Università
Ca'Foscari
Venezia

Master of Arts Degree

in Environmental Humanities

Department of Asian and North African Studies

Final Thesis

THE RISE IN ECOTOURISM AND MARINE CONSERVATION OF GREEN SEA TURTLES IN OKINAWA

Supervisor
Prof. Giovanni BULIAN

Assistant supervisor
Prof. Patrick HEINRICH

Graduand
Kiera BAILEY
893281

Academic Year
2022/2023

TABLE OF CONTENTS

ACKNOWLEDGEMENTS

I would like to thank my husband, family, and friends for their support during this time.

If you would like to contribute towards marine conservation efforts in Okinawa and help ChuraMura reach their goals, you can make a donation at this link:

https://gogetfunding.com/churamura-sea-turtle-conservation-okinawa/

INTRODUCTION

Green sea turtles, scientifically classified as *Chelonia Mydas*, are ecological useful reptiles that are significant to the marine environment as they play a vital role for biodiversity but are threatened due to human activities - anthropogenic threats. Climate change activism concerning conservation of sea turtles is taking on an increasingly important role, trying to ban single use plastics, with campaigns urging the ban of straws, plastic bags, and the plastic rings on soda cans, but it is not enough to be taken off the endangered species list. Ecotourism is an approach that can help sustain green sea turtle conservation as it is a sustainable form of tourism, helping alleviate anthropogenic threats and biodiversity loss, without jepordizing the local people and their economy, as it calls for "responsible travel to natural areas that conserves the environment, sustains the well-being of the local people, and involves interpretation and education" (TIES: 2015). Achieving ecotourism for marine conservation, we must take a holistic reformist approach - understanding the cultural and historical heritage of a specific location and how they have impacted its current culture, politics, socioeconomics and the environment, relating to the loss of ecological stability. Doughnut Economics is one reformist approach providing a visual framework, involving all stakeholders, that allows them to understand exactly what needs to be addressed such as education on marine conservation, and sustaining the management of the health, income and work, peace and justice, political voice, and social equity of a specific location through both private and public sectors. *Satoumi*, a Japanese concept, represents an alternative approach that embraces comprehensive methodologies, offering a practical framework for implementation. To illustrate the application of such holistic approaches, this study will examine the case of ChuraMura [ちゅらむら] in Okinawa, Japan. By analyzing the prominent cultural, political, and socioeconomic factors that have shaped conservation policies and fostered equilibrium within the local marine ecosystem, this research will concentrate on a nonprofit Ocean Conservation Agency dedicated to safeguarding sea turtle habitats in the Yomitan prefecture on the main island of Okinawa. First, I will focus on ecotourism, what it is, its approaches: nature based, education, and sustainable management, benefits, and applying it to Japan, or more specifically Okinawa, and its possible impacts from Covid-19. Then, interconnected with one another, understanding the effects on marine conservation – examining the history of Okinawa, its impacts of green sea turtles – giving an overview of them, their role within local biodiversity, and anthropogenic threats. After will be the case study of ChuraMura [ちゅらむら] — a non-profit Ocean Conservation Agency focusing on Sea Turtle habitats in the prefecture of Yomitan on the main island of

Okinawa, focusing on their goals, objectives, achievements through education, art, and science, sea turtle data, as well as their future projections. Concluding, the reader should be able to understand how ecotourism can be beneficial and effect marine conservation of green sea turtles in Okinawa.

CHAPTER ONE

ECOTOURISM IN OKINAWA

This chapter centers around the term 'ecotourism' and its multifaceted nature. The exploration will encompass the core components of ecotourism, including nature-based experiences, education-focused initiatives, and sustainable management practices. Moreover, an examination will be conducted to ascertain the advantages linked to ecotourism, particularly within the specific context of Japan, with an emphasis on Okinawa. Additionally, the ramifications of the Covid-19 pandemic on ecotourism in Okinawa will be evaluated, acknowledging the industry's encountered obstacles and adaptive measures in response to this worldwide crisis.

Definition of ecotourism

What is 'ecotourism'? What are the proposed definitions of ecotourism?

Ecotourism is a general term to describe *Sustainable tourism*. Sustainable tourism can be defined as "tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment and host communities" (UNWTO: 2023). Han's article, *Consumer behavior and environmental sustainability in tourism and hospitality: a review of theories, concepts, and latest research*, found ten key factors that determines consumer behaviour for being 'environmentally-sustainable' that can be applied to the visitors, industries, environment, and the locals of the host communities (Han: 2021, p 1027-1028): Green Image, Pro-environmental behavior in everyday life, Environmental Knowledge, Green product attachment, Descriptive social norm, Anticipated pride and guilt, Environmental Corporate Social Responsibility (CSR), Perceived effectiveness, Connectedness to nature, Green value.

Sustainable tourism encompasses several subcategories, including green tourism, responsible tourism, equitable tourism, soft tourism, and ecotourism. It can be diverse through the many forms ecotourism can be put into practice and its scale. Most commonly seen today is through sustainable architecture such as 'Bosco Verticale' skyscrapers in Milano to vernacular housing in Indonesia, but it can also be applied as simply volunteering at a marine rehabilitation center in Florida, hiking Mount Fuji in Japan, being a researcher or employed by the Brazilian Sea Turtle Program (TAMAR) in Praia de Forte, Brazil, or visiting a natural wonder of the world like The Great Barrier Reef in Australia. Its approaches can be educational,

nature based, and have a focus on sustainable management. Many scholars have defined the term, which we will take a look at in the next paragraph, through their own proposition and research. The first Earth Day on April 22, 1970 began the environmental movement in the USA which brought awareness to concerns over pollution and environmental destruction which thus began political and social changes in regards to sustainability to make sure the environment and human health would not become at risk. However, it did not become 'popular' until the 1980's when it was promoted as "a type of travel for people who wanted to learn about different and exotic environments without causing the environmental harm or damage associated with other forms of tourism" (Bulger: 2016).

The next section of this thesis will explore how different scholars and researchers define ecotourism and how I would define ecotourism.

Amanda Stronza's 2001 article titled *Anthropology of tourism: Forging new ground for ecotourism and other alternatives* delves into the anthropological dimension of ecotourism, with a particular emphasis on the dynamics between international tourism and local communities residing in economically disadvantaged nations. Stronza's research centers on the reciprocal impacts and interdependencies that arise within these contexts, shedding light on the multifaceted aspects of ecotourism.

"...On the host end, what are some of the factors that can explain particular kinds of local involvement in tourism? On the guest end, what are the differential effects of certain kinds of tourism on guests' attitudes and behaviors, both in the midst of their tour and once they have returned home?"

In her 2019 article entitled, *Ecotourism for conservation?*, building upon nearly two decades of research, Stronza underscores the critical importance of achieving clarity in measurement as a means of defining ecotourism. She highlights the inherent variability among communities, ecosystems, and ecotourism destinations, emphasizing the inherent challenges of establishing strict controls akin to a laboratory setting. That's precisely why studying at a micro or local level holds significant importance. For instance, comparing or quantifying different states within the USA would be inappropriate since each possesses its own jurisdiction and laws pertaining to the local environment. The same principle applies to Japan and Okinawa. Furthermore, in *Ecotourism for Conservation?*, an annual review of environment and resources

by Amanda L. Stronza, Carter A. Hunt, and Lee A. Fitzgerald, the potential of ecotourism as a solution for conservation efforts is thoroughly explored.

David Fennells book, *Ecotourism,* explains many researchers have issues defining ecotourism as they "include a whole series of principles and variables related to the term, or to try to isolate specific variables which can be used to best represent the overall concept" (Fennell: 2020). Instead, the author emphasizes the importance of distinguishing between tourists' novelty, curiosity, and learning, highlighting the distinction between learning and knowledge, while examining the impact of skills and biology (Fennell: 2003). Additionally, the author suggests that ecotourism should prioritize preservation rather than conservation (Fennell: 2003). Scientific research and findings on ecotourism predominantly align with sustainability and conservation initiatives. Independent researchers, Fernando Ramirez and Josefina Santana explain in their book, *Environmental Education and Ecotourism,* ecotourism "should help educate the public as well, in order to foster nature conservancy" (Ramirez & Santana: 2019, p 24), but Fennells goes further in explaining that there is also a complex political side to ecotourism. Political Ecologist Rosaleen Duffy says, "such positive accounts of the potential for ecotourism belie the politics of pursuing ecotourism as a policy to produce sustainable development. For example, the politics of ecotourism includes the contested definitions of ecotourism and ecotourists, the ways that destinations are marketed and promoted, its relationship to global networks that include donors and international travel agents, as well as its links to the promotion of neoliberalism as the path to development" (Duffy: 2006).

These definitions provided by scholars and researchers serve as an introductory framework for readers to grasp the concept of 'ecotourism'. However, this thesis will delve deeper into the subject through a specific case study. To enhance your understanding of my perspective and definition of 'ecotourism', it is important to provide some cultural and academic background about myself.

I hail from the beautiful islands of Hawai'i, where I was raised amidst the rich cultural heritage of the Hawaiian people. While I may not have Hawaiian ancestry flowing through my veins, Hawaiian culture has profoundly influenced my upbringing and way of life. My culture has allowed me to gain perspective between the human connection to the natural environment, all living things, and although it is not foreign to me, it is foreign for the majority of tourists who visit the islands or even from people who have only heard or seen Hawai'i in songs and movies.

Hawaiian people and their culture are deeply connected to the environment - fully physically, mentally, and spiritually, but has been almost completely lost due to colonization efforts after the annexation of The Kingdom of Hawai'i. Both at the mental and spiritual level, communication to the ancestral world through the natural world is brought out in Hawaiian culture and amplifies our significance in life by understanding our direction in taking care of the land. Both anthropologists Tim Ingold and Laura Rival in her book, *Animism and the Meaning of Life,* discuss the continuation of life and in Hawai'i this is seen as a part of the Kapu system- Hawaiian laws and regulations. The Kapu system consists of gender roles, politics, and religion. In Hawai'i, animism is expressed through the relationships between people, natural elements, gods and goddesses, etc. Religion is particularly associated with mana- power and/or strength, so anything that compromises this negatively also impacts the spiritual aspect of Hawaiian culture because Hawaiian gods and goddesses hold the mana. *Awaiku* (spirit of nature) and *ʻaumakua* (spirit of ancestors) come in the form of what is known as a *pō* , [literal meaning is night] a source (Gonzales: 2020), bringing forth a connection from the ancestral world. Connections with the ocean can be divided by looking at sea life such as *honu* [turtles] (a guardian spirit in Hawaiian mythology), *manō* [sharks], *ʻākoʻa* [coral], etc. as well as, *wai* [water] in and of itself. But, the natural environment of Hawai'i is quickly disappearing with overdevelopment and Hawaiian identity is slowly reclaiming itself again, this time through formal education.

In terms of my academic experience, I hold a Bachelor of Honours degree in Politics and International Relations. For my very first thesis, I dedicated my research to exploring methods of combating climate change in underdeveloped Pacific Islands, with a specific focus on the case study of Tuvalu. Subsequently, I pursued a Master's degree in Environmental Humanities. Drawing from my diverse academic background and my own cultural roots, I have come to recognize the intricate interconnectedness of culture, politics, and the environment. I firmly believe in the significance of integrating these elements wherever possible, as they cannot be separated from one another.

When it comes to defining ecotourism, I would incorporate elements from the definitions provided by the aforementioned scholars and researchers. However, I would particularly emphasize the crucial inclusion of Indigenous or traditional knowledge and practices, whenever feasible. I firmly believe that such involvement should be integrated at every level of decision-making, be it local, national, international, or within organizations.

Ethnoecology is classified as a scientific study of how different people, in different parts of the world, understand the environment around them and the relationships it can bring forth. Traditional Ecological Knowledge/Indigenous Environmental Knowledge is a branch of this type of study and can give us further insight, at a micro level, to subjects like Hawaiian identity or Okinawan fishing communities. Laura Rivals book, *Animism and the meanings of life*, explains "Atran's approach to folkbiology through ecological reasoning gives much importance to conditions of learning – that is, to whether children are in intimate contact with nature, and whether their understanding of biology has been modified by schooling. It also gives full significance to the cultural system in which children are socialized" (Rival: 2012, p 76).

An Indigenous view on ecotourism is dependent on the local level, indigenous knowledge and practices can all be different depending on what part of the world they live, but can share the basis of a connection with nature. James R. Kimmel's article, *Ecotourism as Environmental Learning,* explores the definition that can 'be carried out through ecotourism' from the concept of 'love', supported through affection and emotion. Although, due to these countering differences between the anthropogenic (economic importance) and natural world, it has created tension between people who back science and the people who value tradition, identity, and culture. In my essay, *Ecological Existentionalism of Tuvalu: Indigenous Connection to Nature in the Face of Natural Disasters,* I discussed how ecological existentialism allows oneself to understand at a 'higher' level and become closer in understanding human connections (that can be affectionate and emotional) to the natural environment in a time of chaotic 'certainty' (Bailey: 2022, p 4-7):

"Ecological Existentialism is a response to uncertainty and shifts in Western thought. It combines ecological connectivity to nature with the idea that there is no predetermined essence of humanity due to the absence of God. Deborah Bird Rose explores this concept in her book, *Wild Dog Dreaming: Love and Extinction*, examining the perspectives of Lev Shestov, Ilya Prigogine, and Val Plumwood. The concept represents a shift in Western thought and challenges the Western fascination with certainty and order. This fascination is linked to a desire for predictability and a belief that humans have a specific purpose or role. It also contributes to a sense of isolation and hierarchy, causing distress.

Uncertainty breaks the symmetry of time. Our present actions do not guarantee future benefits. In the past, a collective decision was made to prioritize industrialization and consumption, leading to severe consequences such as greenhouse gas emissions, rising sea levels, and extreme weather events like droughts and floods. How we choose to adapt and mitigate these consequences now will shape the future, but this process is filled with uncertainty. According to Bird Rose, we are not mere components of a machine; instead, we actively participate in the ongoing processes of life's interconnectedness. Our willingness to learn and accept that knowledge is never complete is crucial. Certainty can be detrimental, as it jeopardizes our sustainability as a species.

So who could possibly be the 'people' when we refer to "people save what they love"? It's the 'people' who shift away from certainty and accept the unknown possibilities, adapting to the challenges faced in today's world. Breaking through hyper-separation and becoming ecocentric allows us to recognize the reality of life and its continuation of connectivities intertwined at every 'level'. In chapter ten World-Crazy of Bird Roses book, Wild Dog Dreaming, connectivity is "the ecological fact that organisms and environments permeate each other, are mutually constitutive, and thus mutually necessary and sustaining" (Bird Rose: 2011, p 118). We now see different branches of science trying to understand this at every level, pushing away from dualism and following a feminist approach, from microbes to plants, insects, mammals, humans, etc.. that can allow us to come closer to 'becoming'. These include, but are not limited to, botany, emergence of multispecies ethnography, affective ecology, etc.. Indigenous people, saving what they love, is just another part of living. Nature provides food for us so how we treat nature affects us. We can definitely learn from indigenous knowledge and practices. If done correctly, it can lead to a transformational change. pushing away brings us closer to eros- desire for life, connection, others, and self and ethics- opens us to interactive, world-making encounters that facilitate the capacity to live together in the long term thus allowing science, culture and nature to work in harmony."

At an international level, the specialized agency of the United Nations, World Tourism Organization (UNWTO), gave international awareness to the term 'ecotourism' and defines it through characteristics by in which tourism includes (UNWTO: 2002):

1. *All nature-based forms of tourism in which the main motivation of the tourists is the observation and appreciation of nature as well as the traditional cultures prevailing in natural areas.*
2. *It contains educational and interpretation features.*
3. *It is generally, but not exclusively organized by specialized tour operators for small groups. Service provider partners at the destinations tend to be small, locally owned businesses.*
4. *It minimizes negative impacts upon the natural and socio-cultural environment.*
5. *It supports the maintenance of natural areas which are used as ecotourism attractions by:*
    - *Generating economic benefits for host communities, organizations and authorities managing natural areas with conservation purposes.*
    - *Providing alternative employment and income opportunities for local communities.*
    - *Increasing awareness towards the conservation of natural and cultural assets, both among locals and tourists.*

2. Ecotourism and education programmes

Education is the foundation of knowledge and is essential for ecotourism – especially for youth. Our first step is needing to acquire knowledge through learning and conditioning new behaviors or practices. Teachers can be people that solely have appreciation of the environment, conservationists, trained scientists, family, and even people with experience in the hospitality or tourism industry. Harris, K. book, *Education and knowledge: The structured misrepresentation of reality*, defines education as 'formal' meaning through an institution (schools, colleges, and universities), but this limits our connections or influences to 'external factors' [anything outside said formal education]. He discusses 'ignorance' being valued as a positive for two reasons: being equated to innocence (Harris: 1976) and 'all one needs to know is already known' (Harris: 1976). He uses the analogy of innocence and children as children don't 'face' the realities that adults do, but this leaves room for error. Error in the sense of designifying a person's socio-economical and historical situation within their local community that conditions how they act and learn. What children learn, that they carry onto their adulthood, is not solely from formal education. Harris refers to this as "the more ignorant one is in socio-historical context, the more easily one can be exploited and manipulated in that context" (Harris: 1976) The second reason, 'all one needs to know is already known', can be interpreted in a few ways. For example, a local government on a "need to know" basis with the public and not being transparent on certain issues that may affect them. There are different pathways of educational learning such as, at the national level or internationally with universal (United

Nations – UN), sectoral (United Nations Environmental Programme – UNEP, United Nations Educational, Scientific, and Cultural Organization - UNESCO, etc.), and NGO/NPO (ChuraMura) organizations. These pathways can be how I mentioned above or formal, informal, special, research, or environmental. *Environmental learning*, explained in JR Kimmels article, *Ecotourism as Environmental Learning*, poses advances for environmental education and ecotourism as it can lead to affection, love, and care for the marine and natural environment for both tourists and locals. Spending more time in our natural environment can equate to more appreciation and awareness of how our actions can impact our environment. In 2019, Kuo, M., Barnes, M., & Jordan, C. article, *Do Experiences With Nature Promote Learning? Converging Evidence of a Cause-and-Effect Relationship*, explains that our increased experiences with nature can contribute to extensive academic learning, 'personal development' (physically, spiritually, and mentally), and sustaining the environment. Some examples include, but are not limited to, "promoting learning by improving learners' attention, levels of stress, self-discipline, interest and enjoyment in learning, and physical activity and fitness. Nature also appears to provide a calmer, quieter, safer context for learning; a warmer, more cooperative context for learning" (Kuo & Barnes & Jordan: 2019, p 1). Stevenson, R. B., Brody, M., Dillon, J., & Wals, A. E. study, *International handbook of research on environmental education*, found three themes for students' 'environmental learning experience' as (Stevenson & Brody & Dillon & Wals: 2014, p 246):

1. *Students dealing with emotions and values – the challenges for students of having to deal with their own values and emotions in the environmental learning situation*
2. *Students' view on relevance – the extent to which students' see environmental learning as relevant to particular curriculum subjects, to themselves as learners and to their personal/perfessional futures*
3. *Negotiating viewpoints amongst students and teacher – the ways in which differences betweens teachers' and students' viewpoints can present challenges for student engagement and learning*

There are many educational programmes related to ecotourism as it is a concept that is a 'subcomponent' of sustainable tourism. Some examples include National Geographic (NatGeo) 'explorer classrooms', expeditions, degree courses, programmes, or modules, volunteer work, and internships at *The International Ecotourism Society* (TIES) or at marine rescue and rehabilitation centers, and documentaries educating on biodiversity and climate change. What

can these educational programes teach us and how impactful are they really for ecotourism? NatGeo explorer classrooms provide face to face interactions with NatGeo photographers, researchers, and scientists and educate children about findings of new species, nature conservation, both marine and space, and 'youth leading initiatives'(NAT GEO: 2023). Iakovoglou, V., Zaimes, G. N., Bermúdez-Cañete, M. A., García, J. L., Giménez, M. C., Calderón-Guerrero, C., ... & Abrudan, I. article, *Understanding and enhancing ecotourism opportunities through education*, explained that ecotourism educational modules were created in order to give people (or students) the proper knowledge and tools for jobs in the environmental and sustainability sector (Iakovoglou & Zaimes & Bermúdez-Cañete & García & Giménez & Calderón-Guerrero & Abrudan: 2015, p 2643). With proper knowledge and tools, it paves a clearer pathway to understand exactly what needs to be addressed. These modules are (Iakovoglou & Zaimes & Bermúdez-Cañete & García & Giménez & Calderón-Guerrero & Abrudan: 2015, p 2643):

1. *Concept and Importance of Ecotourism and Sustainable Tourism*
2. *Natural Heritage and Biodiversity*
3. *Cultural Heritage*
4. *Environmental Management and Quality (basic understanding for single water technology layouts and solid waste management)*
5. *Ecotourism Products*
6. *Green Building (sustainable architecture)*
7. *Geographic Information Systems (GIS)*
8. *Marketing of Ecological and Sustainable Tourism Destinations*
9. *Economic Resources and Financial Management of Funds*
10. *Social Responsibility and Environmental Best Practices: Land Stewardship*

Internships allow a person to gain work experience, when their education may not be enough to be hired within the industry they are searching in. They help us learn skills such as teamwork and building up our organizational and communication skills, and more. Undertaking an internship with a marine rescue or rehabilitation center can consist of working hands-on with marine life, being able to learn their patterns and behaviors, and assisting in their medical history. Documentaries on biodiversity and climate change, on a personal level, help me understand further/connect me to nature, but studies have been conducted that show

documentaries such as David Attenborough's *Our Planet* on Netflix, lack data that shows its impact on its viewers. Although it can help educate viewers about 'threats to nature' and conservation efforts, they avoid discussing the actual impact caused by humans, and steering away from philosophical arguments such as, if we can forget certainty and dualistic thoughts of separation and hierarchy (Bird Rose: 2011, p 47) and move towards being eco-centric. Both authors, McKay, C. J., Sommer-Trembo, C., & Sánchez-Villagra, M. R. of, *The portrayal of animal interactions in nature documentaries by David Attenborough and Bernhard Grzimek. Evolution: Education and Outreach,* and C. Anderson of, *Examining The Content And Impact Of Nature Documentaries,* agrees on conducting further empirical research. In regards to its impact on ecotourism, J. Smith's article, *Netflix's new David Attenborough series Our Planet shows us what tourism's future might be,* says instead of focusing only on our relationship with nature (eco-centric), we should focus our attention *with* one another in how we communicate and address other issues. Topics like a community's history or socio-economics, "our relationships with threatened nature, with marginalized communities, with indigenous peoples"(Smith: 2019).

