Special Problem Adviser: 

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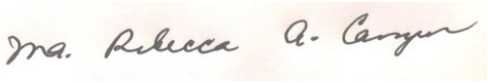
11 February 2021

This Special Problem entitled “Using Citizen Science to Promote Coastal Resource Management Strategies: A Pre-Feasibility Study on the Willingness and Ability of Resort Guests to Pay for Citizen-Based Reef Monitoring Activities in Binukbok Point, Philippines” prepared and submitted by **Astrid Natasha O. Ocampo** in partial fulfillment of the requirements of ENRM 290 (Special Problem) is hereby accepted.



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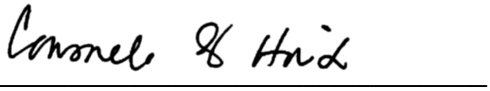

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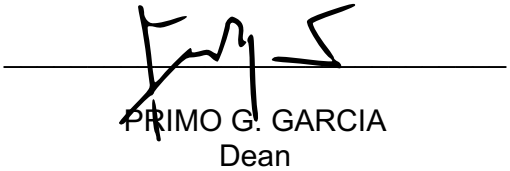

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BIOGRAPHICAL SKETCH

The author, Astrid Natasha O. Ocampo, was born on 31 January 1994 in San Juan City, as the eldest of Alberto Julio Gaskell Ocampo and Arlyne Grace Olavere Ocampo.

She took her primary education at Dominican College, San Juan and secondary education at Miriam College. She took further studies in Ateneo de Manila University with a Bachelor's Degree in Political Science, Minor in Development Management. Throughout her stay in Ateneo, she has exemplified her desire and purpose for public as having been part of the Sanggunian ng mga Mag-aaral ng mga Paaralang Loyola ng Pamantasang Ateneo de Manila. This desire is continued and reflected as she has since pursued her career in the development sector, specifically in environmental conservation and sustainability. She is currently a Public Sector Partnerships Officer at the World Wide Fund for Nature (WWF)-Philippines, where she spearheads coordination amongst different partners to develop project and programs that enable the balance between people and nature. She has also served time volunteering the ABS-CBN Lingkod Kapamilya Foundation, Inc. – Bantay Kalikasan where she similarly provided support in project development.

In her spare time, Astrid practices photography as an art form and enjoys films and literature.

ABSTRACT

OCAMPO, ASTRID NATASHA O. Master of Environment and Natural Resources Management. Faculty of Management and Development Studies. University of the Philippines Open University. February 2021. **Using Citizen Science to Promote Coastal Resource Management Strategies: A Pre-Feasibility Study on the Willingness and Ability of Resort Guests to Pay for Citizen-Based Reef Monitoring Activities in Binukbok Point, Philippines.**

Special Problem Adviser: Maria Rebecca A. Campos, Ph.D.

Citizen science can provide long-term solutions in data generation in the Philippines, where regular and widescale data monitoring is often lacking. However, despite its cost-effectiveness, it still comprises costs in technical equipment, labor, and/or consultancy which can be costly for communities that may not have enough operational and financial resources to sustain it. Tourism, as one of the largest and fastest growing economic sectors in the world, serves as great avenue for citizen science not only to generate a pool of participants but also to build greater public awareness and civic participation in coastal ecosystems. The possibilities to finance this initiative through an additional user fee added especially in monitoring activities in tourism areas are assessed through a willingness and ability to pay study in Binukbok Point, Philippines. Fifteen respondents—equally divided into SCUBA/recreational divers, freedivers/skin divers, and non-divers/snorkelers—are identified in this study for a conduct of focus-group interviews to identify their perceptions on different variables and to gather their willingness to pay bids. These bids—as well as a base price of ₱100—are also evaluated to look into whether they can truly afford to pay for additional user fees. This study reveals that visitors are willing

to pay for an additional user fee. However, transparency and accountability factor considerably in their decision: Visitors are willing to pay so long as changes in the area are visible and usage of fees is transparently disclosed. While visitors are willing to pay for an additional user fee, they are able to afford only a limited range of values with a maximum tolerance around ₱100 to financially sustain this undertaking. Future willingness to pay studies are recommended to add ability to pay assessments.

Keywords: willingness to pay, citizen science, sustainability

DECLARATION

This is to certify that:

i. the special problem comprises my original work towards the MENRM except where indicated in the Preface;

ii. due acknowledgement has been made in the text to all other material used; and

iii. the special problem is fewer than 25,000 words in length, exclusive of tables, maps, bibliographies, and appendices

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I would like to express my deepest gratitude to my adviser, Ma'am Maribec Campos, for her guidance throughout the process of this study. My shift from one topic to another for which I now have written this research—pushed only by unfortunate circumstances—has taken full form with her support and wisdom. She has only been present and ever willing to help me in endeavors outside of this research.

I am also truly grateful for friends and their friends for connecting me with the respondents I needed for this study. With the COVID-19 pandemic, there was simply no possibility to return to the research site, leaving me to look for old and new guests only through virtual circles. Without their assistance, I would not have found respondents on which study depends.

I would like to thank my colleagues at WWF-Philippines for spurring the idea of this study even as early as 2018. People at work have always been proponents of citizen science and many of our projects have successfully integrated this in our beneficiary communities. My special mention goes to Ms. Marivel Dygico and Ms. Mavic Matillano (†) for finding the potential in this study and for giving me that extra enthusiasm to keep going. Whatever my colleagues have started has simply inspired me to seek ways to make sure efforts like this can be achievable in other parts of the country.

DEDICATION

No other people do I dedicate this Special Problem other than my parents, Alberto and Arlyne Ocampo. Throughout my life, they have constantly and so willingly gifted me space and love to pursue my dreams and growth and happiness. All the fruits of my love and hard work I shower them profusely.

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CHAPTER I

INTRODUCTION

The Role of Citizen Science in Research and Monitoring

Citizen science is an approach that invites the participation of the general public in obtaining and analyzing scientific data. As the term suggests, citizen science does not require any prior expertise or knowledge from the participants (Cappa et al., 2018). The practice assumes that reliable data is produced and can be used by scientists and decision-makers, and is "open to the same peer review that applies to conventional science" (McKinley et al., 2017). Citizen science primarily serves to widen spatial coverage of scientific research and offer larger datasets (Forrester et al., 2015). Collection of data, because of the "voluntary" nature of the practice, is presumed to free up costs that conventional scientific research otherwise often requires (Aceves-Bueno, 2015; Blaney & Philippe, 2016). Citizen science mostly affects how research monitoring is conducted, especially in understudied areas (Lamine et al., 2018), where there is limited availability of data. Not only is data is produced, but the longevity of its monitoring is also sustained.

While citizen science is not new (McKinley et al., 2017), there has been a trend on the growing appreciation on the field, with professional, scientific teams starting to employ it to remove logistical constraints in acquiring necessary data (Bear, 2017; Becken et al., 2017; McKinley et al., 2017; Cappa et al., 2018). Thiel et al. (2014) were able to record a list of 227 published studies that revealed professional scientists using the support of volunteers in a wide range of marine research investigations.

Citizen Science and the Role of Tourism. Tourism is one of the largest and fastest-growing economic sectors in the world (Giuleti et al., 2014). Globally, the total value of reef tourism, alone, amounts to US $36 billion (Spalding et al., 2017). Tourism carries an expansive market base that is at prime advantage to collect observational data and encourage citizen participation in research monitoring (de la Barre et al., 2016; Lucrezi et al., 2018; Cusick et al., 2020). The Municipality of Donsol, Sorsogon, in partnership with the Large Marine Vertebrate Institute of the Philippines (LAMAVE), packages their activities so that tourists can partake in data monitoring through photo-identification of whale sharks (WWF-Philippines, 2019). The California-based non-profit organization, Ocean Sanctuaries, also conducted a similar methodology, wherein divers are encouraged to take photographs of Sevengill Sharks in their excursions; photos are later uploaded to a Wildbook Database (Mieras et al., 2017).

Binukbok Point, in Bauan, Batangas Province is a small cove that rests on the Calumpan Peninsula, alongside the renowned diving spot, Anilao (WWF-Philippines, 2007). Binukbok Point equally boasts of rich biodiversity with frequent sightings of schools of jackfish in its waters. As it is a small cove, only six resorts are in the area but record a number of visitors per weekend due to its accessibility in Manila. Binukbok Point's "house reefs" are only a few short meters away from the resorts, making it also ideal for snorkelers and ordinary visitors. Binukbok Point can serve as a microcosm and testing site of citizen-based reef monitoring activities from which larger tourist areas can refer.

Research Gap

While extensive literature explores the applicability and necessity of utilizing citizen science in lieu of and as support to traditional science, barely any study truly explores the costs of conducting the practice. Often, citizen science is considered "cost-free" or "cost-effective," (Aceves-Bueno et al., 2015; Cigliano et. al., 2015; Embling et al., 2015; Rambonnet et al., 2019) but any entity has to invest in both personnel and resources to be able to conduct and maintain any citizen science project. In the United States, initial investment becomes more accessible because the government and non-government organizations already heavily depend on volunteer work to implement services (McKinley et al., 2017). Although labor may technically be free, equipment and analyses are not (Tulloch et al., 2013); hence, issues on expense still lingers. In the Philippines, for instance, the Department of Science and Technology-Philippine Council for Agriculture, Aquatic, and Natural Resources Research and Development (DOST-PCAARD) and the Science, Education, Advocacy (SEA) Institute-Philippines develop awareness and skills on data monitoring amongst several groups and communities along the Verde Island Passage and in other parts of the country. Both organizations have shouldered expenses for training and sought funding sources to be able to sustain local community monitoring activities.

Valuation on citizen science is also understudied primarily because the practice itself is varied. Citizen science is used differently depending on a project's purpose and aim (Fauver, 2016). Of the existing literature on valuating the cost of citizen science, the methods used differ significantly from each other (Fauver, 2016). Some literature analyzes citizen science projects based on

costs per site. Other research studies focus on cost per volunteer-hour, while others analyze the costs per volunteer data collection hour. Cash-based accounting is also used to determine these costs and is used to calculate the average annual budgets for each of the citizen science projects assessed (Fauver, 2016).

