

## Safe and Sustainable Snorkelling Spot on Tidung Island, Thousand Islands DKI Jakarta

Samadi<sup>1</sup>, Fauzi Ramadhuan Arachman<sup>2</sup>, Vrita Tri Ayuni<sup>3</sup>, Risky Nuri Amelia<sup>4</sup>  
*State University of Jakarta, Indonesia<sup>1,2</sup>, Khairun University, Indonesia<sup>3,4</sup>*

**Abstract.** *This study aims to develop environmental aspects of the island and get a coral location that is safe for snorkelling activities. To support research objectives, applies two methods in parallel, namely surveys for scoping social data, and the Line Intercept Transect (LIT) method for mapping coral locations that are safe for snorkelling activities. The results of this study explain that environmental aspects that must be socially available to support the creation of sustainable tourism especially snorkeling tourism activities are calmness, residents with more virtuous behavior, environmental cleanliness, security in both residential, tourist and public areas, local residents are provided with environmental education, stakeholders and the government regarding conservation and better management of resources, population control, regulations management, developed conservation of local culture, conditions like the past, and urbanization to other regions to improve the welfare.*

**Keywords:** *Snorkelling, Tidung Island, Tourism.*

### Introduction

Tourism is one of the economic machines for regions that have attractive and exotic natural conditions, provided they are practiced wisely and sustainably, respecting local heritage and culture. Sustainability implies a rational relationship between man and nature; alterations that affect the natural environment impose limits that must be evaluated before they create disturbances in that environment(1).

Contemporary thinking on sustainable tourism has largely focused on reducing the impacts of tourism while maximizing benefits to sustain local communities, thus promoting inter- and intra-generational equity. Sustainable tourism can be enhanced by mobile connectivity through new space-time practices and using ephemeral interpersonal relationships to harness niche groups to create bottom-up social systems interested in sharing experiences, ideas and resources(2). And for this reason a simple but comprehensive concept is needed regarding the development of environmental aspects to obtain safe snorkeling attractions. Integration is an important concept that helps solve the problem above. Effective environmental policies and programmers need to be informed by a comprehensive understanding of the biophysical, social and economic processes of a system, their complex interactions, and how they respond to different changes(3). In other words, “understanding a complex whole requires knowledge about specific variables and how their component parts are related”(4). The county with the most emphasis placed on sustainable tourism within their plan was found to have the highest performance evaluations(5). In this idea, the local environmental impacts of

communities dedicated to tourism can cause undesirable effects on the host environment of a given area, and contribute to its degradation over time. The regional level has been recognized as a good scale for implementing actions towards sustainable development(6).

The novelty of this study when compared to the results of similar research is to carry out two methods at once in the action of collecting data, namely the survey method for collecting social data and the LIT method for identifying coral in coastal area.

Coral reef ecosystems on Tidung Island (Tidung Besar and Tidung Kecil) in the Thousand Islands area of DKI Jakarta are currently increasingly threatened and have the potential to decrease in number and distribution. Such conditions will affect the interest of tourists to visit, because one of the tourist attractions is an exotica of coral reefs. In addition to the facts mentioned above, the problems faced by the people in Tidung Island in general are the lack of community capacity and tourism managers at the managerial skill level which is not optimal knowledge about how to develop tourism potential. The knowledge and understanding of the people who are still low on the environment and the high tourism activities on Tidung Island contribute to the increasing occurrence of environmental degradation. And to reduce the rate of these problems and other negative impacts, it is deemed necessary to make a tourism map for shallow snorkeling and diving activities as well as terrestrial maps (land) for a deeper introduction to the natural conditions of Tidung Island; so that it can increase the knowledge of local people and tourists who come. And in the long run it will help create conditions for improving local ecosystems.