Japan joined the United Nations (UN) in 1956. They are also members of the UNs specialized agencies *Food and Argriculture Organization* (FAO), *The United Nations Educational, Scientific, and Cultural Organization* (UNESCO), *The United Nations Children's Fund* (UNICEF), and *United Nations Environment Programme* (UNEP). In 2007, the FAO legislated the Ecotourism Promotion Act (No. 105) and it was entered into force on the first day of April, 2008. The Ecotourism Promotion Act of 2007 consisted of "20 articles on promoting Ecotourism with consideration of preserving natural resources and development of local economies. The Act asks Municipalities to establish Ecotourism Promotion Councils to prepare overall concepts for promoting ecotourism as well as play a coordinator role among different related sectors" (FAO: 2007). That act was amended in 2008 and was replaced with the *Ordinance for Enforcement of the Ecotourism Promotion Act* (No. 1) in 2010.

Japan has a tourism organization called *Japan National Tourism Organization*. The organization has a website that has a section on how to be a more responsible traveler (sustainable traveler experiences). '10 ways to travel responsibly in Japan' (JNTO: 2023):

1. *Honor Japan's Rich Natural Environment*

2. *Taste Seasonal Marine and Mountain Delicacies*
3. *Stay in Historic Buildings*
4. *Immerse Yourself in Japanese Culture with Traditional Festivals and Performing Arts*
5. *Support Local Artisans: Bring Back a Piece of Japan*
6. *Roam Roads Less Traveled with Japan's Extensive Public Transportation Network*
7. *Stay Longer and Explore More Deeply with Locals*
8. *Visit during Off-Seasons and See a New Side of Japan*
9. *Act like a Local while Travelling*
10. *Share Your Travel Experiences*

A sustainable travel guide for Japan suggests various eco-friendly activities such as staying in sustainable accommodations, trying local cuisine, engaging in traditional arts, visiting craftsmen, meeting the Ainu tribe, and experiencing festivals. During a trip to Tokyo, Kyoto, and smaller cities, we took precautions to respect the local culture. We learned basic phrases, stayed in a traditional Ryokan, and immersed ourselves in Japanese traditions and nature. These activities align with ecotourism, but it raises the question of how local communities respond to this form of tourism. During our travels, we made sure we were cautious as we were guests in Japan. Firstly, we wanted to make sure we could communicate with the locals so we brushed up on basic phrases that could help us with daily tasks such as *Ohaiyogozaimasu* – good morning, *Konichiwa* – good night, *Ogenkidesuka* – how are you, *Arigatogozaimasu* – thank you very much, *Doko wa desuka* – where is this, *Kore wa desuka* – what is this, and *Ikura* – how much. Secondly, we stayed in a *Ryokan* – traditional Japanese style hotel. Third, we explored Japanese traditionals like going to a summer food festival, where we were the only foreigners, visit the imperial palace and other temples, take part in a kimono and tea ceremony ritual, and escape the city and walk around nature by the Arashiyama river. These were just some of the things we did that can be categorized as 'ecotourists'. But, how do local communities respond to ecotourism?

3. Ecotourism in Okinawa

What is ecotourism like today in Japan and Okinawa? Are there any policies or frameworks put in place to ensure the natural environment does not continue to deteriorate? How welcoming are the local community? Will ecotourism hurt or help the local community socio-economically? According to Riho Imagawa and Brian Harrisons article, *The Current*

State of Ecotourism in Japan, states that recognition of ecotourism in Japan is low and they categorized their findings by local government, private operators (tour organizations), and the general public (Harrison & Imagawa: 2021, p 48-49):

- *Local government: "approximately 80% admitted that they did not have a council for ecotourism"*
- *Private operators: "approximately half of them stated that they were experiencing difficulty with securing and managing staff resources"*
- *General Public: "only 13.8% of respondents said that they knew the meaning of ecotourism…the rate for young people in their 20s was even worse, and the number of people who said that they had in fact participated in an ecotour was a mere 3.6%"*

In their article, *Ecotourism Policy Research Trends in Indonesia, Japan, and Australia*, Sisriany and Furuya compare ecotourism trends in these three countries. They find that Japan emphasizes heritage tourism and shares biodiversity aspects and community participation approaches with Indonesia, while focusing on sustainability like Australia. However, Japan lacks a strong focus on conservation and management. This information is based on their research from 2020 (Furuya & Sisriany: 2020, p 184). Looking specifically at Okinawa, the local government has preferred foreign tourists as they have brought an increasing amount of economic revenue compared to local tourists [including mainland Japan] with revenues "rising 21.5 times over 1974-2018 to 697.9 billion yen" (Harrison & Imagawa: 2021, p 51) and not only know about what ecotourism is, but they have shown more interest in partaking in ecotourism activities.

Ecotourism in Okinawa is lacking in aspects of conservation, like mentioned above, but more importantly for this thesis, on marine conservation of sea turtles. Mendes, S., Martins, J., & Mouga, T. article, *Ecotourism based on the observation of sea turtles – A sustainable solution for the touristic promotion of são tomé and príncipe*, explains that revenue from wildlife-based ecotourism, particularly sea turtle conservation, does not only "contribute to the conservation of these endangered species, through the implementation of conservation plans and educational strategies" (Mendes & Martins & Mouga: 2019, p 5), but it also provides employment opportunities of the local community, such as guides, 'conservation guarding', craft selling, and more. Japan adopted the *Ecotourism Promotion Act* [Act No. 105] in 2007. Regarding

ecotourism and education, "necessary consideration must be given to promote the utilization of Ecotourism as opportunities for environmental education, in view of the importance of deepening citizens understanding of environmental conservation" (FAOLEX: 2007, p 2).

Some examples around Japan include, the most famous ecotourism destination, Mount Fuji. The entry fee covers the preservation of the volcanic grounds. In Kyoto, the city provides tourists with traditional Japanese architecture and traditions, allowing you to educate yourself on Japanese cultural and historical heritage, and participate in traditional green tea, *ikebana* [flower arrangements], and geisha ceremonies. The archipelagic islands that make up Ogasawara Islands provide scientific research with research facilities and educational programs as the islands are home to many endemic and rare species like birds, whales, turtles, etc. and can help provide insight to evolutionary processes. There is a huge green sea turtle breeding and nesting area along the islands and a marine conservation center. I will explain further in chapter two. All three of these examples embody environmental education, but they are, in my opinion, overly studied and I wanted to research a subject that needs more extensive understanding, research, and development, but still holds the same amount of significance culturally, environmentally, socio-economically, and politically.

I found there are a significant number of similarities between Hawai'i and Okinawa and wanted to explore further. Some similarities between the islands are its history with WWII, military occupation, annexation of a kingdom leading to loss of identity, traditions, and values, and its socio-economic dependency on tourism. I like to focus my studies on islands in the Pacific Ocean as I grew up there and I've noticed living around the world when conversing with people, they do not know much of their true culture, history, socioeconomics, environment, etc.. I think it's important to spread awareness of their true situations. Not all, but most islands can be considered 'underdeveloped' in regard to structure and proper management, underlying their ability or want to conserve their environment. Academically and/or professionally, in the past, I have spread awareness by conducting research, writing essays, a thesis, and presentations on Hawai'i, Tuvalu, and Indonesia. I'm now currently interested in Okinawa because in Hawai'i there is a mix of ethnicities and cultures that together make Hawai'i what it is today. There is a mix of Hawaiian, Filipino, Portuguese, Chinese, and Japanese, so I am familiar with Japanese language, culture, and tradition. Hawai'i is also advertized as one of the best places to vacation, or move to (if you're rich enough), along with

this, there is the presence of the military. Okinawa has recently also been advertized as 'The Hawai'i of Japan' and has a US military presence.

Before my own research, I was unfamiliar with Okinawan traditions, practices, and knowledge, as there are some differences between the islands and mainland Japan, particularly towards the sea. Also, I found out that there was no organization to help protect sea turtles in Okinawa until 2020, only three years ago! This information was astonishing to me because of how significant green sea turtles are in my culture; I wanted to understand why there wasn't a need for Okinawans to protect such an ecological useful reptile. This called for me to understand not only Okinawan history, but how their current culture, socioeconomics, politics, and environment affect one another, its people, and apply it to how it essentially affects green sea turtles.

Before Okinawa was a prefecture of Japan, it was known as the Ryukyu Kingdom. The Ryukyu Kingdom ruled from 1429 until 1879 until Japan annexed the monarchy. Since the 10th century, Okinawa can be classified under six eras: prehistoric (life revolving around fishing, hunting, and gathering), Gusuku era (boom in conflict of territories thus development of castles (Gusuku), Sanzan era (three major political spheres were developed and traded with China's Ming dynasty), 'The Great Trading' era (trade between Japan, China, Philippines, and Thailand, influencing Okinawan culture and traditions). At the end of 'The Great Trading' era, the Ryukyu Kingdom was annexed and became known as Okinawa prefecture of Japan. After, there was WWII. Okinawa suffered a lot of casulaties as it was the main battleground for Japan and the USA during the war. Survivors of WWII also lost a lot of their culture, it affected their economy, and impacted their desire to adopt certain conservation practices that can still be seen today.

Yoshimasa Matsuzawa's report, *Sea Turtle Conservation in the Land of Urashima Taro*, established that Post-WWII economics led Japan to being "one of the world's worst nations for sea turtle conservation" (Matsuzawa: 2018). The war had ultimately led to Okinawa being placed under USA military control until 1972. Okinawa was returned to Japan after, but there are a lot of American influences as the US military still occupies the islands. Today, Okinawa is known as a vacation spot as it has clear blue waters, historical sites, and a relaxing culture, but is cheaper and closer to other Asian countries than Hawai'i is. But, Okinawans still face disparities as they have lost the majority of their identity, traditions, and values that preceded

WWII. Disparities include a lack of 'human freedoms': inequality, social class, access to healthcare, education, nature, proper infrastructure/housing, nutrition, water and waste management, and income. Kate Barclay explains in her article, *Between modernity and primitivity: Okinawa identity in relation to Japan and the South Pacific*, that Japan was (and still is in some senses) obsessed with Japanese nationalism that went 'beyond structural political and economic change' and based on 'notions of cultural and racial homogeneity' (Barclay: 2006, p 119-120) that led the suppression of Okinawan language, religion, basic human freedoms like sanitation and medical treatment, timekeeping, and prohibiting bare feet. All of these factors have an effect on Okinawans being able or wanting to adopt certain behaviors or practices to be more sustainable and conserve their natural environment and its resources.

According to the Japanese government, Ryukyuan, or Okinawans, are not classified as indigenous people. Patrick Heinrich and Giulia Valsecchi article, *Ryukyuan Language Reclamation: Individual Struggle and Social Exchange,* explain Ryukyuan language, culture, and customers were 'forced' into the Meiji state and declared "epiphenomena of Japanese language, culture, and customs" (Heinrich & Valsecchi: 2023, p 140) after the military annexation of the Ryukyuan Kingdom, ultimately resisting the acknowledgement, and to this day, a debate on whether Ryukyuan, or Okinawans, derive from Japanese or are classified as their own, separate from Japanese. This is like the same situation of when the Hawaiian Kingdom was annexed in 1893 by the United States of America (USA) and still to this day, there is a debate on whether Hawai'i was one: illegally annexed into becoming the 50th state of the USA and two: whether Hawaiians should be identified as Hawaiians or Americans. And, this has caused many people and organizations like the MRG, Cultural Survival, the Association of Comprehensive Studies for Independence of the Lew Chewan Peoples, All Okinawa Council for Human Rights, and Nirai Kanai nu Kai (Indigenous Peoples' Organization for the Repatriation and Aerial Reburial of Ryukyuan Human Remains into original Ryukyuan Graves) to submit a human rights violation by Japan to the UN Human Rights Council. A more accurate representation of the current people in Okinawa may be with the term 'Local Ecological Knowledge'. Defined in Danielle Rodrigues Awabdia, Davi Castro Tavaresa, Ana Cristina Vigliar Bondiolib, Camilah Antunes Zappesc, and Ana Paula Madeira Di Beneditto article, *Influences of conservation action on attitudes and knowledge of fishermen towards sea turtles along the southeastern Brazil*, as "the knowledge of the members of [these] communities about the natural resources that are part of their economy or subsistence and acquired through personal experiences and transmitted between family members or from older

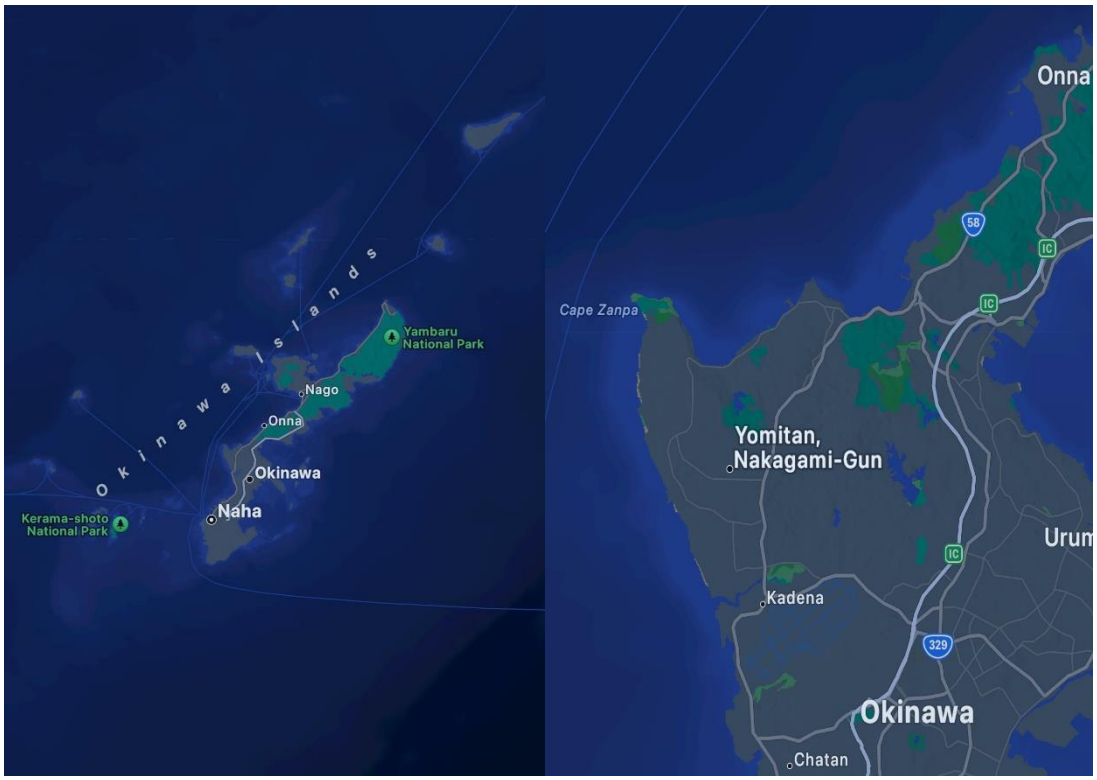
to younger people in the community" (Awabdi & Tavares & Bondioli & Zappes & Di Beneditto: 2018, p 57).

Ecotourism does exist in Okinawa now though as tourism helps feed the local economy. Ecotourism in Okinawa comes in the forms of cultural and environmental ecotourism. Cultural ecotourism includes Ryukyu dancing, glass making class, textile class, pottery, a *Sanshin* [okinawan banjo] ceremony, karate show, and more! Some examples of environmental ecotourism include diving and kayaking excursions in coral reefs and with whales, fish, dolphins, or exploring rare flora and fauna, or the nine UNESCO World Heritage Sites. Throughout the Okinawa Islands, in order to preserve biodiversity, landscapes, etc., the island of Ishigaki prohibits swimmers in Kabira Bay. But, Okinawa Island, Iriomote Island, and Kerama Islands tourists can swim with sea turtles, manta rays, whales, dolphins, and hammerhead sharks so laws and regulations are quite vague or varying depending on the island. Andrea E. Murrays research in Okinawa, *Footprints in Paradise:Ecotourism, Local Knowledge, and Naure Therapies in Okinawa,* categorizes the average socioeconomic characteristics of an 'ecotourist' to be "mostly women in their twenties, of the highest educational background" and 'sub-categorized' to be, similar to myself, (Murray: 2017, p 11-12):

- *Socially Aware (politically active)*
- *Visible Achiever (interested in material success)*
- *Young Optomist (age 18-24)*

Yomitan Village in Okinawa is the setting of my case study. Yomitan Village is located on the main island of Okinawa, about an hour drive away from the capital city, Naha. There are 47 prefectures in Japan and Yomitan Village is one of the smallest prefectures with 1.4 million residents. The village, culturally enriched, is known for being the birthplace of the *Sanshin* [okinawan banjo], *Beni Imo* [okinawan sweet potato] (purple in color), *Yomitanzan-Hanaori* textiles and *Tsuboya* pottery, and home to the UNESCO World Heritage site 'Zakimi Castle'. Economically, surprisingly, fishing, fishermen, or the overall fishing sector/industry in Yomitan only accounts for 6% of its economy, where 69% is engaged into the tertiary sector.

The tertiary sector includes businesses such as hotels and restaurants. Along the coastline, there are over 20 hotels and restaurants, including big franchises such as Hilton and Marriot.



(Photo 1. Map of the Okinawa Islands and Yomitan Village, Okinawa. Source: Google Maps)

In regard to ecotourism that focuses on marine conservation, particularly of sea turtles, Okinawa is lacking, but the non-profit organization (NPO) *ChuraMura,* located in Yomitan Village, Okinawa Island, is the first every organization to conduct research and data on the island and provide educational presentations, seminars, and exhibitions to kids, students, tourists, hotel, etc., on topics of climate change concerns. Topics of concern include biodiversity, sustainability, air and sand temperatures, fishermen and fisheries, ocean acidification, plastic, noise and light pollution, tourism, management, and most notably marine conservation of sea turtles. On October 21, 2023, they held the first ever 'Okinawan Sea Turtle Festival'.

4. Nature based. Ecotourism and Traditional Ecological Knowledge

Nature based solutions for tourism is considered a more recent solution for problems such as climate change (Padma & Ramakrishna & Rasoolimanesh: 2022) and what can come

along with it such as, but is not limited to – socioeconomic poverty, over tourism, and environmental degradation. Ecotourism can revolve around the cultural, educational, scientific, and agriculture of a travel destination.

Ecotourism in Okinawa is described in Andrea Murray's book, *Footprints in Paradise: Ecotourism, Local Knowledge, and Nature Therapies in Okinawa*, as "promise[ing] to provide employment for a dwindling population of rural youth while preserving the natural environment and bolstering regional pride" (Murray: 2017). Ideologies and themes of ecotourism are like those of people whose connection to nature is ingrained into their culture, so it is important to spread awareness and education to those where nature is not ingrained into their culture, especially with the younger generations and those who follow as they will be the ones facing the changes and challenges their whole lives. Peoples' connection to nature is commonly associated with indigenous people as it plays a significant role in impacting their physical, mental, and spiritual health. Explained through love, in chapter ten *World-Crazy* of Bird Rose's book, *Wild Dog Dreaming*, connectivity is "the ecological fact that organisms and environments permeate each other, are mutually constitutive, and thus mutually necessary and sustaining" (Bird Rose: 2011, p 118). Indigenous people, saving what they love, is just another part of living. Nature provides so much for us so how we treat nature affects us. If we correctly learn from their practices and knowledge, it can lead to a transformational change. Pushing away negative impacts can bring us closer to 'eros- desire for life, connection, others, and self and ethics- opens us to interactive, world-making encounters' that facilitate the capacity to live together in the long term thus allowing science, culture, and nature to work in harmony.

Okinawa and the Ryukyuan people- indigenous people of Okinawa- have a complex history exposed to war which has caused vulnerability with socio-economic, political, and environmental disparities. This has created the islands and its native people to have a unique lifestyle, incomparable to the mainland of Japan, still seen today. To further understand the effects Okinawa and its indigenous people have endured it is important to define the term *indigenous people* and *traditional ecological knowledge* (TEK or IEK).

The United Nations (UN: 2022) define Indigenous people as:

inheritors and practitioners of unique cultures and ways of relating to people and the environment. They have retained social, cultural, economic, and political characteristics that are distinct from those of the dominant societies in which they live. Despite their cultural differences, indigenous peoples from around the world share common problems related to the protection of their Indigenous peoples have

sought recognition of their identities, way of life and their right to traditional lands, territories, and natural resources for years, yet throughout history, their rights have always been violated. Indigenous peoples today are arguably among the most disadvantaged and vulnerable groups of people in the world. The international community now recognizes that special measures are required to protect their rights and maintain their distinct cultures and way of life.

The definition of Traditional Ecological Knowledge (TEK or IEK) is (Berkes: 1993, p 151):

an attribute of societies with historical continuity in resource use practices; by and large, these are non-industrial or less technologically advanced societies, many of them indigenous or tribal.

In Okinawa, there isn't a strong current presence of indigenous practices and knowledge, especially in ways to conserve the natural environment as it has been politically suppressed. My research led me to find only one Okinawan mythology story relating to sea turtles, *Urashima Tarō*. Similar in Shinto and Buddhism, Urashima Tarō was a fisherman who helped save a sea turtle from troubling boys. As a reward, the turtle brought Tarō to the underwater dragon palace of Ryugu, home of princess Otohime. Some say they became really good friends, others say they were lovers, but Tarō wanted to return home after a while so Otohime let him. Before Tarō left Otohime, she gave him a box, but warned him not to open it. When he returned, no time had passed for him, but everything felt foreign to him. He found out that over 300 years had passed! Because of this, he opened the box that Otohime gave him and his age finally caught up to him.