Identifying and analyzing costs and benefits of citizen science in the context of environmental management also remain challenging. Citizen science merely conditions an initiative to occur, which makes it difficult to compute for its direct impacts and benefits. Environmental management and conservation efforts are often valuated through Willingness-to-Pay (WTP). Extensive literature has been used to explore both users' and non-users' WTP in environmental efforts (Thur, 2010; Birdir et al., 2013; Subade & Francisco, 2014; Marzetti et al., 2016; Emang et al., 2016; Grafeld et al., 2016; Abrina & Bennett, 2020). No studies still indicate what these efforts specifically entail and how much is valued for their components. Citizen science is one such component that still needs further study to cost it as an initiative in itself.

There remains a gap on who should exactly fund citizen science projects and what the metrics are to conduct frequent research monitoring, to determine and ensure the sustainability of these activities.

Statement of the Problem

Research and data monitoring remain an issue that hinders the effective management of biodiversity and ecosystem conservation in the Philippines. Monitoring efforts have been difficult to sustain due to a lack of financial and operational capacity on the part of the government (Department of Environment

and Natural Resources, unpublished; Licuanan et al., 2019). The academic sector has attempted to fill on this gap, but data on the magnitude and changes in coral cover still has been limited as many of the existing studies have only been one-off assessments (Licuanan et al., 2019).

To help address this issue, the De La Salle University SHORE Center—in partnership with the SEA Institute Philippines—has been conducting a string of reef monitoring training since 2017/2018 to different communities across the province of Batangas. Depending on the knowledge and skillsets of volunteers, the group has also administered diving training to the participants and provided equipment where it was lacking. The presence of scientists was deemed necessary until communities can reliably collect data on their own. Analysis was also still under the purview of the team of scientists, but communities are also familiarized with different analysis methods. Training would cost about ₱180,000 on average, with actual monitoring to cost about ₱30,000 - ₱40,000 per monitoring event. These costs also include consultancy services for the scientists that would mostly come in the form of accommodations, food, and transportation. Monitoring events would happen once a quarter, but depending on the needs of any area and preferences of stakeholders, monitoring may be frequent. The group has been working with local governments for collaboration and for the governments to potentially co-finance future data monitoring activities, but much of the project so far has been funded by the Oscar M. Lopez Center and other external sources, including resort-participants *(Ascalon, J., personal communication, February 21, 2020)*. There is, then, the need to still identify avenues that could help financially secure monitoring activities when funding becomes unavailable or inaccessible.

A similar effort, through the guide, “A Handbook of Protocols for the Conduct of Reef Assessments in the Philippines,” was published in 2019 to standardize scuba diving-based data collection procedures across the Philippines (2019). Another guidebook is also set to be published catering to freedivers and other lesser-skilled monitoring volunteers (Ascalon, 2020). These handbooks are especially important as they encourage other civilian sectors to partake in citizen science efforts to contribute to reef data in the country (Luzon et al., 2019). While these seem to be a breakthrough in mainstreaming reef monitoring, creating and maintaining sustainability mechanisms in the conduct of citizen science efforts are still lacking.

Binukbok Point in Bauan, Batangas is one such area in need of regular data monitoring to update support and management on the coral reef cover within its cove. The last reef monitoring activity conducted in the San Pablo Marine Protected Area (MPA)—in which Binukbok Point belongs—was in 2017 and conducted with the University of the Philippines-Los Baños (Municipality of Bauan, 2019). As recent as November 2019, local anecdotes have reported destruction on the coral communities as the cove was swept by large tidal waves, presumably an effect of Typhoon Tisoy that hit and impacted the area (anecdotal). The researcher has managed to observe the magnitude of the destruction, with hard corals turned to rubble and soft corals almost non-existent. This event could not have only affected business but also created ripples in the area’s biodiversity. The exposure of the reefs to constant change makes data monitoring imperative to properly assess and address identified problems and impacts, and ensure the reef’s restoration and protection. The local government of Bauan, however, lacks operational capacity to jumpstart

this initiative. This gap can be partially resolved with resorts in the cove that specialize in diving activities, and that can take on reef monitoring activities to support a more inclusive local management and policy.

The research seeks to determine:

> How does citizen science promote coastal resource management strategies through an ability and willingness to pay study of Binukbok Point?

Objectives

The primary objective of this research is to determine how citizen science can promote coastal resource management strategies through an ability and willingness to pay study of Binukbok Point.

The specific objectives are:

1. To analyze the potential for sustaining citizen-based reef monitoring and incentivizing the participation of diving resorts by determining the willingness of resort guests to pay for the conduct of the effort; and
2. To assess the ability of resort guests to pay for citizen-based reef monitoring activities.

Conceptual Framework

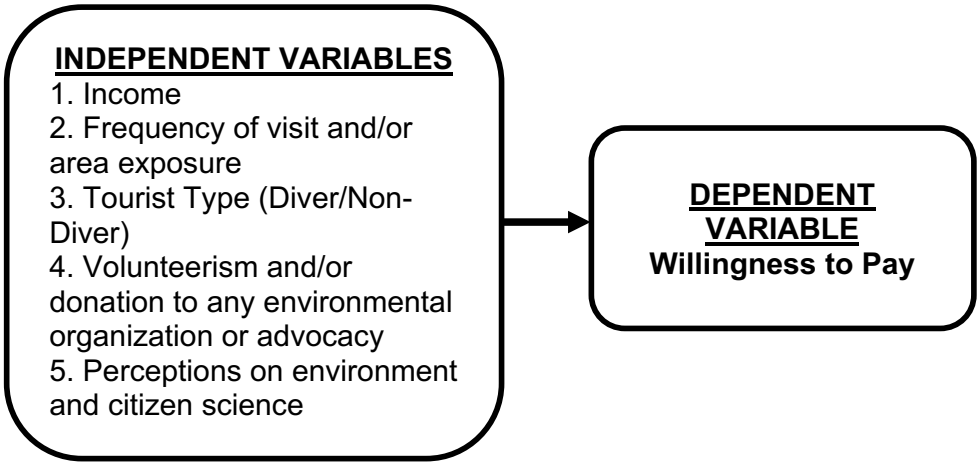
Willingness-to-Pay (WTP) is often used to derive non-use values, such as public goods (Veisten, 2007; Schläpfer & Bräuer, 2007), including wildlife and/or natural landscapes (Hanley et al., 1998). As non-use values, these goods are not directly related to marketed goods; hence, individuals are asked

to gauge their willingness to pay usually through a hypothetical scenario (Schläpfer & Bräuer, 2007). WTP is useful in identifying the value of management and protection of natural resources, as the methodology reveals the extent of an individual's investment in seeing improvement in environmental quality.

There has been extensive research that discusses the usefulness of WTP in determining the value of environmental management and conservation efforts in coastal areas. As WTP assumes individuals directly benefit from the improvement of an environmental good, the value becomes much easier to identify, the stake easier to define. Moreover, WTP also functions to identify the benefits or impacts of assessing values to environmental services/efforts (Thür, 2010; Birdir et al., 2013; Marzetti et al., 2016; Emang et al., 2016; Grafeld et al., 2016). However, "environmental management and conservation" is defined very generally; barely any study indicates what this specifically entails and how much is valued for its components.

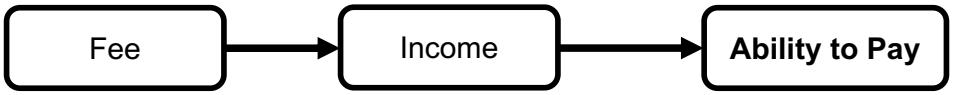
However, it can be assumed that because an individual is willing to pay for an environmental effort, they are willing to pay for the activities that constitute this intervention. The profile and perceptions attached to conduct WTP can also equally reflect individuals' willingness to pay for activities that enable and supplement the function of environmental management and conservation. WTP can still, in its basic exercise, reveal the extent to which individuals are willing to pay to ensure that the good is managed and protected.

Figure 1. Factors (income, frequency of visit and/or area exposure, tourist type, volunteerism to any environmental advocacy, and perceptions on environment) affecting willingness to pay for conservation efforts, including monitoring activities



Value for the improvement of an environmental good and its attributes are influenced mainly by the frequency of visit and exposure in an area. Tourists who engage in marine-based recreational activities and equally experienced tourists present greater chances of paying marine conservation fees with higher WTP values (Schuhmann, Skeete et al., 2019). First-hand exposure in marine resources also dramatically increases an individual's value for environmental protection (Schuhmann, Skeete et al., 2019), which implies that divers present greater WTP for such efforts. Divers, due to exposure and experience, reflect higher WTP values for the protection of high reef biodiversity. Individuals who are also equally affiliated with or involved in environmental groups and advocacies place a higher value in the need for reef protection (Grafeld et al., 2016; Lucrezi et al., 2018). Income also determines the willingness to pay of an individual, with respondents with higher incomes reflecting greater behavior to pay for conservation fees (Schuhmann, Skeete et al., 2019).

Figure 2. Illustration of the user fee as a factor of income and the ability to pay for conservation efforts, including monitoring activities



However, the presence of leisure funds and leisure time as fundamental factors of tourism (Vujović et al., 2017) already presumes the ability of tourists to pay for environmental fees, albeit in varying degrees. Income equally affects the degree to which travelers are able to pay for fees. Older, more experienced travelers demand higher quality in tourism services and may then exhibit higher ability to pay for a determined value of fees, while younger, less experienced travelers may tend to have lower ability (Kastenholtz et al., 2016; Schuhmann, Skeete et al., 2019). Tourists' ability to pay is, therefore, dependent on the pricing of the environmental fee. Fee correlates with income which, in turn, affects an individual's ability to pay (Campos, n.d.; Amponsah et al., 2015).

CHAPTER II

REVIEW OF LITERATURE

Willingness to Pay of Resource Users for Environmental Efforts and Services

Common determinants used to measure the willingness to pay (WTP) of an individual are gender, age, educational level, and income (Halkos & Matsiori, 2012; Xiong et al., 2018). Perceptions and attitudes also factor largely and are also used as metric to gauge an individual's WTP (Xiong et al., 2018). In marine/coastal protection WTP studies, country/place of residence (Grafeld et al., 2016) is also accounted for as a variable depending on the studies' need to determine exposure, duration of visit, or expenses (Batel et al., 2014; Rodella et al., 2019) as motivations for the degree of WTP.

