

1 **Tourism in Marine Protected Areas: A view from Nha Trang Bay, Vietnam**

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7  
8 **Highlights**

- 9 • Tourism is booming in many coastal provinces in Vietnam.
- 10 • Marine Protected Areas often have multiple objectives and offer tourists many
- 11 opportunities
- 12 • The perception of tourism effects on society and environment plays a key role in
- 13 communities living adjacent to MPAs.
- 14 • Contemporary tourism mechanisms have not yet helped to improve the economic
- 15 wellbeing of the coastal communities.
- 16 • Improving community education and community-based ecotourism is a possible
- 17 priority solution.

18  
19 **Abstract** *Tourism development is considered a key accompanying strategy in creating*

20 *alternative livelihood options for the communities living in and adjacent to the Marine*

21 *Protected Areas. This paper examines the socioeconomic characteristics of the Nha Trang Bay*

22 *protected area to determine the factors that influence the decision to participate in tourism*

23 *sectors, and analyse whether these decisions would help to improve the economic wellbeing of*

24 *the local communities. Using a mixed-method approach, including a strategic model and*

25 *analysis of household surveys, the paper shows that tourism development has not yet helped to*

26 *improve economic well-being of the communities, as was expected. The primary factors that*

27 *prevent local residents from participating in the tourism industry are low levels of education,*

28 *long distances between homes and tourism destinations, and perceptions of the effects of*

29 *tourism. Thus, improving education and supporting the communities to meet multiple social*

30 *and ecological goals should be a priority policy.*

31  
32 **Keywords** Marine protected areas, Community's wellbeing, Resource use, Binary choice model,

33 Strategic games, Sustainable tourism, Nha Trang Bay

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## 37 **1. Introduction**

38 Tourism is one of the fastest growing businesses in the world. While playing a vital role in the  
39 United Nations Sustainable Development Goals, tourism is increasing social and  
40 environmental concerns, particularly in protected areas. Achieving sustainable tourism is a  
41 continuous process and requires the informed participation of all relevant stakeholders, as well  
42 as strong political leadership to ensure broad participation and consensus-building (UNWTO,  
43 2017). People who make a living from fishing have a direct dependency on marine resources  
44 and their ecosystem services (ESs). In many developing countries, however, the incomes of  
45 fishers are very small and unstable because of overexploited fish stock in the coastal areas, and  
46 limitation of offshore fishing due to old wooden boats (Garcia and Rosenberg, 2010). Without  
47 conservation initiatives, their lifestyle can threaten ecosystems, which will, in turn, influence  
48 the well-being of the same local communities (Pomeroy et al., 2007). The world has witnessed  
49 seen many collapsed and collapsing fish stocks, including those exploited by small-scale  
50 fisheries (Costello et al., 2012; Pauly and Zeller, 2016; Harasti et al., 2019). It is important to  
51 find income alternatives that do not impair the livelihoods of coastal fishing and aquaculture  
52 communities (APFIC, 2010; Katikiro, 2016), and ensure that the marine ecosystem continues  
53 to provide people with goods and services such as food, game, water, air purification, spiritual  
54 fulfilment, and aesthetic enjoyment (Gossling & Hall, 2006; Summers et al., 2012; Triarchi  
55 and Karamanis, 2017).

56 Marine Protected Areas (MPAs) are special areas of the marine environment, specifically  
57 established and managed to achieve long-term conservation with its associated ecosystem  
58 services and cultural values (Day et al., 2012). Since the last three decades, MPAs have become  
59 an important management tool for coastal and marine resources (Dudley, 2009; Fernandez and  
60 Pham Do, 2010; Halpem, 2003; Pauly et al., 2002). There are many different types of MPAs,  
61 but all share the purpose of (i) protecting biodiversity, (ii) preventing overexploitation, and (iii)  
62 developing non-attractive uses of ecosystems as well as other recreational activities for  
63 management of sustainable fishing systems (Alban et al., 2006; Davies et al., 2018). Having  
64 restricted certain human activities for the multiple objectives (Claudet, 2011), however, MPAs

65 also offers various tourist possibilities; the number of declared MPAs is increasing worldwide  
66 (Elgar et al., 2007; Bennett and Dearden, 2014; Gill et al. 2017).