The socio-cultural component that covers all aspects of the human environment, social problems that affect individuals and society, including cultural aspects, as well as efforts to conserve cultural heritage including aspects of health, education, way of life and customs, identity and development of human qualities(7). One effort to preserve cultural heritage is to develop environmental aspects to get Safe Snorkeling Tourism. In this connection, community experience is seen as important as a result of collaborative social practices so the need to find satisfying synthesis for academic and industrial perspectives(8), which ultimately supports the realization of management of potential human resources and village environmental resources, village tourism data systems , and patterns to support the acceleration of the village economic system. And related to this, communities that have social security are needed(9). The existence of a tourist route map ultimately helped tourism activities, especially tourist satisfaction(10). Dorfman(11) seeks to strengthen the definition of satisfaction, namely the level of satisfaction maximized when aspirations (desires) are the same as perceptions but only when desires are for the conditions expected earlier. The desire for conditions can immediately reconnect with social identity theory and the need for personal distinctiveness.

Cardoza(12) refers to it as "customer efforts are physical, mental or monetary resources issued by customers in the acquisition of a service or product", where visitors will have their own perceptions and descriptions before they travel to sites / tourist locations. Tourist maps greatly contribute to the tourism industry, which is important because the tourism industry ultimately contributes a lot to the economic development of a country and even the world along with its contribution to the development of community livelihoods(13). Careful from that fact, a healthy tourist experience can be achieved as a result of the efforts made through the knowledge of products, services, customers / tourists and their own employees(14). In this

study, an environmental aspect to obtain safe snorkeling is very important to know, and one of the media is through a map of safe snorkeling routes in addition to fulfilling the need for supporting environmental facilities, as well as the community's knowledge of the local environment that is safe for visitors. Related to this, Samadi and Dwi looked at the importance of environmental education for social and ecosystem resilience that affected the construction of environmental education models in the management of carrying capacity of natural and environmental(15).

### **Methodology**

This study uses a survey method on the mainland area of the and coastal areas as a potential location for snorkeling. For selected respondents are 61 local guides who already understand tourism objects on the island. The survey includes 14 closed questions on various topics, such as important information needs, things that are desired and unwanted, things that are considered disturbing and not disturbing, demographic characteristics, etc. From the questionnaire submitted, respondents were very cooperative and the whole questionnaire was returned, giving an overall response rate of 100 percent. The survey data is then processed using the Analytical Hierarchy Process (AHP) analysis method. The AHP(16)(17) is a decision-making method that was developed by Saaty. This technique calculates the qualified priorities of a given set of alternatives on a scale based on the judgment of the decision-maker. The process stresses the importance of the intuitive judgments of a decision-maker and consistency in the comparison of alternatives in the decision-making process.

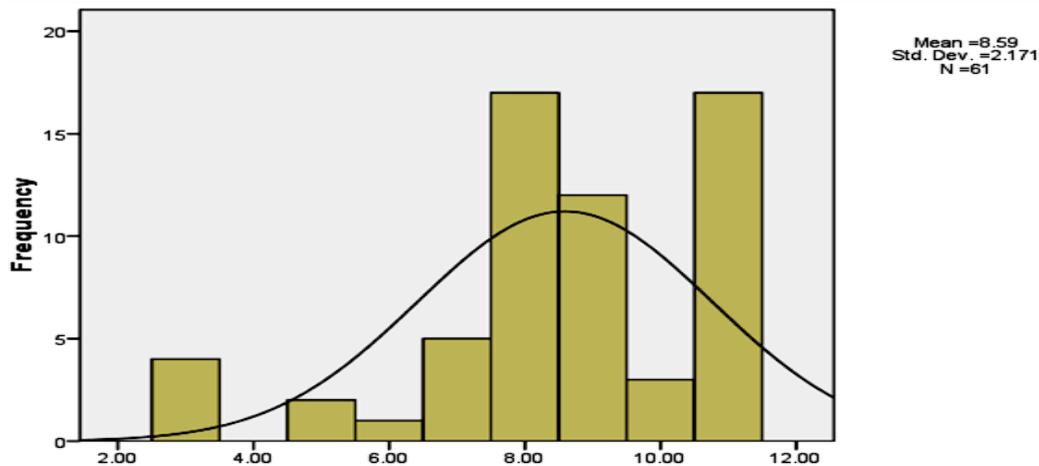
A thorough examination of the relevant literatures has been made to ensure data validity and to further reduce the possibility of non-random errors. Four post graduates majoring information management and information system were asked to review the questionnaire for validity, completeness, and readability. At the same time, inter-item analysis was used to check scales for internal consistency or reliability. Specifically, Cronbach's reliability coefficient was calculated for each scale. The questionnaire used in this survey demonstrated excellent inter-rater reliability (Cronbach  $\alpha = 0.95$ ). Individually analyzing scale variables, the score varied between 0.842 (reliability) and 0.680 (quality of information).