Each of the determinants' effect on WTP is contextual. In Dong et al.'s (2003) community-based WTP study, women were found to be less likely to pay and have lower WTP bids compared to men in Burkina Faso. López-Mosquera's (2016) study on the theory of planned behavior surmised that women have stronger perceived control and greater WTP for national park conservation in Spain. Other environmental studies also showed the inconsistency of gender as a significant variable in the determination of WTP (Eisler et al., 2003; Mostafa, 2007; Lee, 2013; Wolters, 2014; Rani et al., 2020).

Age similarly presents the same variability. Younger people have stronger perceptions on environmental protection that drive their inclination for greater WTP (Vivithkeyoonvong & Jourdain, 2016; Nicolau et al., 2020; Dardanoni & Guerriero, 2021). In certain studies, however, younger people are

found to have less WTP, mostly due to their lower income levels (Kastenholtz, et al., 2016; Schuhmann, Skeete et al., 2019; Shahsavar et al., 2020).

Income provides considerable evidence and weight as a determinant of WTP (Agimass & Mekonnen, 2011; Breffle et al., 2015; Vivithkeyoonvong & Jourdain, 2016; Baumgärtner et al., 2017; Gong et al., 2020; Tian et al., 2020). Some of these studies have also accounted the significance of education level (Agimass & Mekonnen, 2011; Ofori & Rouleau, 2020; Tian et al., 2020; Tianyu & Meng, 2020). However, these determinants are also varied in significance. There are cases in which respondents are willing to pay for additional fees for any effort, irrespective of income level and/or degree of educational attainment (Breffle et al., 2015; Vivithkeyoonvong & Jourdain, 2016; Ofori & Rouleau, 2020). Even in marine/coastal WTP studies, significance of income status (Ahmed et al., 2007; Edwards, 2009; Cruz-Trinidad et al., 2011; Birdir et al., 2013; Batel et al., 2014; Marzetti et al., 2016; Zavala & Reynoso, 2018) and educational level (Hesley et al., 2017; Hermoso et al., 2019; Indab, 2016; Tonin, 2019; Rani et al., 2020) is still relative.

Perceptions or attitudes towards an environment or an environmental effort are often the litmus test for determining WTP. Positive attitudes often presume the WTP of a respondent regardless of bid level, however these perceptions also reveal the preference and driver of respondents' WTP to any effort/service, priority area, or benefit to personal well-being (Mmopelwa et al., 2007; Schäufele & Hamm, 2017; Llagostera et al., 2019; Wang et al., 2019; Gong et al., 2020; Tian et al., 2020). However, perception does not exist in isolation but is often also determined through a combination of socio-economic and demographic factors. Income, education level, and exposure to elements

or the environment similarly affect perceptions as they do WTP (Dong et al., 2003; Agimass & Mekonnen, 2011; Vivithkeyoonvong & Jourdain, 2016; Wang et al., 2019). In marine/coastal WTP studies, exposure significantly contributes to WTP (Schuhmann, Casey et al., 2013; Batel et al., 2014; Marzetti et al., 2016; Schuhmann, Skeete et al., 2019). Divers and fisherfolk, having high degrees of exposure in the marine environment, have stronger attitudes towards environmental protection and are, therefore, more inclined to pay for the effort (Agimass & Mekonnen, 2011; Emang et al., 2016; Lucrezi et al., 2018).

In cases where there is resistance to WTP, respondents find that payment of taxes and other public service fees is already sufficient for the improvement and protection of the environment (Alves et al., 2015; López-Mosquera, 2016; Tian et al., 2020).

Ability to Pay of Users on Public Goods

Literature on the ability to pay of resource users in coastal management has been sparse. Existing environmental studies are linked to electricity and water utility services (Campos, n.d.; Al-Ghuraiz & Enshanssi, 2004) and thus far, the only identified environmental ability-to-pay study relates to agriculture and irrigation (Amponsah et al., 2015). Other ability-to-pay studies assess medical services (Donaldson, 1999; Mataria et al., 2006; Danyliv et al., 2014; Aizuddin & Aljunid, 2017).

In Donaldson's (1999) public health care WTP and ability to pay study, he found that willingness to pay and ability to pay are positively associated—determined mostly by household income—with respondents identifying WTP

bids based on their affordability. Other studies on utility services also revealed the correlation between WTP and ability to pay, either affording the willingness to pay for a marginal increase in fees (Al-Ghuraiz & Enshanssi, 2004; Danyliv, Groot, Gryga, & Pavlova, 2014) or the unwillingness to pay due to the increase in fees' impacts on household income and expenses (Campos, n.d.; Mataria, et al., 2006). A WTP study on green electricity (Knapp et al., 2020)—while not assessing the ability to pay of respondents—found low-participation program areas citing less willingness to pay based on the affordability of green energy services.

However, in Amponsah et al.'s (2015) reclaimed water for irrigation WTP and ability to pay study, the great willingness to pay of vegetable farmers does not translate to their actual ability to pay, the latter being much lower than their average WTP bid. This study, then, entails the possibility of the insufficiency of WTP to reveal the ability of users to sustain additional fees for any service, if basing solely on their preferred values.

Synthesis

Existing literature on environmental WTP studies cite gender, age, income, and education as independent variables in determining WTP. Marine/coastal protection studies also factor country/place of residence to contextualize travel and exposure to the area. However, these factors vary in significance and do not necessarily reveal the willingness to pay of any respondent or resource user to an environment or improvement of efforts towards the environment.

Perception often has a significant relationship with WTP, in which perceptions and attitudes of a respondent often already reveal their willingness to pay. These perceptions also help form an image of the preferences of a respondent and the reasons behind their decisions. However, perception does not exist in isolation and can also still be influenced by other socio-economic and demographic factors. In marine/coastal protection studies, exposure has considerable influence over one's perception; and divers and fisherfolk, having high exposures to the environment, regard the environment higher and have a tendency to pay more for its improvement.

In cases where there is resistance to pay, the reason often cited is that payment of taxes and other public service fees is seen as being enough to protect and manage environments.

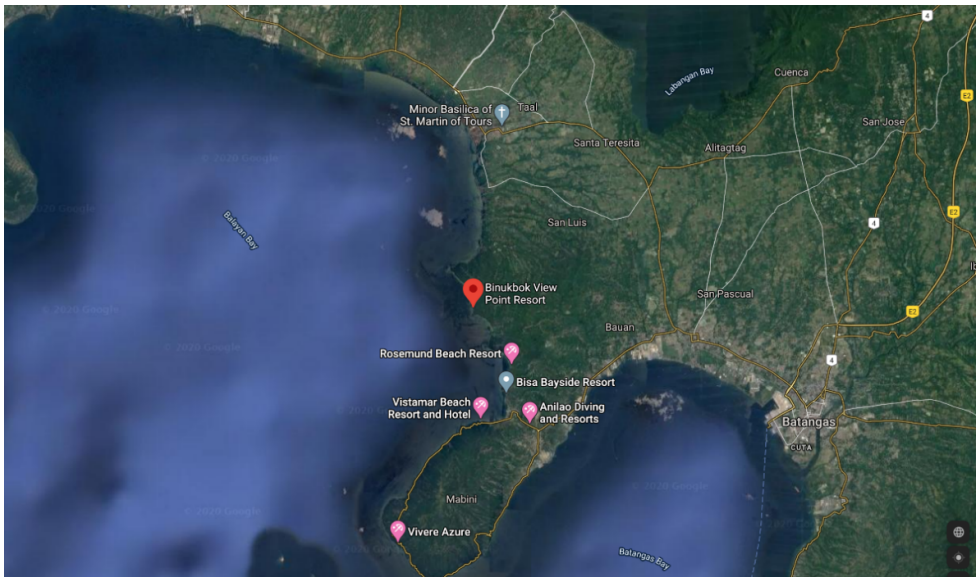
Willingness to pay is also found to be positively associated with ability to pay, with studies finding respondents placing WTP bids based on their affordability. Studies that assess marginal increase in fees also reveal the varied preferences of respondents paying additional costs. However, Amponsah et al.'s (2015) WTP and ability to pay study—so far, the only identified literature that used ability to pay to assess agriculture and irrigation services—found that fisherfolk set a higher WTP bid than their actual ability to pay, opening the possibility that WTP may not necessarily be sufficient in understanding the ability to pay of respondents.

CHAPTER III

METHODS

Study Area

Figure 1. Location of Study Area: Binukbok Point in Bauan, Batangas



SOURCE: Google Maps

The area of study in Binukbok Point in the Municipality of Bauan, Batangas Province, Philippines. Binukbok Point is a cove across the Balayan Bay, and which sits in the Calumpan Peninsula, alongside Anilao, Mabini, and Tingloy, Batangas (WWF-Philippines, 2007). The study area is a 2 ½ -hour drive from Manila.

Binukbok Point is part of the 125-hectare San Pablo de Bauan Marine Protected Area (MPA) established in 2009 under the Municipality of Bauan, Batangas Government Ordinance No. VII (Municipality of Bauan, 2009). Initiatives and enforcement strategies in the MPA are covered under the San Pablo MPA Management Plan of 2016 – 2026 (Municipality of Bauan, 2010).

From 2016 to 2019, the MPA Plan was provided a budget of ₱1.7 million by the local government, with an allocation of ₱468,000 every year (except in 2016, when the budget allocation was at ₱365,000) (Municipality of Bauan, 2019).

Part of the MPA Plan are conservation fees rated as follows (Municipality of Bauan, 2010):

Daily Snorkeler Pass	**₱30**
Snorkeler Pass/Boat	**₱200**
Daily Diver Pass	**₱150**
Annual Diver Pass	**₱2,000**
Annual Dive Professional Pass	**₱2,000**

Conservation fees are surcharge fees in resorts, except for the boat pass where outside visitors pay their fees directly to the Bantay Dagat Team assigned in Binukbok Point. The head of the Bantay Dagat in the area is Emmanuel de Castro Garces, owner of Binukbok View Point Resort (Municipality of Bauan, 2019; *Garces, E., personal communication, February 29, 2020*). Disaggregated data in Binukbok Point on revenues and tourist arrivals is not readily available.

