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Tourism in marine protected areas: A view from Nha Trang Bay, Vietnam

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ABSTRACT

Tourism development is considered a key accompanying strategy in creating alternative livelihood options for the communities living in and adjacent to the Marine Protected Areas. This paper examines the socioeconomic characteristics of the Nha Trang Bay protected area to determine the factors that influence the decision to participate in tourism sectors, and analyse whether these decisions would help to improve the economic well-being of the local communities. Using a mixed-method approach, including a strategic model and analysis of household surveys, the paper shows that tourism development has not yet helped to improve economic well-being of the communities, as was expected. The primary factors that prevent local residents from participating in the tourism industry are low levels of education, long distances between homes and tourism destinations, and perceptions of the effects of tourism. Thus, improving education and supporting the communities to meet multiple social and ecological goals should be a priority policy.

1. Introduction

Tourism is one of the fastest growing businesses in the world. While playing a vital role in the United Nations Sustainable Development Goals, tourism is increasing social and environmental concerns, particularly in protected areas. Achieving sustainable tourism is a continuous process and requires the informed participation of all relevant stakeholders, as well as strong political leadership to ensure broad participation and consensus-building (UNWTO, 2017). People who make a living from fishing have a direct dependency on marine resources and their ecosystem services (ESs). In many developing countries, however, the incomes of fishers are very small and unstable because of overexploited fish stock in the coastal areas, and limitation of offshore fishing due to old wooden boats (Garcia & Rosenberg, 2010). Without conservation initiatives, their lifestyle can threaten ecosystems, which will, in turn, influence the well-being of the same local communities (Pomeroy, Mascia, & Pollnac, 2007). The world has witnessed seen many collapsed and collapsing fish stocks, including those exploited by small-scale fisheries (Costello et al., 2012; Harasti, Davis, Jordan, Erskine, & Moltschaniwskyj, 2019; Pauly & Zeller, 2016). It is important to find income alternatives that do not impair the livelihoods of coastal fishing and aquaculture communities (APFIC, 2010; Katikiro, 2016), and ensure that the marine ecosystem continues to provide people with goods and services such as food, game, water, air purification, spiritual fulfilment, and aesthetic enjoyment (Gossling & Hall, 2006; Summers, Smith, Case, & Linthurst, 2012; Triarchi & Karamanis, 2017).

Marine Protected Areas (MPAs) are special areas of the marine environment, specifically established and managed to achieve long-term conservation with its associated ecosystem services and cultural values (Day et al., 2012). Since the last three decades, MPAs have become an important management tool for coastal and marine resources (Dudley, 2008; Fernandez & Pham Do, 2010; (Halpem, 2003; Pauly et al., 2002). There are many different types of MPAs, but all share the purpose of (i) protecting biodiversity, (ii) preventing overexploitation, and (iii) developing non-attractive uses of ecosystems as well as other recreational activities for management of sustainable fishing systems (Alban, Appéré, & Boncoeur, 2006; Davies et al., 2018). Having restricted certain human activities for the multiple objectives (Claudet, 2011), however, MPAs also offers various tourist possibilities; the number of declared MPAs is increasing worldwide (Edgar et al., 2007; Bennett & Dearden, 2014; Gill et al., 2017).

To date, tourism is one of the world's largest industries. Many recreational pursuits rely heavily on marine resources, and marine-based

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tourism is growing at a significant rate (Cvitanovic et al., 2018). Tourism development is able to consider as a key accompanying strategy in creating alternative livelihood options for the communities living in and adjacent to the MPAs. Existing literature on tourism management reveals that tourism industry has the potential to enhance local economies (Pyke, Pyke, & Watuwa, 2019; Ritchie, 1988) such as by generating employment, improving incomes, and raising the standard of living of the residents (Ahmed & Krohn, 1992; Kim, Uysal, & Sirgy, 2013; Lopes, Pacheco, Clauzet, Silvano, & Begossi, 2015). Despite these positive effects, the development of tourism in MPAs could create unequal value in ESs (Briassoulis, 2013; Gossling & Hall, 2006), and provoke conflicts among users (Christie, 2004; Lopes, Mendes, Fonseca, & Villasant, 2017); not all possible economic activities in MPAs, including tourism activities, can necessarily compete with the income gained from fishing (Katikiro, 2016). Moreover, international tourists can lead to an increase in the prices of local services and facilities (Dwyer, 2018), as well as a shortage of certain commodities (Cater, 1994a, 1994b; King & Stewart, 1996; Wall, 1997). There is potential for conflict over many tourism resources, whether natural or human-made, tangible or intangible (Bimonte, 2008; Lopes et al., 2017; Nagabhatla et al., 2019).

Like many other countries with long coastlines, Vietnam has established a network of MPAs since 2001. The main objective here has been to enable local island communities to effectively protect and sustainably manage the marine biodiversity, in partnership with other stakeholders (Tuan, Long, Tuyen, Hoa, & De Vantier, 2005). At the same time, tourism has become a major sector of economic activity in Vietnam, and all indications are that it will continue growing in the years to come.[1] Despite the growing interest in tourism, an emerging question is whether tourism is the best option for the economic well-being of local communities. There is an urgent need to understand communities' behaviours in order to develop sustainable tourism. This study offers new insights into the recent debate on whether tourism development is a good solution for the economic wellbeing of the communities living in and adjacent to the MPAs. The aim is to analyse the challenges of tourism development as well as to determine how best to sustainably exploit marine resource and preserve the livelihoods of local communities in the MPAs.