67 To date, tourism is one of the world's largest industries. Many recreational pursuits rely heavily  
68 on marine resources, and marine-based tourism is growing at a significant rate (Cvitanovic et  
69 al., 2018). Tourism development is able to consider as a key accompanying strategy in creating  
70 alternative livelihood options for the communities living in and adjacent to the MPAs. Existing  
71 literature on tourism management reveals that tourism industry has the potential to enhance  
72 local economies (Ritchie, 1988; Pyke et al., 2019) such as by generating employment,  
73 improving incomes, and raising the standard of living of the residents (Ahmed and Krohn,  
74 1992; Kim et al., 2013; Lopes et al., 2015). Despite these positive effects, the development of  
75 tourism in MPAs could create unequal value in ESs (Briassoulis, 2013; Gossling & Hall, 2006),  
76 and provoke conflicts among users (Christie, 2004; Lopes et al. 2017); not all possible  
77 economic activities in MPAs, including tourism activities, can necessarily compete with the  
78 income gained from fishing (Katikiro, 2016). Moreover, international tourists can lead to an  
79 increase in the prices of local services and facilities (Dwyer, 2018), as well as a shortage of  
80 certain commodities (Cater, 1994a, 1994b; King and Stewart, 1996; Wall, 1997). There is  
81 potential for conflict over many tourism resources, whether natural or human-made, tangible  
82 or intangible (Bimonte, 2008; Lopes et al., 2017; Nagabhatla et al., 2019).

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

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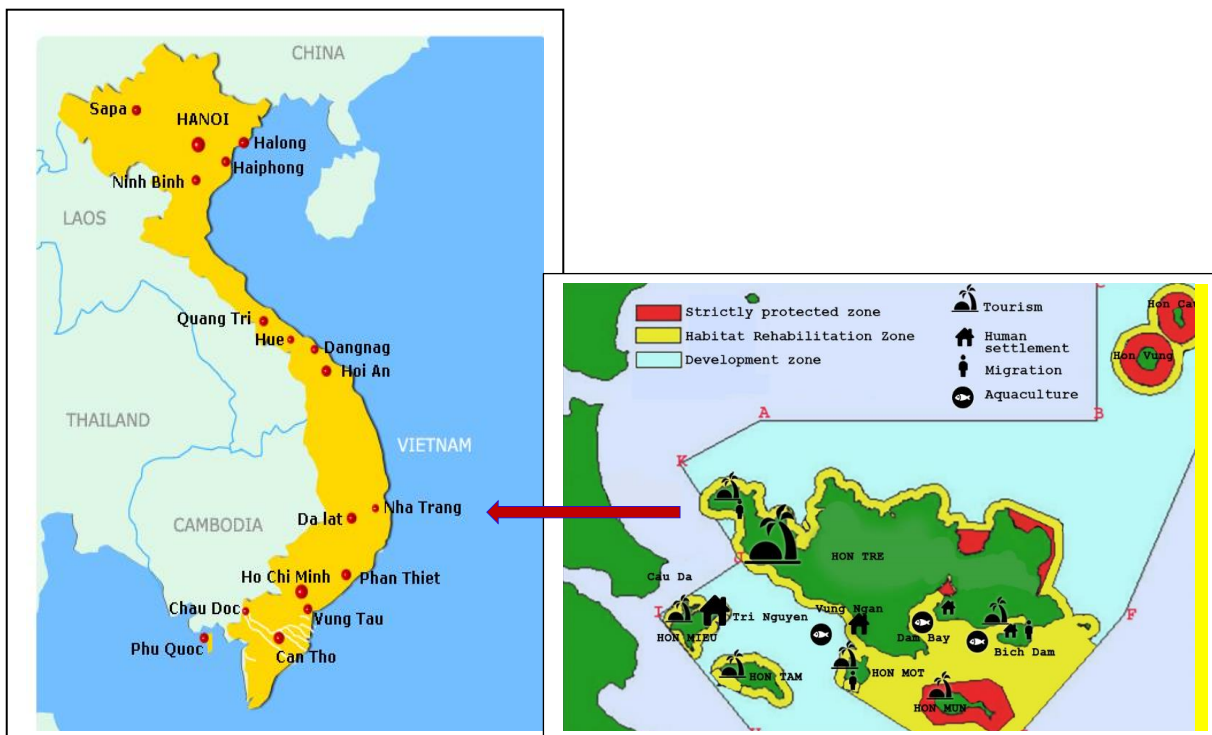
<sup>1</sup> In the first half of 2017, about 3 million tourists visited the Khanh Hoa province, up 22 percent from the same period last year, earning more than 7.5 trillion VND (330 million USD) in revenue (VNAT, 2018).