Due to the COVID-19 outbreak and subsequent community quarantines implemented in Metro Manila and throughout Luzon, the study was conducted mostly virtually from March to May 2020. Data analysis and finalization was conducted from June to August 2020.

Sources of Data

All data collected in the study were from primary sources. Fifteen (15) visitors in Binukbok Point—both first-time and regular guests—have been selected as respondents for this study. Respondents are equally divided into five SCUBA/recreational divers, five freedivers/skin divers, and five snorkelers/non-divers. The primary sources of data were generated through directly administered focus-group interviews.

Data Collection

Qualitative methods were predominantly used to achieve the research objective. Focus-group interviews were conducted and supported by quantitative elements through an online questionnaire.

The focus group interviews assessed the preferences and insights of resort guests in their willingness to pay for citizen-based reef monitoring activities in the study area. The group interviews are a necessary undertaking prior to any plans of drafting a questionnaire for a wide-scale conduct of a valuation survey (Subade & Francisco, 2014; Samonte et al., 2016; Abrina & Bennett, 2020; Rani et al., 2020). Eliciting willingness-to-pay preferences and attitudes through structured interviews is also ideal, especially in cases where there is a possibility or means to do so (Haveman & Weiner, 2001). Group interviews were conducted to three (3) different categories of resort guests, identified based on diving skills: a) SCUBA/recreational divers; b) Freedivers (both technical and enthusiasts); and c) Non-divers or snorkelers. Each group had a number of five (5) participants. The participants were interviewed via the Zoom tele-conferencing application. Given limitations, not all participants were

interviewed at the same time as the rest of each group, and had to be interviewed separately.

After the interviews, an online questionnaire, administered through Typeform.com™, was distributed to the participants, to fill information on the respondents' level of income/allowance, and the exact amount they are willing to pay for citizen-based reef monitoring. A hypothetical user fee of ₱100 paid for every visit was also presented to the participants. The hypothetical user fee was based on SEA-Institute's experience on expenses of about ₱40,000 per monitoring activity and on the scenario of an average of 40 guests per weekend visit in a resort.[1] The average was based on the two resorts interviewed for The fee was used to gauge their ability to pay, considering their frequency of dive and their average monthly expenses; participants were also asked on the ability if the fee would increase to a greater value. The purpose of the questionnaire was to collect more sensitive and confidential information that were difficult to extract in a group interview setting.

Data Analysis

All interviews were transcribed and recorded, with the full consent of the participants. Responses from each group were summarized and compared to identify similarities and differences in perceptions and values.

Respondents from the participants' ability to pay had been derived according to their expense and income. The income is deducted with the respondent's expenses. From the subtracted value, their maximum value to pay

[1] Average was based on the two resorts interviewed:
(Faustino, J. personal communication, February 29, 2020)
(Garces, E. personal communication, February 29, 2020)

for an added user fee for citizen science activities is assessed, also against the 2018 Philippine Statistics Authority's Family Income and Expenditure Survey (FIES) (2018) to corroborate the viability of spending for the fee with their given value (Campos, n.d.). The recreational value under the FIES is adjusted according to the current inflation rate using the formula:

$$Present\ Value = Past\ Value\ (1 + IR_1)(1 + IR_2)$$

where the present value is the 2020 equivalent of the FIES and the Past Value is the listed 2018 recreational value in the PSA data, multiplied by the annual inflation rate of 2.48% in 2019 and the forecasted 3.10% inflation rate by the end of 2020 (Trading Economics, 2020).

In computing for the ability to pay, the following limitations and assumptions are considered:

- All respondents are Filipino.
- Some respondents only provided a range of income and not the actual estimated value. Responses were accordingly averaged within the provided range.
- Some respondents provided income and expenses that were equal or similar to each other. These responses were removed from the analysis. Students were also removed from the analysis as they do not earn any income. Eleven of 15 responses are valid.
- All respondents with valid responses are single.
- Respondents provided their estimated gross income in the questionnaire. To better compute for the ability to pay of the respondents, the conservative estimate of the net income was deduced from the Bureau of Internal Revenue income tax bracket (Bureau of

Internal Revenue, n.d.) computed against their responses. Self-employed respondents were assumed to follow the graduated income tax rates.

- The comparison between the FIES recreational value and the WTP values are analyzed on a monthly, quarterly, and semi-annual frequency basis, i.e. the percent reflects the scenarios if respondents pay the user fee monthly, quarterly, or semi-annually. These scenarios were created because not all respondents answered the question on their frequency of dives/visits per month.

Pearson's correlation coefficient was used to infer the relationship (Chang, 2012; Jorgenson et al., 2017) between the participants' WTP bid and their income/allowance level (Lo, 2014). Graphic representations and data analyses had been formulated with the support of the IBM SPSS Statistics Software®.

Pearson's Correlation Coefficient (r). Pearson's correlation coefficient ® is the most commonly used correlation coefficient in determining relationships between pairs of variables. This relationship is linear: The line is in a positive direction is *r* is positive and above 0; the line is in a negative direction when *r* is negative and below 0. The value of *r* ranges between -1 to +1; the closer the value of *r* is to 0, the less the variables' relationship is to each other. Pearson's correlation coefficient is used only in cases where both variables are interval/continuous. Pearson correlation coefficient can be computed as:

$$r = \frac{\sum(X_i - \overline{X})(Y_i - \overline{Y})}{\sqrt{\sum(X_i - \overline{X})^2 \sum(Y_i - \overline{Y})^2}}$$

where the summation of the product of the covariation *X* and *Y* variables is divided into the product of the standard deviation of the *X* and *Y* variables (University of Regina, n.d.; Prion & Hearling, 2014).

The *t-statistic (ρ)* for the value of *r* is (University of Regina, n.d.):

$$t = r\sqrt{\frac{n-2}{1-r^2}}$$

The study assumes the hypothesis *(H_1)* that there is a relationship between a respondent's income and their WTP bid. The higher one's income, the higher the WTP value. A two-tailed test was used for this problem to consider the possibility of a reverse relationship between the two variables. The assumption follows:

$$H_0: \rho_I = 0$$

$$H_1: \rho \neq 0;\ H_1: \rho > 0$$

where, *ρ* is the relationship between income and the WTP bid. *H_0* is the null hypothesis that rejects *H_1*, which follows that there is no significant relationship between the two variables.

Scope and Limitations of the Study

The study focused on the profiling and assessment on the perceptions of guests on their willingness and ability to pay for the dive resorts to properly conduct/lead reef monitoring activities in Binukbok Point, Bauan, Batangas. The research aims to be a pilot study from which future studies on economic valuation research can be based and necessary baseline can be derived.

CHAPTER IV

RESULTS AND DISCUSSION

Focus Group Interviews on Perceptions and Insights on Citizen-Based Reef Monitoring Activities

***Reasons for Visiting Binukbok Point*.** Six of the 15 respondents are returning guests in Binukbok Point. Majority of the mostly frequent guests are freedivers, who cited the accessibility and close proximity of the reef to the resorts as an influencing factor in their frequency in the area. For the scuba divers, whether new or regular, the topography of the reef—with its large sand cover and easy traverse—is an ideal site for novice divers to learn basics on scuba diving. One of the respondents, a PADI Course Director, also explained that the sandy cover helps alleviate novice divers to minimize any reef *disturbance*.

Two of the five non-diving respondents are the only regulars in the area, who also cited the close proximity of the reef to the resorts as a factor for their return. The three other respondents were new guests and had no intention in returning to Binukbok Point unless required. The respondents' greater preference lied on whether a site has a beach and places where one can lounge; they do not actively look for any snorkeling activities.

The respondents, save for the Course Director, would frequent Binukbok Point for recreational purposes. The frequent sightings of the schools of jackfish in the area was also a reason for their return. However, frequency plays critically in the respondents' intent to return to Binukbok Point as the freediving group, identifying themselves as regulars in the area, are the only respondents

that express conviction in returning to the area and stronger intent to pay an additional user fee, as evidenced in the subsequent discussions.

Many of the respondents have had experience going to other sites, with many of the divers also frequent Anilao, Batangas in their excursions.

***Environmental Advocacies and Knowledge on Reefs*.** Almost all of the respondents across the three groups value plastic/single-use waste reduction and proper waste segregation as the environmental cause they primarily uphold or believe in. “Every dive is a clean-up dive,” explaned one freediving respondent. Divers—both scuba and freedivers—attributed this value to their exposure in the seas and how many of their excursions are often met with sightings of plastic on the reefs and on the coast. A non-diving respondent thought that waste reduction is the only real problem where they can have the most contribution. Exposure also plays out in everyday contexts and helps heighten the environmental value of the respondents, where majority of the respondents also cited their regular encounter with single-use waste and experiences in seeing trash in non-designated areas as contributing factors.

Two of the respondents—a freediver and the Course Director—found tourist responsibility and coral conservation and rescue as more important causes to uphold. Their value was also largely based on exposure and experience, being first-hand witnesses to different tourist and boat practices around and along the reef. Regardless, such causes are more substantiated within the diving groups because of their larger exposure and experience in the sea. As the Course Director put it, “immersion is important because [one] can never have that appreciation for marine life if [they] do not see it.” Respondents

from the diving groups expressed that their value for the oceans grew only after they started diving.

Apart from exposure, respondents find knowledge as a critical factor in increasing the value for coral reefs. All respondents do not have an extensive marine knowledge, and only two of the respondents (one from the freediving group and one from the non-diving group) think knowledge is immaterial in accruing value for the reef environment. Some of the respondents from the diving groups find that if they have better knowledge on how things function and operate, they can have more appreciation of what they see and can behave accordingly within and around the ecosystem. One non-diving respondent also echoed the same sentiment, in that greater knowledge precedes a stronger value for the environment. A non-diving respondent, however, thought that having knowledge is important only on a conditional basis, i.e. it is only useful when boatmen or tour guides impart the condition or status of a particular ecosystem or species.

