Developing a Model to Evaluate the Sustainability of Marine Turtle Conservation Organisations

What are the criteria that may be used to evaluate the sustainability of Marine Turtle conservation projects and why?

Environmental Systems and Societies

Word Count: 4072

Contents

Introduction

This essay asks the question "**What are the criteria that may be used to evaluate the sustainability of Marine Turtle conservation entities and why?**".

Marine Turtles currently face a magnitude of threats and while most species of sea turtles are endangered, there are quite a few organisations that are trying to protect these turtles and conserve them[1]. Organisations must be commended for their good work, the Environmental Systems and Societies syllabus asks students to question such organisations' sustainability, that is, are they creating more problems than they are intending to solve?

In order to answer this question, the essay will be exploring the Sustainability Model and "the three major components of human existence" and using that principle and its associated principles to create an evaluation model[2] . This tool, depending on the result, will allow individuals to evaluate the sustainability of marine turtle conservation entities in order to holistically assess their efficacy.

This essay, in aiming to create an evaluation model, will take into consideration a major threat to marine life: poaching, predation and illegal trade of eggs[3]. The intended result of this research essay is a model which is able to identify, predict and evaluate potential environmental, social and economic impacts of an initiative in order to assess its sustainability.

---

[1] World Wide Fund For Nature. Welcome to WWF Guianas. Accessed November 7, 2017. http://www.wwfguianas.org/.
[2] Duran, D. "The Components of Sustainable Development - A Possible Approach - ScienceDirect." ScienceDirect.com | Science, Health and Medical Journals, Full Text Articles and Books. Last modified 2015. http://www.sciencedirect.com/science/article/pii/S2212567115008497.
[3]SeeTurtles.org. SEE Turtles. n.d. https://www.seeturtles.org/.

Section A | The Sustainability Model

What is sustainability?

In the last century, the world's technological and economic advancements have led to a rapid deterioration of natural resource systems either due to overexploitation or neglect[4]. This rapid deterioration, unless stopped, will result in excessive resource shortages and the inability of future generations to consume resources without being affected by harrowing scarcity.

According to The University of Alberta, sustainability refers to the meeting our (the current generation) own needs without compromising the ability of the future generations to meet their own needs. Simply put, it means living and using resources in such a way in the current day so that our children can be as comfortable as us in the future. The term is relatively new and contains two specific understandings. One being the aforementioned concept of allowing the perpetuity of resources and the other being the concept of sustainable development.

"Sustainable development is a juxtaposition of two elements of major importance. The first term "durable" represents durability and sustainability, while the word "development" aimed at expanding or construction the potentialities of; bring gradually to a fuller, greater, or better state." [5]. While this may seem simple, sustainable development may be viewed from two sides:

1. The establishment of initiatives which aim to fix or reverse the current environmental issues [environmental protection][6] or

[4] Duran, D. "The Components of Sustainable Development - A Possible Approach - ScienceDirect." ScienceDirect.com | Science, Health and Medical Journals, Full Text Articles and Books. Last modified 2015. http://www.sciencedirect.com/science/article/pii/S2212567115008497.
[5] Duran, D. "The Components of Sustainable Development - A Possible Approach - ScienceDirect." ScienceDirect.com | Science, Health and Medical Journals, Full Text Articles and Books.
[6] Environmental Science. "Sustainability | EnvironmentalScience.org." Environmental Science |

2. The establishment and reformation of initiatives that conform to the guidelines of sustainability[7].

For this essay, the focus will be on evaluating the sustainability of organisations which aim to mitigate environmental issues in order to promote sustainability.

Going forward, it is important to consider The Bruntdland Commission's deductions about sustainability and its associated concepts. The commission was set up in 1983 and focused heavily on the ecological and social aspects of sustainability[8]. After years of trying to promote healthy ecological and social practices, however, they found that prosperity was short-lived if ecological health and social equity were prioritised over economic development and concluded that the world had to "find a way to harmonize ecology with prosperity"[9]. It was this commission's findings that resulted in the existence of this definition of sustainability:

"Sustainability is a holistic approach that considers ecological, social and economic dimensions, recognizing that all must be considered together to find lasting prosperity." [10]

The 3 Components of Sustainability

It is suspected that the findings of The Bruntdland Commission resulted in the establishment of the triple bottom line (TBL or 3BL)[11] or as it's called in environmental science, the Three Pillars of