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

104 **MPA and tourism development in Nha Trang Bay**

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

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Figure 1: Nha Trang Bay MPA<sup>2</sup>

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<sup>2</sup> 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.

122 The residents mainly live on two islands (Hon Tre and Hon Mieu), concentrated by four  
 123 communities (Bich Dam, Dam Bay, Vung Ngan, and Tri Nguyen), with more than half of the  
 124 population living on Hon Mieu, the island closest to the mainland. Due to low birth rates and  
 125 emigration, the population has declined from 5,647 residents in 2004 to 4,793 in 2017 (VNAT,  
 126 2018; NTBMPA Management Board, 2018). Although the overall literacy rate is high (95%),  
 127 the education level is low; only 65% of adults have been to primary school – i.e. schooling  
 128 given to young people aged 6 to 10 – while women, in general, have a lower educational level  
 129 than men. At present, all communities have primary schools and kindergartens, but there is  
 130 only one secondary school located in Hon Mieu, to which children from other islands have to  
 131 move to continue their studies.

132 The establishment of the NTB-MPA introduced a zoning scheme comprising a core zone, a  
 133 buffer zone, and a transition zone. In 2014, these names and their boundaries were changed  
 134 and adjusted, and currently, the regulated zones are strictly protected, for ecological  
 135 rehabilitation, or slated for development. As can be seen from Table 1, the zone regulations  
 136 were set up for conservation and protecting the marine environment. However, the MPA has  
 137 also been developing as a major destination for tourism in Vietnam (Dung, 2009). Tourists  
 138 have access to the strictly protected zone where they can participate in many kinds of water  
 139 sports, except motorized sports. The ecological rehabilitation zone includes the islands and  
 140 water 300 m around Hon Tam, Hon Mot, Hon Mieu, the remaining part of Hon Tre, and  
 141 additional waters of 300 m surrounding the strictly protected zone. The rest of the Nha Trang  
 142 Bay is made up of the development zone, where there is no restriction to activities but they  
 143 have to follow the rules on environmental protection and aquaculture facilities. Generally,  
 144 destructive fishing and polluting activities are not allowed in any of the three zones<sup>3</sup>.

145 **Table 1.** Nha Trang Bay MPA regulations

Activities	Zone		
	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
Jestsy & parasailing	No	Yes	Yes
Fishing	Licensed	Yes	Yes
Anchoring	No	Limited	Yes

<sup>3</sup> 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.

Aquaculture	No	Limited	Yes
Spearfishing & dive fishing	No	Limited	Limited
Trawling and destructive fishing	No	No	No
Polluting activities	No	No	No

146 Fishing is the primary source of livelihood for the most residents in the NTB-MPA. Though  
147 most fishing vessels are small-scale wooden boats featuring simple equipment, commercial  
148 fish products from this area contribute 30% of total landings in Khanh Hoa Province (KHSO,  
149 2016). Aquaculture has developed rapidly in Nha Trang Bay since the mid-1990s and today is  
150 a significant source of income for approximately 30% of the households. Similarly to the  
151 fisheries, most aquaculture farms are small-scale and family-run (Van, 2013). Table 2 presents  
152 the characteristics of the settlements in NTB-MPA.

153 **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

154 Source: NTBMPA Management Board (2018)

155 The two prevalent models of tourism in NTB are the island tour and the sea tour. The NTB-  
156 MPA offers various tourist possibilities. The number of tourists who visited the area has been  
157 increasing rapidly over the last years. In 1995, there are only 30,000 visitors (Tuan et al., 2005).  
158 In 2016, tourism turnover reached 12,998 billion VND (560 million US\$), the total number of  
159 visitors reached more than 4.5 million people, of which more than 1.1 million international  
160 visitors. Particularly, in the first half of 2017, more than 2.6 million visitors arrived in the south-  
161 central city of Nha Trang, Khanh Hoa Province; international arrivals rose by 180 per cent  
162 year-on-year to 949,000, while the average length of stay increased by 90 percent to 3.3 days  
163 (VNAT, 2018). Currently, 114 travel service companies are operating in the MPA. Most of  
164 them are domestic. Eight companies offer diving services, and seven offer other water-based  
165 sporting activities, while 30 companies and 67 households provide transport services within  
166 the MPA, mainly for tourists. The dominant actor in the NTB-MPA is the Vingroup Joint Stock  
167 Company (NTB-MPA Management Board, 2018), which operates several luxury hotels, villas,