In this paper, we investigate whether tourism has had a positive economic effect on local communities and identify factors that influence the local residents' decision in participating or not participating in tourism. Using a mixed-method approach, including a strategic form game and empirical analyses, this paper shows that tourism development has not yet helped to improve local communities' economic wellbeing, as was expected. The primary reasons for this are low levels of education, long distances between home and tourism destinations, and a perception that tourism exerts a deleterious effect on these communities. This study provides evidence that tourism is not always a final-good solution or panacea for local communities. There are complexities and imbalances.

2. MPA and tourism development in Nha Trang Bay

Located in the south-central coast of Vietnam, the Nha Trang Bay Marine Protected Area (NTB-MPA) was established in 2001 with a total area of approximately 250 km^2, encompassing 38 km^2 land, 14 islands, and 212 km^2 surrounding water, as shown in Fig. 1.

The residents mainly live on two islands (Hon Tre and Hon Mieu), concentrated by four communities (Bich Dam, Dam Bay, Vung Ngan, and Tri Nguyen), with more than half of the population living on Hon Mieu, the island closest to the mainland. Due to low birth rates and emigration, the population has declined from 5647 residents in 2004 to 4793 in 2017 (NTBMPA Management Board, 2018; VNAT, 2018). Although the overall literacy rate is high (95%), the education level is low; only 65% of adults have been to primary school – i.e. schooling given to young people aged 6 to 10 – while women, in general, have a lower educational level than men. At present, all communities have primary schools and kindergartens, but there is only one secondary school located in Hon Mieu, to which children from other islands have to move to continue their studies.

The establishment of the NTB-MPA introduced a zoning scheme comprising a core zone, a buffer zone, and a transition zone. In 2014, these names and their boundaries were changed and adjusted, and currently, the regulated zones are strictly protected, for ecological rehabilitation, or slated for development. As represented in Table 1, the zone regulations were set up for conservation and protecting the marine environment. However, the MPA has also been developing as a major destination for tourism in Vietnam (Dung, 2009). Tourists have access to the strictly protected zone where they can participate in many kinds of water sports, except motorized sports. The ecological rehabilitation zone includes the islands and water 300 m around Hon Tam, Hon Mot, Hon Mieu, the remaining part of Hon Tre, and additional waters of 300 m surrounding the strictly protected zone. The rest of the Nha Trang Bay is made up of the development zone, where there is no restriction to activities but they have to follow the rules on environmental protection and aquaculture facilities. Generally, destructive fishing and polluting activities are not allowed in any of the three zones.[2]

Fishing is the primary source of livelihood for the most residents in the NTB-MPA. Though most fishing vessels are small-scale wooden boats featuring simple equipment, commercial fish products from this area contribute 30% of total landings in Khanh Hoa Province (KHSO, 2016). Aquaculture has developed rapidly in Nha Trang Bay since the mid-1990s and today is a significant source of income for approximately 30% of the households. Similarly to the fisheries, most aquaculture farms are small-scale and family-run (Van, 2013). Table 2 presents the characteristics of the settlements in NTB-MPA.

The two prevalent models of tourism in NTB are the island tour and the sea tour. The NTB-MPA offers various tourist possibilities. The number of tourists who visited the area has been increasing rapidly over the last years. In 1995, there are only 30,000 visitors (Tuan et al., 2005). In 2016, tourism turnover reached 12,998 billion VND (560 million US$), the total number of visitors reached more than 4.5 million people, of which more than 1.1 million international visitors. Particularly, in the first half of 2017, more than 2.6 million visitors arrived in the south-central city of Nha Trang, Khanh Hoa Province; international arrivals rose by 180% year-on-year to 949,000, while the average length of stay increased by 90% to 3.3 days (VNAT, 2018). Currently, 114 travel service companies are operating in the MPA. Most of them are domestic. Eight companies offer diving services, and seven offer other water-based sporting activities, while 30 companies and 67 households provide transport services within the MPA, mainly for tourists. The dominant actor in the NTB-MPA is the Vingroup Joint Stock Company (NTB-MPA Management Board, 2018), which operates several luxury hotels, villas, and restaurants, as well a huge amusement park on Hon Tre. Today Vingroup operates two of the three large tourism projects that are under construction, located on Hon Mot and Hon Tre. The other companies (i.e. Maico Dalat and Hon Tam Companies) operate the projects on Hon Mieu and Hon Tam. Based on a contract with the provincial government, Hon Tam Company plans to undertake a conservation program that combines all envisioned tourism services on Hon Mun Island.

[1] In the first half of 2017, about 3 million tourists visited the Khanh Hoa province, up 22% from the same period last year, earning more than 7.5 trillion VND (330 million USD) in revenue (VNAT, 2018).