All respondents unanimously found reef protection important because of the overall impact of the reefs in the human life.

Knowledge and Importance on Citizen Science; Insight on the Environmental Management and Need for Reef Monitoring in the Area. Only the Course Director is aware of the term “citizen science,” given their extensive experience in administering courses that also act as data collection avenues for the PADI school. Regardless of the lack of awareness of the rest of the respondents, they all agree that monitoring is important in coral reef protection and management to track any recent changes in reef conditions and assess their health and resiliency. All respondents echoed the sentiment that

monitoring is needed for improvement of the reef. Freediving respondents also added that citizen science creates space for community involvement that provides them greater value on their immediate environment.

All respondents across the three groups also echoed the sentiment that such an activity is needed in Binukbok Point and thought that this can improve management of the reefs in the area. The freediving and scuba diving respondents found that the area still requires improvement in its reefs, and given the lack of exposure in Binukbok Point, the non-diving respondents source their insight on the general idea and knowledge of reefs being constantly exposed and damaged because of tourist activities.

The Course Director, however, pointed the risk in citizen-based reef monitoring activities as to their knowledge, there is no program to regulate and sustain such an activity. The Course Director also expressed their ambivalence towards the capability of the resorts to undertake such an effort because the Course Director often observes resorts violating basic rules on reef protection (e.g. mooring/anchoring in non-designated areas, etc.).

Willingness to Pay for Citizen Science Activities. Majority of the respondents expressed their willingness to pay only on the condition that there will be a visible change in the area, whether in the reefs or in the management approach of the resorts and communities. A scuba diving respondent expressed their ambivalence in paying the resort directly as they find the resorts might not use the fee for its actual purpose. The scuba diving respondents also pointed the existence of a dive pass on top of the environmental fee, which they felt is not a transparent transaction. Transparency, as they echoed, is an important variable in their willingness to pay.

The freediving respondents were more ideal in their answer in that they found citizen science as a way to involve the communities in the area. This may have been an effect of their regularity in the area and their bigger familiarity with the locals.

The new non-diving guests also suggested the possibility of tucking the fee on top of the resorts' overall costs and services, instead of keeping it as a separate payment. The other non-diving respondents also cited their condition that the resorts have to pay their share in citizen-based monitoring fees. A non-diving respondent found that environmental fees are already cumbersome, and suggested that citizen science fee might be best integrated in the overall payment to the resorts.

The amount of the user fee is also a consideration for all respondents across the three groups. For the non-regular respondents, if the cost was too high an expense, they would simply entertain going to a different area instead. Only the freediving group—specifically, four of the five respondents—was still willing to frequent Binukbok Point, regardless of cost.

The scuba diving and freediving respondents were more enthusiastic in participating in the citizen science monitoring activities considering their skill, experience, and longer immersion. A scuba diving respondent also reiterated knowledge as an effect of their participation, that would further allow them to donate money to the effort. The Course Director also surmised that divers generally are more willing to spend their dispensable income for any conservation-related effort.

When asked on who should bear greater responsibility in bearing the funding on citizen science projects, only the scuba diving group brought up the

local government as the primary actor that needs to contribute more. The respondents mentioned that the local governments hold the management plans for the area as well as the budget for these plans and must, therefore, take helm. This response is largely influenced by the fees that scuba divers have to pay before their excursions. The rest of the respondents switched between resort owners and the local communities as the respondents find they are the sectors that directly benefit from the reefs.

The freediving and non-diving groups also mentioned that visitors/guests should also be held responsible for these activities. However, as one non-diving respondent pointed out, there has to be a sharing scheme between the guests and the resorts in funding for these efforts.

***Discussion of Results*.** Frequency of visit appears as one of the most contributing factors in identifying the WTP of tourists/visitors. The enthusiasm of freediving respondents to Binukbok Point and the opportunity to support the area through paying additional monitoring fee stems largely from their familiarity and regularity in the area. Frequency breeds a level of attachment to an area that allows visitors to better contextualize the need for monitoring in the site and the impacts this can generate. Recent studies have also recorded that tourists who frequent or do re-visits have positive perception on the area, are more willing to pay, and tend to prefer higher WTP values (Schuhmann, Casey et al., 2013; Batel et al., 2014; Marzetti et al., 2016; Schuhmann, Skeete et al., 2019).

Exposure also contributes significantly to the willingness to pay of visitors (Schuhmann, Casey et al., 2013). Exposure is often attributed to diving groups which have considerable immersion in the reefs. There is an obvious advantage for recreational and SCUBA divers in conducting more extensive

and comprehensive data monitoring. Where conducting transects is required, a minimum diving experience and training is a requisite (Edgar & Stuart-Smith, 2014; Done et al., 2016). The use of underwater camera also corroborates data reading (Pecl et al., 2014), and the presence of dive computers also confirms physical conditions that help in the reliability of data (Wright et al., 2016).

There have been cases wherein citizen science projects request for a specific profile of diver according to the task and purpose of excursion. Some projects seek recreational divers, while others require SCUBA divers with their use of and access to specific gear and documentation equipment to better report specific values needed for the effort. Some projects also require a minimum level of diving experience or knowledge in marine science to be able to join as volunteers. Depending on the purpose of the study, the types of divers differ, as well. Fishers volunteer for documentation of fisheries resources; while recreational and SCUBA divers often document for general types of biodiversity or species research. Recreational divers often use direct observations during transects, while SCUBA divers have more complex data readings (Hermoso, et al., 2019).

More importantly, divers are found to be highly supportive of marine education programs and research efforts, with the sector often participating in data monitoring (Lucrezi et al., 2018). This is also evidenced in the more substantiated responses of the diving groups in their value for reef monitoring areas such as Binukbok Point.

Perception also influences WTP (Batel et al., 2014; Zambrano-Monseratte & Ruano, 2020), however majority of the respondents in this study prioritized plastic pollution as the problem that drives them towards

understanding the importance of reef ecosystems. Willingness to pay for monitoring or conservation initiatives in sites such as Binukbok Point (Choi & Lee, 2016; Abate et al., 2019; Zambrano-Monseratte & Ruano, 2020).

Majority of the respondents cited education and an overall knowledge in marine ecosystems as fundamental in propelling visitors to contribute more to the environment. Certain studies have been able to conclude that levels in education and/or experience can influence the participation of divers and visitors in any type of citizen science project (Hesley et al., 2017; Hermoso et al., 2019). Tonin (2019) also posits that awareness of an environment provides visitors/respondents a better context for their WTP. However, Indab (2019) has found that knowledge does not significantly affect the WTP of respondents. This helps understand the responses of the other respondents in this study which find that protecting the environment is “common sense and a basic duty” and does not require any additional knowledge to push one to take action.

In this study, transparency also came out as a significant variable in determining respondents’ WTP. In the local context, the knowledge and accountability of the proceeds of the fees have to be fleshed out in order for visitors to invest in initiatives. Transparency also includes the publication of public information and data from the monitoring activities.

Respondents' Demographic Profile

Table 1. Frequency Table of Respondents, by Age

AGE	Frequency	Percent	Cumulative Percent
20-24	3	20%	20%
25-29	8	53.3%	73.3%
30-34	2	13.3%	86.6%
35-39	0	0	86.6%
40-44	1	6.7%	93.3%
45-49	1	6.7%	100%
TOTAL	**15**	**100%**	

Of the 15 respondents, 86.6% are clustered within the same age range of 20-30 years old. Fifty three percent (53%) of the total respondent base belongs to the 25-29-year old age range. Only 13.3% belong to an older age bracket. The study records a limited sampling range across various ages.

Table 2. Frequency Table of Respondents, by Gender

GENDER	Frequency	Percent	Cumulative Percent
Males	8	53.3%	53.3%
Females	7	46.7%	100%
Others	0	0	100%
TOTAL	**15**	**100%**	

The respondent base is split evenly between males and females. Fifty-three percent (53%) identified themselves as male, while 46.7% as female. Other genders have not been accounted in the study. Sixty percent (60%) of

the SCUBA/recreational diving group and 40% of the freediving group are females. Sixty percent (60%) of the non-diving group are males.

Table 3. Frequency Table of Respondents, by Employment Status

EMPLOYMENT STATUS	Frequency	Percent	Cumulative Percent
Employed	11	73.3%	73.3%
Self-Employed	1	6.7%	80%
Student	3	20%	100%
TOTAL	**15**	**100%**	

Seventy-three percent (73%) of the respondents belong to the employed pool. Twenty percent (20%) of the respondents are students and only source their “income” from allowance/stipend. Only one respondent is self-employed and sources income from their own capital.

Table 4. Frequency Table of Respondents, by Monthly Gross Income/Allowance

INCOME/ALLOWANCE	Frequency	Percent	Cumulative Percent
< ₱40,000	7	46.7%	46.7%
₱40,000 - ₱59,999	2	13.3%	60%
₱60,000 - ₱99.999	4	26.7%	86.7%
₱100,000 - ₱249,999	2	13.3%	100%
TOTAL	**15**	**100%**	

Majority of the respondents have low to low-middle incomes. Sixty percent (60%) of the total respondents belong to the lower to lower middle-income brackets, 78% of which earn less than ₱40,000. Forty percent (40%)

belong to upper middle to higher income brackets, with 13% of the total respondent base earning ₱100,000 - ₱249,999.

Table 5. Frequency Table of Willingness to Pay (WTP) Values

WTP VALUES	Frequency	Percent	Cumulative Percent
₱100	1	6.7%	6.7%
₱150	3	20%	26.7%
₱200	2	13.3%	40%
₱250	2	13.3%	53.3%
₱500	4	26.7%	80%
₱1,000	2	13.3%	93.3%
₱2,000	1	6.7%	100%
TOTAL	**15**	**100%**	

While a hypothetical user fee of ₱100 was referenced in the questionnaire, the respondents were still given the option to cite their WTP bids for the citizen science user fee. The values play within the range of ₱150 - ₱500, with 20% of the respondents willing to pay ₱150 and 26.7% willing to pay ₱500 for every visit. The statistical significance between the males and females (Table 2) and their WTP bids is inconclusive as the data sets of the two groups are small. Using the IBM SPSS Statistics Software®, tests betpeen the two groups encountered high standard error values that reflected the inability of the data to conclude any difference in WTP bids between the two.