168 and restaurants, as well a huge amusement park on Hon Tre. Today Vingroup operates two of  
169 the three large tourism projects that are under construction, located on Hon Mot and Hon Tre.  
170 The other companies (i.e. Maico Dalat and Hon Tam Companies) operate the projects on Hon  
171 Mieu and Hon Tam. Based on a contract with the provincial government, Hon Tam Company  
172 plans to undertake a conservation program that combines all envisioned tourism services on  
173 Hon Mun Island.

## 174 **Methodology and data**

### 175 *3.1 A model framework*

176 This paper uses the notions of game theory to analyse the local communities' decision to  
177 participate in tourism development. Game theory (GT) is a set of analytical tools designed to  
178 help us understand the situations in which a decision maker's behaviour depends not only his  
179 or her own but also the others. The basic assumptions of GT emphasise that rational players,  
180 pursuing well-defined objectives, take into account their knowledge of others and accordingly  
181 form expectations of other decision-makers' behaviour. Game theory, therefore, provides  
182 powerful instruments to analyse the strategic choices in interactive environments (Pham Do,  
183 2009), particularly in environmental and resource management. According to Buckley (2013),  
184 GT's usage in tourism research has not yet been widely applied, though has increased paying  
185 attention in recent years (for example, see: Tan et al., 2017; Tavares and Tran, 2018; and  
186 references therein).

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

196 Table 3 presents a payoff matrix of the game with two players: residents and authorities. The  
197 "authorities" here can be public (e.g., the government) or private bodies (e.g. private tourism  
198 investors). It is conventional to describe a matrix game as played by a row player and a column  
199 player. In each cell, the first entry gives a payoff (i.e. income) to local residents, while the

200 second entry gives a payoff to the authorities. We assume that a resident (R) performs all the  
 201 necessary activities to raise their living standards, he or she has two strategies: either to involve  
 202 in tourism related occupation or not to do so. Depending on the tourism development plan, in  
 203 the first stage, the authorities seek to enact changes to fit their plans by either indirectly  
 204 influencing the environment (i.e., building infrastructure) or directly offering tourism-related  
 205 jobs. In the second stage, however, the residents are able to make the final decision. The  
 206 residents' payoffs (incomes) are based on the values of activities and the decisions they make,  
 207 depending on their perceptions (human psychological factors) and (observations) the  
 208 opportunities provided by the authorities. We consider an authority (A) to have two strategies:  
 209 to either support or not support residents to participate in their plans.

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

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

227 **Table 3:** The payoff matrix between residents and authorities in the NTB-MPA

	Authorities		
Residents	<i>Strategies</i>	Support	No support
	Participate		$R_{ph}, A_{ph}$



	Not participate	$R_{nh}, A_{nh}$	$R_{nl}, A_{nl}$
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229 While the NE can help us to predict the best actions of individuals, it does not indicate the main  
 230 factors that influence the game’s outcomes. In this regard, we use the binary choice models to  
 231 analyse the factors that affected communities’ decisions. Binary choice models assume that  
 232 individuals face a choice between two alternatives and that their choice depends on their  
 233 particular characteristics (Vogelvang, 2005). In our model, the variable of residents’ decision  
 234 is a dichotomous variable,  $T_i$ . Given data availability<sup>4</sup>, we adopt Gill et al. (2017) for selecting  
 235 the explanatory variables. The following are the independent variables that influence residents’  
 236 decision whether to get involved in tourism work: age ( $A_i$ ), education ( $E_i$ ), gender ( $G_i$ ), location  
 237 ( $L_i$ ), number of positive ( $P_i$ ), and negative ( $N_i$ ) effects. The relationship between the dependent  
 238 and the independent variables is presented as follows:

239 
$$T_i = \alpha A_i + \beta E_i + \gamma G_i + \varepsilon L_i + \epsilon P_i + \theta N_i + u_i \quad (3.1)$$

240 where 
$$T_i = \begin{cases} 1 & \text{if person } i \text{ involves in tourism} \\ 0 & \text{if person } i \text{ does not involve} \end{cases}$$

241 and  $u_i$  is an independently distributed random variable with a mean of 0.