[2] According to Dung (2009), the water area of NTB-MPA is being considered as a major nursery ground to supplement fish larvae to other coral reefs of Vietnam and maybe Cambodia due to a high abundance of larvae.

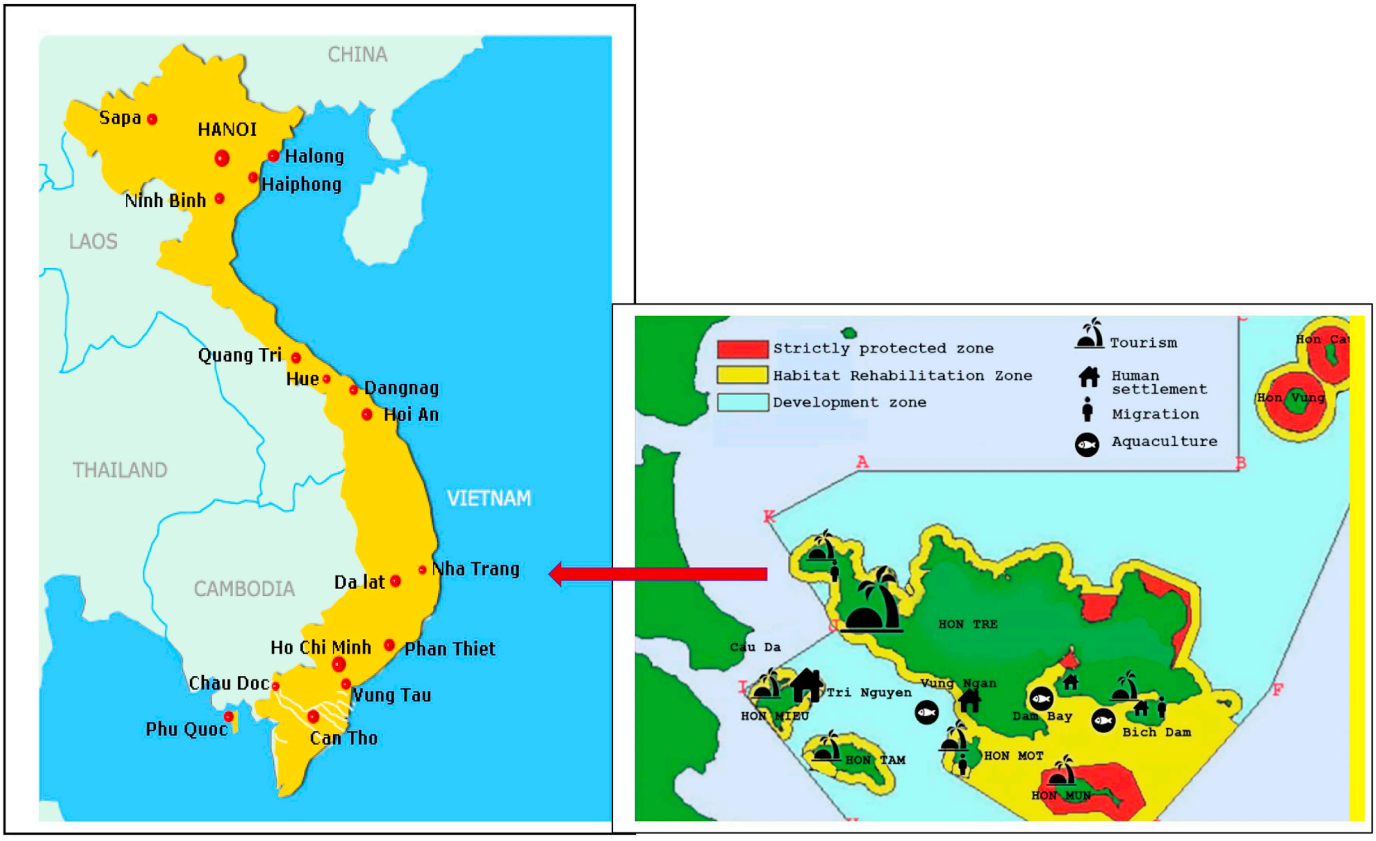

Fig. 1. Nha Trang Bay MPA. The authors have redesigned based on an old version presented in Haynes and Tu (2005). The sizes of the tourism area and of the human settlement population are reflected by the size of symbols.

Table 1
Nha Trang Bay MPA regulations.

Activities	MPA's zones		
	Strictly protected	Rehabilitation	Development
Diving & snorkeling	Yes	Yes	Yes
Education	Yes	Yes	Yes
Research & training	Yes	Yes	Yes
Mooring on buoys	Yes	Yes	Yes
Tourism boats	Limited	Yes	Yes
Jestsky & parasailing	No	Yes	Yes
Fishing	Licensed	Yes	Yes
Anchoring	No	Limited	Yes
Aquaculture	No	Limited	Yes
Spearfishing & dive fishing	No	Limited	Limited
Trawling and destructive fishing	No	No	No
Polluting activities	No	No	No

Table 2
The characteristics of the four communities in the Nha Trang Bay Marine Protected Area.