EnvironmentalScience.org. n.d. https://www.environmentalscience.org/sustainability.
[7] Bossel, 1999
[8] University of Alberta. "What is Sustainability?" McGill University. Last modified June 27, 2013. https://www.mcgill.ca/sustainability/files/sustainability/what-is-sustainability.pdf.
[9] University of Alberta. "What is Sustainability?" McGill University. Last modified June 27, 2013. https://www.mcgill.ca/sustainability/files/sustainability/what-is-sustainability.pdf.
[10] University of Alberta. "What is Sustainability?" McGill University. Last modified June 27, 2013. https://www.mcgill.ca/sustainability/files/sustainability/what-is-sustainability.pdf.
[11]The Economist. "Country Ranking." BCFN Foundation: Food and Nutrition Sustainability Index. Last modified 2017. http://foodsustainability.eiu.com/sustainabilty/.

Sustainability[12]. These frameworks are simple and contain three components, as mentioned before; the economy, society and environment.

Figure #1 Showing a Model of the Components of Sustainability[13]

In the image above (Figure #1), three intersecting circles are shown and each circle represents a component of sustainability. In this model, which differs from many others, the three components must all intersect in order for sustainability to be achieved[14]. An organisation may be deemed unsustainable even if it performs well in the economic and social component but not as well in the environmental component and vice versa. In creating this evaluation model, I will include all three components of sustainability and weigh them equally, lest an organisation be only bearable, viable or equitable, but not sustainable.

These three components are further regarded by their own degree of sustainability according to the topic of the study[15] .

[12] Thwink. "The Three Pillars of Sustainability." Thwink.org - Finding and Resolving the Root Causes of the Sustainability Problem. Accessed November 27, 2017. http://www.thwink.org/sustain/glossary/ThreePillarsOfSustainability.htm.
[13] Rochester Institute of Technology, Rochester Institute of Technology. "Sustainability | Industrial & Systems Engineering (RIT)." Rochester Institute of Technology. n.d. https://www.rit.edu/kgcoe/ise/sustainability.
[14] Rochester Institute of Technology, Rochester Institute of Technology. "Sustainability | Industrial & Systems Engineering (RIT)."
[15] University of Alberta. "What is Sustainability?" McGill University. Last modified June 27, 2013. https://www.mcgill.ca/sustainability/files/sustainability/what-is-sustainability.pdf.

1. Environmental Sustainability

All natural systems are maintained in a state of equilibrium so that they are able to replenish themselves[16].

1. **Whether or not the strategy is effective in protecting the turtles** in question must be considered as environmental sustainability refers to creating stable physical and biological systems in such a way that they can withstand changes[17]. The system created or altered by the strategy must reflect signs of environmental stability[18].
2. **The strategy's use of resources and the form of waste disposal** must also be considered. This is because the resource and waste receptor functions are two of the basic functions of environmental development[19]. This criterion will evaluate the resources used in the strategy and their impacts on the environment when disposed of.

2. Economic Sustainability

Economic systems remain intact in such a way that the activity does not adversely affect the livelihood of the community[20].

1. **Affordability of the method** must be taken into account as sustainable development demands that strategies must be able to recover or be sustained during economic crisis[21]. In this context, sustainability refers to the organisation's ability to either maintain the strategies without operating at a loss or their ability to gain a profit from it.

[16] University of Alberta. "What is Sustainability?" McGill University. Last modified June 27, 2013. https://www.mcgill.ca/sustainability/files/sustainability/what-is-sustainability.pdf.
[17] Bran, 1991
[18] Bran, 1991
[19] Wardle and Giller, 1996
[20] University of Alberta. "What is Sustainability?" McGill University. Last modified June 27, 2013. https://www.mcgill.ca/sustainability/files/sustainability/what-is-sustainability.pdf.
[21] Duran, D. "The Components of Sustainable Development - A Possible Approach - ScienceDirect." ScienceDirect.com | Science, Health and Medical Journals, Full Text Articles and Books. Last modified 2015. http://www.sciencedirect.com/science/article/pii/S2212567115008497.

2. **Effect on the economy of the region** is another crucial economic factor as Duran, Gogan, Artene and Duran claim that the acceleration of economic growth and poverty eradication are goals of sustainable development that cannot be ignored. In other words, a strategy needs to not only consider the "pivita environmental protection" but also the economic well being of all[22].

3. Social Sustainability

The attainability of human rights and basic necessities are not adversely affected or infringed upon; the people, their culture and their healthcare are protected from negative impacts of any form[23].