The sampling of coral locations was carried out through the Line Intercept Transect (LIT) method. The selection of the LIT method is usually able to show the status of the ecosystem and the ecological resources of coral reefs showing fluctuating status and being in moderate to good conditions with coral diversity tending to decline. LIT method is one of the most common transect methods, which measures the length of corals that intercept a transect line and assess the percentage cover of the corals by their relative lengths(18). However, this in-situ visual method requires long diving time, tends to miss small species and must be conducted by an expert in coral identification(19). In a meantime, the data collected cannot be verify or reassess unless the surveys are repeated(20).

### **Findings and Discussion**

The following histogram is known that the scale score of understanding data in this study has a distribution that tends to be normal. From the description, it can also be seen that between the average value and the middle value is almost the same, namely 0.27795, this indicates that the

understanding score data obtained in this study is quite representative. Whereas the score that is above the median is higher than the one below the median, so that respondents who have a high score of understanding are more than those who have a low understanding score.



**Fig. 1** Analysis of respondents' understanding variables

### 1.1. Public perceptions about the desired development to support environmental aspects and tourism activities

Through good understanding of the important factors of managing and developing tourism villages, it will usually be able to shape the behavior of the community and tourists to take part and maintain the environment. Specifically, Archibald P. Sia, Harold R. Hungerford and Audrey N. Tomera(21), outlined eight relative contributions in predicting responsible environmental behavior.

**Table 1.** Public perceptions about the desired development to support environmental aspects and tourism activities

No.	Which are desired	%	Rank
1	Calmness	100.00	1
2	Residents with more virtuous behavior	100.00	2
3	Cleanliness	96.88	3
4	Security	84.38	4
5	Have environmental education	81.25	5
6	Better conservation and management of resources	71.88	6
7	Control of the growth of population and migrants	71.88	7
8	Has good and applicable fisheries regulations	59.38	8
9	Better cultural conservation	53.13	9
10	Location conditions like the past	34.38	10
11	Urbanization	12.50	11

The analysis of the list of needs and desires can be seen from factors such as intent to act, prior knowledge of problems encountered, and the desire to act more likely to lead to the actual action of the individual(22).

Regarding the increase in environmental change which is more due to external factors, namely high tourist activities, it tends to be overcome through several island residents' agreements through understanding perceptions of what is desired and what is not desired. So that efforts to mediate environmental conflicts can be carried out by paying attention to aspects of the calm of local residents, hopes for more virtuous behavior, efforts to improve hygiene and security problems, feeling of having high environmental education, awareness of the importance of conservation and management more both on resources, the desire of local residents to control the growth of population and immigrants, the enforcement of rules (law) environment and the realization of stakeholders in implementing better cultural conservation; so that the local environment is able to show the condition of the location like the situation in the past but with a better treatment environment for example with tourism activities that care for the environment.

#### 1.2. Observation of coral reefs

The results of observations of coral reefs carried out on Tidung Island, that safe snorkeling spots are at three points at 5°48'08"S 106°30'30" are also spread narrowly in the location of Pulau Tidung Kecil.

Due to the high level of understanding from the local guide to the environmental aspects that are good for snorkeling tourism, the determination of snorkeling spots from the results of this study is expected to help provide certainty of efforts to develop tourist sites on Tidung Island commensurate with the appreciation of the values in the community.