Community	Households	Population	Area (ha)	Fishing vessels	Aquaculture farms
Tri Nguyen	772	3307	38	334	42
Vung Ngan	160	600	10	89	87
Bich Dam	209	836	12	92	25
Dam Bay	18	50	5	12	16
Total	1159	4793	65	527	170

Source: NTBMPA Management Board (2018)).

3. Methodology and data

3.1. A model framework

This paper uses the notions of game theory to analyse the local communities' decision to participate in tourism development. Game theory (GT) is a set of analytical tools designed to help us understand the situations in which a decision maker's behaviour depends not only his or her own but also the others. The basic assumptions of GT emphasise that rational players, pursuing well-defined objectives, take into account their knowledge of others and accordingly form expectations of other decision-makers' behaviour. Game theory, therefore, provides powerful instruments to analyse the strategic choices in interactive environments (Pham Do, 2009), particularly in environmental and resource management. According to Buckley (2013), GT's usage in tourism research has not yet been widely applied, though has increased paying attention in recent years (for example, see: Tan, Chen, Guan, Yang, & Wu, 2017; Tavares & Tran, 2018; and references therein).

To understand the rationale behind tourism development strategies, we construct an income matrix of the strategic form games with imperfect information, i.e., Bayesian game. These typologies of games make it possible to examine situations in which players do not know a relevant aspect of the environment in which they operate (Osborne, 2004). We consider tourism development (by the authorities) and the resident populations to be internally homogeneous, i.e., as communities (uniform bodies), although homogeneity is itself the outcome played within the populations of residents and authorities to achieve an equilibrium. Without loss of generality, we introduce a 2-player game with two strategies (e.g., participating or not participating in tourism versus having or not having support from authorities).

Table 3 presents a payoff matrix of the game with two players: residents and authorities. The "authorities" here can be public (e.g., the

Table 3
The payoff matrix between residents and authorities in the NTB-MPA.

		Authorities' payoff	
Residents' payoff	*Strategies*	Support	No support
	Participate	R_{ph}, A_{ph}	R_{pl}, A_{pl}
	Not participate	R_{nh}, A_{nh}	R_{nl}, A_{nl}

government) or private bodies (e.g. private tourism investors). It is conventional to describe a matrix game as played by a row player and a column player. In each cell, the first entry gives a payoff (i.e. income) to local residents, while the second entry gives a payoff to the authorities. We assume that a resident (R) performs all the necessary activities to raise their living standards, he or she has two strategies: either to involve in tourism related occupation or not to do so. Depending on the tourism development plan, in the first stage, the authorities seek to enact changes to fit their plans by either indirectly influencing the environment (i.e., building infrastructure) or directly offering tourism-related jobs. In the second stage, however, the residents are able to make the final decision. The residents' payoffs (incomes) are based on the values of activities and the decisions they make, depending on their perceptions (human psychological factors) and (observations) the opportunities provided by the authorities. We consider an authority (A) to have two strategies: to either support or not support residents to participate in their plans.

Let R_{ij} and A_{ij} be the outcomes of residents and authorities, where i = p (participate) or n (not participate), and j = h (support) or l (not support or low support) are the strategies of R and A, respectively. Depending on the structure of the games, the Nash equilibrium (NE) can be determined as the optimal action chosen by each player, given the actions chosen by the other player. However, the NE may or may not exist with the pure strategies, and when it does, it may not be unique (Osborne, 2004); the NEs, therefore, provides scenarios to understand the interactions between individuals and their choices.

Assuming all participants are rational, and their decisions depend on desirable incomes, one can expect that involvement in tourism-related activities leads to higher incomes (i.e. efficient economic performance). In addition, if participating in tourism were a dominant strategy, one would expect $R_{ph} \geq R_{nh}$ and $R_{pl} \geq R_{nl}$, while assuming that an authority will derive greater benefit if they provide a higher degree of support to the local communities. In the investments, higher support could be more costly than lower support, i.e. $A_{ph} \geq A_{pl,}$ and $A_{nl} \geq A_{nl}$. Since the development plans designed by the authorities play an important role in the establishment of alternative livelihoods, one should expect that R_{ph} = max {R_{ij}, for all i, j} and A_{ph} = max {A_{ij}, for all i, j} will be the best possibilities for sustainable tourism. This argument is also used to analyse the internal division of employers vs. employees.

While the NE can help us to predict the best actions of individuals, it does not indicate the main factors that influence the game's outcomes. In this regard, we use the binary choice models to analyse the factors that affected communities' decisions. Binary choice models assume that individuals face a choice between two alternatives and that their choice depends on their particular characteristics (Vogelvang, 2005). In our model, the variable of residents' decision is a dichotomous variable, T_i. Given data availability,[3] we adopt Gill et al. (2017) for selecting the explanatory variables. The following are the independent variables that influence residents' decision whether to get involved in tourism work: age (A_i), education (E_i), gender (G_i), location (L_i), number of positive (P_i), and negative (N_i) effects. The relationship between the dependent and the independent variables is presented as follows:

$$T_i = \alpha A_i + \beta E_i + \gamma G_i + \varepsilon L_i + \varepsilon P_i + \theta N_i + u_i \quad (3.1)$$

where $T_i = \begin{cases} 1 & \textit{if person i involves in tourism} \\ 0 & \textit{if person i does not involve} \end{cases}$ and u_i is an independently distributed random variable with a mean of 0.