1. **The society's response to the method** is a considerable factor as the last thing a strategy that is sustainable should do is change the way a community functions; how those in the society respond to each other and to the strategy. A strategy should improve the way the community functions and be able to be integrated into its society[24]. This criterion also takes into account the population's awareness of the method and the degree to which they support it[25].
2. **The strategy's effect on the rights and culture of the individuals in the community** is pivotal to social sustainability as sustainable development must avoid the amendment of

[22] Duran, D. "The Components of Sustainable Development - A Possible Approach - ScienceDirect." ScienceDirect.com | Science, Health and Medical Journals, Full Text Articles and Books. Last modified 2015. http://www.sciencedirect.com/science/article/pii/S2212567115008497.
[23] University of Alberta. "What is Sustainability?" McGill University. Last modified June 27, 2013. https://www.mcgill.ca/sustainability/files/sustainability/what-is-sustainability.pdf.
[24] Ing Lim, Chye, and Wahidul Biswas. An Evaluation of Holistic Sustainability Assessment Framework for Palm Oil Production in Malaysia. Malaysia: MDPI, 2011. http://www.mdpi.com/journal/sustainability.
[25] YadaDROP. "Three Pillars of Sustainability: Economic, Environmental, Social." Drupal Web Analytics | Drupal SEO | Drupal Website Development | YadaDROP. Accessed August 27, 2017. http://www.yadadrop.com/about/sustainability.

the rights and cultures of societies. If this occurs it must be in a way that does not limit the community's ability to function in a way that is satisfactory for them[26].

Section B | Building the Evaluation Model

What are models?

"A model is a simplified version of reality and can be used to understand how a system works and predict how it will respond to change."[27]. A model is a tool used to easily consider a given set of variables in order to ascertain either their collective future or the quality of their relationship. In this essay, the latter understanding, a model, will be applied to create a rubric to evaluate sustainability.

The Proposed Evaluation Model

The evaluation model, in order to be as effective as possible, will contain two main components: the Theoretical Assessment of Sustainability (TAS) and the Quantification Rubric (QR). The TAS was discussed in the earlier sections of this essay. It, the TAS, guides the assessment of an organisation's sustainability through the Sustainability Model, its components, and the criteria assigned to those components. The QR's purpose is to assign values to the components and criteria of sustainability in order to arrive at a score out of 5. This score will make comparative analysis between several organisations more efficient than the comparison of qualities. In order to be as holistic as possible, this rubric will assess the organisation's response to each threat.

[26] Duran, D. "The Components of Sustainable Development - A Possible Approach - ScienceDirect." ScienceDirect.com | Science, Health and Medical Journals, Full Text Articles and Books. Last modified 2015. http://www.sciencedirect.com/science/article/pii/S2212567115008497.
[27] Rutherford, Jill, and Gillian Williams. Environmental Systems and Societies: Course Companion, 2015 ed. Oxford, 2015.

The Quantification Rubric contains 3 sections as follows:

Section 1

There are 2 criteria for each component of sustainability. Through the TAS, and the using the scale below, a score (out of 5) will be assigned to each criterion according to their approach to a named threat. The scores assigned to each criterion for the associated component are then averaged to produce to final figure.

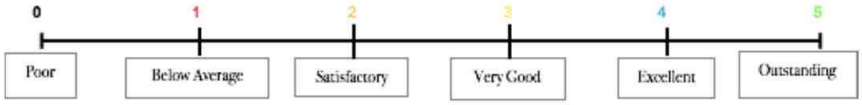

Figure #2 showing the scale used in this section to judge each criterion[28]

The result is that each threat in question will have 3 scores out of 5 (one for each component) as shown in the image to the below.

Component	Criterion	Threat 1
The Economy	A	2
	B	2
	Average	2.00
The Society	A	4
	B	5
	Average	4.50
The Environment	A	4
	B	3
	Average	3.50

Figure #3 showing result of Section 1 of the QR[29]

[28] Created by author
[29] Created by author

Section 2

The 3 averages will then be averaged to find a single value out of 5 which will represent the individual sustainability of the entity's approach to handling the specific threat. This will allow a researcher to point out which threats are being dealt with more sustainably than others.

The result is a single value out of 5 for each threat as shown below.