5. Cultural tourism

The United Nations World Tourism Organization (UNWTO) defines cultural tourism as "activity in which the visitor's essential motivation is to learn, discover, experience and consume the tangible and intangible cultural attractions/products in a tourism destination" (UNWTO: 2023). Such cultural attractions and products can include arts and architecture, historical and cultural heritage, food, literature, music, and appreciating the lifestyles, beliefs, and traditions of a culture. Ryukyu culture is still prominent and is an indicator or influence of Okinawan indigenous people and culture today. Okinawa, particularly Yomitan Village and the surrounding area, is known especially for traditional arts, performing arts, and crafts like pottery or ceramics, glass, textiles, weaving, dyes, *sanshin* - a musical instrument, dances – like the *kumiodori*, folk, as well as Ryukyuan ruins, abundant agriculture, and beautiful nature

like clear and blue beaches, that tourists love to visit. Regarding architecture, there are a lot of historical and cultural temples and ruins that have dated back to the Ryukyuan Kingdom. Yomitan Village is the home of Zakimi Castle, one of nine UNESCO World Heritage Sites in Okinawa, which was used as a 'safeguard' from the North Kingdom. In 1879, the Ryukyu Kingdom became Okinawa as it transitioned under Japanese rule and the islands became a Japanese prefecture. Since then, a few wars have occurred. Its historical heritage includes *The Battle of Okinawa*, in World War II, on April 1, 1945. The battle lasted for two months, ending on June 22, 1945, with America claiming victory. The Battle of Okinawa claimed the lives of millions including U.S. troops, Japanese, and civilians native to Okinawa. There were also camps where people were forced to live in unhealthy conditions, and they were provided turtle eggs as a source for food – a contribution to why there is push back for marine conservation of green sea turtles. Because of its historical heritage, Ryukyuan identity was lost, but revitalization efforts from indigenous academics, like Seira Machida, and her partner Yumiko Ohara, in Yomitan Village have been made to preserve their culture. Revitalizations of one's culture or identity have impacts on the person's physical, spiritual, and mental health.

6. Scientific tourism

Scientific tourism can be categorized into four forms: cultural trips, scientific expeditions, eco volunteering, and scientific research. Based on the topic of this thesis in Okinawa, it will be best to solely focus on scientific research tourism. Scientific research tourism is based "on the scientific method and the advancement of knowledge to contribute to the understanding and resolution of environmental and social challenges of territories attractive for tourism" (Scientific Tourism Network: 2021) and can be defined with what Mongush explains, "actively observed, carried out research works, interviewing local people and/or a regularly kept diary" (Mongush: 2014). The purpose of scientific research is to conduct field work and collect data for scientific and educational purposes. As field work is involved, it would be considered 'long term' tourism because fieldwork is usually a minimum of two or three months up to a year, or in some cases, multiple years. In Okinawa, there are many research facilities focusing on many topics relating to the marine environment including the graduate university *Okinawa Institute of Science and Technology (OIST),* NPO ChuraMura in Yomitan Village, *Churaumi Aquarium* in Motobu Town [Kunigami District], and coral farms: *Sea Seed* and *Sango Batake* in Yomitan Village and *Reef Builders* in Onna Village. OIST marine related

disciplines include *Ecology and Evolution* and *Marine Sciences* with specialties in coral reef restoration and the assembling orange clown fish and spiny damselfish genomes, transcriptomes, and proteomes within their *Marine Climate Change Unit*. They also provide a *Research Internship* open to all graduate and post-graduate students. In hopes to achieve sustainable tourism, OIST created a 'regional revitalization plan' in Onna Village in hopes to "promote the development of all the areas of Onna Village by protecting its beautiful ocean as a valuable resource for tourism and aquaculture and improving the visibility of the Village through marine science research conducted at OIST" (Okubo: 2022) with the creation of an 'Ecological Smart Resort'. Yomitan Village, Onna Village, and sometimes Chatan, are the main areas in Okinawa Island where green sea turtles can be found. In December 2022, OIST and the governor of Yomitan Village signed a Memorandum of Comprehensive Collaborative Agreement in December 2022 that covers (Gakiya: 2022):

Regional cooperation and revitalization, Exchange of human resources and knowledge, Education and human resource development, Joint scientific surveys, research, and projects, ***Environmental conservation in the community****, and other matters necessary to achieve the objectives of this agreement.*

ChuraMura will be explored later as it is my case study, but the Churaumi Aquarium and Sea Seed work closely with the non-profit organization. The Churaumi Aquarium has a research facility called, *Research and conservation activity in Okinawa Churaumi Aquarium* where they facilitate breeding programs, winning awards for 26 species, conducts research and collects data of the animals connected to the aquarium, assessing the welfare of animals, and protecting endangered species through rescue, release, and 'head starting' programs.

In January 2020, a weakened green sea turtle was found on a beach in Itoman City, Okinawa. The green sea turtle weighed 4.7 kg (10.4 lbs) and was 36.4 cm (14.3 in) in length. The aquarium diagnosed the turtle with digestive issues and a bacterial infection, causing difficulties in swimming. They treated the turtle with vitamins, antiparasitic drugs, and antibiotics. In July 2020, another green sea turtle was found stranded on a beach in Nago City, Okinawa. The green sea turtle weighed 6.9 kg (15.2 lbs) and was 44.4 cm (17.5 in) in length. The aquarium diagnosed the turtle with a healed injured front left flipper and also had digestive issues. After review, the turtle was released. In 2021, a dead juvenile green sea turtle was found in Chatan Town, Okinawa. The weight of the green sea turtle was not recorded but was 6.5 cm

(2.6 in) in length. In its stomach, plastic debris and pumice was found. In 2022, 119 green sea turtle eggs were found on the beach in Motobu Town, Okinawa. Due to low temperatures of 15 degrees Celsius, the eggs were collected, placed in an incubator at the aquarium, and were kept after hatching until the summer when ocean temperatures increased. Lastly, most recently in April 2023, a green sea turtle that was rescued by ChuraMura, as it was found drifting, was transferred to the aquarium in February, but unfortunately died and it is believed that the barnacles attached to its body may have one effect. In the wake of a major storm in mid-March, ChuraMura conducted a successful rescue operation for a stranded green sea turtle. The turtle was temporarily housed at the SeaSide Coral Farm facility in Yomitan Village before being transferred to the Churaumi Aquarium for assessment and recuperation, as it exhibited signs of not eating.

Sea Seed Coral Farm has a rehabilitation center for ChuraMura, but if intensive care is needed, it is taken to the aquarium discussed above. Sea Seed, Sango Batake, and Reef Builders facilitate coral research, building coral fields, and promote biodiversity, allowing the public to experience. Sea Seed rehabilitates and transplants coral. 20 years in the making, Reef Builders have built what is known as 'Coral Fields' because of a bleaching event in Onna Village. In Onna Village, coral reefs are essential to their culture, especially with fishing as Onna Village is considered a fishing village. The coral farms have successfully attracted ecotourists.

7. Agriculture tourism

Agri-ecotourism is a combination of agriculture tourism and ecotourism, explained by the UN Food and Agriculture Organization (FAO), it can provide sustainable economic stability for small-scale farmers 'to commit to biodiversity-friendly agriculture management' and in tropical countries, "extraordinary biodiversity have an untapped potential for generating tourism business around biodiversity-rich farms" (FAO: 2023). In Okinawa, there are many agricultural sectors including: fisheries, sugar cane, starch vegetables, etc… Regarding fishermen and fisheries, as they directly and indirectly affect marine conservation, nearly 95% of fishermen are from small-scale fisheries, providing half of the world‘s fish for human consumption supply for local and regional markets. Threats of fisheries include external threats such as politics and large-scale fisheries, an increase in industrialization, technology, finance, not being mass produced, having low prices, and rising prices in the local and regional markets.

Fishermen's livelihoods are made up from physical, financial, natural, human social and cultural capital (Tikadar & Islam & Saha & Alam & Barman & Rahman: 2022). In accordance with international cooperation, fishermen and fisheries in Japan ensure that the overuse and mistreatment of marine life and resources 'must be avoided' (Ministry of Foreign Affairs Japan: 2022) as their initiatives and functionality of orientated knowledge of the marine ecosystem consists of all small-scale fisheries developing it, emphasizes the time and conditions of availability, definite ideas for best methods of conservation, and IEK may not be transmitted entirely in the same way it was in the past. Plagerson explains it is 'essential' to "guide improved large-scale [and small-scale] management, prioritize investments, and inform policies" (Plagerson: 2020, p 8), but risks and benefits of marine conservation need to be considered.

8. Covid-19

Covid-19 impacted the whole world around March 2020, essentially halting everyones lives, shutting down every business, tourism, and people losing their jobs. With the world shut down, the natural environment substantially restored itself. Mountain goats were sighted roaming the streets in Wales (CNN: 2020), Dolphins swimming along a port in Sardinia (Wray: 2020), and sea turtles restoring their nesting grounds in Okinawa (Bastian: 2023). Covid-19 in Okinawa has caused a blow to the local economy on the fishing, tourism, tertiary, and cultural industry, as well as affecting the social life of Okinawans. Robert D. Eldridge's, *The Japan Times*, article describes Covid-19 in Okinawa as a 'wasted' year (Eldridge: 2021). Okinawa Times article, *As COVID-19 compounds Okinawa's tourism woes, industry looks for a way* out, explains the Okinawan government was looking for solutions regarding potential layoffs due to the global pandemic (THE OKINAWA TIMES: 2021). They also state that if layoffs were to be made, once borders open, there could be labor shortages, but as international borders opened about five months ago and tourists are slowly returning, it is too soon to understand what will happen to the near future economy. As of May 2022, *The Observatory of Economic Complexity*, shows data that Okinawa is ranked number 41 out of 41 prefectures in Japan when it comes to economic complexity. Economic complexity can be defined as (OEC: 2023):

both an academic field and a concept. As an academic field, Economic Complexity studies the geography and dynamics of economic activities using methods inspired in ideas from complex

systems, networks, and computer science. That makes the field of Economic Complexity somehow unique, is that it studies the geography of activities using an outcomes based approach. That is, instead of trying to figure out what capabilities or factors drive an economy, it uses data on the geography of economic activities to infer the presence of bundles of capabilities

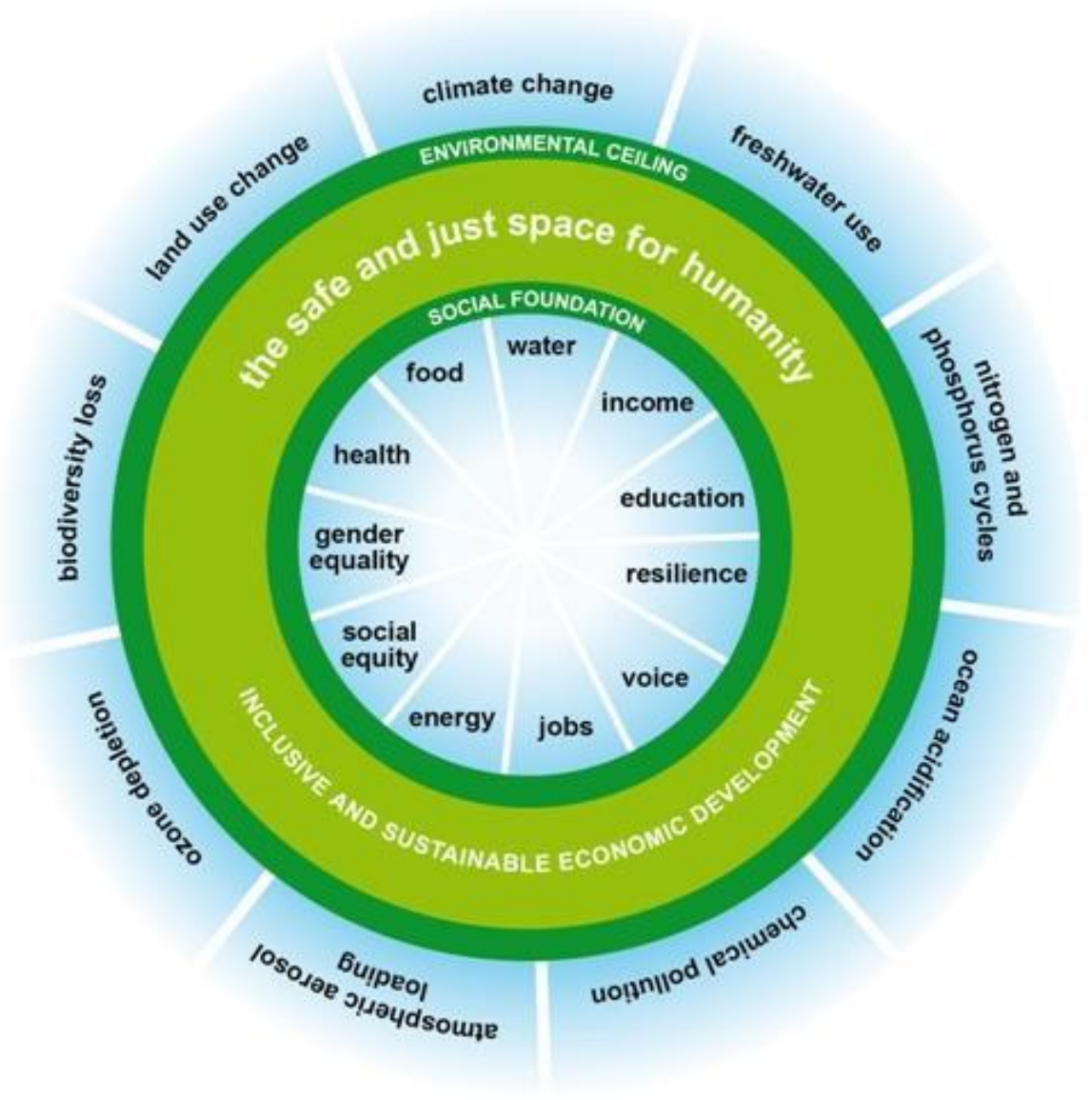
Economic complexity is measured by the *Economic Complexity Index*, also known as ECI. It is used to "predict a country's expected level of income, economic growth, income inequality, and greenhouse gas emissions…" (OEC: 2023) and Okinawa was measured at -0.52 ECI, where in 2021, Japan's index was 2.06 ECI. The index is also known to indicate inclusive green growth. Inclusive green growth "combines the development vision of ecological environment protection, social equity, and sustainable growth, and is an important tool to promote the construction and sustainable development of eco-civilisation" (Zhang & Guo & Bashir: 2022, p 58). As Okinawa ranks the lowest, there is a lot that needs to be addressed and changed.

9. Sustainable management.

Sustainable development is defined in the Brundtland report as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (UN: 1987, p 37). Without proper management, sustainable development cannot be achieved. Sustainable management is a concept that combines sustainable development and management, involving all stakeholders, focusing on the accountability economics have in conservation efforts and safeguarding biodiversity. Thanks to *The World Bank* (WTB), the *Blue Economy* is usually seen as a 'blueprint' for ecotourism solutions. The *Blue Economy* is defined as "sustainable and integrated development of economic activities in healthy oceans through policies that determine whether the use of oceanic resources is sustainable and traditional uses- fisheries, tourism, maritime transport- and emerging activities- offshore renewable energy, aquaculture, etc.… With collaboration across nation-states and across the public-private sectors, and on a scale that has not previously been achieved" (Kemper: 2019).

The *Doughnut Economics* model can help people visually understand what needs to be focused on to achieve such sustainability. The hole of the doughnut correlates to 'critical human

deprivation' – social foundation and indicator shortfalls in (Raworth: 2017, p 39): water, food, health, education, income and work, peace and justice, political voice, social equity, gender equality, housing, networks, and energy. The first part of the doughnut correlates to 'social foundations'. The middle part is 'the safe and just space for humanity'. The most outward part of the doughnut is the 'ecological ceiling'. Outside the doughnut is the 'critical planetary deprivation' – overshoots which include climate change, ocean acidification, chemical and air pollution, nitrogen and phosphorus loading, freshwater withdrawals, land conversion, biodiversity loss, and ozone layer depletion. For marine conservation of green sea turtles in Okinawa, this reformist approach should be adopted to have sustainable management and development, mainly focusing on the education of marine conservation, and sustaining the management of health, income and work, peace and justice, political voice, and social equity. It can be done through integrated ocean, marine protected area (MPA), fisheries, and educational management, and policy frameworks. This will be done in the next chapter.



(Photo 2. Oxfam Doughnut Economics Model. Source: (Sayers & Trebeck: 2015, p 3)

In Giovanni Bulian's article, *The Multilocality of Satoyama: Landscape, Cultural Heritage and Environmental Sustainability in Japan*, the term Satoyama is introduced as a representation of the Japanese landscape. It signifies the collective efforts, both national and international, to safeguard local territories and promote human well-being, eco-justice, ecological awareness, cultural heritage preservation, tourism enhancement policies, and environmental protection. Building upon this knowledge, further research revealed the existence of another term, Satoumi, which pertains to the human connection with and the preservation of marine ecosystems. The concept of Satoumi was formally introduced in 1998. In Japanese, *sato* means an area where

people live and *umi* refers to the sea. Characteristics of *satoumi* include humans and nature coexisting rather than humans 'overtaking' the environment (Kakuma & Sato: 2022, p 2). The concept provides an operational framework that 'guides' the desired coastal zone of an area and can "reflect the current social-ecological state" (Uehara & Niu & Chen & Ota & Nakagami: 2016, p 804). Satoumi therefore can provide sustainable management of local communities, economic growth, and conservation and sustainable use of the marine ecosystem for sustainable development, all UN SDG goals. According to Shinichiro Kakuma and Masahito Kamimura's article, *Satuomi in an Okinawan Coral Reef System*, the concept is generally defined as "marine and coastal landscapes that have been formed and maintained by prolonged interaction between humans and ecosystems" (Kakuma & Kamimura: 2010). Tetsu Yanagi further defines *satoumi*, in his book with Shinichiro Kakuma, *Satoumi Science: Co-creating Social-Ecological Harmony Between Human and the Sea*, with "high productivity and biodiversity in the coastal sea with human interaction (intervention)" (Yanagi: 2022). *Satoumi* uses natural and sociological mechanisms to enhance biodiversity and productivity in coastal waters (Yanagi: 2022, p 21) through the relationships between *Ecosystem Based Management* (EBM), *Marine Spatial Planning* (MSP), and *Integrated Coastal Management* (ICM):

EBM- "Proposes using nutrient concentration and transparency as environmental indices to maximize the primary production in the water collumn". Primary production in coastal areas/waters is significant for biological productivity to understand how it indicates the integration of water quality (and management) and marine ecosystems. This can affect the nutrients of algae, seagrass, seaweed, and the seabed.

MSP- "Coordinating the use of marine areas for various purposes (fishing, transportation, recreation, renewable energy…aiming to produce the plan and spatial distribution of the use of marine areas to conserve ecosystem services and minimize conflicts among resource uses by mapping the use patterns on hydrographic charts

ICM- "Academic integration, Area integration, Stakeholder integration, Government integration"

Discussed in Joannes Berque and Osamu Matsuda's journal, *Marine Policy: Coastal biodiversity management in Japanese Satoumi*, there is also Coastal *Biodiversity Management* or *Community Based Management* (CBM):

CBM- [Satoumi] can contribute to the effectiveness of [these] co-management regimes by facilitating convergence of views between users and conservationists" (pg 195, 2013) and its "human relationship with nature is perhaps a central element of restoration in practice…creat[ing] a coastal ecosystem inclusive of human influence and sustainable use, yet with impacts on biodiversity controlled".

Uehara, T., Niu, J., Chen, X., Ota, T., and Nakagami, K. I. article, *A sustainability assessment framework for regional-scale Integrated Coastal Zone Management (ICZM) incorporating Inclusive Wealth, Satoumi, and ecosystem services science*, discusses using Inclusive Wealth (IW) as it 'provides a technical framework for computing the sustainability using stocks and their shadow prices', Satoumi as it 'provides a desired state for the coastal zones, by describing their benefits associated with the community desires and needs, and providing management wisdom', and Ecosystem Services Science (ES Science) as it 'can translate a desired state, developed using Satoumi, into scientific terms as required by IW'. ES includes provisioning (fisheries), regulating (climate disturbances, waste treatment, local climate, water circulation and environment, coastal erosion), habitat (nursery habitat, biodiversity), and cultural services (leisure, tourism, culture, art, religion, education). Together, they support a successful ICZM, but there is an emphasis on the importance Satoumi has for its application in other areas (Uehara & Niu & Chen & Ota & Nakagami: 2016, p 801). To evaluate ICZM, an indicator needs to have a minimum of four attributes (Uehara & Niu & Chen & Ota & Nakagami: 2016, p 802):

1. *An indicator should have a long-term as well as a short-term perspective.*
2. *An indicator needs to consider the social and ecological systems as integrated systems (SES).*
3. *An indicator should reflect an appropriate system boundary.*
4. *An indicator should be a readily useful input for ICZM and should inform as to how ICZM can be implemented. For example, an indicator should identify the management targets (e.g., size and type of ecosystems) and the desired states that need to be attained or sustained. Any changes to SESs recommended within ICZM should lead to the increase of the associated social welfare of the desired state.*

In Okinawa, there have been successful examples of implementing *satoumi* in order to achieve conservation efforts, government, organizational, and community collaboration, and sustainable economic growth. On Ishigaki island, Okinawa, in the village of Shiraho, collaboration on conservation efforts between WWF Japan and the local community took around a decade because of

their wants for different approaches. WWF Japan's approach, according to Kamimura and Anne Claus's chapter, *Enlivening Ecosystems with Human Hands: Building Satoumi Through Coral Reef Culture*, included the need for preserving the coral reefs. The local community of Shiraho Village faced many disparities during and after WWII and with the proposed development of an airport on their coral reef and environmental degradation, their approach needed to include "cultural inheritance and community regeneration as their priorities" (Claus & Kamimura: 2022) as the sea had played a significant role for their culture and economy. Some solutions discussed in Kakuma and Kamimura article, *Satoumi in an Okinawan Coral Reef System,* were the implementation of a charter enacting seven policies for village development, decided by a community members council, starting *The Shiraho Conservation Council for Bountiful Seas* (SCCBS), a guide for tourists on 'ettiqute' when they are visiting ("Self-Determined Rules for Coral Reef Tour Guides" and "Dear Visitors to Shiraho…"), and traditional fishermen practices that hadn't been used since before WWII called *Ishihimi.* Ishihimi is "the infrastructure of an ancient fishing method where rocks are piled up in walls on the shore or in shallow areas of the coral reef in order to use the tides to catch fish"(Kakuma & Kamimura: 2012). The practice actually plays an important role for biodiversity and education as its infrastructure allows marine life to live and feed off of it as well as, limiting pollution of nets and accidental bycatches of sea turtles.