3.2. Data collection

To estimate the parameters of Eq. (3.1), we use the 2014 surveyed data, collected by asking directly residents questions such as whether or not they are involved in the tourism industry (T_i = 1 or 0); their age, education, and location; and whether they perceive tourism to have had a negative or positive effect on the well-being of the local community.

The total sample size for this study was 140 households, which accounts for 12% of the total population of the NTB-MPA, who are currently living in Bich Dam, Tri Nguyen, Vung Ngan, and the mainland. As shown in Table. 4, 35 of the survey respondents are involved in tourism, while 105 are not. Of the 35, 20 (57%) are currently working for larger tourist companies, while 15 (43%) are self-employed. Table 5 presents the characteristics of the selected variables, whereas summaries of the data between employer and employee groups is in Table A.1 (Appendix).

In our survey, employers are those who have capital and can run their own business, while employees are those who do not possess such capital and thus have to work for employers. Employers exercise control over their employees' activities, while employees have specific salaries or wages, and are bound by employment contracts. In general, employers are boat owners, farm owners, and canoe owners who provide transport services to tourists, while employees are crewmembers and staff working in establishments such as tourism companies, restaurants, and hotels.

4. Results and discussion

4.1. The role of support from the authorities on locals' career choices

We observed that residents could only receive support from either the government or the tourism investors if they take part in tourism, and no one receives support from both sources. However, even when locals participate in tourism and receive support, their income is still significantly lower than both those who do not participate in tourism and those who participate but do not receive support (see, Table 6).

Generally, the government aims to support only those who did not have job opportunities previously and focuses only on female empowerment. However, these job opportunities mainly fall in the field of handcrafts or giving tours on bamboo basket boats. Table 6 indicates the different incomes among working positions (employer versus employee), job categories (fishing, aquaculture farming, and tourism; fishing and/or aquaculture farming; tourism only), and with or without support. The findings reveal that residents who work simultaneously in tourism and other activities receive the highest income, compared to

Table 4
The distribution of questionnaires.

Community	Participate in tourism		Does not participate in tourism	
	Observations	Rate (%)	Observations	Rate (%)
Vung Ngan	5	14.29	21	20.00
Tri Nguyen	10	28.57	37	35.24
Bich Dam	0	0.00	22	20.95
Mainland*	20	57.14	25	23.81
Total	35	100.00	105	100.00

* Those who live close to harbours and have access to the NTB-MPA.

[3] We aim to focus on the creation and balanced job of tourism development processes and, as the indicators of evaluating local communities' well-being and their perceived impact on MPAs.

Table 5
Descriptive statistics of variables.

			Observation			
Variable	Total	SD	Involve in tourism Mean (n = 35)	SD	Not invlove in tourism Mean (n = 105)	SD
Age	41.10	8.80	36.46	7.92	42.60	8.56
Gender 1: female; 0: otherwise	0.11	0.32	0.23	0.43	0.08	0.27
Education 1: high level; 0: low level	0.10	0.30	0.31	0.47	0.03	0.17
Support 1: support; 0: otherwise	0.06	0.24	0.23	0.43	0.00	0.00
Location 1–4: low difficulty to high difficulty in accessing the tourism areas	2.17	1.05	1.54	0.70	2.39	1.07
Job catergory 1: employer; 0: employee	0.65	0.48	0.37	0.49	0.74	0.44
Positive effect Number of possitive effects: higher income, better infrastructure	1.14	0.79	1.49	0.78	1.03	0.77
Negative effect Number of negative effects: sex worker, high price, lack of labour force, migration, poor living environment	1.31	0.91	1.00	1.06	1.41	0.84

Table 6
Individual incomes (standard errors in the parentheses).
Unit: Mil. VND per year.

Observations (n)	Incomes	
	With support	Without support
All, n = 140	74.51 (34.42), n = 8	116.67 (9.89), n = 132
Employer, n = 91	98.93 (67.13), n = 4	133.41 (14.41), n = 87
Employee, n = 49	50.10 (25.03), n = 4	84.32 (5.87), n = 45
Involved in fishing, and/or aquaculture farming, n = 105		96.86 (6.39)
Employer, n = 78	-	108.14 (8.12)
Employee, n = 27	-	64.27 (4.07)
Involved in fishing, and/or aquaculture farming and tourism, n = 10	212.4 (87.60), n = 2	375.21 (103.22), n = 8
Employer, n = 6	300, n = 1	526.74 (120.29), n = 5
Employee, n = 4	124.8, n = 1	122.67 (13.69), n = 3
Involved in tourism only, n = 25	28.54 (3.19), n = 6	117.3 (14.67), n = 19
Employer, n = 7	31.89 (5.19), n = 3	134.38 (60.68), n = 4
Employee, n = 18	25.20 (3.6), n = 3	112.75 (11.54), n = 15

Table 7
The payoff matrix between employers and employees (standard errors are in the parentheses).
Unit: Mil. VND per year.