Component	Threat 1	Threat 2	Threat 3
Holistic Rating	3.39	3.64	3.78

Figure #4 showing the Result of Section 2 of the QR[30]

Section 3

If more than one threat is considered, the holistic rating for each (as produced in Section 2) will be averaged to produce a single value. This is the organisation's sustainability rating.

This rubric, however, not only allows me to assess the holistic sustainability of an entity but also the:

1. Best or worst economical approach and the quality of economic operation
2. Best or worst social approach and the quality of social operation
3. Best or worst environmental approach and the quality of environmental operation
4. The entity's performance for specific threats
5. Holistic view of the individual components of sustainability
6. Most sustainable approaches

[30] Created by author

Component	Criterion	Threat 1	Threat 2	Threat 3	Average Component Rating
The Economy	A	2	2	2	
	B	2	2	4	
	Average	2.00	2.00	3.00	2.33
The Society	A	4	4	4	
	B	5	5	5	
	Average	4.50	4.50	4.50	4.50
The Environment	A	4	4	4	
	B	3	3	3	
	Average	3.50	3.50	3.50	3.50
Holistic Rating		3.33	3.33	3.67	3.44

Figure #5 is showing an example of the model in use[31]

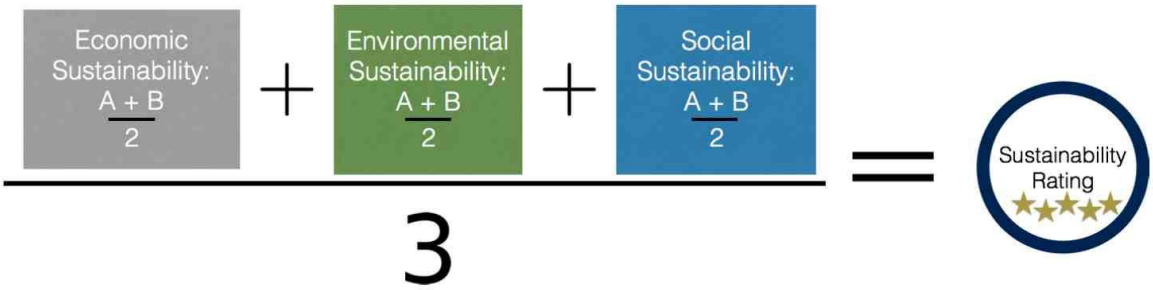

Figure #6 is a Modular Summary of the Calculations Applied to Arrive at the Final Sustainability Rating[32]

[31] Created by author
[32] Created by author

The Premises of this Evaluation Model

In order to function effectively, this evaluation model will establish the following premises and standards:

1. The three components of sustainability, the environment, economy and society, are all equal and should be weighed equally.
2. The two criteria identified for each component are universal and applicable to all studies and strategies.
3. The criteria are:

I. The Environment:

A. *Whether or not the strategies are effective in protecting the turtles,*
B. *The strategies' use of resources and the form of waste disposal.*

II. The Society:

A. *The society's response to the method,*
B. *The strategy's effect on the rights and culture of the individuals in the community.*

III. The Economy:

A. *Affordability of the method,*
B. *Effect on the economy of the region.*

4. Ratings below 3 indicate a low degree of sustainability, those between 3 and 4 indicate moderate sustainability and those 4 and above indicate a satisfactory to excellent degree of sustainability.

Section C | How the Model Works

Evaluating The World Wide Fund Guianas (WWF Guianas) and The Juara Turtle Project (JTP)

The World Wide Fund Guianas is a subsidiary group of The World Wide Fund International and operates in the three Guianas, Guyana, Suriname and French Guiana. For this essay, the author will be evaluating the organisation's strategies in Guyana. Notably, the Guyanese branch of WWF collaborates with the Guyana Marine Turtle Conservation Society (GMTCS) in order to operate[33]. WWF Guianas and GMTCS operate on Shell Beach, a somewhat remote coastal area in the North of Guyana as shown in the map below[34].

Image removed for copyright reasons

[33] International Institute of Environment and Development. "Biodiversity." International Institute for Environment and Development. n.d. https://www.iied.org/biodiversity.
[34] VK, Suresh. "Shell Beach Protected Area." Lost In Guyana. Last modified February 21, 2015. http://www.sureshvk.com/2015/02/shell-beach-protected-area.html.