Table 6. Descriptive Statistics of Respondents' Income/Allowance and WTP

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
Age	15	22	45	28.33	6.29	39.52
Income/Allowance		15,000	134,000	52,767	32,385	118217381
Willingness-to-Pay		100.00	2,000.00	496.67	505.85	255881

The low standard deviation (6.29) and variance (39.52) values of the age category signifies the limited sampling range across various ages and further supplements the evidence as seen in Table 1 that majority of the participants are aged 20 – 30 years old. However, incomes tally relatively spread out values given the standard deviation (32,384.75) and variance (1182173809.52) that signify respondents still covering varied and distributed income levels. However, the standard deviation and variance values may also mean a skew in distribution given the wide disparity of income and age of some from the rest of the respondents. The low number of respondents can also account for this skew in distribution.

The standard deviation value of 505.75 from the mean value of ₱496.67 only signifies that the sample respondents are only willing to pay around this range for additional citizen science fees for every visit.

Correlation between Income and Willingness to Pay (WTP)

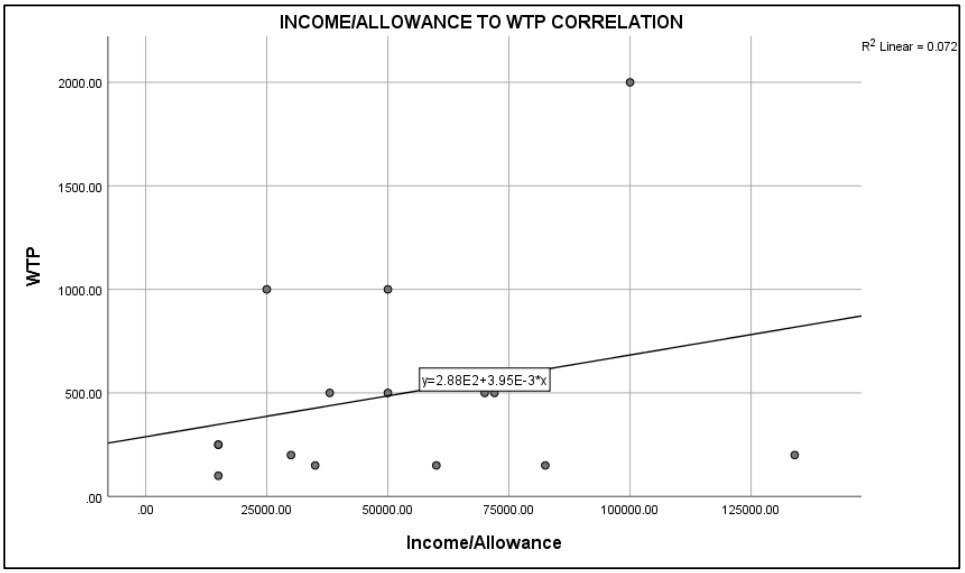
Using the IBM SPSS Statistics Software®, the respondents' incomes were weighed and assessed against their WTP bids to determine whether there is correlation between the level of income and the amount they are willing to pay.

Table 7. Results of Correlation Coefficient and *T-statistic* for Income and WTP

		Income	WTP
Income	Pearson Correlation	1	0.268
	Sig. (2-tailed)		0.334
	N	15	15
WTP	Pearson Correlation	0.268	1
	Sig. (2-tailed)	0.334	
	N	15	15

The correlation coefficient (*r*) is computed at 0.268, which signifies that there is no significant relationship between the level of income and the degree of the WTP value. The scatter plot diagram (Figure 4) also best illustrates the variety of responses, in which respondents in lower income brackets are as willing to pay as much as ₱1,000; whereas higher-income respondents are willing to pay less.

Figure 4. Scatter plot diagram for the correlation between income and WTP



Approaching the data through the critical value arrives at the same result. At 95% significance level—with which the data was also analyzed—the critical value falls at 0.514 (Rohlf & Sokal, 1995) (the degree of freedom is 13, following the formula *Df* = *n* – *2*). In order to reject the null hypothesis, the *t-statistic* must exceed the critical value. In this case, the *t-statistic* of 0.334 is less than the critical value, which strengthens the evidence that there is no significant increase in WTP value when the income also increases.

With only 15 respondents, the hypothesis, then, remains inconclusive in determining if income is a critical variable in the amount of WTP bid. However, as this research has been able to prove, income only becomes a significant consideration when: 1) the fee is not set to an exorbitant price; 2) factors such as transparency and accountability are accounted for; and 3) frequency of visit and exposure also factor as key determinants of the willingness to pay of respondents.

Certain studies also argue that income does not determine visitors' WTP (Cruz-Trinidad et al., 2011; Birdir et al., 2013; Marzetti et al., 2016) but other

studies also find that income has an effect in visitors' WTP (Robles-Zavala & Reynoso, 2018; Schuhmann, Skeete et al., 2019). Studies on non-users' WTP also remain varied (Subade & Francisco, 2014; Abrina & Bennett, 2020), which only supposes that the correlation between income and WTP may be contextual. In this study's case, income does not affect WTP but extensive multivariate research may present further understanding and evidence on the function of income in the WTP of visitors in Binukbok Point.

Ability to Pay of Respondents in Additional User Fee for Citizen-Based Monitoring Activities

Table 8. Ability to Pay Matrix, with WTP Bids

PSA FIES Income Bracket	Expenses	WTP Bid	FIES 2018 Recreational Value[2]	Monthly		Quarterly		Semi-Annually	
				WTP Annual % of Net Income	Ability to Pay[3]	WTP Annual % of Net Income	Ability to Pay	WTP Annual % of Net Income	Ability to Pay
< ₱40,000	₱7,000	**₱100**	0.21%	0.67%	No	0.22%	No	0.11%	Yes
	₱9,000	**₱1,000**	0.21%	4.29%	No	1.43%	No	0.71%	No
	₱20,000	**₱200**	0.21%	0.71%	No	0.24%	No	0.12%	Yes
	₱25,000	**₱500**	0.21%	1.46%	No	0.49%	No	0.24%	No
₱40,000 - ₱59,999	₱20,000	**₱500**	0.32%	1.15%	No	0.38%	Yes	0.19%	Yes
	₱20,000	**₱150**	0.32%	0.30%	Yes	0.10%	Yes	0.05%	Yes
	₱30,000	**₱500**	0.32%	0.86%	No	0.29%	Yes	0.14%	Yes
	₱30,000	**₱500**	0.32%	0.84%	No	0.28%	Yes	0.14%	Yes
₱60,000- ₱99,999	₱20,000	**₱150**	0.53%	0.22%	Yes	0.07%	No	0.04%	Yes
	₱50,000	**₱2,000**	0.53%	2.53%	No	0.84%	Yes	0.42%	Yes
₱100,000 - ₱249,999	₱40,000	**₱200**	0.63%	0.19%	Yes	0.06%	Yes	0.03%	Yes

[2] The values in this column are adjusted values based on inflation rates as of 2019 (2.48%) and 2020 (3.10%).

[3] Respondents' WTP bids and the percent value of this as an expense is compared to the PSA FIES national average. If the percent value of their WTP expenses falls higher than the national average, the respondent is assumed to not be able to sustainably pay for additional user fees on citizen-based monitoring activities depending on their frequency of visit.

The ability to pay reveals the range limit that respondents can tolerate and afford for an additional user fee in citizen-based reef monitoring activities. In a quarterly scenario (Table 8), only 45% of the respondents can afford their WTP bids. The lowest income-level respondents may find it difficult to pay an increase of a base fee of ₱100 for every visit unless they limit their excursions to twice a year. Eighty-two percent (82%) of the respondents can afford their WTP bids if they only visit the area on a semi-annual basis.

Thirty-six percent (36%) of the respondents set a WTP bid of ₱500. Of the 36%, 75% can afford to pay this fee for both quarterly and semi-annual scenarios. Only two respondents answered a WTP bid of over ₱1,000 and only one from the two can afford said value for quarterly and semi-annual scenarios.

Assuming that respondents have excursions on a monthly basis, their WTP bids become significantly less affordable. Only 27% of the respondents can afford their bids if they were to pay a user fee per monthly visit. The 27% of the respondents who can still afford their WTP bids belong to the ₱40,000 - ₱59,999; ₱60,000 - ₱99,999; and the ₱100,000 - ₱249,999 income brackets and only logged the values of ₱150 and ₱200 as their bids. Respondents in the lowest income bracket, who responded within the ₱100 - ₱200 range may also not be able to afford these values.

Table 9. Ability to Pay Matrix, with the WTP Value of ₱100

PSA FIES Income Bracket	Expenses	WTP Bid	FIES 2018 Recreational Value	Monthly		Quarterly		Semi-Annually	
				WTP Annual % of Net Income	Ability to Pay	WTP Annual % of Net Income	Ability to Pay	WTP Annual % of Net Income	Ability to Pay
< ₱40,000	₱7,000	**₱100**	0.21%	0.67%	No	0.22%	No	0.11%	Yes
	₱9,000	**₱100**	0.21%	0.43%	No	0.14%	Yes	0.07%	Yes
	₱20,000	**₱100**	0.21%	0.36%	No	0.12%	Yes	0.06%	Yes
	₱25,000	**₱100**	0.21%	0.29%	No	0.10%	Yes	0.05%	Yes
₱40,000 - ₱59,999	₱20,000	**₱100**	0.32%	0.23%	Yes	0.08%	Yes	0.04%	Yes
	₱20,000	**₱100**	0.32%	0.20%	Yes	0.07%	Yes	0.03%	Yes
	₱30,000	**₱100**	0.32%	0.17%	Yes	0.06%	Yes	0.03%	Yes
	₱30,000	**₱100**	0.32%	0.17%	Yes	0.06%	Yes	0.03%	Yes
₱60,000- ₱99,999	₱20,000	**₱100**	0.53%	0.15%	Yes	0.05%	Yes	0.02%	Yes
	₱50,000	**₱100**	0.53%	0.13%	Yes	0.04%	Yes	0.02%	Yes
₱100,000 - ₱249,999	₱40,000	**₱100**	0.63%	0.10%	Yes	0.03%	No	0.02%	Yes

With the hypothetical value of ₱100 provided in the questionnaire, the ability to pay of respondents increases. On a quarterly basis, 82% of the respondents can afford to pay an additional user fee. On a semi-annual scenario, 100% of respondents can afford to pay ₱100. On a monthly scenario, however, the percentage of respondents who can afford to pay a ₱100 user fee dip to 64%. Though still significantly higher than the WTP bids case in Table 10, this shows that ₱100 serves as cap or as maximum for the range of values that visitors can afford in any frequency of visit.