(Photo 3. Map of Onna Village, Okinawa. Source: Google Maps)

(Photo 4. Satoumi efforts through coral reef farms in Onna Village, Okinawa. Source: *@heppokotaylor* on Instagram)

On the main island of Okinawa, just about a 25-minute drive up north of Yomitan Village, in Onna Village, satoumi was implemented as the village has an active fishery sector that is focused on seaweed farming. There is only one fishing association in Onna Village and seaweed farming is considered to be one of the village's main businesses. Its environmental impact is also very low. Altogether, creating satoumi in Onna Village, nutrient salts from coral, bleaching, and acanthaster, nutrietent salts from land areas, red soil run-off, and water quality preservation, and mudflats, eelgrass beds, *Mozuku* (seaweed/algae) seabeds and farms, giant clam cultivation, and coral farms were monitored and managed. The Onna Village Fisheries Cooperative places coral reefs as their highest importance for conservation efforts as healthy coral reefs drive the influx of fish. The objective is to use 'sustainable' human intervention by having the local community and fishermen adopt restoration techniques to help build healthy coral reefs faster. Without human intervention, the Cooperation has explained reefs can take decades to regrow, which would potentially cause a scare in fish, ultimately affecting the fishery sector and the local economy. The success of the restoration of the coral reefs was thanks to the support from 'Mozuku funds' by the local residents of Onna village. The residents believed there was a justification for the restoration as the local

government promoted products and dishes made from Mozuku. In 2014, there was an 'Expert Conference on Development of Island's Sustainable Societies' with the subject being, *Creating a Sato-Umi in Onna Village - Coral reef preservation and regional economic revitalization*. This conference was in collaboration with Onna Village Fisheries Cooperative and *Okinawa Institute of Science and Technology Graduate University* (OIST). They promoted collaborative efforts with schools and encouraged tourists to participate in educational programs such as coral observation and meetings, coral planting workshops, and fieldwork like planting coral.

How can ecotourism and *satoumi* be connected through marine conservation of sea turtles in Okinawa? Ecotourism and *satoumi* share core foundations focused on re-connecting and co-existing with our natural environment and emphasizing importance on environmental education. They both address socioeconomic, cultural, political, and environmental needs. Tourism affects sea turtles in multiple ways like feeding the local economy, insufficient infrastructure, and uneducated tourists, just to name a few. Clevo Wilson and Clem Tisdale's paper, *Conservation and Economic Benefits of Wildlife-based Marine Tourism: Sea Turtles and Whales as Case Studies,* concludes that economic benefits [of sea turtle - based tourism] (ecotourism) are "not only useful for the further development of such nature-based activities but can develop political support for conservation" (Wilson: 2003, p 58), but "if the populations decrease, then visitor numbers would also decline" (Wilson: 2003, p 58). This is another reason why it is important to emphasize environmental education by targeting the youth of an aging community. Such activities – boating, jet ski, snorkeling, etc. and practices – wearing sunscreen, noise, and light pollution from hotels – contribute to both insufficient infrastructure and uneducated tourism as they can cause harm to the ocean and beach erosion, but in Onna Village, the Okinawan Travel website, providing information for tourists, promotes swimming with sea turtles – particularly during nesting season (VIST OKINAWA: 2023, p 1)! Other things to take into consideration include, but are still not limited to, the capacity of sustainable management in governance and environmental NPOs.

For example, Hawai'i's government, Department of Land and Natural Resources: Division of Boating and Ocean Recreation in Hawai'i have both federal and state laws towards protecting marine species on all islands. Species protected under: *The Endangered Species Act (ESA)* (1973), *The Marine Mammal Protection Act* (1972), *National Marine Sanctuaries Act*, and *Hawai'i State Laws*, include Monk Seals, Sea Turtles [green sea turtles and hawksbill sea turtle], the Hawaiian word for sea turtles - *Honu*, False Killer Whales, Humpback Whales, and

Oceanic Whitetip Sharks and Pelagic Manta Rays. Violations of these acts and laws can result in "federal criminal charges up to $50,000 and/or time in jail. Minor charges can result in fines anywhere from $500 - $12,000" (DLNR Hawaii: 2023). In 2021, the National Oceanic Atmospheric Administration (NOAA) fined two tourists with a $500 fine after local outrage of video footage went viral on social media. Hawai'i NewsNow reported a tourist from Louisiana slapped a resting monk seal on the island of Kaua'i and the other incident happened on another island (HNN Staff: 2021). Even though they were prosecuted, they can still be fined through state and federal laws. The Hawaiian Islands and NOAA provide research on how the islands deal with tourism and traffic through a collective effort to keep green sea turtles safe. Laniākea is a popular sea turtle basking beach on the North Shore of O'ahu, Hawai'i and over the decades, since 1999, tourism has caused traffic congestion and infrastructure problems. *Mālama na Honu* [translated into English as 'Respect/take care of turtle[s]'] is the non-profit organization that initiated in 1999 and over the years, received grant funds from NOAA to protect and promote 'respectful behavior' [of tourists]. They state that it should be required for the local community, marine conservationists [and/or enthusiasts], and especially the government and government agencies, to work as a collective to ensure successful sea turtle conservation. They also explain the importance and necessity of the grant funds as it allows the organization to continue their achievements. Similarly in Praia do Forte, Brazil, sea turtles are protected under federal law and with collaboration between the Brazilian government and Pro-TAMAR, a non-profit organization, a 'carrot and stick' approach is practiced to ensure sea turtle conservation. The non-profit organization monitors "coastal areas for activities that do not follow sea turtle protection laws, fostering sea turtle conservation awareness through environmental education, conducting research, and promoting economic development through sea turtle ecotourism" (de Vasconcellos Pegas & Stronza: 2010, p 16).

Focusing on economic development, they ensure by employing locals, both at their research station and visitor centres. This is what needs to be addressed in Okinawa, something my case study is working on achieving, as sea turtles aren’t protected under Japanese conservation laws, but there has been little to no education and both community (older generations) and (local) government resistance to ecotourism – defaulting in the inability to capacitate sustainable management. Kitololei, S., Soderberg, A., Qaqara, N., Prakash, S. S., Tuiono, M., Veitayaki, J., & Piovano, S. article, *Conservation status and cultural values of sea turtles leading to (un) written policies in Fiji*, concludes that "formal policies which govern marine resource use are important in shaping conservation" (Kitololei & Soderberg &

Qaqara & Prakash & Tuiono & Veitayaki & Piovano: 2022, p 2442). The concept of Satoumi, I believe, will be the first step for the local community of Yomitan Village to accept ecotourism as it can break the resistance by integrating sustainable management, push government resistance, and it can bring the community back to tradition, but collaborate effort from all stakeholders is necessary. The next steps include needing to understand green sea turtles in Okinawa, their significance to biodiversity, and anthropogenic threats they face. The case study on ChuraMura in chapter three will provide us with the present socioeconomic, cultural, political, and environmental information in Yomitan Village while addressing their conservation efforts, goals, and needs. Following, will be the conclusion.

CHAPTER TWO

GREEN SEA TURTLES, BIODIVERSITY AND ANTHROPOGENIC THREATS

Green Sea Turtles and Biodiversity

(Photo 5. Green sea turtle laying on a coral reef in Cape Maeda, North Yomitan Village, Okinawa by Patrick Stoney. Source: *@Churamura* on Instagram) *Chelonia mydas*, commonly known as green sea turtles, are reptiles and the longest wild living species of turtles with a lifespan reaching 80 years. A full grown adult green sea turtle can weigh up to 700 lbs. (318 kg). They are identifiable by their 'heart' shaped shell pattern with colors ranging from brown, green, olive, and black. Green sea turtles can be found in the Atlantic, Indian, and in the Pacific Oceans.

The present study aims to investigate the habitat and conservation of green sea turtles in Okinawa, Japan, with particular emphasis on a case study of a conservation organization in Yomitan Village. This research will also draw upon examples from other global locations such as Hawai'i, Indonesia, and Ogasawara, Japan, in order to establish a comprehensive framework for successful green sea turtle conservation initiatives. The discussion will be informed by the assertion made in the essay "Ecological Existentialism of Tuvalu: Indigenous Connection to Nature in the Face of Natural Disasters", where it was argued that the interconnectedness of human social systems and natural resources, such as the ocean, coral, mangroves, and coconut trees, underscores the dependence of these resources on successful human interventions to mitigate threats such as biodiversity loss, erosion, and unsustainable tourism. This interdependence extends to marine life, including green sea turtles, whose well-being is contingent upon the implementation of effective conservation frameworks, initiatives, and practices within the human social sphere.

Green sea turtles occupy a significant ecological niche as they play a crucial role in preserving biodiversity within marine ecosystems, particularly through their influence on the health of seagrass beds and coral reefs. Within the ecological pyramid of the marine ecosystem, green sea turtles are categorized as primary consumers, positioned above primary producers such as algae and phytoplankton and below secondary consumers like crabs and humpback whales, as well as predators such as sharks. Despite their classification as primary consumers, the eggs and hatchlings of green sea turtles are susceptible to predation by various animals including crabs, birds, cats, and snakes. The term "biodiversity", denoting "Biological Diversity", was officially defined at the 1992 United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro, Brazil, as encompassing the variability among living organisms from all sources, including terrestrial, marine, and other aquatic ecosystems, and the ecological complexes of which they are a part. This definition emphasizes the diversity within species, between species, and of ecosystems. Upon conducting an investigation into biodiversity in Okinawa, it has come to light that marine conservation efforts primarily emphasize the preservation of coral reefs and various fish species, notably the well-known Clownfish, classified scientifically as *Amphiprioninae*, while comparatively affording less attention to green sea turtles. Notably, the Ministry of Environment in Japan and the International Union for Conservation of Nature (IUCN) have designated green sea turtles as "endangered" or included them on the "red list". However, it is noteworthy that under Japanese conservation legislation, green sea turtles do not currently receive the same level of protection.

Climate change in Okinawa

Green sea turtles being classified as 'endangered' and not being protected under Japanese conservation law (Ministry of the Environment Japan: 2023) can be attributed to climate change and anthropogenic threats in Okinawa. Climate Change in the last few decades, exacerbated through warming temperatures, extreme weather, and the incline of anthropogenic threats have affected green sea turtles. Warming temperatures have created a shift in the ecological pyramid (Nat. Clim. Chang.: 2020), causing premature sea turtle deaths, and disproportionately affecting the outcome of female and male born turtles, just to name a few. Okinawa is prone to extreme weather as the islands have a temperate climate. Extreme weather such as typhoons bring strong winds, heavy rain, and change the currents/tides of the oceans and seas and have the potential to inflict extensive damage upon buildings, infrastructure, and agricultural areas, as well as precipitate beach erosion, resulting in the accumulation of debris within the oceans, seas, and coastal areas (Chi & Shu & Lin & Li & Luo & He... & Zheng: 2023) (NCAS: 2020) (Rosane: 2022) (Shigemitsu & Gray: 2021). Consequently, these environmental disturbances can significantly impact the behavior of green sea turtles, particularly with regard to nesting activities, given that the typhoon season in Okinawa spans from June to September. Furthermore, the elevation of sea levels prompted by typhoons may lead to the inundation of sea turtle nests, thus elevating the risk of mortality through drowning. A specific case in point is the occurrence of typhoon 'Khanun' during the 2023 turtle season, which developed on July 26, 2023, and dissipated on August 11, 2023, ushering in robust wind gusts ranging from 60 mph (96.6 km/h) to 115 mph (185.07 km/h), heavy precipitation, flooding, and power outages within the Okinawa region. Regrettably, this event resulted in the reported loss of 53 sea turtle hatchlings due to the inundation of their nests by typhoon Khanun.

As temperature rises, the new average temperature in Okinawa is another part of extreme weather that affects green sea turtles. Taking a look into temperature, we will understand the terms *thermal discomfort* and *heat perception*. In Antonella Mazzone and Radhika Khosla's review, *Socially constructed or physiologically informed? Placing humans at the core of understanding cooling needs*, they explain, "previous approaches which are largely based on technical assessments of human and environmental temperatures and heat-exchange models provide important contributions to understanding human thermal comfort, but do not provide the basis to address a cultural shift in society nor tackle the roots of the socially driven need

for cooling comfort" (Mazzone & Khosla: 2021, p 2). Agreeing to this review, Lorenza Pistore and Wilmer Pasut's article, *Roots and mechanisms of thermal comfort expectations: from individuals' own background to adaptation and change*, explain the complexity of thermal comfort as it cannot be limited in its focus and must take into consideration multiple factors such as culture, socio-economics, and technology. Gail S. Brager and Richard J. de Dear's article, *Historical and Cultural Influences on Comfort Expectations*, also adds history to this equation. Pistore and Pasut have delineated the concept of thermal comfort by presenting two distinct models, pertaining to indoor and outdoor environments. However, the current study will exclusively concentrate on the outdoor model. Accordingly, outdoor thermal comfort is expounded in terms of the "outdoor running mean temperature" (Pistore & Pasut: 2023, p 2). In a related review, Mazzone and Khosla identified temperature's influence on psychological states as one of the five areas requiring additional investigation with respect to cooling requirements (Mazzone & Khosla: 2021, p 7).

Emotions can be an influence on cooling needs and require taking account of. Studies investigating the interactions between the mind and physical temperatures show how some temperatures may induce certain emotions and, conversely, emotions or psychological states can regulate body temperatures [2021: 89]. […] For example, emotional stress can be responsible for hyperthermia and therefore a change in perceived thermal comfort [2021: 90]

Lastly, in understanding thermal comfort, or discomfort, the scientific research and photographic exhibition, *The Cooling Solution*, subjectifies the terms based on personal experiences of 'external stimuli [through body, culture, and society' (ENERGYA: 2023, p 22) as they are considered influences. These influences help define thermal comfort and discomfort, directly impacting "human experience, such as a person's physiology, the living physical environment such as architecture, geometry, and morphology of external spaces, as well as the cultural environment, such as education and values" (ENERGYA: 2023, p 22).

Turtles are sensitive to temperature changes, just like humans. When ocean temperature drops, turtles' metabolisms decrease and if it gets too cold, they can go into emotional stress or shock and end up drowning. Regarding laying eggs, when global temperatures rise, it affects the biological function of the turtle's eggs because higher temperatures cause an imbalance between male, and female born turtles. Oguz Turkozon, Vasiliki Almpanidou, Can Yilmaz,

and Antonios D. Mazaris's report, *Extreme thermal conditions in sea turtle nests jeopardize reproductive output*, explains, "once a clutch of eggs is laid, population recruitment depends explicitly on the environmental conditions of the nest environment" (Turkozan & Almpanidou & Yılmaz & Mazaris: 2021, p 30). In Robert Howards, Ian Bell, and David A. Pikes article, *Thermal tolerances of sea turtle embryos: current understanding and future directions*, they state that by 2070, "extreme climate forecasts can lead to 'complete feminization of hatchlings'" (Howard & Bell & Pike: 2014, p 76). However, a study conducted by Florida Atlantic University revealed that the sex determination of sea turtles is not exclusively influenced by heat or air temperature. The study highlighted that "moisture [from humidity] alters the microclimate experienced by the eggs within the nest and can significantly impact their development" (Florida Atlantic University: 2018).

This finding underscores the notion that green sea turtles are sensitive to, and may struggle to adapt to, changes in temperature, suggesting a condition of thermal discomfort rather than thermal comfort, as characterized by Gail S. Brager and Richard J. de Dear as a "more straightforward phenomenon to measure" (Brager & de Dear: 2003, p 178). Heat perception is defined as the behavioral and physiological responses of both humans and animals to temperature variations. Consequently, sea turtle hatching programs have emerged as a recognized short-term strategy to enhance the success rates of sea turtle populations by manipulating incubation temperatures. Studies have indicated that the optimal range for sea turtle embryos incubated at a constant temperature lies between 25 to 27 degrees Celsius and 25 to 35 degrees Celsius (Howard et al.: 2014, p 81). Notably, Okinawa is classified as having a 'temperate climate', characterized by a relatively stable average temperature throughout the year, with the average air temperature in Okinawa currently recorded at 29 degrees Celsius, exceeding the typical average. This elevated temperature presents challenges to the sustainable habitation and reproduction of green sea turtles.

In Yomitan Village, the combined stretch of coastline encompassing all of Yomitan's coastal areas with the exception of Torii Beach, which is situated on the US Army base, and the entirety of Onna village from the southern point to Seragaki in the mid-north, along with Ginoza beach on the east coast, spans an estimated length of approximately 30 kilometers. During a meeting with Carl Bastian from ChuraMura, it was conveyed that their data indicates an "average sand temperature at a depth of 50 cm on Uza beach, just below the grass level, ranged around 27 degrees Celsius between May and September" (Bastian: 2023). Research demonstrates that a

temperature of 29 degrees Celsius yields a 100% success rate for the hatching of green sea turtle eggs (Howard: 2014, p 77); however, it is important to note that numerous other factors contribute to the overall success rate. Notably, ChuraMura's nesting season in 2023 achieved an 80% success rate, with a total of 1,393 eggs, of which 1,115 hatched. Furthermore, the rising sea levels can lead to a reduction in the available sand mass, thereby limiting the areas in which green sea turtles can lay their nests. In addition, extreme weather events expose green sea turtles to single-use plastics and microplastics, increasing the risk of ingestion or entanglement, with a particular prevalence noted in Okinawa. While green sea turtles face a myriad of challenges, including but not limited to extreme weather and plastic pollution, the latter concerns have garnered more focused attention.

Anthropogenic Threats

Since we are looking at the case of Okinawa, we must also take into consideration the island's history as Okinawan culture, socio-economic, and political disparities, mainly caused by war, have impacted biodiversity and marine conservation efforts, still seen till this day. For example, during the war, green sea turtles' populations declined, as explained in Yuki Tanaka's book, *Hidden Horrors: Japanese War Crimes in World War II,* because "meat and fish were rarely supplied… [POWs could purchase] turtle eggs [as an alternative]" as they were sought as 'sufficient' for good health, although malnutrition was evident (Tanaka: 2017, p 45). The island's history has also caused socio-economic poverty, leading to other anthropogenic threats that impact the health, biodiversity, and marine conservation efforts of green sea turtles. These include overtourism (lack of ecotourism) and environmental degradation, which we will take a closer look into.

Socio-economic poverty

Socio-economic impoverishment exerts a profound influence on the overall well-being of individuals and communities. Within the context of Okinawa, an examination of energy poverty in relation to socio-economic deprivation can furnish valuable insights into the socio-economic circumstances of a community and its inhabitants, as well as the diverse factors that impinge upon it. Energy poverty, as delineated in the European Commission's 2022 handbook,

Introduction to the Energy Poverty Advisory Hub (EPAH) Handbooks: A Guide to Understanding and Addressing Energy Poverty, is characterized as "the inability of households to meet their energy requirements". This condition may stem from "low-income levels, suboptimal household energy efficiency and energy performance..." (European Commission: 2022, p 6-9), and is intertwined with various factors including age, health, and socio-economic status, the understanding of which is most effectively achieved at the local level. When all these factors are substandard, the precariousness of health is notably exacerbated.

In Okinawa, J. R. Tokyo's article, *What's behind Okinawans' falling life expectancy?*, explains, the average age of life is 80.27 [years] for men and 87.44 [years] for women (Tokyo: 2022). These ages are high, with Okinawa even being one of five 'Blue Zones', but it has been reported that health and age of the younger Okinawan generations are slowly declining (Tokyo: 2022), partially influenced from the US military occupation and socio-economic situation. These can be factored as a vulnerability to Okinawans, as in particular to this thesis, environmental education on marine conservation and biodiversity, 'household composition', financial disparities, declining health, and local culture. There is a linkage between marine biodiversity and poverty, as Sophie Plagerson's report, *Marine biodiversity, and poverty alleviation*, explains "coastal marine ecosystems are vulnerable to both increased and intensified development activity and related environmental change, affecting both marine biodiversity and poverty" (Plagerson: 2020). Raul Castano-Rosa and Shinichiro Okushima's review, *Prevalence of energy poverty in Japan: A comprehensive analysis of energy poverty vulnerabilities*, displays figures of energy prevalence (EP) in Japan and shows Okinawa with the highest percentage of all prefectures at 12.4% in 2017 (Castaño-Rosa, R., & Okushima: 2021, p 6), increasing CDDs (cooling degree days) in the summer when green sea turtle nesting occurs.