(Guyana Land and Surveys Commission 2014)

I will be evaluating WWF Guiana's approached to predation and poaching in Guyana. These are their approaches:

1. WWF Guianas tries to educate the surrounding villagers about the importance of marine turtles and how poaching may affect them[35].
2. They try to find to find alternative sustainable livelihoods for the inhabitants other than turtle harvesting[36]. To this extent, the organisation has set up two economic projects to help with this strategy.
3. They've established Shell Beach as a Protected Area so that poaching is illegal there[37].
4. They use wardens to patrol the beach so that predatory animals and illegal poachers may be caught and scared away[38].

The table below evaluates these strategies.

Theoretical Assessment of Sustainability and Evidence for Poaching and Predation of Marine Turtles		
Environmental Sustainability	Social Sustainability	Economic Sustainability
Criterion A: **Whether or not the strategies are effective in protecting the turtles:** Across the 4 strategies used, it would appear that the organisation is able to legally protect (isolate) the region, patrol it and educate villagers in order to get them to not abuse the area, in the opinion of the Sea Turtle Conservancy, these strategies account for 4 of the 7	Criterion A: **The society's response to the method:** Considering the culture of the inhabitants of the surrounding villages, an attempt to protect the environment would be seen as good and, as such, the society would respond well. Additionally, the strategies' inclusion of economic projects also means that the villagers are more	Criterion A: **Affordability of the method:** These are very cheap strategies and would not cost much in the current day. The economic projects, however, seek to gain no operational profit but to give back to the villagers and may, therefore, be in crisis during economic crises. These strategies are, therefore, very good and

[35] International Institute of Environment and Development. "Biodiversity." International Institute for Environment and Development. n.d. https://www.iied.org/biodiversity.
[36] International Institute of Environment and Development. "Biodiversity." International Institute for Environment and Development. n.d. https://www.iied.org/biodiversity.
[37] Kaieteur News. Kaieteur News Editorial. Accessed August 27, 2017. https://www.kaieteurnewsonline.com/2014/02/03/26-years-of-marine-turtle-conservation-on-shell-beach/.
[38] World Wide Fund For Nature. Welcome to WWF Guianas. Accessed November 7, 2017. http://www.wwfguianas.org/.

Turtle Conservation Goals (all of which apply to this threat and can, therefore, be described as an excellent strategy and given a score of **4**. I am unable to assign a score of 5 as there is not quantifiable data available to justify such claims. Criterion B: **The strategies' use of resources and the form of waste disposal:** These strategies appear to use very little resources as due to its location in rural Guyana, the inhabitants, due to their culture, use very organic materials and in measured quantities. I believe that these strategies may be described as excellent and a score of **4** may be assigned.	receptive to the attempt. This is an excellent project and should score **4**. Criterion B: **The strategy's effect on the rights and culture of the individuals in the community:** These strategies do not seek to change or affect the culture and rights of the individuals in the community in any way. The Protected Areas law allows inhabitants to dwell on the land but not to overexploit its resources, which is aligns with the view of the locals[39]. This is outstanding as a score of **5** should be assigned.	should be given a score of **3**. Criterion B: **Effect on the economy of the region:** The economic projects compensate well for the poaching restrictions and actually educate the inhabitants during the process in order to improve occupational mobility. These strategies are outstanding with a score of **5**.

WWF Guianas' Quantification Rubric:

Component	Criterion	Threat 1	Average Component Rating
The Economy	A	3	
	B	5	
	Average	4.00	4.00
The Society	A	5	
	B	4	
	Average	4.50	4.50
The Environment	A	4	
	B	4	
	Average	4.00	4
Holistic Rating		4.17	4.17

[39] Kaieteur News. Kaieteur News Editorial. Accessed August 27, 2017. https://www.kaieteurnewsonline.com/2014/02/03/26-years-of-marine-turtle-conservation-on-shell-beach/.

The Juara Turtle Project is a non-governmental organisation that operates on Tioman Island, Malaysia. The Juara Turtle Project (JTP) is a non-governmental organisation in Tioman Island, Malaysia. The project was founded by John Amos in 2006 when he observed a decrease in the degree of turtle nestings in Juara Bay . His intention was to create a shelter for the organisms and to raise awareness on the effect of human activities on them. The organisation operates on the Mentawak Beach, Juara, but its strategies extend all the way to Penut and Mentawak Beaches as shown below[40].

Image removed for copyright reasons

[40] Juara Turtle Project. "Development on Mentawak Beach." Juara Turtle Project. Last modified September 2, 2012. http://www.juaraturtleproject.com/?p=732.

