

Public perception of fish massage impact at the 'Tagal' areas in Sabah

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ABSTRACT The "Tagal system" is a traditional water conservation that prohibits fishing activities in the river for a predetermined time. The initiation of this system is to sustain the inland river resources, restoration of polluted river and generate income for the inhabitants. Furthermore, the 'Tagal' system is evolved into ecotourism activities such as fish massage which is beneficial to the inhabitants. However, the hygiene and management of fish massage becomes an issue for the users. Surveys were conducted at two Tagal areas namely 'Tagal' Luanti Moroli River, Ranau, and 'Tagal' Kiulu, Tamparuli. Result from the surveys have shown that the majority agreed fish massages are beneficial activities and would be safe to be conducted at 'Tagal' area. The majority also agreed to participate in the 'Tagal' conservation because it promotes good sustainable management for the inland river. Moreover, Willingness to Pay (WTP) would be a good management practice for the inhabitants but the linear regression model shows that only marital status, level of education, occupation, and distance variables were correlated with WTP. Further investigation is necessary in this field of study in the future.

KEYWORDS: Public perception, Tagal, Fish massage, fish massage impacts, Willingness to Pay (WTP)

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INTRODUCTION

The word 'Tagal' is a type of water conservation technique that was used by local communities in Sabah. 'Tagal' was taken from Kadazan-Dusun word that means "do not" or "forbid" and it is also alternately called 'Bombon'. The full meaning of the "Tagal system" is the prohibition of fishing activities in the river for a predetermined time (Er *et al.*, 2012). The system is developed to limit the utilization of natural resources to ensure the continuous production of aquatic resources, especially inland fish (Foo, 2011). In the past, it would be easy for inhabitants to harvest freshwater fish from the inland river. However, the rapid growth of timber industries and oil palm plantations causes soil erosion and pollution to the river thus lessening the fish production. Therefore, the Fishery Department of Malaysia and the Sabah state government had introduced this Community-based fisheries management to the inhabitants to sustain the inland river resources and river restoration (Wong *et al.*, 2008). The Fishery Department of Sabah and the dweller emphasized protecting the river to protect "Red Masheer" which is over-harvested by the inhabitants. Red Masheer or "Ikan Pelian" in the Malay Language is a type of freshwater fish that requires high oxygen demand in the river and their breeding ground is also unique. They can only survive in uncontaminated high-water current location in the river (Wong *et al.*, 2008). This type of fish is also an important source of income to the river dwellers.

The 'Tagal' system is classified into three-zone, which is green, yellow, and red zone. The Green Zone area is "open" for fishery activities throughout the year, while the Yellow Zone is only opened twice a year during special celebration such as "Kaamatan Festival". Meanwhile the red zone is restricted for any fishery activities due to the important breeding ground for Red Masheer. Furthermore, there are other rules and regulations enforce the 'Tagal' system which is called "Sogit". The "Sogit" is another word from the Kadazan-Dusun that means "the punishment for acting as guilty". Given that river resources are the only source of income for the river dwellers, they were concerned about their river wellbeing hence ensured there is nothing bad happen to the river.

The 'Tagal' system is evolved into fish massage water recreation which is safe to be carried out in the 'Tagal' area. This is because the water current in the river is faster than in the pool, therefore there are little chances it can spread dangerous diseases. For literature purposes, a study has been done on fish pedicure fishes that spread clinical sign disease or pathogen to a healthy person through pedicure fishes (Ruane *et al.*, 2013). However, the Health Protection Agency (HPA) in the United Kingdom believed that fish pedicure or fish massage has 'extremely low' risk of spreading dangerous diseases such as HIV and hepatitis (Geoghegan, 2011). This is due to good hygiene management which will reduce the risk of spreading diseases.

Good management practice is needed in the "Tagal system". The Willingness to Pay (WTP) approach is one of the ecosystem evaluation techniques under Contingent Valuation Method (CVM) that is often used to raise fund for environment restoration (Rosenberger *et al.*, 2012). Not all natural resources can be evaluated through monetary method especially for the experience of recreation (Daniel *et al.*, 2012). Besides, funding for an experience of recreation does not only reduce the direct consumption from natural resources but to save it (Mojiol *et al.*, 2017). Therefore, the fee paid by a visitor does not only generate income for the river dweller but also for protecting and managing the natural resources (Rosenberger *et al.*, 2012). This research aims to investigate the public perceptions on the impacts of fish massage and good management practices. It was conducted at two famous "Tagal" areas named Tagal Luanti Moroli River, Ranau and Tagal Kiulu, Tamparuli.