Poverty can be expressed deeper in tourist destinations, where locals get economically 'outbid'. Prioritizing development of global chain hotels in Yomitan Village, Okinawa has increased in recent years, but local people and environmental organizations have fought to sustain the natural environment between the beaches and hotel development. Hiroshi Kakazu's journal, *Island Sustainability and Inclusive Development: The Case of Okinawa (Ryukyu) Islands, The Role of Tourism for Small Island Economies & How to sustain Okinawa's tourism industry?*, express the impact tourism has on sustaining a community and their living standards, being small islands, somewhat remote to the mainland. Tourism is widely recognized as a

driving force for economic development (Kakazu: 2018, p 23). Kakazu further elucidates the concept of Social Carrying Capacity (SCC) as "the socially determined maximum number of tourists tolerated by local communities" (Kakuza: 2018, p 27). The incorporation of SCC into the framework of sustainable tourism facilitates an in-depth comprehension of the requirements of both tourists and host communities (local inhabitants) for the preservation of the natural environment and the economy, as it governs the availability of resources. Exceeding the SCC threshold can lead to overtourism, resulting in unsustainable conditions and environmental deterioration.

Although tourism is not the only problem needed to be addressed, it is important in a local context, being able to understand how, what, and why the local people are dependent on their coastal areas and its resources [including marine life] to find solutions in sustaining them. Fishermen are also dependent on their coastal areas. Fisheries and fishermen in Okinawa play a big role in green sea turtle conservation in Yomitan Village, but data shown before and during the global pandemic are not easily accessible. Although the impacts were discussed on Okinawa and Japan as a whole, my case study is the first organization to ever collect data on sea turtles in Yomitan Village and the surrounding areas. When the borders were closed from 2020 until 2022, Carl Bastian explained green sea turtle numbers were healed as the fishing industry was put to a halt and there was little to no tourism. Because of this, fishermen activities declined which was another reason for an incline in turtle numbers, but at the same time, an economic disparity for the local people.

The Food and Agriculture Organization of the United Nations (FAO) created a report in 2020 called, *The impact of COVID-19 on fisheries and aquaculture food systems: Possible Solutions*, explained the fishing industry became unprofitable as there was less demand, market and finances, supply, and safety measure of physical contact or proximity limited fishermen (FAO: 2021, p 10). The 2021 Trends in Fisheries and 2022 Fisheries Policy Summary, a publication by the Japanese Ministry of Agriculture, Forestry, and Fisheries (MAFF), features graphical representations encompassing all prefectures of Japan, detailing the association between the 'state of emergency' lockdown or 'stay at home' directive during the global pandemic and the activities of fishermen and the fishing industry. Commencing in March 2020, the graphs illustrate a reduction in dining out at restaurants and an upsurge in domestic meal consumption, with the accompanying observation that "While sales in the food service industry have declined significantly, sales of fish and fishery products in supermarkets has increased"

(MAFF: 2022, p 2). In response to the gradual return to normalcy, the ministry has instituted a 'Response in Anticipation of Future Impacts' initiative, with the overarching objective of augmenting fish consumption beyond supermarket and online channels (MAFF: 2022, p 4). Moreover, the publication delineates the 'New Basic Plan for Fisheries', comprising five focal points (MAFF: 2022, p 1):

- *Steady implementation of fishery resource management, taking into account changes in marine environments.*
- *Realization of transformation of fisheries into a growth industry, taking into account increasing risks.*
- *Promotion of activation of fishing communities that support the region.*
- *Measures to be promoted in a cross-sectoral manner for sustainable development of fisheries, etc..*
- *Goals for the Self-Sufficiency Rate of Fish and Fishery Products.*

With the recent reopening of Japanese borders, concerns have arisen among marine conservationists, organizations, and biologists regarding the potential negative impact of increased tourism and fishing activities on the population of green sea turtles. While my ongoing case study has documented several incidents leading to sea turtle fatalities on other islands in Okinawa, the current situation in Yomitan Village underscores the complex "trade-offs" faced by fishermen and fisheries, particularly those involved in seaweed farming, as they weigh economic interests against the imperative of conserving green sea turtles. Seaweed farming represents a significant aquaculture commodity for fishermen and a primary source of income, yet it also constitutes a principal dietary component for green sea turtles. In July 2022, over 20 green sea turtles were found stabbed in Okinawa and it was apparent the stabbings were done by a fisherman, but it was stated that no arrests would be made (Hida & May: 2022). Fishermen are economically tied to their coastal areas so there is a struggle with protecting their commodities while also protecting marine life like green sea turtles. Protecting both can lead to increased biodiversity, beneficial for all parties involved. Throughout the pandemic, the production of seaweed farms in Onna Village demonstrated

resilience (Higa & Takeuchi & Yanaka: 2022). In light of this, a policy briefing titled "Ensuring the Sustainable Future of the Rapidly Expanding Global Seaweed Aquaculture Industry – A Vision" from 2021 recommends the adoption of evidence-based decision-making practices to safeguard 'social inclusivity', gender equality, economic prosperity, oceanic well-being, and workplace safety (Cottier-Cook & Nagabhatla & Beveridge & Bianchi & Bolton & Yarish: 2021). This approach is advocated as essential for ensuring the security and sustainability of the industry.

Overtourism and environmental degradation

Tourism brings forth more people and demand, putting pressure on the natural environment and economy. All those involved include the tourists, the local community, and their businesses. Overtourism is associated with tourist numbers, the type and time frame of their visit, and a destination's carrying capacity (Vagena: 2021, p 1-2). The Social Carrying Capacity (SCC) of tourism, is defined as "the socially determined maximum number of tourists which are tolerated by local communities" (Kakazu: 2018, p 27). SCC can be implemented in the analysis of sustainable tourism to understand both the tourists and host communities' (local people) needs to sustain the natural environment and economy as it determines the amount of resources accessible. Going over the SCC can cause overtourism (unsustainable) and create environmental degradation. Other challenges associated with overtourism may relate to alienated residents, a degraded tourist experience, overloaded infrastructure, damage to nature, or threats to culture and heritage (Vagena: 2021, p 2).

There needs to be proper infrastructure to support further development within the tertiary sector. The development of more hotels and restaurants, especially coastal areas, expose green sea turtles to light, noise, and plastic pollution, as well as an increase of interactions with humans. As we discussed the term thermal conditions in the 'Climate change in Okinawa' section, there are also *non-thermal conditions*. Non-thermal conditions can also impact green sea turtles' responses including demographics in the local community, context (climate), environmental interactions with lighting, sounds, etc. (Brager & De Dear: 1998, p 85). Noise and light pollution aren't quite recognized when considering the whole of climate change, but they can have an effect on marine conservation. Noise pollution is any unwanted, disturbing - causing a nuisance – sound that negatively affects humans, wildlife, and the

environment. Japanese Environmental Quality Standards indicate Area 'C' [areas used for commerce and industry as well as for a significant number of residences] 'standard values' shall be 60dB or less in the day time and 50 dB in the night time (Ministry of the Environment Japan: 1999). This information does not include noise for construction, railway, or airplane noise. Such sounds people would mostly be familiar with are airplanes, loud concerts, and construction.

Light pollution encompasses any artificial illumination that disrupts the natural cycles of light, affecting both human beings and wildlife, as well as the broader environment. Examples of such disruptive light sources are commonly encountered in the form of fireworks, urban centers, high-intensity vehicle headlights, and street lamps. On the other hand, environmental degradation pertains to the decline of environmental quality resulting from the depletion of essential resources such as air, water, and soil, as well as the disruption and loss of ecosystems, ultimately leading to the extinction of various species of wildlife. It is defined as any change or disturbance to the environment perceived to be deleterious or undesirable (unescwa: 2020). Soil erosion, coastal development, and coral bleaching are all examples of environmental degradation. The coast of Okinawa Island has been subject to significant alterations leading to habitat loss (63.2%) of the coastline artificially altered with the west coast being the most impacted (72.3%) (Masucci & Reimer: 2019). Paved roads, restaurants, and hotel construction can cause erosion, decreasing the area of beaches green sea turtles can nest, hatch, and rest. Coastal activities like swimming, snorkeling, and jet skiing and the wear of non coral friendly sunscreen pollute the waters in where green sea turtles feed and mate.

In Yomitan and surround villages, there are many hotels along the beaches causing these types of pollution and disturbance to the natural environment, so much so, Carl Bastian explained to me, "turtles don’t tend to come up into the beaches due to light pollution, noise pollution, oil pollution, and jet ski activity as it is unsafe for turtles and causes destruction of their feeding and nesting grounds, sunscreen pollution from tourists, fireworks, deckchairs, swimming nets etc. etc.." (Bastian: 2023). Fortunately, Carl Bastian, founder of ChuraMura, is mitigating these negative aspects with his connections as he has not only started in the hotel and hospitality industry, but also a current member of the American Chambers of Commerce in Okinawa.

Mitigating Anthropogenic Threats: Rescue and Rehabilitation Centers and MPAs

Rescue and rehabilitation centers are important in protecting marine life as they provide an environment for research, development, education, and management to help aid conservation efforts. MPAs are also important as it is a global connected system to safeguard biodiversity, health, and abundance of ecosystem services (European Environment Agency) in designated marine zones. MPAs have been openly adopted in 23 countries around the world including Australia, Japan, Indonesia, Sardinia, and more.

Rescue and rehabilitation centers

Regarding rescue and rehabilitation centers, they can be categorized as being able to facilitate green sea turtles that are unreleasable or releasable:

Unreleaseable green sea turtles. Animals such as sea turtles, dolphins, sharks, sea lions, and more, that are rescued, but are unrelasable, come from many different situations including boating accidents, smuggling, birth defects, illegal pets, or being attacked by external threats. Their injuries leave them vulnerable to many threats if they were to be released. *Theater of the Sea* in Islamorada, Florida is an example of a rescue and rehabilitation center that have rescued sea turtles that were entangled in wires/nets causing amputation, boat strikes causing buoyancy issues, needing the turtles to wear weights for the rest of their lives, being attacked by house pets causing full blindness, and being found sick. These types of rescue and rehabilitation centers follow government regulations, provide examinations, physicals, and diagnostics, personalized diets, record behavior, patterns, and medical history, and a hands on caretaker/trainer.

(Photo 6. Injured green sea turtle found by Mariner's Aid to Sea Turtlesand rescued by Theater of the Sea in 1986, Quasi is a female green sea turtle that was born with a shell defect and buoyancy disorder preventing normal surfacing, diving, and hunting. She wears a life vest to compinsate. Source: *@theater_ofthe_sea* on Instagram)

Theater of the Sea caretakers and trainers use an enrichment approach into understanding the animals natural behavior and how to properly work or care for them. It is all about communication with one another instead of exhibiting dominance and promoting 'positive animal and human interaction[s]' (Theater of the Sea: 2023). Caretaking or being a trainer of marine life has acquired a negative tone as people believe it's a manipulation of behavior and enforces a non eco-centric relationship because a lot of places use a correction approach. Westlund's review, *Training is enrichment – And beyond*, discusses four criterias that a human and animal relationship can be enrichment (Westlund: 2014, p 3):

1. *Give the animal more control over its environment;*
2. *Add behavioral choices;*
3. *Promote species-appropiate repertories;*
4. *Empower the animal to deal adequately with challenges.*

Releasable green sea turtles. Firstly, I came across a marine conservation organization on the island of Byobudani chichijima, Ogasawara in Japan called *Ogasawara Marine Center* and they specialize mainly in environmental protection and conservation of green sea turtles, but they also protect and conserve humpback whales. I originally heard of the Ogasawara Islands in 2021 when I was searching for a job or an internship in marine conservation after graduating from my Bachelors of Honors in Politics & International Relations at St. Mary's University, Twickenham in London, England. The Ogasawara Islands, also known as Bonin Islands, is a Japanese archipelago and a UNESCO World Heritage Site, of around 30 sub-tropical and tropical islands reachable by a 24-hour ferry ride from Tokyo, Japan. The islands are in the north-western part of the Pacific Ocean and are widely appreciated in the Anthropology community as the islands are home to many endemic and rare species like birds, whales, turtles, etc. and can help provide insight to evolutionary processes. There is a huge green sea turtle breeding and nesting area along the islands. Indigenous people of Ogasawara view green sea turtles as a local delicacy that can be eaten in stews and other dishes. The organization on the island was established in April 1982 by the Tokyo Metropolitan Association for Marine Environmental Conservation (TMKCA), but was turned over to Japan Sea Turtle Association from April 2001 to March 2006, and from then to present, has been managed by the NPO organization Everlasting Nature. Ogasawara Marine Center is now known as "a place for information exchange, education and community interaction [for locals, organizations, and tourists]". UNESCO explains (UNESCO: 2022):

The majority of the property is state-owned and under the authority of various agencies. Some land is owned by Ogasawara Village with some other areas privately owned. The property contains five legally designated categories of protected area managed by three national Government agencies and is surrounded by the much larger Ogasawara National Park serving as a functional buffer zone. The property is protected through seven pieces of national legislation which overlap in jurisdiction and objectives specifying the mandate of the Ministry of the Environment, the Forestry Agency and the Cultural Agency. Any jurisdictional conflicts are resolved through an interagency Regional Liaison Committee structure.

The marine center includes an educational center and program, catch and release program, artificial hatching program, rehabilitation center, as well as hosting volunteers and interns.

(Photo 7. Hatching green sea turtles as part of Ogasawara hatching and catch and release program. Source: *@ogasawara_marine_centre* on Instagram)

(Photo 8. Green sea turtle covered in algae in June 2022. Source: *@ogasawara_marine_centre* on Instagram)

(Photo 9. Green sea turtle getting algae brushed off its body in December 2022. Source: *@ogasawara_marine_centre* on Instagram)

(Photo 10. Green sea turtle after algae has been brushed off in June 2022. Source: *@ogasawara_marine_centre* on Instagram)

They explain on their website:

You can learn about the ecology, history, and current status of sea turtles through a "sea turtle lecture" through a slideshow presentation, a "tour of the aquarium" with our staff, a "feeding experience" with cute sea turtles, and a "shell polishing experience" where you can touch real sea turtles. I'm sure that by the time you leave, you'll be amazed at the ecology of sea turtles, and continue to fall in love with them more after our fun hands-on experiences!

Since they were established in 1982, they have over 40 years of data, records, research, and articles and book publications regarding green sea turtle behavior. Publications include, but are not limited, of topics ranging from *Contextual factors influencing support for sea turtle management actions in Ogasawara Islands, Japan: An application of conjoint analysis* and *Factors affecting the long-term population dynamics of green turtles (Chelonia mydas) in Ogasawara, Japan: influence of natural and artificial production of hatchlings and harvest pressure.* Their educational center and programs provide understanding on a deeper level of the ecology, history, and current 'statuses' of green sea turtles from presentations and seminars, along with interactions with the turtles cleaning their bodies of algae. Also, people are allowed to attend the release of the baby turtles through their catch and release program. The green sea turtles in Ogasawara have been identified to have been migrating and immigrating between the islands of Ogasawara and Okinawa. Also, some of the turtles within the rehabilitation center have been identified as coming from the Okinawa Islands. The examination of ChuraMura in Yomitan Village, Okinawa, presents a parallel to the enduring efforts of the Ogasawara Marine Center, albeit on a reduced scale and within a more limited timeframe. Both initiatives have encountered analogous challenges from the local populace with regard to the conservation of green sea turtles. The primary objective of these endeavors is the facilitation of understanding and public awareness concerning the behaviors and threats faced by green sea turtles, with a concurrent emphasis on fostering population growth. These efforts involve minimal direct interactions with the turtles and do not purposefully induce alterations in their behavior or other ecological dynamics. The demonstrated success of the Ogasawara Marine Center in green sea turtle conservation serves as a model for the intended emulation and exhibition of requisite strategies by ChuraMura and the Yomitan Village, thereby aiming to achieve effective green sea turtle conservation in Okinawa.

Marine Protected Areas (MPAs)

Mitigating anthropogenic threats by MPAs:

ChuraMura's long-term goal is to create Okinawa islands first ever MPA. The Minority Rights Group International (MRG), funded by the European Commission, publishes annual reports on minority and indigenous trends each year that are or can be contextualized through the social and economic situations of specific case studies – in different countries.

From 2018, topics range from migration and displacement, climate change, technology, Covid-19, and work. There are also reports of editor Peter Greant from 2019, *Minority and Indigenous Trends 2019 – Focus on Climate Change, 2020, Minority and Indigenous Trends 2020 – Focus on Technology*, and the most recently published in 2022, *Minority and Indigenous Trends 2022 – Focus on Work.* In the chapter, T*raditional Livelihoods – Southeast Asia: Without safeguards, conservation efforts could undermine the traditional livelihoods of seafaring indigenous people*, by Nicole Girard, in the 2022 MRG report on work, is about the initiative of the Coral Reefs, Fisheries, and Food Security (CTI) on promoting sustainable biodiversity of coastal communities, where fishermen and fishing is common. One of the topics discussed in this chapter is Marine Protected Areas (MPAs). The European Environment Agency (EEA) defines Marine Protected Areas (MPAs) as "geographically distinct zones for which protection objectives are set. They constitute a globally connected system for safeguarding biodiversity and maintaining marine ecosystem health and the supply of ecosystem services" (EEA: 2018) and the International Union for Conservation of Nature (IUCN) states MPAs also offer, "nature-based solution to support global efforts towards climate change adaptation and mitigation" (IUCN: 2017). MPAs are a good initiative to take under as it can help maintain biodiversity, thus helping green sea turtles and maintaining fishermen livelihoods, but it needs to be done properly.

In Yomitan Village, and Okinawa in general, there are no MPAs despite the islands both being a tourist destination and having scientific value. Girard explains, "While vast swathes of marine areas are being designated as protected, there is of course the issue of enforcement. Unless the MPA is an area attracting sustained international attention via either its ecotourism or scientific value, enforcement of the NTZs has been difficult, because of underfunding, ongoing destructive development projects and weak governance generally" (Girad: 2022, p 199). In 2023, OECD data shows that 40% of land mass – including both 'terrestrial and marine domains', are 'protected areas', above the OECD average of 20%. This must mean, there is some form of mismanagement, etc. Sophie Plagerson's report, *Marine Biodiversity and Poverty Alleviation,* suggests, "seasonal closures of reserves are more acceptable to fishers than year-round closures; and periodically harvested closures have been employed as a predominant fisheries conservation strategy through a community-based approach (Li et al., 2020)" (Plagerson: 2020, p 2). Unfortunately, fishermen statistics in Yomitan Village aren't easily accessible.

MPAs are classified depending on their protection level. Fully protected parks are known as *Blue Parks*. Blue Parks are evaluated in three parts. The first evaluation of eligibility criteria: biodiversity value and implementation that must satisfy an MPA designated by a legitimate and functional government representing the interests of civil society, meets the IUCN standards for recognizing indigenous peoples' rights. permanent or is effective for at least 25 years, has a management plan that has been updated within the last 15 years, implements strategies to achieve high compliance that are appropriate to its ecological context, size and threats, must include clear communication to users and local communities about the regulations and MPA zone boundaries as well as enforcement strategies appropriate for the MPA's size, location, and poaching threats, additional strategies may include incentivizing compliance or leveraging social influence through community engagement, managers report high compliance in the MPA, and available evidence does not indicate high levels of non-compliance and has a budget and staff (Marine Conservation Institute: 2022, p 11). The second evaluation of eligibility criteria includes award status evaluation: regulations and design, management, and capacity. The last evaluation of eligibility criteria is system priorities: ecosystem representation and ecological spatial connectivity. The *Marine Conservation Institute's* website shows there are 16,856 zones, 1,042 zones that are fully or highly protected from fishing and 'extractive activities', but only 104 zones are classified as a Blue Park. Majority of the zones, 13,092 to be exact, are only partially protected and allow moderate to extensive extraction and associated impacts. 2,481 zones are classified as designated or unimplemented as the zone is now classified as an MPA because it is legally recognized, but is yet to be implemented. Lastly, there are 239 zones that have publicly expressed their goal to create an MPA. The Okinawa islands are classified as less protected/unknown because the area is a 'Common fishery right'. There is no information available on fishing information, stats, protection, management, or MPA guide assessment.

(Photo 11. MPA in Misool, Raja Ampat, West Papua, Indonesia in 2016. Source: *Asiadivingvacation.com*)

What I consider a successful example of an MPA, is located in Raja Ampat, Indonesia. The MPA zones in Raja Ampat include the Ayau-Asia Island, Teluk Mayalibit, Selat Dampier, Perairan Kepulauan Fam, Kofiau and Boo Islands, Southeast Misool and they are all Blue Parks. I discovered Raja Ampat through a documentary called *Tales by Light: Paradise in Peril Part one and two* by Abraham Joffe in 2018. They explored *Conservation International*'s work in Raja Ampat and their collaborative efforts with *Birds Head Seascape Initiative*— founded by local Indonesian communities, regional governments, and other NGOs such as *The Nature Conservancy* and *World Wildlife Fund* to create MPAs with the indigenous community and government. Conservation International is an organization that combines 'fieldwork with innovations in science, policy, and finance' and its mission is to "empower societies to responsibly and sustainably care for nature, global biodiversity, for the well-being of humanity" (Conservation International: 2023). Tradition and innovation, in this case, consists of sustaining traditional knowledge and practice of an indigenous community while adopting climate change friendly innovations. In Nicole Girard chapter, *Indigenous Knowledge and Resistance to Climate Change*, of the 2019 MRG report on climate change, discusses the challenges or discrimination indigenous people face towards adaptation and mitigation, and international rights, participation, and cooperation. Nicole Girard explains (Girad: 2019, p 42):

[indigenous people] are not only especially exposed to climate change due to the location of many communities in territories with glaciers, lakes, forests, grasslands, coastlines and other ecosystems that are especially threatened by climate change, but are also more sensitive to its effects as a result of their strong attachment to their ancestral lands. This is why, when indigenous communities are forced by natural disasters or other shocks to leave their territories and their resources, they not only face the loss of traditional livelihoods but also the severing of deep cultural and spiritual ties. Their ability to respond, on the other hand, is often constrained by the broader context of discrimination they face from state authorities and the majority population – in particular, lack of recognition of their rights to land and natural resources.

Their successful case of all the topics discussed above with the local indigenous people in Raja Ampat, Papua New Guinea, Indonesia could be applied to the case study in Yomitan Village.