I will be evaluating JTP's following approaches to predation and poaching on Pulau Tioman[41,42]:

1. They raise awareness in and around the village of Juara, especially on the Mentawak Beach. They do this by hosting workshops for locals and tourists, operating a booth at the weekly night market, operating a daily Turtle Exhibition and Turtle Talks and posting posters around the village.
2. They hire a local collector who sails to the Penut and Munjur Beaches every morning to in order to nested collect eggs and to scare away poachers and predators.
3. The eggs collected from the morning patrol (and the night patrol that occurs at every night during high tide) are placed into the organisation's hatchery which is carefully crafted to mimic the original nest that they were laid in.

The table below evaluates these approaches:

Theoretical Assessment of Sustainability and Evidence for Poaching and Predation of Marine Turtles		
Environmental Sustainability	Social Sustainability	Economic Sustainability
Criterion A: **Whether or not the strategies are effective at protecting the turtles:** According to the organisation's records, about 80.6% of the eggs in their hatchery hatch and those turtles return to the ocean[43]. This reflects a significant amount of baby turtles surviving the hatching phase which may be disrupted by predators and poachers.	Criterion A: **The society's response to the method:** The residents of Juara are generally aware of the Juara Turtle Project and what they stand for. About 85% of the population (tourists and non-tourists) are aware of the project and what they stand for [47]. This is a very good response to the organisation, especially as there are several paintings and billboards around the village which promote turtle conservation. Moreso, only	Criterion A: **Affordability of the method:** These strategies are funded by sponsors, volunteers and income from the organisation's merchandise.The organisation seems to be able to manage them efficiently without a large budget, but in the event that there is an economic crisis and tourism falls, so will the organisation's funding from some sponsors, most volunteers

[41] Roslan, Izzati. "Juara Turtle Project 2016 Report." Last modified 2016.
[42] Juara Turtle Project. "Development on Mentawak Beach." Juara Turtle Project. Last modified September 2, 2012. http://www.juaraturtleproject.com/?p=732.
[43] Roslan, Izzati. "Juara Turtle Project 2016 Report." Last modified 2016.
[47] Carnier, V. "Environmental Systems and Societies Internal Assessment." How effective is the Juara Turtle Project in advocating for the protection of sea turtles on Tioman Island, Malaysia?, June 16, 2017, 7-8. Accessed November 7, 2017. https://docs.google.com/document/d/1FnKCFd60kBBeGzJgaY-PNXZHKw8VWk7zodlNXvRm6NM/edit.

They claim that 95% of turtle nests have been saved due to this strategy which is outstanding and should be awarded with a score of **5** as they not only try to save eggs but raise awareness among tourists who may then travel to other islands and share that information[44]. Criterion B: **The strategies' use of resources and the form of waste disposal:** The organisation is generally quite cautious about their use of resources and always reuse, recycle or find ways to reduce the materials used in awareness events[45]. They also use very little fuel in order reduce their CO_2 emissions[46]. This reflects a lot of cautious and consideration in the way that they perform and should be described as outstanding with a score of **5**.	about 10.3% of persons surveyed in Juara Village would consider eating turtle eggs so the organisation's demotivation of turtle/turtle egg diets does not adversely affect the functionality of the society[48]. This criterion scores a **5**. Criterion B: **The strategy's effect on the rights and culture of the individuals in the community:** From what I've seen, these strategies have added to the culture of society and the villagers are proud to associate themselves with turtle conservation. The discouraged taking of turtle eggs may, for some individuals who appreciate such a diet, cause some sort of disruption. It would appear, however, that the majority of villagers are not bothered by the discouragement. This criterion scores a **4**.	and merchandise. In the current day, however, the strategies seem quite stable and should be given a score of **3**. Criterion B: **Effect on the economy of the region:** Kampung Juara is most known for being a Turtle Nesting site and for having a turtle sanctuary. The Tioman Barat Beach Resort, for example, references the entity's existence as a selling point[49]. In fact, during my time in the village, I had interacted with many other tourists who were there solely because of JTP and their works. This suggests that JTP does not adversely affect Kampung Juara's economy but helps it by attracting tourists. This criterion scores a **5** as although its positive economic contribution isn't perfectly quantifiable, there appears to be no adverse economic effects or the acceleration of poverty.