The base value of ₱100 supposes the tolerance of the respondents to pay for any additional user fee on citizen-based reef monitoring activities. Lower range on user fee values would generate greater ability of respondents to pay; however, this may cost the overall ability to afford monitoring activities in the area. A value lower than ₱100 may assure the frequency of visits and number of guests all the Binukbok Point resorts can accommodate at any given period or season.

Willingness-to-pay does not directly reflect the ability of respondents to pay for a user fee (Amponsah et al., 2015). While the correlation between income and WTP remains inconclusive, the ability to pay reveals that visitors can only pay within a limited range of values for every visit in Binukbok Point. Extensive WTP surveys can reveal the actual bid that visitors are willing to spend.

CHAPTER V

SUMMARY AND CONCLUSION

Summary

The primary objective of this research is to determine how citizen science can promote coastal resource management strategies through an ability and willingness to pay study of Binukbok Point.

In answering the first research objective, the study has been able to identify the potential for sustaining citizen-based reef monitoring through an analysis of the willingness of resort guests to pay for the effort. Results of the study showed that visitors in Binukbok Point are willing to pay any additional user fee on citizen-based reef monitoring activities. Visitors have an intrinsic value on protecting the environment and would like to contribute to this effort in whatever way possible. However, the degree to which visitors are willing to pay largely depend on their frequency of visit, their exposure to the reefs, and the transparency and accountability that is required of this endeavor.

Regular visitors are much more likely to continue paying for monitoring activities because of grown attachment to the area (Schuhmann, Casey et al., 2013; Batel et al., 2014; Marzetti et al., 2016; Schuhmann, Skeete et al., 2019). Freedivers and SCUBA/recreational divers are also more willing to pay for any user fee because of their immersion in the reefs (Emang et al., 2016; Lucrezi et al., 2018). The study found gender inconclusive as a significant variable in the perceptions and preferences of the respondents (Alves et al., 2015; Grafeld et al., 2016; Schuhmann, Bass et al., 2016) as the percentage of males and females in the diving groups are split even and no statistical significance was

found between their genders and their WTP bids (BirdirÜnal, Birdir, & Williams, 2013). Age also does not sufficiently reveal as many of the respondents were skewed towards the 20 to 30-year old age bracket (Schuhmann, Bass et al., 2016).

Awareness-building provides support in informing the visitors of their payment decisions but transparency often comes up as a factor in their willingness to pay. Visitors expect the resorts and communities to be publicly accountable for the conduct of these activities and to provide updating schemes so visitors get the sense of where their money goes. These reservations are mostly bred from the fact that taxes and fees are already being paid for by visitors (Rodella et al., 2019), but there are currently no mechanisms to know how these funds are being used.

Income is not a primary determinant in the willingness to pay of visitors (Cruz-Trinidad et al., 2011; Birdir et al., 2013; Marzetti et al., 2016).

In answering the second research objective, the study has also been able to assess the ability of resort guests to pay for citizen-based reef monitoring activities. While visitors are able to pay for recreational fees due to their dispensable income, the respondents' WTP bids ranging from ₱100 - ₱2,000 became less affordable as scenarios progressed from semi-annual to monthly frequency of visit scenarios. The hypothetical value of ₱100 also revealed to be a strenuous fee for lower-income visitors who frequent the area more than once a month, but a cost of less than this value may be tolerable.

Conclusions

The research aimed to determine how citizen science can promote coastal resource management strategies through a willingness and ability to pay study of Binukbok Point, Batangas. The study aimed to determine if visitors are willing and able to pay for any additional user fee to finance and sustain citizen-based monitoring activities.

In the study's first research objective to identify the potential for sustaining citizen-based reef monitoring and incentivizing the participation of diving resorts, the study conducted a quantitative analysis—interspersed with quantitative elements—to identify the motivations behind visitors' willingness to pay for this effort. By assessing the preferences of SCUBA/recreational diving, freediving, and non-diving groups, the study was able to identify that diving groups, with considerable exposure in reefs and reef-based activities, have greater preference to pay for fees that would provide them opportunities to support conservation (Schuhmann, Casey et al., 2013; Emang et al., 2016; Lucrezi et al., 2018). However, amongst all the groups, the importance of transparency and accountability stand out as equally significant factors to commit visitors to pay additional fees. The study also revealed that visitors have great preference and attitudes towards activities that would help address plastic pollution and see citizen-based monitoring as a means to curb this issue.

In this study, income, age, and gender are not significant variables in determining the willingness to pay of visitors. Larger and more randomized samples are needed to identify the significance of these factors.

In the study's second research objective to assess the ability to pay of resort guests to pay for citizen-based reef monitoring, it was able to find that

willingness to pay does not directly reflect the ability to pay of visitors. While visitors express great willingness to pay for an effort, this does not reveal the affordability of their preference (Amponsah et al., 2015). The study revealed that in order to sustain the effort, the citizen-based monitoring fee should be within a limited range of values tolerable to all types of visitors.

The importance of data in marine science and conservation remains unquestioned. The foundation of any effective management mechanism rests on consistent monitoring of an area and the changes that affect it in different periods in time. In the evolving and growingly dire condition of the oceans due to climate change and in the proliferation of literature that document its impacts, there becomes a great need to identify the anthropogenic impacts that further put our oceans in peril. An effective way of understanding this is through citizen science because it encourages the participation of the public to document changes in reefs in the long-term (Embling et al., 2015; Forrester et al., 2015) and present real-time interventions to identified problems (Cigliano et al., 2015; Theobald et al., 2015; Gray et al., 2017; Newman et al., 2017; Schläppy et al., 2017; Dean et al., 2018; Falk-Anderson et al., 2019).

Adding user fees is a sustainable financing option that can be pursued to allow for more expansive conservation and management initiatives that local governments or communities cannot necessarily afford (Thur, 2010; Grafeld et al., 2016; Birdir et al., 2018; Schuhmann, Skeete et al., 2019; Aseres & Sira, 2020). This study was able to identify that visitors in sites such as Binukbok Point are willing to pay and participate in research monitoring efforts that help in pursuing conservation and protection of reef ecosystems.

Issues and Possible Deterrents. While promising in theory, the feasibility of citizen science efforts remains largely dependent on politics and local dynamics, which can either ensure or hinder the effectivity of these initiatives. In Binukbok Point, only three of the six resorts in the area are certified, which raises the question of the legality and compliance of these entities and the damage the bypassing of laws creates on the reefs.[4] To require the resorts to conduct monitoring efforts may be a challenge. Given this, future research efforts in the area that would require the participation of all the resorts might be difficult to accomplish.

Recommendations

To further fulfill the first objective, research that require multivariate models may generate greater understanding on the willingness and ability to pay of visitors in Binukbok Point. As this study has revealed, transparency/accountability also weighs as an important independent variable in determining the WTP. Further studies should consider to add this as a determinant on its own and design surveys that capture questions to elicit perceptions on this variable. Separate research studies can also capture the behaviors and attitudes of visitors in transparency/accountability of fees. Exploring the reservations of visitors to pay for fees may open up to interventions that allow for better relationships and collaboration among the communities, visitors, and the local government.

[4] This information was shared by an anonymous informant. The informant chose not to disclose their identity for security.

Questions on perceptions and values towards plastic pollution should also be included as a variable. Given the relevance and timeliness of the topic, respondents resonate heavily with this issue and can possibly affect their WTP for any environmental initiative.

In fulfilling the second research objective, future WTP studies should also capture the ability of visitors to pay for any additional user fees. While they are willing to pay for a certain amount, this does not necessarily reflect their ability to do so. Ability to pay also opens solutions to ensure the regularity and consistency of guests to visit any protected area or reef site. Sustaining any conservation effort has to make sure that users can afford it.

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ANNEXES

ANNEX I. FOCUS GROUP INTERVIEW GUIDE

Date: _____

Group: _____

BASIC SNORKELING AND BINUKBOK VIEW POINT INSIGHTS

1. Are you new or returning guests in Binukbok View Point? How often do you visit this area?
    a. If you are new to Binukbok View Point, would you like to return in the future? Why?
2. What are your reasons for coming here?
3. What are your reasons for snorkeling/diving?
    a. How often do you snorkel/dive? Do you also do this in other areas?
4. What are your metrics for going to a reef site? What do you consider is a good place to snorkel/dive at?
    a. Do you think Binukbok View Point is a good reef to visit?

ENVIRONMENTAL ADVOCACIES AND VALUE ON CORAL REEFS

1. Do you have any environmental advocacy?
    a. If you have, what specifically are your advocating for/against? Plastics in oceans? Climate change? Coastal management? Sustainable tourism?
2. Do you think your exposure in reefs/seas affect your environmental advocacies/beliefs? Why?
    a. What else influences your beliefs/advocacies?
3. Do you have any knowledge on marine ecology? In what level? From where were you able to acquire this knowledge?
    a. Does this have any effect on your snorkeling/diving and on your advocacies?
4. Based on your experience diving/snorkeling, what do you think should be given more attention?
5. Do you think reef protection is important? Why?

KNOWLEDGE AND INSIGHT ON ENVIRONMENTAL MANAGEMENT/PROTECTION AND CITIZEN-BASED REEF MONITORING IN THE AREA

1. Are you aware of the term ‘citizen science?’
    a. Have you ever been involved in any citizen science project or activity?
2. Do you believe monitoring is important in coral reef protection and management? Why?
3. Do you think Binukbok View Point needs to also experience reef monitoring? Why?
4. How do you think citizen-based reef monitoring can impact Binukbok View Point?