242 **3.2 Data collection**

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

247 **Table 4:** The distribution of questionnaires

Place	Participate in tourism		Does not participate in tourism	
	Respondents	Rate (%)	Respondents	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

<sup>4</sup> 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.

Mainland*	20	57.14	25	23.81
Total	35	100.00	105	100.00

248 *\*: those who live close to harbours and have access to the NTB-MPA*

249 The total sample size for this study was 140 households, which accounts for 12% of the total  
250 population of the NTB-MPA, who are currently living in Bich Dam, Tri Nguyen, Vung Ngan,  
251 and the mainland. As shown in Table 4, 35 of the survey respondents are involved in tourism,  
252 while 105 are not. Of the 35, 20 (57%) are currently working for larger tourist companies, while  
253 15 (43%) are self-employed. Table 5 presents the characteristics of the selected variables,  
254 whereas summaries of the data between employer and employee groups is in Table A.1  
255 (Appendix).

256 **Table 5:** Descriptive statistics (standard errors in parentheses)

Explanatory variables	Unit	All residents	Residents	Residents not
		(N=140)	involved in tourism (N=35)	involved in tourism (N=105)
Age	Years old	41.06 (0.74)	37.15 (1.46)	42.67 (0.83)
Gender = 1 (Female)		16	9	7
Gender = 0 (Male)		124	28	96
High education = 1 (Secondary school)	Person	15	12	03
Low education = 0 (Illiteracy or primary school)	Person	125	23	102
Support = 1 (With support)	Household	8	8	0
Support = 0 (No support)	Household	132	27	105
Location = 1 (Close to tourism area)	Household	110	31	79
Location = 0 (Far from tourism area)	Household	30	10	20
Employment = 1 (Employer)	Household	91	13	78
Employment = 0 (Employee)	Household	49	22	27
Positive effects (higher income, better infrastructure)	Number of effects	1.14 (0.07)	1.46 (0.13)	1.03 (0.08)

Negative effects (sex worker, high price, lack of labour force, migration, poor living environment)	Number of effects	1.31 (0.08)	0.95 (0.17)	1.44 (0.08)
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258 In our survey, employers are those who have capital and can run their own business, while  
 259 employees are those who do not possess such capital and thus have to work for employers.  
 260 Employers exercise control over their employees' activities, while employees have specific  
 261 salaries or wages, and are bound by employment contracts. In general, employers are boat  
 262 owners, farm owners, and canoe owners who provide transport services to tourists, while  
 263 employees are crewmembers and staff working in establishments such as tourism companies,  
 264 restaurants, and hotels.

## 265 4. Results and discussion

### 266 4.1 The role of support from the authorities on locals' career choices

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

272 **Table 6:** Individual incomes (standard errors in the parenthesis)

273 Unit: Mil. VND per year

Residents	Authority	
	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
<i>Fishing, and/or aquaculture farming, n=105</i>		96.86 (6.39)
Employer, n=78	-	108.14 (8.12)
Employee, n=27	-	64.27 (4.07)
<i>Fishing, and/or aquaculture farming and tourism, n=10</i>	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

<i>Tourism only</i> , 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

274 Generally, the government aims to support only those who did not have job opportunities  
275 previously and focuses only on female empowerment. However, these job opportunities mainly  
276 fall in the field of handicrafts or giving tours on bamboo basket boats. Table 6 indicates the  
277 different incomes among working positions (employer versus employee), job categories  
278 (fishing, aquaculture farming, and tourism; fishing and/or aquaculture farming; tourism only),  
279 and with or without receiving support. The findings reveal that residents who work  
280 simultaneously in tourism and other activities receive the highest income, compared to those  
281 who either do not participate in tourism or work solely in tourism. Moreover, employees work  
282 in the fishing or aquaculture sectors receive particularly lower incomes, compared to those who  
283 work solely in tourism. However, if they have their own capital, invest in either fishing or  
284 aquaculture, and become employers, their incomes will be better. This observation might  
285 explain why people prefer to retain their traditional occupations, given that only 25% of the  
286 residents surveyed are involved in tourism. We also observed that most residents earn a higher  
287 income when they do not receive support, except employees working in the fishing and  
288 aquaculture sectors. Overall, the provision of support from the authorities does not improve  
289 local residents' economic well-being.