Employee's income	Employer's income	
	Participates in tourism	Does not participate in tourism
Participates in tourism	102.71, 274.37 (10.46, 76.27)	114.40, 352.36[*,NE] (105.23, 96.87)
Does not participate in tourism	71.87, 90.45 (5.17, 38.5)	64.27, 108.14 (4.07, 8.12)

* NE: a Nash equilibrium.

those who either do not participate in tourism or work solely in tourism. Moreover, employees work in the fishing or aquaculture sectors receive particularly lower incomes, compared to those who work solely in tourism. However, if they have their own capital, invest in either fishing or aquaculture, and become employers, their incomes will be better. This observation might explain why people prefer to retain their traditional occupations, given that only 25% of the residents surveyed are involved in tourism. We also observed that most residents earn a higher income when they do not receive support, except employees working in the fishing and aquaculture sectors. Overall, the provision of support from the authorities does not improve local residents' economic well-being.

4.2. Whether or not to be involved in tourism

Table 7 presents the payoff matrix of the 2-player game (employers and employees) with two strategies (participate in tourism or not to do so). The estimated outcomes are based on the job categories and working positions.

The interaction between employers and employees, and the support they receive differs depending on whether they act differently in this regard (i.e., one participates in the tourism industry and receives the subsequent support, while the other did not). We consider this situation to reveal whether or not individuals are unreservedly interested in tourism development. One can easily see from Table 7 that a dominant strategy for employees is to participate in tourism, while the opposite is true for employers. The NE (114.40; 352.36) is optimal because it offers the highest benefit for all. However, just as if a stag hunt game,[4] but in the situation with only one equilibrium, this shows a potential conflict between job categories, support levels, and social cooperation, which predicts an unstable development. The existence of NE, therefore, indicates that there is a particular problem in the NTB-MPA, which aligns with our observations during the survey. The market rule is that employers' income is higher than that of their employees, so if residents

[4] In GT, the stag hunt is a game that describes a conflict between safety and social cooperation. In our game, one could expect both players participated in tourism (i.e. for extra income) or not (i.e. for marine protection/conservation). However, with only one NE, this game indicates a situation as similar to a prisoner dilemma game.

Table 8
Probit regression estimates of residents' decisions to participate in tourism.

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	−0.377	1.047	−0.360	0.719
Age	−0.028	0.018	−1.612	0.107
Education	1.466	0.429	3.412	0.000
Gender	0.506	0.453	1.118	0.264
Location	−0.483	0.177	−2.729	0.006
Negative effect	−0.368	0.158	−2.335	0.019
Positive effect	0.396	0.190	2.079	0.038
R-squared	0.352			
LR statistic	55.345	Log Likelihood		−0.364
Prob (LR statistic)	0.000			

possess sufficient money to invest in fishing boats and/or aquaculture farms, they prefer to be self-employed than to be hired by a tourism company. Residents who do not possess their own capital prefer a stable job in the tourism industry that is less hard and offers a higher income than those in the fisheries and aquaculture sectors.[5]

4.3. Factors associated with the decision of whether or not to participate in tourism

In our survey, less than 18% of both employees and employers work entirely in tourism. Additionally, residents who participate in tourism obtain a higher income than those who do not, from which it can be inferred that participation in tourism may be considered an extra income. Table 8 presents the estimated outcome of the selection model, while the accuracy of the fit and expectation-prediction evaluations of the model are reported in Tables A.2 and A.3 in the appendix.

As can be seen from Table 8, the coefficient of location and negative effect on tourism are negative and significant, implying that, ceteris paribus, an increase of one unit in either location or negative effect will reduce the probability of tourism's involvement by either 48% or 37%, respectively. However, the coefficients of education and positive effect are positive and significant, implying that, ceteris paribus, an increase of one unit in either education or positive effect will raise the probability of tourism's involvement by either 147% or 40%, respectively. The results[6] of the estimates, therefore, suggest that positions on location and education, as well as the residents' perception of how tourism affects society and the environment, serve best to explain why one may have chosen not to participate in tourism. Though education plays a very important role, ones can also predict the probability of whether an individual participates in tourism will increase or decrease depending on whether they have observed it have positive or negative effects. The positive effects perceived are higher income or better infrastructure whereas negative effects are a high price, lack of labour force, the pressure of out-migration, poor living environment or the existence of prostitution.

Overall, the estimated model (Table 8) correctly predicts 86.43% of the observations (95.24% of the Dep = 0 and 60% of the Dep = 1, cf. for not involve and involve in tourism, respectively), as reported in Table A.3 (Appendix). Comparatively, this prediction is correct for the 105 observations $T_i = 0$, but is incorrect for the 35 $T_i = 1$ observations (cf. Eq. 3.1). The gain is 11.43 percentage points better at predicting responses than the constant probability model, i.e., represents a 45.71% improvement over the 75% correct prediction of the default model.

Table 9 presents the three estimated linear regression models to compare employers and employees' decisions. Model 1 represents the estimations of whole sample (i.e. 140 observations), while models 2 and 3 focus separately on employers and employees. As can be seen, the coefficients of location, education, negative and positive effects have the right signs, and all are statistically significant at the 1% level, suggesting that these variables play an important role in the decision whether to become involved in the tourism industry.