[44] Juara Turtle Project. "Development on Mentawak Beach." Juara Turtle Project. Last modified September 2, 2012. http://www.juaraturtleproject.com/?p=732.
[45] Roslan, Izzati. Email Interview. July 22, 2017.
[46] Yap, Daniel. Email Interview and Personal Interview . July 22, 2017.
[48] Carnier, V. "Environmental Systems and Societies Internal Assessment." How effective is the Juara Turtle Project in advocating for the protection of sea turtles on Tioman Island, Malaysia?"
[49] The Barat Tioman Beach Resort. "Welcome To The Barat Tioman." Barat Tioman. Last modified 2016. http://barattioman.com/sea-based/.

Juara Turtle Project's Quantification Rubric:

Component	Criterion	Threat 1	Average Component Rating
The Economy	A	3	
	B	5	
	Average	4.00	4.00
The Society	A	5	
	B	4	
	Average	4.50	4.50
The Environment	A	5	
	B	5	
	Average	5.00	5
Holistic Rating		4.50	4.50

Exemplar Comparative Analysis

Because of the Quantification Rubric, it is now easy to compare the sustainability of two entities' approaches. It is clear that Juara Turtle Project appears to have a more sustainable approach to handling Poaching and Predation, with a rating of 4.50, as compared to WWF Guianas' 4.17.

Furthermore, the results show that both entities scored 4 and 4.5 for their Economic and Social components, respectively, but while JTP scored 5 for their Environmental conduct and WWF Guianas scored 4. This suggests that the main difference between the entities' lies in their consideration of the environment and if WWF Guianas' wishes to improve their sustainability rating in this approach, they would need to not only sensibly use friendly resources, but also create a reuse loop with them, much like the Juara Turtle Project.

Section D | Evaluating the Model and this Example

Strengths

The model's main strength is that it simplifies the concept of sustainability and makes it applicable to everyday entities by creating a Theoretical Analysis of Sustainability (TAS) and a Quantification Rubric (QR).

The TAS guides rigorous evaluation, allowing a researcher to assess the entity under study with a firm understanding of sustainability, its derived criteria and the expectations of each component. The criteria are broad enough to be applied to any approach to any threat by any entity but concise and specific enough to encapsulate the core concepts of sustainability, allowing the researcher to produce a holistic review.

The QR allows the researcher to quantify their assessment, simplifying their findings into numbers that can easily be compared to others or independently. In Section C we see that, following the TAS, the findings are converted to numbers according to the predetermined scale and a series of values, out of 5, are produced. These values may then be easily compared to other such values in order to ascertain the benchmark sustainability rating of certain approaches to threats, which further allows the researcher to make a more informed conclusion.

Weaknesses

As is the problem with all models, this one simplifies reality into concepts and numbers. It is possible that, during this simplification process, details were lost and systems were not equally

measured or represented. Another issue is the objectivity-subjectivity complex. It is possible that evaluators can assign scores to various criteria based solely on their interpretation of the criteria. In this case, indicators should be predetermined so that an approach needs to satisfy a specific ratio of positives to negatives in order to qualify for a particular score in a criterion. This, however, may oversimplify the researcher's findings and result in inaccurate conclusions as some positives may be more valuable than others and some negatives may be very insignificant. This, however, is the fundamental issue with any such model.

Limitations

Due to the word limit of this essay, I was not able to evaluate a larger range of threats. Consequently, my conclusion is only representative of a series of approaches to one threat and cannot be indicative of the entities' holistic sustainability. In order for this model to produce accurate results, it needs to evaluate at least 50% and not the usual 20% as the approaches may vary significantly and evaluation of only a few may not be very accurate.

Conclusion

This essay sought to answer the question "**What are the criteria that may be used to evaluate the sustainability of Marine Turtle conservation entities and why?**" and I believe that it has managed to do so. Given the application of the Theoretical Analysis of Sustainability and the Quantification Rubric, the appropriate criteria to evaluate the sustainability of the Marine Turtle conservation entities are as follows:

I. The Environment:

C. *Whether or not the strategies are effective in protecting the turtles,*
D. *The strategies' use of resources and the form of waste disposal.*

II. The Society:

C. *The society's response to the method,*
D. *The strategy's effect on the rights and culture of the individuals in the community.*

III. The Economy:

C. *Affordability of the method,*
D. *Effect on the economy of the region.*

Bibliography

The Barat Tioman Beach Resort. "Welcome To The Barat Tioman." Barat Tioman. Last modified 2016. http://barattioman.com/sea-based/.