Abraham Joffe is a conservationist and marine photographer whose quest is to conserve marine life and through his travels in Indonesia. One of his goals is to use art, through photography, and science to promote marine life conservation. He interviewed DR. Mark Erdmann, a leading fish biologist from Conservation International. DR. Erdmann expressed that the local community in Raja Ampat, including indigenous, were 'very welcoming to our presence' as the organization allowed the local people to own and manage the NGOs proposed plans [particularly with MPAs]. He explained, "if you think about the concept of these MPA basically being a fish bank, there's no bank in the world which stops the bad guys. And then they just say, OK, now we're not going to have any guards anymore. It doesn't work like that. And in [what is] happening in these MPAs, as the fish biomass increases, as you get more sharks, as you get more mantis [and green sea turtles], if anything, they become a bigger target for the bad guys. And that's what we've continued to see here. Approximately every six months there's another big bust. We've just had a big bust…" (Erdmann: 2018, 5:00 - 6:10 minutes). Since accepting, the local community were trained in many things such as learning how to use equipment, how to call in the local coast guard, etc., so together, they all monitor the surrounding water and report when fishermen are trying to harm marine life. Equipment can include new forms of technology to a community. The chapter, *The challenges of technology and sustainability: Some reflections on the future of the SDGs for minorities and indigenous peoples,* of the 2020 MRG report on technology, describes

technology as "innovations developed to enhance living and social conditions, including health, well-being and the environment" (MRG: 2020, p 60). Our accessibility to technology and injustices can directly and indirectly affect marine conservation. This chapter emphasizes the importance for participatory and rights-based development where there is presence of indigenous people as it will provide easier access to technology for education and science, allowing to achieve the UN SDGs. Marine technology in Okinawa has increased with the help from the Okinawa Institute of Science and Technology (OIST), a graduate university, which helps economic growth in Okinawa, located 20 minutes by drive from Yomitan Village. Although technology has increased in Okinawa, research, protection, and conservation of green sea turtles is still limited as OIST research focus is ecology, microbiology, and evolution, on coral reefs, mangroves, fish, and more.

An article by Faunalytics, *Studying Turtle Migration Patterns To Inform Conservation*, examined green sea turtles can migrate outside of MPA zones for feedings (Faunalytics: 2017) and this can collide with fishermen fishing zones and seaweed farms; suggesting smaller MPA zones spreaded out may be more effective during crucial periods of green sea turtle lives. The MPA in Raja Ampat even earned a 'Blue Park' award at the UN Oceans conference (Conservation International: 2022). Looking at Yomitan Village, fishermen are a problem for green sea turtles as their main food source is seaweed and fishermen have seaweed farms, causing a collision in what is just. As the local government pushes back these types of problems, they need to find a common ground on where to begin, and ChuraMura could be the first step.

Marine Protected Areas (MPAs) have been observed to falter in their effectiveness when they fail to address the socio-ecological requirements of local communities. The concept of *satoumi* can enable a community to fulfill these needs, thereby facilitating the implementation of MPAs in Okinawa. Socio-ecological systems foster relational values that can serve as a potent incentive for non-fishing communities to endorse *satoumi*, engendering enduring support even among those residing beyond the immediate locality (Uehara et al.: 2019, p 439). *Satoumi* shows the improvement of implementation in the local government, biodiversity, water quality, fisheries, and activities, but its effectiveness is leveled to certain degrees between ecological and socio-economic aspects. The socio-economic benefits of *satoumi* include "culture, education, and local economy, including the enhancement of

cooperation among stakeholders, their increased awareness toward coastal conservation, and the revitalization of traditional practices" (Kakuma: 2022, p 7). The implementation of MPAs as a mechanism for promoting *satoumi* (Kakuma: 2022, p 6) underscores the pivotal importance of local government involvement within communities to ensure enduring benefits. Such involvement is essential for fostering increased community access to environmental education and fostering greater receptivity towards conservation endeavors.

CHAPTER THREE

CASE STUDY OF CHURAMURA IN YOMITAN VILLAGE, OKINAWA

(Photo 12. ChuraMura's logo. Source: *@Churamura* on Instagram)

What is ChuraMura?

ChuraMura (ちゅらむら, "beautiful village") is a non-profit Ocean Conservation Agency focused on protecting sea turtle habitats. It was established in the summer of 2020 in Yomitan Village, Okinawa, after Carl and Machi discovered tracks of green sea turtles and noticed an increase in nests, a phenomenon they had never encountered before on their local beaches, which they suspected to be sea turtle tracks. Through social media, Carl had come across a man named Yogi-san, who patrolled sea turtles throughout the Villages. He contacted Yogi-san to confirm if the tracks were indeed those of sea turtles. After confirmation, Carl and Machi took on the responsibility of safeguarding any sea turtles they found. They began by creating a makeshift sign in both Japanese and English to alert beachgoers to the presence of a sea turtle nest, marking the beginning of ChuraMura.

ChuraMura is located in the smallest prefecture of Japan, with a population of 1.4 million people. The organization's core team consists of 20 dedicated individuals. Carl Bastian founded ChuraMura, with key team members including Craig Pope, an educator, Commander Machi, Chizuko, the office manager, Yogi Yoichi, Teruyuki Kawebe, Nao, and Yukiko. ChuraMura's partners include EcoJapan, EcoSolar Japan, Hacogame, OkiLife, Kafuu Resort Fuchaku, Kodomo NPO (a children's NPO focused on creating a sustainable society), and the American Chambers of Commerce in Okinawa (ACCO). The organization is committed to protecting the ocean through activities such as beach cleanups to address microplastic pollution, conducting coral research at a nearby facility, monitoring seagrass beds, addressing threats from ghost nets, and conserving green sea turtles through various methods.

What challenges does ChuraMura face?

During my first meeting with Carl, he explained to me that the challenges the organization faces as a 'newer' organization are mainly the limitations of resources and funds. Carl has put over $20,000 of his own money into the organization to keep going as there is no government funding or grants. ChuraMura’s partners and sponsors contribute to funding, but most of it comes from generous local artists and musicians. There was a local construction company that donated fuve tons of sand that was worth $500 in total. The American Chambers of Commerce in Okinawa, in which Carl is a member of, give $100 a month for beach cleanups. It would be best to have a union or be registered, but it's a complicated process. Before

establishing ChuraMura, Carl even tried to push ecotourism through the EcoJapan organization, but there was no government push to implement this. An audit was also needed. There are other ways to receive government approval such as being backed up by science, but as funds are limited, ChuraMura is currently unable to hire scientists. Another option, having credible research, findings, and community involvement for a minimum of five years before an organization can or will be considered eligible for funding or grants.

A deviation from these regulations imposes a constraint on the future actions of the organization. It is imperative for the organization to enlist a team member with a scientific background or substantial experience, as this is essential for obtaining permits and advocating for policies that support sea turtle conservation. While the organization anticipates approximately two years until this objective is realized, their immediate priorities include accumulating funds for the implementation of GPS tracking systems to gain insights into the migratory patterns of sea turtles. Upon either recruiting a scientist to their team or establishing credibility with local government authorities, Carl articulated the organization's intention to initiate genetic profiling of sea turtles through blood samples, with the goal of artificially incubating male turtles, drawing inspiration from a similar program in the Ogasawara Islands, Japan. This initiative is driven by the observed decline in the fertilization rates of sea turtle nests in Yomitan Village. Furthermore, they aspire to establish their own rehabilitation facility to nurture ailing or injured sea turtles, with the eventual objective of reintroducing them into their natural habitat within a year, a recognized conservation practice known as "head starting". However, the realization of these aspirations is contingent upon obtaining the necessary permits, which the organization is presently awaiting.

(Photo 13. Construction of a new rescue tank. Source: *@Churamura* on Instagram)

(Photo 14. Construction of an expansion to include the plans to create Churamura's sea turtle rescue and rehabilitation aquarium in the future at the Sango Batake Coral Farm. Source: *@Churamura* on Instagram)

Another challenge that ChuraMura faces is the acceptance in marine conservation or ecotourism as it may change the practices, traditions, or values native Okinawans have known and done their whole lives. For native Okinawans, especially the older population (who make up the majority of the current population), there is no urge to conserve as only until about 60 years ago, green sea turtles were eaten as part of the local diet. This was not by choice though as war and socio-economics limited food sources. There is also little to no access of information that leads to the awareness or precaution of wanting to conserve. When researching marine conservation and ecotourism efforts or information on the mayor or a

government website, in Yomitan Village, it is not readily available. The only current information I could find was on the collaboration with OIST. I asked Carl if there is a website where I could find further information particularly on environmental governance in Yomitan Village and he said, "Nope- it really doesn't exist". This has led to no sea turtle marine conservation efforts and no serious protection against the coastline - sold off land, preserving land between beach and land proposals- of potentially constructing beach parks. Fortunately, there is some good natural land left. The American base is slowly giving back land and coastal hotels have been accommodating as Carl has a hotel background and is friends with some of the hotel managers.

What threats does ChuraMura face?

ChuraMura faces several threats to the conservation of green sea turtles in Yomitan Village, with local fishermen posing a significant challenge. According to Carl, the primary threat stems from the activities of local fishermen, who perceive sea turtles as a hindrance and an issue that does not directly concern them. Of particular concern is the fact that fishermen cultivate seaweed, which serves as a primary food source for turtles. Consequently, the interaction between sea turtles and seaweed farming is viewed as a socio-economic issue within the local community, as the turtles may consume the seaweed or become entangled in fishing nets.

Notably, an alarming incident occurred on Kumejima island, a smaller island in Okinawa, where 60 mother sea turtles were discovered dead along a beach, purportedly at the hands of fishermen. Despite evidence of injuries to the turtles' necks, no charges or fines were imposed in connection with this distressing event. In seeking to obtain relevant statistics or information related to fishermen in Yomitan Village, including Marine Protected Areas (MPAs), biodiversity conservation efforts, satoumi (coastal landscape management), compensation mechanisms, and legal repercussions, ChuraMura has encountered obstacles, as such information is not readily accessible, and the organization is not extensively engaged with the fishing industry.

(Photo 15. Unfortunately, a rescue of a dead green sea turtle in Onna that was caught in a ghost nest left by fishermen. Source: *@Churamura* on Instagram)

Another threat ChuraMura faces are changes in weather conditions and temperatures. Changes in weather conditions have caused extreme weather patterns like typhoons. As Okinawa has a 'temperate tropical climate' and there are no mountains, it is known as 'Typhoon Alley' (Kadena Air Base). The effects of the typhoons will be shown later in the green sea turtle nesting and hatching data of each nesting season from 2020 to 2023. Speaking of temperatures, average temperatures in Okinawa are 29 degrees Celsius, with sand temperature being 27 degrees Celcius. Scientists and experts say 99% of green sea turtles are born female which creates an imbalance for mating. The ChuraMura team has not personally observed any discernible trends in the gender distribution of sea turtles, as gender determination typically requires a time span of 20 to 30 years. However, organizations such as the Ogasawara Marine Center, with decades of experience, have documented significant gender-related trends among sea turtles. Additionally, ChuraMura has noted fluctuating patterns in the overall incubation period and hatching success data, which suggests a degree of variability in sea turtle reproductive outcomes in response to environmental factors such as temperature.

(Photo 16. Okinawa Sea Turtle Patrol patrolling the incoming typhoon. Source: *@Churamura* on Instagram)

Coastal development and activities can also be seen as a threat. I tried to see if there was specific data collected on the local hotels in Yomitan Village on how they disrupt sea turtles. I searched hotel websites for information, but couldn't find anything. Carl explained, "For the hotels near natural beaches it is hard to talk about data as there was no data before we started to compare with, and after we started we still have no data because turtles don't tend to come up into these beaches due to; light pollution, noise pollution, jet ski activity (oil pollution, unsafe for turtles, destruction of feeding grounds), sunscreen pollution from tourists, fireworks, deckchairs, swimming nets etc. etc..". Carl also explained to me that Phuket, Thailand, just like the Hawaiian Islands, has a similar economy to Okinawa, but in Phuket, hotel associations have created policies for ecotourism.

(Photo 17. Carl Bastian (to the left) presents a letter of appreciation to the Royal Hotel Okinawa Zanpa Misaki in Uza, Yomitan Village for their cooperation in sea turtle activities, such as laying the time to turn off the hotel lights. Source: @Churamura on Instagram)

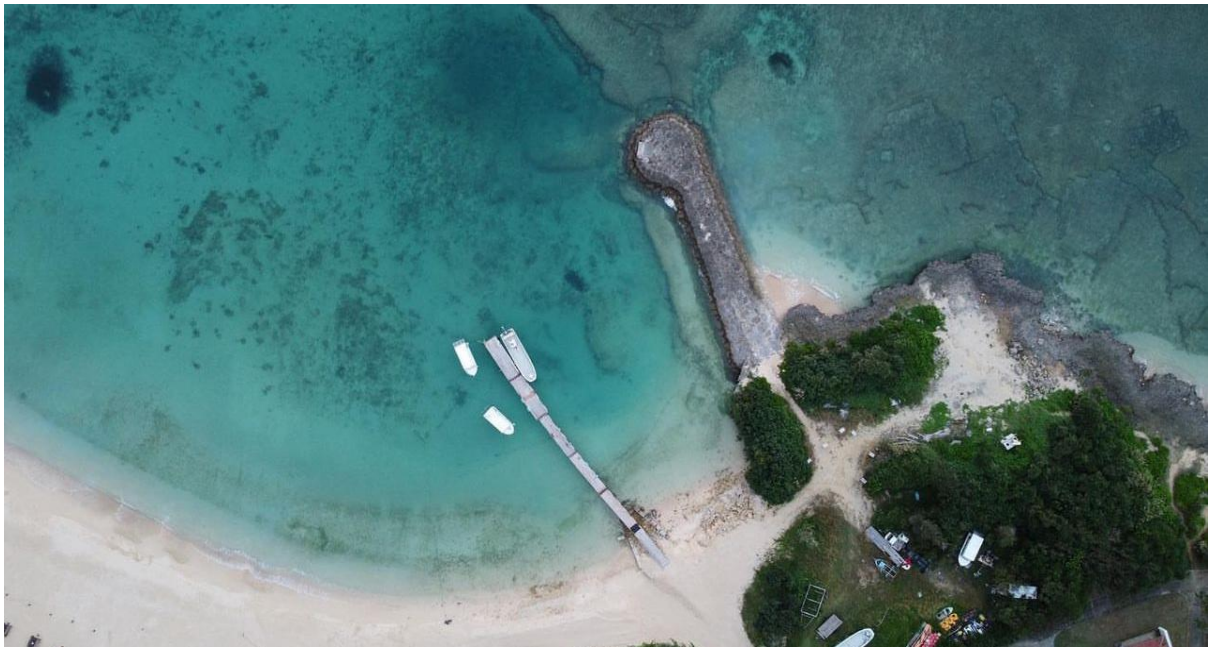
Where does ChuraMura monitor?

The organization monitors roughly 30km that includes the whole of Yomitan Village's coastline, all of Onna village from the southern point to Seragaki in the mid-north, as well as Ginoza beach on the east coast, but excluding Torii Beach (US Army base). They operate Okinawa's 24-hour sea turtle rescue HOTLINE. Please report by calling 080-5537-9991.

(Photo 18. Okinawa's Sea Turtle Stranding Response Team (STSRT). Source: *@Churamura* on Instagram)

(Photo 19. Cape Maeda. A beach in Yomitan Village patrolled by Churamura. Source: *https://www.goodfreephotos.com*)

(Photo 20. Nirai Beach. A beach in Yomitan Village patrolled by Churamura. Source: *@ad_hawk_0513* on Instagram)



(Photo 21. Aerial shot of Zampa beach. A beach in Yomitan Village patrolled by Churamura. Source: *@tune2700* on Instagram)

(Photo 22. Uza Beach. A beach in Yomitan Village patrolled by Churamura. Source: *@theuzaterrace* on Instagram)

What is ChuraMura's main objective as a non-profit Ocean Conservation Agency?

Their main objective is to raise voices towards politicians and a long-term goal, in about ten years, is to become a sanctuary and have green sea turtles off the endangered list. In order to achieve these, the organization seems to have three focuses: education, art, and science.

Education

Education is the foundation of knowledge and is essential for ecotourism – especially for youth. ChuraMura mainly focuses on education towards the youth as Carl explains, they are not set in their ways, so it is easier to influence the next, or younger generations, to consider conservation as a career. Before the 2021 nesting season began, in February, ChuraMura advertized if there was any interest within the local community for youth programs relating to sea turtles, sustainable living, and general knowledge of the outdoors

with a specialization in ocean education. As there was local interest, they began the youth programs a month later in March. The ages range from children in pre-school all the way to highschool. The organization puts great efforts towards education in the nesting off season. They do this by visiting schools and organizations and presenting presentations or seminars, but also by hosting beach cleanups, exhibitions of artwork from local artists and musicians, and participating in discussions on local radio and news stations. Okinawa still portrays their ancient culture which can be seen as 'homogenic' or 'stuck in their ways' due to the high presence and influence of indigenous Okinawans. Carl explained to me that the indigenous peoples main concern is to increase tax revenue – influenced due to the island's history. During nesting season, ChuraMura tones down their education outreach.

(Photo 23. Participation in Yomitan Village SDGs Summit. Source: *@Churamura* on Instagram)

(Photo 24. Presentation on sea turtle conservation towards high school students. Source: *@Churamura* on Instagram)

(Photo 25. Presentation on sea turtle conservation towards elementary school students. Source: *@Churamura* on Instagram)

(Photo 26. Presentation on sea turtle conservation towards pre-school students. Source: *@Churamura* on Instagram)

(Photo 27. Beach cleanup organized by ChuraMura. Source: *@Churamura* on Instagram)

In terms of public speaking and educational programs, an analysis of the demographics is sought to gauge the organization's impact on the local community. Over the nearly four years of ChuraMura's existence, the demographic composition has exhibited a relatively balanced distribution, although it is evident that the level of support from the United States surpasses that from local constituents, as per Carl's explanation. ChuraMura frequently receives invitations to speak at events organized by US base-affiliated groups, including the Girl Scouts, homeschooling gatherings, and various high school clubs, among others, more frequently than at local schools in Okinawa. Notably, a significant portion of their speaking engagements

involves Japanese mainland students participating in exchange programs in Okinawa, with these talks generally taking place at community halls or rented facilities and drawing an average attendance of 20 to 40 students, whereas US-based engagements typically attract around 10 to 20 children. According to Carl, when assessing the impact in terms of the number of children reached, the ranking is as follows: 1) Mainland Japanese students, 2) Temporary resident US students, and 3) Local Okinawan students.

In 2023, the team introduced new events with a summer called 'Little Loggerheads Summer Camp' for children aged 8-12 years old. The summer camps have predominantly hosted students from the United States, with a combined total of 23 participants. Despite being named after Loggerhead sea turtles, the camps encompass interactions with various sea turtle species found in the local area, including Green sea turtles and Hawksbill. Scheduled to coincide with the nesting and hatching season, the summer camps are conducted over two sessions, the first running from July 3rd to the 7th and the second from July 31st to August 4th. Each camp spans a duration of 5 days, with one of those days involving an overnight stay.. The cost of the camp was $740 per week. The price allowed the children to take part in *PADI Bubblemaker Program* - a supervised scuba diving experience for children in shallow waters, sea turtle nest patrolling, protection, excavation, and relocation, sea turtle identification, tagging, rescue operation, necropsy, overnight turtle snorkeling and lesson in Zamami Island (a top place to spot sea turtles), private tours of Churaumi Aquarium and Sangobatake Coral Preservation facility, and reef and tide pool exploration and study.

(Photo 28. Advertizment for the summer camp in 2023. Source: *@Churamura* on Instagram)

ChuraMura also hosted the first ever 'Sea Turtle Olympics' festival on October 21, 2023. Carl explained to me that the festival attracted over 1000 guests with around 70% of those coming from the US military and their families. Atendees enjoyed music, hula dance performances, conservation workshops, a beach clean up, and interactive games and activities. There were over 20 vendors that consisted of eco and environmentally friendly products, conservation and research based groups, food trucks, and more! Kids were also able to compete in several events replicating different turtle behaviors such as nesting, etc.. In total, $9,000 was raised through a combination of donations and sales of goods, but $8,000 of what was raised were put towards the costs to fund the festival. Because of this, only $1,000 was saved to be able to put back into the NPO. The Churaumi Aquarium, The Japan Sea Turtle Association, The Yomitan Tourism Association, The Yomitan Chamber of Commerce, several 5 star hotels and an international organization called Marine Life Protectors were all sponsors for the festival. There was no help, association, or involvement from the national or local government.