In addition, at the research site it is also important to have a combination of self-interest and concern for other people, living species, or ecosystems; including communication between stakeholders (local residents), tourists, and the government about coral reef environmental issues in order to encourage the formation of environmentally responsible behavior (23).

### **Conclusion**

The results of this study explain that environmental aspects that must be socially available to support the creation of sustainable tourism especially snorkeling tourism activities are calmness, residents with more virtuous behavior, environmental cleanliness, security in both residential, tourist and public areas, local residents are provided with environmental education related to efforts to preserve the island environment and coral ecosystem, serious efforts from island stakeholders and the government regarding conservation and better management of resources, there is control over the growth of population and migrants / tourists, have good and applicable regulations in fisheries management, better and more developed conservation of local culture, island location conditions like the past, and urbanization to other regions such as the city of Jakarta to improve the welfare of families on the island.

So that efforts to develop a snorkeling location can continue to be used as a tourist attraction, but by still paying attention to the sustainability of natural and social ecosystems.

### **Acknowledgements**

We acknowledged financial support from Research Institutions and Community Service (LPPM) State University of Jakarta.

## References

- Ruiz, L., & García, D. Analysis de la falla ambiental de las construcciones turísticas en ecosistemas costeros. *Cub@: Medio Ambiente y Desarrollo*. Revista electrónica de la Agencia de Medio Ambiente. 2014:4, No. 26.
- Dickinson, J., Filimonau, V., Hibbert, J., Cherrett, T., Davies, N., Norgate, S., & Winstanley, C. Tourism Communities and Social Ties: The Role of Online and Offline Tourist social Networks in Building Social Capital and Sustainable Practice. *Journal of Sustainable Tourism*. 2017:25, 163-180. [Internet] <https://doi.org/10.1080/09669582.2016.1182538>
- Kelly, B. et al. Selecting among Five Common Modelling Approaches for Integrated Environmental Assessment and Management. *Environmental Modelling and Software*. 2013:47, 159-181. [Internet] <http://www.sciencedirect.com/science/article/pii/S1364815213001151>
- Ostrom, E. A General Framework for Analysing Sustainability of Social-Ecological Systems. *Science*. 2009:325. [Internet] <https://doi.org/10.1126/science.1172133>
- Boley, B., McGehee, N., & Hammett, A. Importance-Performance Analysis (IPA) of Sustainable Tourism Initiatives: The Resident Perspective. *Tourism Management*. 2017:58, 66-77. [Internet] <https://doi.org/10.1016/j.tourman.2016.10.002>
- Wang, Y. T., Sun, M. X., Wang, R. Q., & Lou, F. Promoting Regional Sustainability by Eco Province Construction in China: A Critical Assessment. *Ecological Indicators*. 2014:51, 127-138.
- Lourdes Ruiz. (2016). Strategic Environmental Assessment of Towns in Ecuador with Tourism Potential. *Journal of Building Construction and Planning Research*, 4, 83-88. [Internet] <http://dx.doi.org/10.4236/jbcpr.2016.41005>
- Elizabeth Cassity, Ien Ang. Humanities- Industry Partnerships and the ‘Knowledge Society’: The Australian Experience. *Minerva*. 2006;44(1): 47-63. [Internet] [http://www.uws.edu.au/data/assets/pdf\\_file/0011/156953/Cassity\\_and\\_Ang\\_HumanitiesIndustryPartnerships\\_ICS\\_Pre-Print\\_Final.pdf](http://www.uws.edu.au/data/assets/pdf_file/0011/156953/Cassity_and_Ang_HumanitiesIndustryPartnerships_ICS_Pre-Print_Final.pdf)
- Raymond Bourdon. *Theories of Social Change*. Cambridge UK: Polity Press. 1986;166-173.
- do Valle, P.O., Silva, J.A., Mendes, J. and Guerreiro, M. Tourist Satisfaction and Destination Loyalty intention: A Structural and Categorical Analysis. Faculty of Economics, University of Algarve, Portugal. 2006.
- Dorfman, P.W. Measurement and Meaning of Recreation Satisfaction: A Case Study in Camping. *Environment and Behaviour*. 1979:11, 483-510. [Internet] <https://doi.org/10.1177/0013916579114004>
- Cardozo, R.N. An Experimental Study of Customer Effort, Expectation and Satisfaction. *Journal of Marketing Research*. 1965:2, 244-249. [Internet] <https://doi.org/10.2307/3150182>
- Bilign Zafu & Molla Mekonnen Alemu. Tourist Satisfaction and Service Delivery at Nech Sar National Park of Ethiopia. *OALib Journal*. 2016:3,e3230.0. [Internet] <http://dx.doi.org/10.4236/oalib.1103230>
- Hayes, B.E. *Measuring Customer Satisfaction: Survey Design, Use, and Statistical Analysis Methods*. ASQC Quality Press, Milwaukee, WI. 1997.