Table 9
Linear regression model estimates of residents' decisions to participate in tourism.

Variable	Model 1 (n = 140)	Model 2 (Employers) (n = 91)	Model 3 (Employees) (n = 49)
C	0.249	−0.302	0.280
	(0.232)	(0.300)	(0.337)
Age	−0.008	−0.003	−0.005
	(0.004)	(0.004)	(0.006)
Education	0.464	0.705	0.132
	(0.102)*	(0.177)*	(0.124)
Gender	0.123	−0.092	0.409
	(0.099)	(0.105)	(0.161)*
Location	−0.089	0.006	−0.145
	(0.029)*	(0.034)	(0.055)*
Negative effect	−0.078	−0.181	0.062
	(0.035)*	(0.039)*	(0.055)
Positive effect	0.099	0.061	0.252
R-squared	(0.041)*	(0.042)	(0.072)*
	0.369	0.391	0.577
Log Likelihood	−49.193	−10.983	−14.241
F-statistic	12.987	8.999	9.539
Prob (F-statistic)	0.000	0.000	0.000

* Is significant at the 1% level.

Table 9 also demonstrates that the residents who have higher education and live near tourism destinations, particularly female (model 3), likely higher participate in tourism,[7] as expected. The issue of location is due to fewer transportation trips to and from the islands every day. Meanwhile, for Tri Nguyen people, there are boats every half an hour and it takes only few minutes to reach all the tourist attractions in the MPA.

The results of Models 2 and 3 show that employers who have completed a high level of education tend to participate in tourism, whereas those deem that tourism has a negative effect do not. Education, therefore, is one of the main factors that influence residents' decision whether or not to participate in the tourism industry. The further explored results in Table A.4 (Appendix) indicate that more highly educated employees earn a higher income, but this is not observed for employers, who have access to their own capital. This could be because access to capital affects career paths more than education.

One can also easily see different levels of income between employees who work in tourism sector and receive support from either tourism investors or government. Such support from the authorities seemed not to bring about higher incomes, which implies that the current support policy should be reconsidered.[8] In other words, people who are better educated have a better chance of finding job in the tourism industry and thus receive a better salary. However, even though one receives additional support from the authorities, working in the tourism industry does not guarantee a better income than working in the fishing or aquaculture sectors. The informants reported two contrasting information; some said that they worked full-time in the tourism industry because it is less risky and less hard work than in the fishing or aquaculture sectors, while others argued that tourism does

[5] Another reason why the tourism sectors are less attractive for employees is due to the degradation of marine resource, resulting in a low salary.

[6] In the 2014 survey, 65% of residents were employers, with only 35% being employees. This is a limitation, due to data unavailable.

[7] This also aligns with what we observed in our fieldwork. At the time of inspection, only a few people from Bich Dam and Vung Ngan participated in tourism

[8] Note that the government often supports poorly educated people, whereas tourism investors are more selective, and tend to prefer to work with higher educated peoples.

not provide a good income, and was more hesitant about taking part in income-generating tourism activities.

Clearly, the goals of MPAs will not be met if tourism cannot guarantee an income for local residents, and even threatens the livelihoods of affected communities. When the tourism industry is developed and prioritized in MPAs, it is important that local people who depend on marine resources be able to receive support from the authorities to sustain and afford their livings. Before establishing no-take areas and designing initiatives for tourism development, the priority should be to assess the livelihood vulnerability of locals, and the resources on which they depend.

5. Concluding remarks

This paper investigates the impacts of tourism development on local communities, as they can decide to be or not to be involved in the tourism industry, and discusses what should be done to improve the economic well-being of communities. The results indicate that gender, low education levels, long distances from homes to tourist attractions, and a negative perception of the effects of tourism on MPAs are the main factors that influence residents' decision to get involved in tourism. Moreover, the paper has found that residents gain the highest income when they are working both in fishing and aquaculture as previously, as well as in tourism, not when they derive their sole income from tourism. Employees perceive that tourism creates positive effects for their community and the MPA, since tourism generates job opportunities and hence incomes, making them are more eager to switch to working in tourism. However, employers prefer to keep fishing or aquaculture as their main occupation and consider tourism as an additional form of work. In short, participation in the tourism industry does not guarantee an alternative livelihood for local communities, but rather brings them a supplementary benefit.

The existence of Nash equilibrium has revealed interesting results. While one could expect both employers and employees would do the same way, the optimal strategy (i.e. NE), in this study, describes a conflict between risk aversion and social cooperation, indicating an existing problem in NTB-MPA. This problem is particularly serious when these communities have different attitudes or expectations regarding resources or want to use them for alternative and mutually exclusive purposes, such as transferring land and resources between authorities and owners in NTB. This may also impair adequate maintenance of the ecosystem. Hence, tourism development has not yet helped to improve economic well-being for the NTB-MPA communities, as was expected.