#### 290 ***4.2 Whether or not to be involved in tourism***

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

294 **Table 7:** The payoff matrix between employers and employees (standard errors are in parenthesis)

295 Unit: Mil. VND per year

Employee	Employer	
	Participates in tourism	Does not participate in tourism
Participates in tourism	102.71; 274.37 (10.46; 76.27)	114.40; 352.36 <sup>*NE</sup> (105.23; 96.87)
Does not participate in tourism	71.87; 90.45	64.27; 108.14

296

297

\* NE: a Nash equilibrium.

298 The interaction between employers and employees, and the support they receive differs  
 299 depending on whether they act differently in this regard (i.e., one participates in the tourism  
 300 industry and receives the subsequent support, while the other did not). We consider this  
 301 situation to reveal whether or not individuals are unreservedly interested in tourism  
 302 development. One can easily see from Table 7 that a dominant strategy for employees is to  
 303 participate in tourism, while the opposite is true for employers. The NE (114.40; 352.36) is  
 304 optimal because it offers the highest benefit for all. However, just as if a stag hunt game<sup>5</sup>, but  
 305 in the situation with only one equilibrium, this shows a potential conflict between job  
 306 categories, support levels, and social cooperation, which predicts an unstable development. The  
 307 existence of NE, therefore, indicates that there is a particular problem in the NTB-MPA, which  
 308 aligns with our observations during the survey. The market rule is that employers' income is  
 309 higher than that of their employees, so if residents possess sufficient money to invest in fishing  
 310 boats and/or aquaculture farms, they prefer to be self-employed than to be hired by a tourism  
 311 company. Residents who do not possess their own capital prefer a stable job in the tourism  
 312 industry that is less hard and offers a higher income than those in the fisheries and aquaculture  
 313 sectors<sup>6</sup>.

#### 314 ***4.3 Factors associated with the decision of whether or not to participate in tourism***

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

321 As can be seen from Table 8, the coefficient of location and negative effect on tourism are  
 322 negative and significant, implying that, ceteris paribus, an increase of one unit in either location

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<sup>5</sup> 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.

<sup>6</sup> Another reason why the tourism sectors are less attractive for employees is due to the degradation of marine resource, resulting in a low salary.

323 or negative effect will reduce the probability of tourism’s involvement by either 48% or 37%,  
 324 respectively. However, the coefficient of education and positive effect are positive and  
 325 significant, implying that, ceteris paribus, an increase of one unit in either education or positive  
 326 effect will raise the probability of tourism’s involvement by either 147% or 40%, respectively.  
 327 The results<sup>7</sup> of the estimates, therefore, suggest that positions on location and education, as  
 328 well as the residents’ perception of how tourism affects society and the environment, serve best  
 329 to explain why one may have chosen not to participate in tourism. Though education plays a  
 330 very important role, ones can also predict the probability of whether an individual participates  
 331 in tourism will increase or decrease depending on whether they have observed it have positive  
 332 or negative effects. The positive effects perceived are higher income or better infrastructure  
 333 whereas negative effects are a high price, lack of labour force, the pressure of out-migration,  
 334 poor living environment or the existence of prostitution.

335 **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
McFadden R-squared	0.352	Mean dependent var		0.250
S.D. dependent var	0.434	S.E. of regression		0.335
Akaike info criterion	0.829	Sum squared resid		14.971
Schwarz criterion	0.976	Log likelihood		-51.053
Hannan-Quinn criter.	0.889	Deviance		102.107
Restr. deviance	157.453	Restr. log likelihood		-78.726
LR statistic	55.345	Avg. log likelihood		-0.364
Prob (LR statistic)	0.000			

336

<sup>7</sup> In the 2014 survey, 65% of residents were employers, with only 35% being employees. This is a limitation, due to data unavailable.