Carnier, V. "Environmental Systems and Societies Internal Assessment." How effective is the Juara Turtle Project in advocating for the protection of sea turtles on Tioman Island, Malaysia?, June 16, 2017, 7-8. Accessed November 7, 2017. https://docs.google.com/document/d/1FnKCFd60kBBeGzJgaY-PNXZHKw8VWk7zodlNXvRm6NM/edit.

Duran, D. "The Components of Sustainable Development - A Possible Approach - ScienceDirect." ScienceDirect.com | Science, Health and Medical Journals, Full Text Articles and Books. Last modified 2015. http://www.sciencedirect.com/science/article/pii/S2212567115008497.

The Economist. "Country Ranking." BCFN Foundation: Food and Nutrition Sustainability Index. Last modified 2017. http://foodsustainability.eiu.com/sustainabilty/.

Environmental Science. "Sustainability | EnvironmentalScience.org." Environmental Science | EnvironmentalScience.org. n.d. https://www.environmentalscience.org/sustainability.

Ing Lim, Chye, and Wahidul Biswas. An Evaluation of Holistic Sustainability Assessment Framework for Palm Oil Production in Malaysia. Malaysia: MDPI, 2011. http://www.mdpi.com/journal/sustainability.

International Institute of Environment and Development. "Biodiversity." International Institute for Environment and Development. n.d. https://www.iied.org/biodiversity.

Juara Turtle Project. "Development on Mentawak Beach." Juara Turtle Project. Last modified September 2, 2012. http://www.juaraturtleproject.com/?p=732.

Kaieteur News. Kaieteur News Editorial. Accessed August 27, 2017. https://www.kaieteurnewsonline.com/2014/02/03/26-years-of-marine-turtle-conservation-on-shell-beach/.

Minnesota Department of Natural Resources. http://files.dnr.state.mn.us/natural_resources/animals/reptiles_amphibians/turtles/blandings_turtle/nest_factsheet.pdf. Accessed August 27, 2017. http://files.dnr.state.mn.us/natural_resources/animals/reptiles_amphibians/turtles/blandings_turtle/nest_factsheet.pdf.

NHS Institute for Innovation and Improvement, Lynne Maher. UK Government Web Archive – The National Archives. n.d. http://webarchive.nationalarchives.gov.uk/20160805122935/www.nhsiq.nhs.uk/media/2757778/nhs_sustainability_model_-_february_2010_1_.pdf.

Norris, Christopher. "B1.4 Is It Too Late For Marine Turtles? - Lessons - Tes Teach." Tes Teach with Blendspace. Accessed August 27, 2017.

https://www.tes.com/lessons/C2aQb-vh-GzRTA/b1-4-is-it-too-late-for-marine-turtles.

Rochester Institute of Technology, Rochester Institute of Technology. "Sustainability | Industrial & Systems Engineering (RIT)." Rochester Institute of Technology. n.d. https://www.rit.edu/kgcoe/ise/sustainability.

Roslan, Izzati. Email Interview. July 22, 2017.

Roslan, Izzati. "Juara Turtle Project 2016 Report." Last modified 2016.

Rutherford, Jill, and Gillian Williams. Environmental Systems and Societies: Course Companion, 2015 ed. Oxford, 2015.

SeeTurtles.org. SEE Turtles. n.d. https://www.seeturtles.org/.

Thwink. "The Three Pillars of Sustainability." Thwink.org - Finding and Resolving the Root Causes of the Sustainability Problem. Accessed November 27, 2017. http://www.thwink.org/sustain/glossary/ThreePillarsOfSustainability.htm.

University of Alberta. "What is Sustainability?" McGill University. Last modified June 27, 2013. https://www.mcgill.ca/sustainability/files/sustainability/what-is-sustainability.pdf.

VK, Suresh. "Shell Beach Protected Area." Lost In Guyana. Last modified February 21, 2015. http://www.sureshvk.com/2015/02/shell-beach-protected-area.html.

World Wide Fund For Nature. Welcome to WWF Guianas. Accessed November 7, 2017. http://www.wwfguianas.org/.

YadaDROP. "Three Pillars of Sustainability: Economic, Environmental, Social." Drupal Web Analytics | Drupal SEO | Drupal Website Development | YadaDROP. Accessed August 27, 2017. http://www.yadadrop.com/about/sustainability.

Yap, Daniel. Email Interview and Personal Interview . July 22, 2017.