To design a better mechanism, fishing and aquaculture farmers should not be excluded from the profitable tourism sector; instead, the tourism sector should reach out to fishing communities, who are often located in the bottom rung of society, and live in biologically significant areas that it is important to preserve (Gurney et al., 2014). One possible solution, therefore, is community-based ecotourism (cf., Gossling & Hall, 2006; Nagabhatla et al., 2019). However, the absence of social capital means that most communities are unable to launch initiatives on their own or work in the tourism industry due to low literacy levels and poor organisational skills. This being so, aid from the government is necessary during the early stages of development, such as by organizing relevant training programmes for fishing communities. Not only might such programmes create potential employment for local people, but they could also teach them the value of preserving the MPA.

In short, it is crucial to promote a sustainable form of tourism, which would not only benefit the regional economy but also help to provide resources and a foundation for economic growth for local communities, as well as diverse employment portfolios. This requires appropriate planning, monitoring, and enforcement. The approach to tourism in Vietnam needs to ensure effective management, to assist and support communities who are most affected. Decisions that will affect villagers, such as forcing them to the mainland, must be made with participation and acceptance of the communities (Ceballos-Lascurain, 1996; Lopes, Rosa, Salyvonchyk, Nora, & Begossi, 2013). In other words, if tourism is encouraged, it should not be given priority over existing traditional activities, but should be promoted in a way that is complementary with other resource-based users (Hall & Boyd, 2005). Future work in this regard could analyse the effects of resource-based use and land use transferrals in the NTB-MPA.[9]

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Appendix A. Appendix

Table A.1
Individual incomes among various economic activities (standard errors in parentheses).
Unit: Mil. VND per year.

	Job type	Mean
Employer	Fishing, and/or aquaculture farming (n = 78)	108.14 (8.12)
	Fishing, and/or aquaculture farming, and tourism (n = 6)	488.95 (105.23)
	Tourism only (n = 7)	90.45 (38.53)
Employee	Fishing, and/or aquaculture farming (n = 27)	64.27 (4.07)
	Fishing, and/or aquaculture farming, and tourism (n = 4)	123.20 (6.69)
	Tourism only (n = 18)	98.16 (12.42)

[9] The current paper has some limitation due to the sample of the study is small and not include the roles of tourists. It diminishes the entire power of the results while increasing the margin of error that will lead to the less valuation of the study.

Table A.2
Goodness-of-fit evaluation for the binary specification .Grouping based upon predicted risk (randomized ties).

	Quantile of Risk			Dep = 0		Dep = 1	Total	H-L
	Low	High	Actual	Expect	Actual	Expect	Obs	Value
1	0.00	0.01	14	13.92	0	0.08	14	0.08
2	0.01	0.04	14	13.65	0	0.34	14	0.35
3	0.04	0.06	11	13.25	3	0.74	14	7.22
4	0.07	0.11	13	12.85	1	1.14	14	0.02
5	0.10	0.15	14	12.22	0	1.77	14	2.03
6	0.16	0.21	14	11.53	0	2.46	14	2.99
7	0.21	0.25	11	10.73	3	3.27	14	0.03
8	0.25	0.42	9	9.19	5	4.80	14	0.01
9	0.43	0.67	3	5.87	11	8.13	14	2.41
10	0.67	0.99	2	2.42	12	11.57	14	0.09
		Total	105	105.66	35	34.33	140	15.24
H-L Statistic			15.24		Prob. Chi-Sq (8)		0.05	
Andrews Statistic			60.27		Prob. Chi-Sq (10)		0.00	

Table A.3
Expectation-prediction evaluation for binary decisions.

Success cut-off: C = 0.5

	Estimated equation			Constant probability		
	Dep = 0	Dep = 1	Total	Dep = 0	Dep = 1	Total
P(Dep = 1) ≤C	100	14	114	105	35	140
P(Dep = 1) > C	5	21	26	0	0	0
Total	105	35	140	105	35	140
Correct	100	21	121	105	0	105
% Correct	95.24	60.00	86.43	100.00	0.00	75.00
% Incorrect	4.76	40.00	13.57	0.00	100.00	25.00
Total gain*	−4.76	60.00	11.43			
Percent gain**	NA	60.00	45.71			
E(# of Dep = 0)	89.59	16.08	105.67	78.75	26.25	105.00
E(# of Dep = 1)	15.41	18.92	34.33	26.25	8.75	35.00
Total	105.00	35.00	140.00	105.00	35.00	140.00
Correct	89.59	18.92	108.51	78.75	8.75	87.50
% Correct	85.32	54.06	77.51	75.00	25.00	62.50
% Incorrect	14.68	45.94	22.49	25.00	75.00	37.50
Total gain*	10.32	29.06	15.01			
Percent gain**	41.30	38.75	40.02			

* Change in "% Correct" from default (constant probability) specification.
** Percent of incorrect (default) prediction corrected by equation.

Table A.4
Residents' income and its relation to education (standard errors in parentheses).

		High education	Low education
Participates in tourism	Employer	91.93 (100.85) n = 3	329.22 (290.11) n = 10
	Employee	114.62 (47.03) n = 9	94.46 (50.47) n = 13
Does not participate in tourism	Employer	–	108.14 (71.73) n = 78
	Employee	78.47 (36.70) n = 3	62.50 (18.97) *n* = 24

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