WILLINGNESS TO PAY FOR CITIZEN-BASED REEF MONITORING

1. Are you willing to pay additional user fees for every visit as part to sustain citizen-based reef monitoring in areas such as Binukbok View Point? What are the factors that affect your decision to pay/not pay for additional user fees for citizen-based reef monitoring?
2. What are your expectations in paying these user fees? Are you also willing to participate in these activities (voluntarily) as part of your payment?
3. If a user fee to pay for citizen-based reef monitoring exists, do you think this will affect your frequency of visit in Binukbok View Point? Why/how?
4. Who do you think should bear greater responsibility in funding citizen science projects? Why?
    a. Do you think citizens like us should also be expected to pay/contribute in these endeavors?

ANNEX II. COPY OF QUESTIONNAIRE TO RESPONDENTS

Hello!
These are questions that are more confidential in nature and therefore needed a written form to be able to fill out.
We hope you can answer as honestly as possible and be open to share your insights! For multiple choice questions, just put a ✓ mark on the box before the option.
Thank you very much for your help!

Date: _____ 2020

1. Age: _____
2. Gender:
   - ☐ Female
   - ☐ Male
   - ☐ Others/Prefer not to say
3. Occupation:
   - ☐ Employed
   - ☐ Self-Employed
   - ☐ Student
4. What is your gross monthly income?

   If you are a student, what is your monthly allowance? *(No need to disclose exact value! Just give us a general estimate)*

   _____
5. Can you give us a general/total average amount of expenses you have per month? _____
6. From what group did you belong during the interview?
   - ☐ SCUBA/Recreational diver
   - ☐ Freediver/skindiver
   - ☐ Non-Diver/I can only snorkel

   a. How long have you been diving (in years)? _____

☐

Less than a year? Please check this box, instead:

b. How often do you dive in a month? (Approximate)

- ☐ 1x
- ☐ 2x
- ☐ 3x
- ☐ More than 3x
- ☐ I don't dive every month

Please specify how often:

_____

7. Keeping in mind your income, what is the price you are willing to pay for citizen-based reef monitoring in Binukbok View Point?

_____

8. Keeping in mind your income and monthly expenses, if the user fee was set at ₱100, will you be willing to pay this amount per visit?

_____

a. Will you be able or are you willing to pay for a user fee higher than ₱100?

- ☐ Yes
- ☐ No

b. If yes, what is the maximum value you are willing to pay?

_____

ANNEX III. CONSENT FORM TO PARTICIPANTS

CONSENT TO PARTICIPATE IN RESEARCH

Using Citizen Science through Tour Operators to Promote Better Coastal Resource Management Strategies: A Case Study on Medium-Scale Resorts in Binukbok View Point, Bauan, Batangas

I am Astrid Natasha O. Ocampo, a graduate student currently undertaking a Master's Degree in Environment and Natural Resources Management at the University of the Philippines-Open University. My advisor is Dr. Maria Rebecca A. Campos. I would like to invite you to take part in my research study, which will explore the costs of conducting citizen science efforts and the capacity of the resorts to be an instrument of the government in reef monitoring in Binukbok Point, Bauan, Batangas.

Procedures

If you agree to participate in my research, I will conduct an interview with you. The interview questions will comprise your insighs on environmental advocacies, knowledge on citizen science, and perception on values and your willingness to pay for any future citizen-based reef monitoring activities in Binukbok View Point Batangas, and other relevant questions that may arise. I will also hand out a simple questionnaire that will ask for your income details, age, average monthly expenses, and projected amount to pay for potential citizen-based reef monitoring activities.

Benefits

The study ultimately aims to provide ways by which local authorities and tourist operators can partake in a participative approach to ensure that the tourism sector continues to develop while marine and coastal resources remain protected and sustainably managed. The study hopefully aims to offer ways for tour operators to involve and engage their guests in equally valuing and embodying the advocacy for environmental sustainability.

Risks and Confidentiality

Some of the research questions may be uncomfortable for you. You are free to decline to answer any questions you do not wish to, or to stop the interview at any time. As with all research, there is a chance that confidentiality could be compromised; however, I am taking precautions to minimize the risk.

Your study data will be handled as confidentially as possible. If results of this study are published, individual names and other personal information will not be used, unless you provide explicit permission to publish such details.

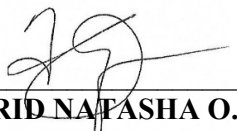
The research will be recorded and transcribed, and might be used for future research purposes. I will retain these records for three (3) years after the completion of study. Confidentiality measures will remain the same to protect the data you have provided.

For better awareness on the extent of confidentiality we can exercise, please provide your initial next to any of the statements that you agree with:

	I wish to review the notes, transcripts, or other data collected during the research pertaining to my participation.
	I agree to be quoted directly.
	I agree to be quoted directly if my name or the name of the resort is not published, and a pseudonym is used.
	I agree that the researcher may publish documents that contain quotations by me.

Rights
Your participation in this research is completely voluntary. You are free to decline to take part in the project and answer any questions. There will be no penalty or any loss of benefits in choosing or declining to participate in the project.

Questions
If you have any questions about this research, please feel free to contact me at: aoocampo@up.edu.ph (e-mail) or (+632) 917-5264110 (mobile).



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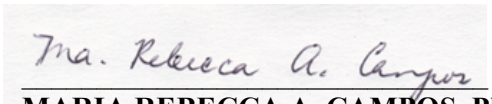

MARIA REBECCA A. CAMPOS, Ph.D.
cmaribec@yahoo.com

CONSENT
(You will be given a copy of this consent form)

If you wish to participate in this study, please sign below.

_____ _____
Participant's Name and Signature Date

ANNEX IV. QUESTIONNAIRE RESULTS

Questions	Are you a new or returning guest at Binukbok View Point?	Age	Gender	Occupation	What is your gross monthly income?	If you are a student, what is your monthly allowance? No need to disclose exact value! Just give us a general estimate. :)	Can you give us a general/total average amount of expenses you have per month?	What type of diver are you/diving do you regularly do?	How long have you been diving (in years)?	How often do you dive in a month? Approximate:	If you don't dive every month, please state how often:	Keep in mind your income and monthly expenses, what is the minimum price you are willing to pay for citizen-based reef monitoring in Binukbok Point?	Keeping in mind your income and monthly expenses, if the user fee was set at P100, will you be willing to pay this amount per visit?	Will you be able or are you willing to pay for a user fee higher than P100?	If your answer is yes, what is the *maximum* value you are willing to pay?	Start Date (UTC)	Submit Date (UTC)
	Returning	26	Male	Employed	75k - 90k		20k	Non-Diver/I can only snorkel	0	I don't dive every month	No set frequency	100	Yes	Yes	150	2020-04-16 07:45:26	2020-04-16 07:49:39
	Returning	24	Male	Employed	25,000		9,000	Freediver/skindiver	4 years	I don't dive every month	Once or twice a quarter	1,000	Yes	Yes	Depends on the rationale - but I wouldn't mind as high as 1,000 kung maganda ang rationale.	2020-04-16 07:08:52	2020-04-16 07:13:20
	Returning	25	Male	Student	N/A	Php 15,000, more on some months	Php 15,000, more or less, sometimes more	Freediver/skindiver	3 years	I don't dive every month	Two to four times a year	Php 1,200	Yes	Yes	Php 250	2020-04-16 07:08:46	2020-04-16 07:12:26
	Returning	25	Male	Employed	70000		30000	Non-Diver/I can only snorkel	Less than a year	I don't dive every month	Once a year	100	Yes	Yes	500	2020-04-16 06:41:57	2020-04-16 06:43:26
	New	26	Female	Employed	38,000	N/A	25,000	Non-Diver/I can only snorkel	N/A	I don't dive every month	Once a year	250	Yes	Yes	500	2020-04-14 05:40:16	2020-04-14 05:43:35
	Returning	29	Female	Employed	60000		20000	SCUBA/Recreational diver	Less than	I don't dive every month	Once a quarter	50	Yes	Yes	150	2020-04-13	2020-04-13

									a year							13:52:33	13:55:10
	Returning	40	Male	Employed	50000+		50000+	SCUBA/Recreational diver	18 years	More than 3x	almost every weekend	maybe Php500	Yes	Yes	1000	2020-04-13 13:31:27	2020-04-13 13:37:56
	Returning	27	Female	Employed	72,000	NA	30000	SCUBA/Recreational diver	1.5	I don't dive every month	Once every 2-4 months	500 per trip	Yes	Yes	500	2020-04-13 05:41:54	2020-04-13 05:45:59
	New	30	Female	Employed	100k		50k	SCUBA/Recreational diver	Less than a year	1x		200	Yes	Yes	2000	2020-04-12 16:52:12	2020-04-12 16:54:07
	Returning	30	Male	Employed	134000		40000	SCUBA/Recreational diver	3	1x		200	Yes	Yes	200	2020-04-12 15:23:40	2020-04-12 15:29:55
	Returning	22	Female	Employed	15k	NA	7000	Non-Diver/I can only snorkel	Na	I don't dive every month	NA	100	No	No	100	2020-04-12 15:09:41	2020-04-12 15:13:48
	Returning	28	Male	Self-Employed	30		20	Freediver/skindiver	2yrs	2x		100	Yes	Yes	200	2020-04-12 15:11:06	2020-04-12 15:12:59
	Returning	23	Female	Student	N/A	15,000	10,000	Freediver/skindiver	4 years	More than 3x	N/A	250	Yes	Yes	250	2020-04-12 15:07:03	2020-04-12 15:09:59
	Returning	45	Male	Employed	50000		20000	Non-Diver/I can only snorkel	2 years	I don't dive every month	2x a year	200	Yes	Yes	500	2020-04-12 15:03:59	2020-04-12 15:07:01
	Returning	25	Female	Student	N/A	35,000	33,000	Freediver/skindiver	2 years	1x	Every 2-3 months	100	Yes	No	150	2020-04-12 15:02:38	2020-04-12 15:05:03