Samadi and Dwi Sukanti Lestariningsih. Environmental Education Model in Non Formal Education at Coastal Community based on Resilience and Social Ecological Systems. Proceeding International: MATEC Web Conf. Vol. 197, 2018, The 3<sup>rd</sup>. AASEC 2018. e- ISSN 2261-236X.

[Internet]

[https://www.mateconferences.org/articles/mateconf/abs/2018/56/mateconf\\_aasec2018\\_13024/mateconf\\_aasec2018\\_13024.html](https://www.mateconferences.org/articles/mateconf/abs/2018/56/mateconf_aasec2018_13024/mateconf_aasec2018_13024.html)

Saaty, T.L. Exploring the Interface between Hierarchies, Multiple Objectives and the Fuzzy Sets. *Fuzzy Sets and Systems*. 1978:1, 57-68. [Internet] [http://dx.doi.org/10.1016/0165-0114\(78\)90032-5](http://dx.doi.org/10.1016/0165-0114(78)90032-5)

Saaty, T.L. *The Analytic Hierarchy Process: Planning, Priority Setting, Resource Allocation*. McGraw-Hill, NY. 1980:287

English, S., Wilkinson, C. and Baker, V. *Survey Manual for Tropical Marine Resources*. Australian Institute of Marine Science, Townville. 1994:34-49

Nakajima, R., Nakayama, A., Yoshida, T., Rajuddin, M. and Kushairi, M. An Evaluation of Photo Line-Intercept Transect (PLIT) Method for Coral Reef Monitoring. *Galaxea, Journal of Coral Reef Studies*. 2010:12, 37-44. [Internet] <http://dx.doi.org/10.3755/galaxea.12.37>

Liew, H.C., Hii, Y.S., Bachok, Z., Ibrahim, K., Wagiman, S., Chan, A.A. and Said, A. *A Guide to Collecting Digital Videos for Coral Reef Surveys and Monitoring Purposes*. Department of Marine Parks Malaysia, Putrajaya. 2012:28

Archibald P. Sia, Harold R. Hungerford & Audrey N. Tomera. Selected Predictors of Responsible Environmental Behavior: An Analysis. *The Journal of Environmental Education*, Volume 17, Issue 2. 1986.

Bamberg, S., and Moser, G. Twenty years after Hines, Hungerford, and Tomera: A new meta- analysis and psycho-social determinants of pro- environmental behavior. *Journal of Environmental Psychology*, 27. 2007;14-25.

Sivek, D. J., and Hungerford, H. Predictors of responsible behavior in three Wisconsin conservation organizations. *The Journal of Environmental Education*, 17(2). 1989;31-40.

**About the Author:**

<b>Chief Researcher</b>
<b>Samadi</b> <i>State University of Jakarta, Indonesia</i>
<b>Researcher Member</b>
<b>Fauzi Ramadhoan Arachman</b> <i>State University of Jakarta, Indonesia</i>
<b>Vrita Tri Ayuni</b> <i>Khairun University, Ternate, Indonesia</i>
<b>Risky Nuri Amelia</b> <i>Khairun University, Ternate, Indonesia</i>