Photo 29. Poster for the first ever Sea Turtle Festival in Okinawa hosted on October 21, 2023. Source: *@Churamura* on Instagram)

(Photo 30. Hālau Hula U'i, based in Okinawa, performing a hula dance at the Sea Turtle Olympics Festival. Source: *@Churamura* on Instagram)

(Photo 31. Team member of Churamura, dressed as a green sea turtle, helping promote the festival! Source: *@Churamura* on Instagram)

(Photo 32. One of the vendors at the festival, Fisherman's POKE 純 TSUNA. Source: *@Churamura* on Instagram)

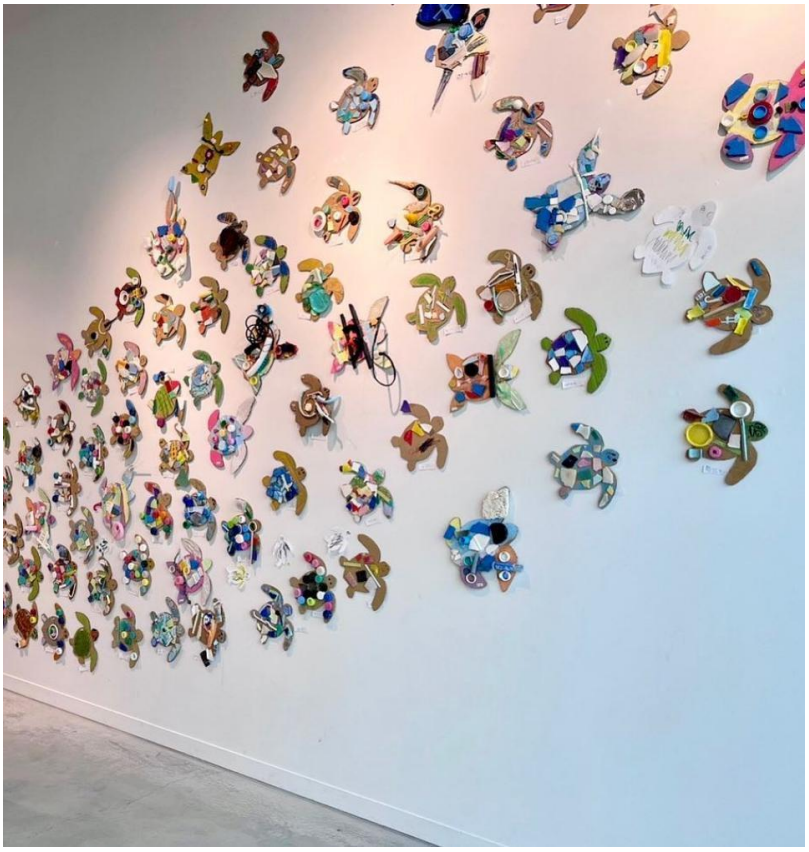
(Photo 33. Vendor, DREAM BEACH, selling textiles. Source: *@Churamura* on Instagram)

(Photo 34. Local band performing at the Okinawa Sea Turtle Olympics festival. Source: *@Churamura* on Instagram)

Art

ChuraMura advocates for sea turtle conservation through a variety of artistic expressions. The organization hosts interactive and informative exhibitions featuring artwork crafted from debris collected during their beach cleanups, such as plastics and ghost nets, alongside paintings depicting sea turtles. Leveraging social media platforms, ChuraMura amplifies its reach to raise awareness about pollution and the organization's conservation initiatives. Moreover, local shops and artists contribute to the cause by conducting complimentary workshops for local children, providing them with opportunities to engage and collaborate with the organization

through donations. These partnerships not only facilitate community involvement but also enhance the outreach of ChuraMura's educational programs.



(Photo 35. 106 baby turtles made from trash found from local beaches, bringing light to environmental issues and marine plastics. August 1 - 14, 2023. Source: *@Churamura* on Instagram)

(Photo 36. Handmade sea turtle puppets made from Okinawan patterned cloth. They were donated to charity sales during a workout lecture program with homeschooled children. Source: *@Churamura* on Instagram)

(Photo 37. Native Okinawans made a donation to Churamura after listening to their sea turtle conservation story. “The cooperation and actions of the local people are very powerful”. Source: *@Churamura* on Instagram)

(Photo 38. A collaboration between a local shop, Island Rythem Okinawa, and Churamura. Source: *@Churamura* on Instagram)

Science

ChuraMura compiles year-round tracking and monitoring of green sea turtles that can be classified through summer and winter. Along with tracking and monitoring green sea turtles, they monitor seagrass beds, sea turtles' food of choice in the local area! In the summer, there is about 30 kilometers of sand for the turtles to nest. Carl explained to me that with all reports of sea turtle tracks, 70% of the time, laying does not occur. Data is monitored from mother turtles to try to determine why they do not lay eggs. When the 30% of laying occurs, they block off and put-up warning signs. This type of monitoring lasts for two months as the incubation period is 60 days. When the time of hatching is close by, the *ChuraMura* team makes sure they get safely into the ocean. Once all hatched turtles make it safely into the ocean, the team excavates the nests and reports the success rate.

(Photo 39. Sign to warn people at the beach of a sea turtle nest. Source: *@Churamura* on Instagram)

(Photo 40. A sea turtle nest blocked off with a barrier and sign. Source: *@Churamura* on Instagram)

(Photo 41. Sign to warn people at the beach of a sea turtle nest. Source: *@Churamura* on Instagram)

(Photo 42. Relocation of a sea turtle nest. Source: *@Churamura* on Instagram)

However, the situation changes during the winter months, as a significant number of deceased green sea turtles are discovered washed up on the shore. The team meticulously investigates the cause of their demise through biopsies. In instances where a green sea turtle is found clinging to life and is washed ashore, a scenario referred to as a 'wash back', the team initiates a rescue operation and arranges for their transfer to a nearby rehabilitation facility. If the turtle requires advanced medical intervention, such as surgery, they are subsequently transferred to the nearby aquarium, Churaumi. In the wake of a major storm in mid-March, ChuraMura conducted a successful rescue operation for a stranded green sea turtle. The turtle was temporarily housed at the SeaSide Coral Farm facility in Yomitan Village before being transferred to the Churaumi Aquarium for assessment and recuperation, as it exhibited signs of not eating.

(Photo 43. Front building of Churaumi Aquarium. Source: *@ccn228* on Instagram)

ChuraMura utilizes citizen science to monitor and track sea turtles in the waters surrounding Okinawa. They have established the Okinawa Turtle Spotters Facebook group to compile a photographic database of these sea turtles. Members, including divers, snorkelers, marine biologists, and photographers, are encouraged to share their photographs and videos of sea turtles, aiding in the identification of species, locations, and movements throughout Okinawa Island. Additionally, ChuraMura focuses on tracking the nesting habits of female sea turtles. The requirements to submit into the database include (*@Churamura*, 2023):

- *At least one photo showing the turtle's head from the side and/or a full body shot (indicating any injuries or scars).*

- *Date, time, and location (GPS coordinates, google maps pin, etc.).*

- *Water depth and temperature.*

- *Presence and/or location of any plastic or metal tags.*

(Photo 44. Churamura's photographic database group via Facebook. Source: Facebook)

Photo 45. A green sea turtle hiding between the coral reefs. Source: Patricia Shelton, submitted through Okinawa Turtle Spotters)

(Photo 46. A green sea turtle sleeping over a reef. Source: Otávio Munefiça, submitted through Okinawa Turtle Spotters)

(Photo 47. Green sea turtle swimming. Source: Brandon Hannan, submitted through Okinawa Turtle Spotters)

(Photo 48. A green sea turtle swimming. Source: Brandon Hannan, submitted through Okinawa Turtle Spotters)

ChuraMura's data on green sea turtles from seasons 2020 to 2024.

2020

The nesting season for sea turtles in Okinawa spans from May to September. Since the NPO was founded in August 2020, there is no pre-existing data for comparison. In March 2020, the global Covid-19 pandemic led to border closures, with Japan entering a nationwide lockdown until May 2020. Even after restrictions were eased, health and safety measures remained in place. In August 2020, an outbreak of Covid-19 prompted the declaration of a 'State of Emergency' in the Okinawa prefecture, imposing restrictions such as beach closures. Despite these challenges, ChuraMura focused on raising awareness about sea turtles in the village during this period.

In 2020, there were a total of 13 nests with five of them being green sea turtles. No other information or data was available due to resources. There were two typhoons during the 2020 nesting season, Typhoon Bavi and Typhoon Maysak. Both Typhoons occurred towards the end of the season that brought severe weather conditions to Okinawa Island such as severe rainfall and flooding. There was one sea turtle nest that was spawned on July 30th and hatched on August 20th that was not affected by Typhoon Bavi. Unfortunately, there was one nest that was spawned on July 3rd and was supposed to be hatched on the 24th or 25th of August, but the typhoon caused a 100% mortality rate. During the nesting season, there was a 100% mortality rate for a nest that had been flooded by an ocean surge, and local authorities advised against interference. However, in between typhoons, a new nest was discovered on August 28th, and the team successfully relocated it, avoiding any impact from Typhoon Maysak. As ChuraMura began operating towards the end of the nesting season, they initially focused on raising awareness through QAB News, informing the local community about the beaches used by sea turtles for resting and nesting, along with guidelines for encountering nests and distressed sea turtles. Additionally, they highlighted anthropogenic threats such as development, bonfires, pollution, and lights, while also asking locals to be vigilant against natural predators like crabs and cats.

2021

Prior to the nesting season, alongside launching youth programs, the team collaborated with fishermen to assess sea turtle bycatch. Any captured turtles were tagged to facilitate movement tracking. This marked ChuraMura's inaugural year of comprehensive data collection. Throughout the nesting season, only two green sea turtle nests were identified, achieving a 78% hatching success rate. Typhoon In-Fa, forming on July 15, 2021, and dispersing on July 31, 2021, unleashed violent winds reaching 103 mph (166 km/h) and massive waves. The typhoon inflicted damage on the Sango Batake Coral Farm in Yomitan Village, prompting ChuraMura to assist in their typhoon resilience efforts. Furthermore, the organization commenced the construction of a future sea turtle rescue and rehabilitation aquarium.

2022

Data from the 2022 nesting season revealed a slight increase, with a total of three successful green sea turtle nests and an 81% hatching success rate. However, one confirmed green sea turtle nest with 55 eggs experienced unusual crab activity, leading to the discovery that a crab had removed an egg from the nest after consuming the baby turtle. Upon investigation by Macchi, the operations manager, it was documented that many eggs failed to develop due to water damage, plant root damage, lack of fertilization, or predation by crabs. This experience prompted the team to learn valuable lessons on nest protection, leading to investments in improved gear and equipment. In August, a weakened green sea turtle was found by beachgoers, prompting its rescue by Carl and his team. Upon examination at Churumi Aquarium, an x-ray revealed a wire stuck in its throat, preventing the turtle from eating, ultimately leading to its demise due to exhaustion. Tropical storm Aere struck Okinawa on July 2, 2022, bringing winds of 45 mph (73 km/h) and flooding, leading ChuraMura to reschedule their turtle trip. Subsequently, Typhoon Hinnamnor formed on August 27, 2022, dispersing on September 6, 2022, with winds reaching 85 mph (140 km/h), once again forcing the cancellation of the turtle trip due to high winds and heavy rainfall.

2023

The 2023 nesting season finished with a total of 12 nests which included 10 loggerhead and one hawksbill. There was one green sea turtle nest that successfully hatched 72 green sea turtle babies on August 3, 2023, but it was not in Yomitan Village. However, the green sea turtle nest and hatchlings were taken care of by affiliates of Churmura on the east coast of Okinawa Island. The total hatching success was 79% with a total of 1,321 eggs and 1,043 of those hatching as babies. Unfortunately, the 2023 season experienced typhoon 'Khanun' formed on July 26, 2023 and dispersed on August 11, 2023, bringing strong gusts of wind ranging from 60 mph (96.6 kmh) to 115 mph (185.07 kmh), heavy rain, flooding, and causing a power outage in Okinawa. The typhoon directly affected a few nests, 53 babies drowned inside the nest before emerging and inundated several eggs from typhoon Khanun, but otherwise the damage was largely mitigated due to the team relocating **all** nests prior. If the team had not relocated any of the nests, then they would have experienced 100% mortality and destruction as other regions also were affected. Thankfully, the 72 green sea turtle babies hatched during the typhoon were not affected and were released into the ocean.

2024

As ChuraMura enters its fifth year, the organization has set ambitious goals for the upcoming 12 months. These include aiming for 50-60 responses before the end of March, an increase of 10 from the previous average, attending the ISTS international turtle conference in Thailand to represent Japan, expanding the Junior Ranger summer camps to 8 weeks with 8 kids per camp, conducting weekly Summer Night Patrols Tours with a target of +5 more than in 2023, aiming to attract over 2000 attendees, doubling workshops and educational booths to +1000 at the October 2024 Sea Turtle Festival, executing over 20 beach cleans, extracting over 10 tons of ghost net from the ocean for upcycling, conducting over 30 "turtle talks" seminars for schools and groups, and raising funds totaling $10,000 in donations, $5,000 in sales, $20,000 in grants, $10,000 in programs, and $5,000 in sponsorships, representing a $10,000 increase from 2023. As the new year commences, ChuraMura’s STSRT team has already responded to 19 stranding reports, January alone, collecting data including curved carapace width and length, as well as side profile shots, which will be submitted to the Okinawa Turtle Spotters. Out of the 19 reports, all but one were found dead when they were reported. 68% of the reports were of green sea turtles, 5% hawksbill, and 26% unknown. The stranding season will continue until March.

A message from the founder of ChuraMura [ちゅらむら], Carl Bastian.

"[you] don’t have to work in an office, [you] can find a satisfying job in doing what you love - expose yourself to different opportunities and experiences- make it happen, your passion. Life isn’t meant to pay off bills etc., it’s not always about finance".

CONCLUSION

The Results

The success rates of green sea turtles are negatively impacted by a lack of sufficient data, limited government support, and human-made threats, as highlighted in this thesis. These challenges are made worse by the relative newness of the organization, which hampers its ability to identify clear patterns. Recorded nests have slowly increased from 2020 until 2023, where no green sea turtle nests were found in Yomitan Village, but affiliates of ChuraMura found one nest on the eastside of Okinawa. It is most certain that, overall, ChuraMura has saved sea turtle numbers in Yomitan Village through environmental education, revitalizing Okinawan traditions and practices – that can be traced back to indigenous roots, relocating nests due to typhoons, creating a scientific database to track movements, constructing a rehabilitation center, Sea Turtle Stranding Response Team (STSRT), and more.

It is unquestionable that ChuraMura has started the beginning of a new era in Okinawa. In a short time, the organization has expanded the knowledge and understanding of the people in Yomitan Village, introducing them to topics and ideas that were previously considered distant or unfamiliar. The community, especially the younger generations, has embraced the organization's goals and values, showing a willingness to participate in their educational programs, partnerships, beach cleanups, and other efforts to change local behaviors. They are continuously fighting to earn their position as a reputable organization, and 2024 marks the fifth year of ChuraMura’s establishment, so they can finally apply for funding and grants from the government. The support from the government will improve the availability of information and data collected on green sea turtles by ChuraMura, making accessibility easier. This circumstance will undoubtedly further the influence of local Okinawans' interests and steer them to get more environmentally educated and involved in marine conservation efforts as Okinawans currently prioritize economic importance due to their socio-economic statuses, leading them to rely heavily on revenues. Due to this, implementing the concept of Satoumi, I believe, will be the first step for the local community of Yomitan Village to accept ecotourism as it can break the resistance by integrating sustainable management, push government resistance, and it can bring the community back to tradition, but collaborate

effort from all stakeholders is necessary. Ecotourism and satoumi share core foundations focused on re-connecting and co-existing with our natural environment, and emphasizing importance on environmental education. They both address socioeconomic, cultural, political, and environmental needs. ChuraMura values tradition, identity, and culture, thus initiating both satoumi and ecotourism in Yomitan Village by reintroducing what was lost post-war – from a connection with nature through James R. Kimmels concept of 'love', supported through affection and emotion expressed in marine conservation efforts of sea turtles.

Suggestions moving forward

I deeply resonate with ChuraMura's philosophies and goals, as they demonstrate a genuine concern for both the natural environment and the diverse individuals within their community. The next steps to this research I believe, for the future, is that I would like to personally travel to Okinawa and work closer with ChuraMura to further my research on a deeper level to personally feel and understand the positive impact and efforts Carl and his team have made and will make in the future. Field work in Yomitan Village will allow me to see, feel, and understand people's situations as it is hard when you cannot see them for yourself so it would be best to experience over a longer time period to actually know. This will also allow me to gain access to data that is not easily accessible online such as local fishermen experiences, pre- and post-covid, first hand impacts on the tertiary sector, and gain further insight to Yomitan Village's governance. As well as seeing the effects of education on the youth by talking to students who have participated. The success of these educational programs won't be seen for a few more years, but adopting the goals and values of ChuraMura will allow the NPO to reach their goals of sustaining green sea turtle conservation, gaining trust by the local community and government, and creating the first sanctuary in Okinawa.

Just like growing up on an island that gets compared to Okinawa, I have personally witnessed the environmental transformations affecting the beaches, ocean, and marine life over the decades. Tourists, visiting for brief periods, are often unable to comprehend these changes and the associated challenges faced by the local community. There exists a "disconnect" between the scientific community and the general public, particularly those without access to such information and data. However, marine conservation organizations like ChuraMura have facilitated an understanding for these individuals, providing not only scientific knowledge,

but also environmental awareness, and insight into the impact of our personal choices, especially concerning green sea turtles. This is only the beginning of ecotourism and conservation efforts in Yomitan Village, Okinawa, but it's rise since 2020 has undoubtedly made its footprints in the sand.

BIBLIOGRAPHY & REFERENCES

Agency of Rual Development and Soil and Water Conservation, MOA. (2018). Rural Development and Soil and Water Conservation Promoting Regeneration of Rural Villages: Value Added Promotion of Satoumi Ecotourism on Penghu County Expressway 202.

Ardoin, N. M., Wheaton, M., Bowers, A. W., Hunt, C. A., & Durham, W. H. (2015). Nature-based tourism's impact on environmental knowledge, attitudes, and behavior: a review and analysis of the literature and potential future research. *Journal of Sustainable Tourism*, *23*(6), 838-858.

American Chambers of Commerce. (2022). Bio - Carl Bastian. Ryukyu World Office.

Australian Government, Department of the Environment and Heritage. (2003). The Benefits of Marine Protected Areas.

Awabdi, D. R., Tavares, D. C., Bondioli, A. C. V., Zappes, C. A., & Di Beneditto, A. P. M. (2018). Influences of conservation action on attitudes and knowledge of fishermen towards sea turtles along the southeastern Brazil. *Marine Policy*, *95*, 57-68.

Barclay, K. (2006). Between modernity and primitivity: Okinawan identity in relation to Japan and the South Pacific. *Nations and Nationalism*, *12*(1), 117-137.

Bennett, N. J., Katz, L., Yadao-Evans, W., Ahmadia, G. N., Atkinson, S., Ban, N. C., ... & Wilhelm, A. (2021). Advancing social equity in and through marine conservation. *Frontiers in Marine Science*, 994.

Berque, J., & Matsuda, O. (2013). Coastal biodiversity management in Japanese satoumi. *Marine Policy*, *39*, 191-200.

Bird Rose, D. (2011). Wild Dog Dreaming: Love and Extinction. Charlottesville: University of Virginia Press.

Blasiak, R., Wynberg, R., Grorud-Colvert, K., Thambisetty, S., Bandarra, N. M., Canario, A. V., ... & Wabnitz, C. C. (2020). The ocean genome and future prospects for conservation and equity. *Nature Sustainability*, *3*(8), 588-596.

BLUEZONES. (2023). History of Blue Zones.

BLUEZONES. (2008). Okinawa, Japan: Secrets of the world's longest-living women.

Brager, G. S., & De Dear, R. J. (2003). Historical and cultural influences on comfort expectations. *Buildings, culture and environment: Informing local and global practices*, 177-201.

Brager, G. S., & De Dear, R. J. (1998). Thermal adaptation in the built environment: a literature review. *Energy and buildings*, *27*(1), 83-96.

Bulgar, K. (2016). History of Ecotourism. IOI.

Castaño-Rosa, R., & Okushima, S. (2021). Prevalence of energy poverty in Japan: a comprehensive analysis of energy poverty vulnerabilities. *Renewable and sustainable energy reviews*, *145*, 111006.

Chi, W., Shu, F., Lin, Y., Li, Y., Luo, F., He, J., ... & Zheng, B. (2023). Typhoon-induced destruction and reconstruction of the coastal current system on the inner shelf of East China Sea. *Continental Shelf Research*, *255*, 104912.

Chibana, M. (2018). An artful way of making Indigenous space. *Verge: Studies in Global Asias*, *4*(2), 135-162.

Conservation International. (2023). ABOUT CONSERVATION INTERNATIONAL.

Conservation International. (2022). "A MODEL FOR OTHER PROGRAMS AROUND THE WORLD" – CONSERVATION INTERNATIONAL STATEMENT ON RAJA AMPAT MARINE PROTECTED AREA EARNING BLUE PARK AWARD AT UN OCEANS CONFERENCE.

Cottier-Cook, E. J., Nagabhatla, N., Asri, A., Beveridge, M., Bianchi, P., Bolton, J., ... & Yarish, C. (2021). Ensuring the sustainable future of the rapidly expanding global seaweed aquaculture industry–a vision.

Cowan, M. A. (2010). Marine Food Chains and Biodiversity. National Geographic Society.

Cultural Survival. (2022). Report to UN Human Rights Council Highlights Indigenous Peoples' Rights Violation in Japan.

De Cian, E., Pavanello, F., Randazzo, T., Mistry, M., & Davide, M. (2019). Does Climate Influence Households' Thermal Comfort Decisions?. *University Ca' Foscari of Venice, Dept. of Economics Research Paper Series No*, *2*.

De Cian, E. (2023). Exhibit in Venice: The Cooling Solution. *Energya*.

de Vasconcellos Pegas, F., & Stronza, A. (2010). Ecotourism and sea turtle harvesting in a fishing village of Bahia, Brazil. *Conservation and Society*, *8*(1), 15-25.

de Vos, A. (2022). *Equity in Marine Conservation: How Local Efforts and Global Partnerships Together Can #SaveOurOcean*.

Dreujou, E., Carrier-Belleau, C., Goldsmit, J., Fiorentino, D., Ben-Hamadou, R., Muelbert, J. H., ... & Beauchesne, D. (2020). Holistic Environmental Approaches and Aichi Biodiversity Targets: accomplishments and perspectives for marine ecosystems. *PeerJ*, *8*, e8171.

EEA. (2018). Marine protected areas.

EIA. (2019). Environmental Impact Assessment in Japan.

Eldridge, D. R. (2021). Okinawa's wasted COVID-19 year.

European Commission. (2022). Introduction to the Energy Poverty Advisory Hub (EPAH) Handbooks: A Guide to Understanding and Addressing Energy Poverty. Energy Poverty Advisory Hub 2022.

FAO. (2023). Complementary Strategies.

FAO. (2021). The impact of COVID-19 on fisheries and aquaculture food systems, possible responses: Information paper, November 2020, Rome.

FAUNALYTICS. (2017). Studying Turtle Migration Patterns To Inform Conservation: A study of turtle migration patterns shows a network of smaller Marine Protected Areas (MPAs) in conjunction with bigger MPAs can achieve better results.