METHODOLOGY

Sample Collection:

In this research, two study areas were selected namely Tagal Luanti Moroli River, Ranau, and Tagal Kiulu, Tamparuli. Each 'Tagal' area has respective water recreational activities. Tagal Luanti Moroli River is famous for fish massage, while Tagal Kiulu is famous for White-water rafting and fish-feeding activities. To conduct a comparison study, a convenience sampling method is conducted at these two Tagal areas. This is mainly because different people have different thought of idea. So, the authors would like to compare these two Tagal dwellers on the perception of the fish massage impacts and good management practice. A total of 103 respondents were collected from these two Tagal areas via questionnaire. Face-to-face interview with the respondents was also conducted to determine the reasons behind the scene of the questionnaire answers. The questionnaire survey is typed into the Survey Monkey.com software for further analysis and the interview is typed into a transcript before analysis in the Qualitative text Data Analysis (QDA).

Quantitative analysis:

In this research, Survey Monkey.com software was used for statistical analysis and graphical visualization. Correlation analysis between each variable and regression model used to describe Willingness to pay or Willingness to accept is performed using Statistical Package for Social Sciences (SPSS). The data is converted from Survey Monkey files into SPSS file before it is analyzed for the correlation and regression. The variables that are selected to analyze the correlation and regression test are the census of statistics and Willingness to pay for the entrance fee.

Qualitative analysis:

QDA Miner Lite is a software developed by Provalis Research company to analyze qualitative data such as interview transcript, questionnaire transcript, and other qualitative data. The variables selected to analyze the fish massage impact are revenue, conservation, health, and outdoor. While

variables that selected to analyze the good management practice such as recreation, communication, economic, responsibility, environmental, and sustainable.

RESULT AND DISCUSSION

The result is shown in Table 1, comparison between Luanti and Kiulu, Luanti has higher than Kiulu corresponding to the result fish massage benefit to humans in Luanti (80.36%) and fish massage benefit to human in Kiulu (61.70%). So, the reason for this result that match with the interview results in Figure 1, fish massage benefits from Luanti dwellers' revenue, while fish massage benefits to Kiulu for health and outdoor aspect. From the past, the Tagal Luanti has successes to tame the fishes in the river for fish massage and evolved to an ecotourism destination in Sabah (Er *et al.*, 2012). As compared to Kiulu, the fishes in the river were the sources of food for the dweller. Freshwater fish is protein-rich and nutritious to human being compared to marine fish (Steffens, 1997).

Table 1. Perception of fish massage impact

Benefits	Tagal' Kiulu		Tagal' Luanti	
	Percentage	Frequency	Percentage	Frequency
Yes	61.70%	29	80.36%	45
No	14.89%	7	5.36%	3
Not sure	23.40%	11	14.29%	8
Total	100.00%	47	100.00%	56

Spread diseases	Tagal' Kiulu		Tagal' Luanti	
	Percentage	Frequency	Percentage	Frequency
Yes	25.53%	12	16.07%	9
No	48.94%	23	57.14%	32
Not sure	25.53%	12	26.79%	15
Total	100.00%	47	100.00%	56

Moreover, Table 1 shows that 57.14% of people in Luanti agreed that fish massage would not spread dangerous diseases which is higher than people in Kiulu (48.94%) because from an informal interview, the fish massage recreational activity was conducted in the open water as known as river water (Sylvia Gusiping 2018, questionnaire interview, September 21). This is also supported by the literature that the fishes for fish massage activities will not spread or carry dangerous diseases (Ruane *et al.*, 2013).

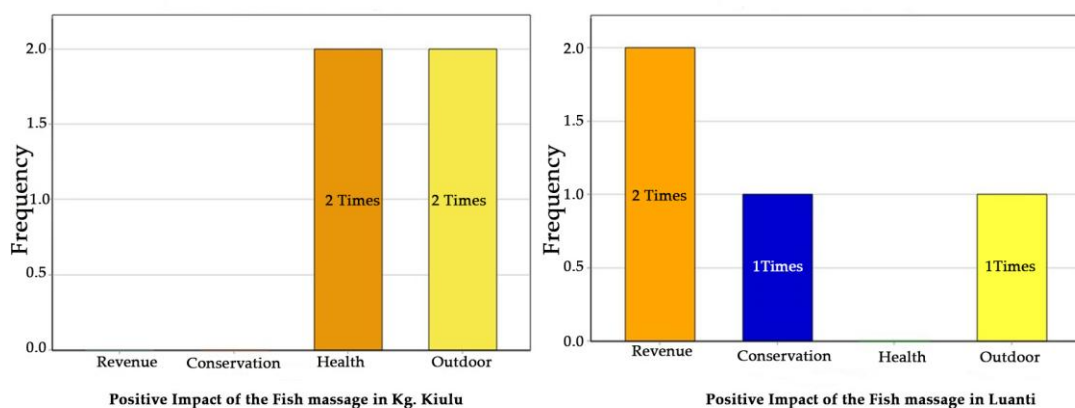


Figure 1. Interview from both Tagal to Positive Impact

Besides that, 46.81% and 64.29% of the respondents from Kiulu and Luanti are willing to be involved in the conservation of 'Tagal', as shown in Figure 2. The reason is the participants wanted to sustain the river resources. Hence, humans have secure senses that give them the ability to aware of the harmful thing (Rogers & Graham, 2009).

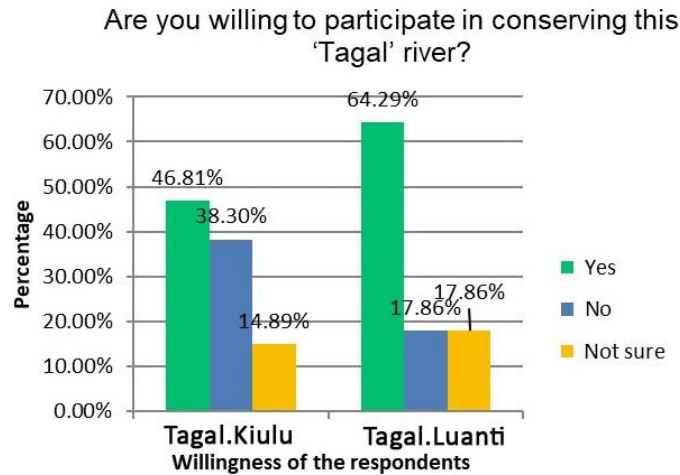


Figure 2. The willingness of the respondents to conserve 'Tagal'

Table 2 shows that the linear regression analysis between the demographics of the respondents and the WTP of Entrance fee that marital status, Level of Education, and Distance variables have a weak relation. This is because the R square value shown in Table 3 was 0.253 by converting into a percentage in which the relationship between these variables was 25.3%. The ANOVA test showed that the coefficients were significant because the level of significance in ANOVA (0.011) is less than the confidence level (Sig. < 0.05). Therefore, the model was accepted to predict the WTP.

Table 2. Model Summary for Regression Analysis of Entrance Fee

R	R Square	Adjusted R Square	Std. error of the Estimate
0.503 ^a	0.253	0.143	1.937

Table 3. ANOVA analysis of Entrance Fee

	Sum of Squares	df	Mean Square	F	Sig.
Regression	112.057	13	8.620	2.298	0.011 ^b
Residual	330.021	88	3.750		
Total	442.078	101			

From the regression analysis in Table 3, willingness to pay for entrance fee will increase when the income increases and for the community aspect to a willingness to accept the price. The willingness to pay the entrance fee is strongly related to marital status, education level, occupation, and distance factors as shown in Figure 4. Hence, the educational level increase, visitor awareness of the conservation of the natural environment is stronger. So, they are willing to pay for the entrance price as a conservation fee as mentioned by the interviewer (Luilis Bin Lopoh 2018, personal communication, June 29; Norhayati Assry 2018, personal communication, September 21). Further, occupation and marital status are also another factors that influence the price of willingness paid by the visitor because these group of people have less economic burden. Therefore, this group is willing to pay for the entrance fee. Also, distance influences the willingness to pay for the entrance fee

because respondents leave farther away, they are willing to pay due to the nature-based environment.

Table 4. Regression Analysis for Entrance Fee

Model	Unstandardized Coefficients		t	Sig.
	B	Std. Error		
(Constant)	3.124	0.687	4.549	0.000
Marital Status	1.382	0.667	2.072	0.041
Education Level	1.205	0.562	2.144	0.035
Occupation	1.411	0.691	2.042	0.044
Distance	-1.278	0.598	-2.137	0.035

* Note: regression is significant at $p < 0.05$

The model of the regression as shown below that:

$$WTP = 3.124 + 1.382*(\text{Marital Status}) + 1.205*(\text{Level of Education}) + 1.411*(\text{Occupation}) - 0.739*(\text{Distance})$$

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CONCLUSION

In conclusion that based on the respondents in both tagal areas the perception that fish massage can be beneficial to humans because fish massage is conducted outdoor, can enhance the human experience to nature and also help raise their awareness on the conservation of the ecosystem. Furthermore, based on the respondents' perception, fish massage at the 'Tagal' area is safe to be used. The reason is fish massage conducted at outdoor or at 'Tagal' area is an open water recreational activity compared to fish massage or fish spa or fish pedicure conducted in a pool. Fish massage activity in a pool need higher hygiene management to reduce health risk to the users compared to the river water.

Last but not least, respondents from both 'Tagal' Luanti Moroli river and Kiulu had a strong perception on the 'Tagal' system. The reason is sustainable natural resources are human responsibility. Moreover, the respondents' willingness to pay for the entrance fee and also the local community willing to accept the price for entrance fee discussed among the community. Marital status, level of education, occupation, and distance variables affected the amount of money that willing to be paid for the conservation. Besides, more studies should be conducted in WTP because WTP not only contributed to the economy among the inhabitants but also for conserved natural resources.

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