Fennell, D. A. (2020). *Ecotourism*. Routledge.

Florida Atlantic University. (2018). Sea turtle crisis: Moisture, not just heat impacts sex of sea turtle hatchlings: Sex-ratio study first to use molecular marker to explain why and how moisture affects the nest. *ScienceDaily*.

Gakiya, H. (2022). OIST and Yomitan Village Sign a Memorandum of Comprehensive Collaborative Agreement. Okinawa Institute of Science and Technology. Institutional News.

Gatto, C. R., Matthews, B., & Reina, R. D. (2021). Role of incubation environment in determining thermal tolerance of sea turtle hatchlings. *Endangered Species Research*, *44*, 397-408.

Gill, D. A., Mascia, M. B., Ahmadia, G. N., Glew, L., Lester, S. E., Barnes, M., ... & Fox, H. E. (2017). Capacity shortfalls hinder the performance of marine protected areas globally. *Nature*, *543*(7647), 665-669.

Goss, R. (2020). This island unlocked the secret to long life- and knows how to get through tough times. *National Geographic.*

Grant, P. (2019). Minority and Indigenous Trends 2019–Focus on Climate Change.

Grant, P. (2020). Minority and Indigenous Trends 2020–Focus on Technology.

Grant, P. (2022). Minority and Indigenous Trends 2022–Focus on Work.

Gumede, T. K., & Nzama, A. T. (2021). Approaches toward Community Participation Enhancement in Ecotourism. *Protected Area Management-Recent Advances*, 1-23.

Han, H. (2021). Consumer behavior and environmental sustainability in tourism and hospitality: A review of theories, concepts, and latest research. *Journal of Sustainable Tourism*, *29*(7), 1021-1042.

Harris, K. (2016). *Education and knowledge: The structured misrepresentation of reality*. Routledge.

Hawaii.gov. (2023). PROTECTING MARINE SPECIES.

Heinrich, P. (2023). Ryukyuan Perspectives for Language Reclamation. *Languages*, *8*(1), 35.

Heinrich, P., & Valsecchi, G. (2023). Ryukyuan Language Reclamation: Individual Struggle and Social Change. In *Discourses of Identity: Language Learning, Teaching, and Reclamation Perspectives in Japan* (pp. 139-157). Cham: Springer International Publishing.

Helgason, N. (2020). *Onna Coral Field in Okinawa Japan*. Reef Builders.

Henriques, M. (2019). Rich mineral reserves at extinct deep-sea vents could help solve the metals shortage for renewable energy technologies, but the environmental price may be high. BBC.

Hernández, M., & Muñoz, P. (2022). Reformists, decouplists, and activists: A typology of ecocentric management. *Organization & Environment*, *35*(2), 282-306.

Hida, H. & May, T. (2022). *Sea Turtles Found Stabbed in Japan, but Charges Are Unlikely*. New York Times.

Higa, Y., Takeuchi, A., & Yanaka, S. (2022). Connecting Local Regions and Cities through Mozuku Seaweed Farming and Coral Reef Restoration: Onna Village, Okinawa. In *Satoumi Science: Co-Creating Social-Ecological Harmony between Human and the Sea* (pp. 193-215). Singapore: Springer Singapore.

Hilton. (2021). Hilton 2021 Environmental, Social, and Governance Report.

Hiyoshi, A., Fukuda, Y., Shipley, M. J., & Brunner, E. J. (2014). Health inequalities in Japan: the role of material, psychosocial, social relational and behavioural factors. *Social Science & Medicine*, *104*, 201-209.

HNN Staff. (2021). Tourists seen harassing monk seals on social media slapped with $500 fine. *HawaiiNewsNow*.

Howard, R., Bell, I., & Pike, D. A. (2014). Thermal tolerances of sea turtle embryos: current understanding and future directions. *Endangered Species Research*, *26*(1), 75-86.

Hu, C., Gallon, N., Humayun, H., Formanek, I., Rahim, Z. (2020). Can nature heal itself? What the pandemic has shown us. *CNN*.

Iakovoglou, V., Zaimes, G. N., Bermúdez-Cañete, M. A., García, J. L., Giménez, M. C., Calderón-Guerrero, C., ... & Abrudan, I. (2015). Understanding and enhancing ecotourism opportunities through education. *International Journal of Humanities and Social Sciences*, *9*(8), 2760-2764.

Ishizaki, A., Teel, T. L., & Yamaguchi, M. (2011). Contextual factors influencing support for sea turtle management actions in Ogasawara Islands, Japan: An application of conjoint analysis. Human Dimensions of Wildlife, 16(5), 287-298.

Itaya, K., (2021). Okinawa and SDGs. Visit Okinawa Japan. Nature & Wildlife.

IUCN. (2017). Marine protected areas and climate change.

IWM. What You Need to Know About the Battle of Okinawa.

JapanSocietyNYC. (2022). Climate Change & the Blue Economy: Diving into Okinawa's Waters. Youtube.

Jenkins, L. D. (2022). Power, politics, and culture of marine conservation technology in fisheries. *Conservation Biology*, *36*(3), e13855.

Joffe, A. (2018). Tales by Light: Paradise in Peril Part 1. Netflix.

Joffe, A. (2018). Tales by Light: Paradise in Peril Part 2. Netflix.

Jones, J. P., Thomas-Walters, L., Rust, N. A., & Veríssimo, D. (2019). Nature documentaries and saving nature: Reflections on the new Netflix series Our Planet. *People and Nature*, *1*(4), 420-425.
Jozuka, E., Yueng, J., (2022). At least 30 endangered green sea turtles found with 'bleeding' neck wounds in Japan. CNN.

Kakazu, H. (2018). Island sustainability and inclusive development: The case of Okinawa (Ryukyu) Islands. *Journal of Marine and Island Cultures*, *7*(2), 1-36.

Kakuma S., & Kamimura M. (2012). *Satoumi in an Okinawan Coral Reef System.* Our World: United Nations University.

Kakuma, S., & Kitolelei, J. (2018). Coastal Resource Management Connected by Marine Protected Area Networks. *Transformations of Social-Ecological Systems: Studies in Co-Creating Integrated Knowledge Toward Sustainable Futures*, 267-286.

Kakuma, S., & Sato, T. (2022). Prologue: What Is Satoumi?. In *Satoumi Science: Co-creating Social-Ecological Harmony Between Human and the Sea* (pp. 1-17). Singapore: Springer Singapore.

Kakuma, S., Yanagi, T., & Sato, T. (Eds.). (2022). *Satoumi Science: Co-Creating Social-Ecological Harmony between Human and the Sea*. Springer Nature.

Kamimura, M., & Anne Claus, C. (2022). Enlivening Ecosystems with Human Hands: Building Satoumi through Coral Reef Culture. In *Satoumi Science: Co-creating Social-Ecological Harmony Between Human and the Sea* (pp. 69-87). Singapore: Springer Singapore.

Kemper, K. (2019). *Blue Economy & Marine Pollution.* World Bank.

Khosla, R., Renaldi, R., Mazzone, A., McElroy, C., & Palafox-Alcantar, G. (2022). Sustainable Cooling in a Warming World: Technologies, Cultures, and Circularity. *Annual Review of Environment and Resources*, *47*, 449-478.

Kobayashi, M. (2022). The COVID-19 impacts and challenges to achieving sustainability in Japan's fisheries and aquaculture. *Marine Policy*, *143*, 105161.

Kondo, S., Morimoto, Y., Sato, T., & Suganuma, H. (2017). Factors affecting the long-term population dynamics of green turtles (Chelonia mydas) in Ogasawara, Japan: influence of natural and

artificial production of hatchlings and harvest pressure. Chelonian Conservation and Biology, 16(1), 83-92.

Kimmel, J. R. (1999). Ecotourism as environmental learning. *The Journal of Environmental Education*, *30*(2), 40-44.

Kirksey, S. E., & Helmreich, S. (2010). The emergence of multispecies ethnography. Cultural Anthropology, 25(4), 545-576.

Kitolelei, S., Soderberg, A., Qaqara, N., Prakash, S. S., Tuiono, M., Veitayaki, J., & Piovano, S. (2022). Conservation status and cultural values of sea turtles leading to (un) written parallel management systems in Fiji. *Ambio*, *51*(12), 2431-2444.

Kuo, M., Barnes, M., & Jordan, C. (2019). Do experiences with nature promote learning? Converging evidence of a cause-and-effect relationship. *Frontiers in psychology*, *10*, 305.

Li, Y., Sun, M., Evans, K. S., Ren, Y., & Chen, Y. (2020). Rethinking marine conservation strategies to minimize socio-economic costs in a dynamic perspective. *Biological Conservation*, *244*, 108512.

Machotka, E. (2018). Consuming Eco-Art: Satoyama at the Echigo-Tsumari Art Triennale 2012. In *Consuming Life in Post-Bubble Japan* (pp. 215-236). Amsterdam University Press.

MAFF. (2022). FY 2021 Trends in Fisheries and FY 2022 Fisheries Policy.

Mallick, F. H. (1996). Thermal comfort and building design in the tropical climates. *Energy and buildings*, *23*(3), 161-167.

Marine Conservation Institute. (2022) Blue Park Criteria: 2022. Seattle, WA, 34pp.

Marine Conservation Institute. (2023). Common fishery right area (Okinawa). *MARINE PROTECTION ATLAS.*

Marine Conservation Institute. (2023). Global Marine Fishing Protection. *MARINE PROTECTION ATLAS.*

Masucci, G. D., & Reimer, J. D. (2019). Expanding walls and shrinking beaches: loss of natural coastline in Okinawa Island, Japan. *PeerJ*, *7*, e7520.

Matsuzawa, Y. (2018). Sea Turtle Conservation in the Land of Urashima Taro. *SWOT Report vol. 13*.

Mazzone, A., & Khosla, R. (2021). Socially constructed or physiologically informed? Placing humans at the core of understanding cooling needs. *Energy Research & Social Science*, *77*, 102088.

McCormack, G., & Norimatsu, S. O. (2018). *Resistant Islands: Okinawa Confronts Japan and the United States*. Rowman & Littlefield.

McKay, C. J., Sommer-Trembo, C., & Sánchez-Villagra, M. R. (2022). The portrayal of animal interactions in nature documentaries by David Attenborough and Bernhard Grzimek. *Evolution: Education and Outreach*, *15*(1), 1-9.

Mendes, S., Martins, J., & Mouga, T. (2019). Ecotourism based on the observation of sea turtles–A sustainable solution for the touristic promotion of são tomé and príncipe. *Cogent Social Sciences*, *5*(1), 1696001.

Ministry of Foreign Affairs of Japan. (2022). Fisheries.

Ministry of Foreign Affairs of Japan. (2023). Japan and the U.N. Convention Law of the Sea: Japan's Contribution to the Adoption of the U.N. Convention on the Law of the Sea.

Ministry of Justice, Japan. (2007). Ecotourism Promotion Act. Japanese Law.

Ministry of the Environment, Government of Japan. (2003). Act on the Conservation and Sustainable Use of Biological Diversity through Regulations on the Use of Living Modified Organisms.

Ministry of the Environment, Government of Japan. (2023). Conservation of the Marine Environment.

Ministry of the Environment, Government of Japan. (2003). Law Concerning the Conservation and Sustainable Use of Biological Diversity through Regulations on the Use of Living Modified Organisms.

Ministry of the Environment, Government of Japan. (2023). Nature Conservation in Japan – Section 6.

Ministry of the Environment, Government of Japan. (2023). [Protection of endangered Species] Wildlife Conservation in Japan.

Mongush, M. (2014). *A trip to Okinawa: the experience of using the results of scientific tourism in the educational process.* ResearchGate.

MRG. (2023). Ryukyuans (Okinawans). World Directory of Minorities and Indigenous Peoples.

Mrosovsky, N. (1980). Thermal biology of sea turtles. *American Zoologist*, *20*(3), 531-547.

Murray, A. (2017). *Footprints in paradise: Ethnography of ecotourism, Local knowledge, and nature therapies in okinawa*. Berghahn Books.

Nat. Clim. Chang. (2020). Shifting Habitats.

National Geographic. (2010). Green Sea Turtle.

NCAS. (2020). Typhoons and climate change: what's causing the floods in East Asia?

NOAA Fisheries. (2023). Green Turtles. Species Directory.

NOAA Fisheries. (2021). Turtles, Tourism, and Traffic – Keeping Hawai'i Honu Safe.

OECD (2023), Protected areas (indicator).

OECD (2023), Threatened species (indicator).

Ogasawara Marine Center. (2023), About Us.

Ohara, Y., & Machida, S. (2023). Uchinaaguchi Learning through Indigenous Critical Pedagogy: Why Do Some People in Yomitan Not Know Yomitan Mountain?. *Languages*, *8*(1), 17.

Okinawa Coastal Conservation Alliance (OCPA). (2023). 私たちの使命.

Okinawa Prefecture. (2013). Biodiversity Strategy of Okinawa (Excerpt).

Okinawa Prefecture. (2023). The History of the Ryukyu Kingdom and Its Culture.

Okinawa Travel Info. (2023). Nesting Season from May to August – The Peak Season for Seeing Sea Turtles.

Okubo, T. (2022). Make Onna Village known as the "Ecological Smart Resort". OIST.

Padma, P., Ramakrishna, S., & Rasoolimanesh, S. M. (2022). Nature-based solutions in tourism: A review of the literature and conceptualization. *Journal of Hospitality & Tourism Research*, *46*(3), 442-466.

Pistore, L., Varin, C., & Pasut, W. (2023). Development of climate-based thermal comfort ranges from existing data: Analysis of the Smart Controls and thermal comfort (SCATS) database. *Energy and Buildings*, *298*, 113509.

Pistore, L. and Wilmer P., (2022). Roots and Mechanisms of Thermal Comfort Expectations: From Individuals' Own Background to Adaptation and Change. Conference proceedings 5th International Conference on Building Energy and Environment (COBEE 2022)

Plagerson, S. (2020). Marine biodiversity and poverty alleviation.

Prado, F. (2023). Biodiversity in Paradise: A Natural History of Raja Ampat.

Ramírez, F., Santana, J., Ramírez, F., & Santana, J. (2019). *Education and ecotourism* (pp. 21-25). Springer International Publishing.

Randazzo, T., De Cian, E., & Mistry, M. N. (2020). Air conditioning and electricity expenditure: The role of climate in temperate countries. *Economic Modelling*, *90*, 273-287.

Ray, G. C., & McCormick-Ray, J. (2009). *Coastal-marine conservation: science and policy*. John Wiley & Sons.

Raworth, K. (2017). *Doughnut economics: seven ways to think like a 21st-century economist*. Chelsea Green Publishing.

Riho, I. M. A. G. A. W. A., & Brian, H. A. R. R. I. S. O. N. (2021). The current state of ecotourism in Japan. *Japanese Journal of Policy and Culture*, *29*, 43-63.

Robinson, G. (2021). Churamura: Footprints in the Sand. Outdoor Japan.

Rosane, O. (2022). Extreme Weather 101: Everything You Need To Know. *World Economic Forum*.

Sayers, M., Trebeck, Dr. K. (2015). The UK Doughnut: A Framework for environmental sustainability and social justice. *OXFAM RESEARCH REPORT*, 2-74.

Scientific Tourism Networks. (2021). What is Scientific Tourism?

Shigemitsu, M., & Gray, E. (2021). Building the resilience of Japan's agricultural sector to typhoons and heavy rain.

Sisriany, S., & Furuya, K. (2020). Ecotourism policy research trends in Indonesia, Japan, and Australia. *Jurnal Manajemen Hutan Tropika*, *26*(2), 178-178.

Smith, E. N., Long, N. C., & Wood, J. (1986). Thermoregulation and evaporative water loss of green sea turtles, Chelonia mydas. *Journal of herpetology*, 325-332.

Smith, J. (2019). Netflix's new David Attenborough series Our Planet shows us what tourism's future might be.

Stevenson, R. B., Brody, M., Dillon, J., & Wals, A. E. (Eds.). (2014). *International handbook of research on environmental education*. Routledge.

Stronza, A. L., Hunt, C. A., & Fitzgerald, L. A. (2019). Ecotourism for conservation?. *Annual Review of Environment and Resources*, *44*, 229-253.

Sumaila, U. R., & Stergiou, K. I. (2015). Economics of marine ecosystem conservation. *Marine Ecology Progress Series*, *530*, 179-182.

T. Nakada (N/A), Coral Reefs of Japan: Sustainable use and conservation of coral reefs. pp. 106-109. https://www.bing.com/ck/a?!&&p=fb5d685863c43452JmltdHM9MTY4MDEzNDQwMCZpZ3VpZD0wZjExM2ZhYS0xZDIxLTY3YjMtMGU3OS0yZDEzMWM1NjY2YmQmaW5zaWQ9NTIxMg&ptn=3&hsh=3&fclid=0f113faa-1d21-67b3-0e79-2d131c5666bd&psq=are+coral+reels+protected+under+japanese+conservation+laws&u=a1aHR0cHM6Ly93d3cuZW52LmdvLmpwL25hdHVyZS9iaW9kaWMvY29yYWxyZWVmcy9yZWZlcmVuY2UvY29udGVudHMvMDQwMS5wZGY&ntb=1

Tanaka, Y. (2017). *Hidden horrors: Japanese war crimes in World War II*. Rowman & Littlefield.

Tanji, M. (2009). Community, Resistance and Sustainability in an Okinawan Village: Yomitan. *The Asia Pacific Journal: Japan Focus*.

TeamLab Borderless. (2023). Artists.

The Nature Conservation Society of Japan (NACS-J). (2012). Panel on Coastal Conservation and Management, The way how Marine Protected Areas in Japan should be to promote biodiversity conservation.

The Okinawa Times. (2021). As Covid-19 compounds Okinawa's tourism woes, industry looks for way out. *thejapantimes.*

Theater of the Sea. (2023). Animal Care and Training.

Tikadar, K. K., Islam, M. J., Saha, S. M., Alam, M. M., Barman, S. K., & Rahman, M. A. (2022). Livelihood status of small-scale fishermen and determinants of their income: insights from north-eastern floodplains of Bangladesh. *Geography and Sustainability*, *3*(3), 204-213.

Tokyo R. J. (2022). What's behind Okinawans' falling life expectancy? *DW Society Japan*.

Torio, L. (2016). Can Indigenous Okinawans Protect Their Land and Water From the US Military? *The Nation.*

Tsujiguchi, L. (2021). Yomitan-son: Visit a Traditional Village and Meet the Locals in Okinawa. Voyapon.

Turkozan, O., Almpanidou, V., Yılmaz, C., & Mazaris, A. D. (2021). Extreme thermal conditions in sea turtle nests jeopardize reproductive output. *Climatic Change*, *167*(3-4), 30.

Türkozan, O., Yılmaz, C., Almpanidou, V., Godfrey, M. H., & Mazaris, A. D. (2023). Thermal conditions of green turtle (Chelonia mydas) nests in the largest rookery in the eastern Mediterranean. *Endangered Species Research*, *50*, 63-73.

Uehara, T., Hidaka, T., Matsuda, O., Sakurai, R., Yanagi, T., & Yoshioka, T. (2019). Satoumi: Re-connecting people to nature for sustainable use and conservation of coastal zones. *People and Nature*, *1*(4), 435-441.

Uehara, T., Niu, J., Chen, X., Ota, T., & Nakagami, K. I. (2016). A sustainability assessment framework for regional-scale Integrated Coastal Zone Management (ICZM) incorporating Inclusive Wealth, Satoumi, and ecosystem services science. *Sustainability Science*, *11*, 801-812.

UKEssays. (2018). The Current Approaches To Ecotourism.

UNCED. (1992). 'Earth Summit': Convention on Biological Diversity.

UNESCO. (2011). Ogasawara Islands. World Heritage Convention.

UNESCO World Heritage Convention. (2023). Gusuku Sites and Related Properties of the Kingdom of Ryukyu.

UNWTO. (2002). ECOTOURISM AND PROTECTED AREAS.

UNWTO. (2023). TOURISM AND CULTURE.

Valerio, M. A. G. (2012). BioArt on the verge of aesthetic ontology. *Annales, Ser hist sociol*, *22*, 327-334.

Vagena, A. (2021). OVERTOURISM: Definition and impact. *Academia Letters*, *12*(7).

Visit Okinawa Japan. (2023). An Overview of Okinawa's History.

Visit Okinawa Japan. (2023). Okinawa's Traditional Performing Arts.

Visit Okinawa Japan. (2023). Traditional Culture.

Visit Okinawa Japan. (2023). Traditional Okinawan Arts.

Visit Okinawa Japan. (2023). The Secret of Okinawan Longevity.

Warren, C., Gripper, J., & Claringbould, L. (2012). World Responsible Tourism Day case study: Encouraging environmental awareness in children through ecotourism interpretation. *Progress in Responsible Tourism*, *2*(2), 111-127.

Westlund, K. (2014). Training is enrichment—And beyond. *Applied Animal Behaviour Science*, *152*, 1-6.

Wilson, C., & Tisdell, C. (2003). Conservation and economic benefits of wildlife-based marine tourism: sea turtles and whales as case studies. *Human Dimensions of Wildlife*, *8*(1), 49-58.

Winther, J. G., Dai, M., Rist, T., Hoel, A. H., Li, Y., Trice, A., ... & Whitehouse, S. (2020). Integrated ocean management for a sustainable ocean economy. *Nature ecology & evolution*, *4*(11), 1451-1458.

Worm, B. (2017). How to heal an ocean. *Nature*, *543*(7647), 630-631.

Wray, M. (2020). Dolphins return to Italy's coast amid coronavirus lockdown: 'Nature just hit the reset button'. *Global News*.

WWF. (2023). Controlling sand temperatures for sea turtles in the Choco region of Colombia.

Yokai.com. (2023). Otohime. Otohime – Yokai.com

Zhang, X., Guo, W., & Bashir, M. B. (2022). Inclusive green growth and development of the high-quality tourism industry in China: The dependence on imports. *Sustainable Production and Consumption*, *29*, 57-78.