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

343 **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 (0.232)	-0.302 (0.300)	0.280 (0.337)
Age	-0.008 (0.004)	-0.003 (0.004)	-0.005 (0.006)
Education	0.464 (0.102)*	0.705 (0.177)*	0.132 (0.124)
Gender	0.123 (0.099)	-0.092 (0.105)	0.409 (0.161)*
Location	-0.089 (0.029)*	0.006 (0.034)	-0.145 (0.055)*
Negative effect	-0.078 (0.035)*	-0.181 (0.039)*	0.062 (0.055)
Positive effect	0.099 (0.041)*	0.061 (0.042)	0.252 (0.072)*
R-squared	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

---

344                      \* is significant at the 1% level

345

346 Table 9 presents the three estimated linear regression models to compare employers and  
347 employees' decisions. Model 1 represents the estimations of whole sample (i.e. 140  
348 observations), while models 2 and 3 focus separately on employers and employees. As can be  
349 seen, the coefficients of location, education, negative and positive perceived effects have the  
350 right signs, and all are statistically significant at the 1% level, suggesting that these variables  
351 play an important role in the decision whether to become involved in the tourism industry. It  
352 also demonstrates that the residents who have higher education and live near tourism  
353 destinations, particularly female (model 3), likely higher participate in tourism<sup>8</sup>, as expected.  
354 The issue of location is due to fewer transportation trips to and from the islands every day.  
355 Meanwhile, for Tri Nguyen people, there are boats every half an hour and it takes only few  
356 minutes to reach all the tourist attractions in the MPA.

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

364 One can also easily see different levels of income between employees who work in tourism  
365 sector and receive support from either tourism investors or government. Such support from the  
366 authorities seemed not to bring about higher incomes, which implies that the current support  
367 policy should be reconsidered<sup>9</sup>. In other words, people who are better educated have a better  
368 chance of finding job in the tourism industry and thus receive a better salary. However, even  
369 though one receives additional support from the authorities, working in the tourism industry  
370 does not guarantee a better income than working in the fishing or aquaculture sectors. The

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<sup>8</sup> 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

<sup>9</sup> 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.



371 informants reported two contrasting information; some said that they worked full-time in the  
372 tourism industry because it is less risky and less hard work than in the fishing or aquaculture  
373 sectors, while others argued that tourism does not provide a good income, and was more  
374 hesitant about taking part in income-generating tourism activities.

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

## 382 **5. Concluding remarks**

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

396 The existence of Nash equilibrium has revealed interesting results. While one could expect  
397 both employers and employees would do the same way, the optimal strategy (i.e. NE), in this  
398 study, describes a conflict between risk aversion and social cooperation, indicating an existing  
399 problem in NTB-MPA. This problem is particularly serious when these communities have  
400 different attitudes or expectations regarding resources or want to use them for alternative and  
401 mutually exclusive purposes, such as transferring land and resources between authorities and  
402 owners in NTB. This may also impair adequate maintenance of the ecosystem. Hence, tourism

403 development has not yet helped to improve economic well-being for the NTB-MPA  
404 communities, as was expected.

405 To design a better mechanism, fishing and aquaculture farmers should not be excluded from  
406 the profitable tourism sector; instead, the tourism sector should reach out to fishing  
407 communities, who are often located in the bottom rung of society, and live in biologically  
408 significant areas that it is important to preserve (Gurney et al., 2014). One possible solution,  
409 therefore, is community-based ecotourism (cf., Gossling and Hall, 2006; Nagabhatla et al.,  
410 2019). However, the absence of social capital means that most communities are unable to  
411 launch initiatives on their own or work in the tourism industry due to low literacy levels and  
412 poor organisational skills. This being so, aid from the government is necessary during the early  
413 stages of development, such as by organizing relevant training programmes for fishing  
414 communities. Not only might such programmes create potential employment for local people,  
415 but they could also teach them the value of preserving the MPA.

416 In short, it is crucial to promote a sustainable form of tourism, which would not only benefit  
417 the regional economy but also help to provide resources and a foundation for economic growth  
418 for local communities, as well as diverse employment portfolios. This requires appropriate  
419 planning, monitoring, and enforcement. The approach to tourism in Vietnam needs to ensure  
420 effective management, to assist and support communities who are most affected. Decisions that  
421 will affect villagers, such as forcing them to the mainland, must be made with participation and  
422 acceptance of the communities (Ceballos-Lascurain, 1996; Lopes et al., 2013). In other words,  
423 if tourism is encouraged, it should not be given priority over existing traditional activities, but  
424 should be promoted in a way that is complementary with other resource-based users (Hall and  
425 Boyd, 2005). Future work in this regard could analyse the effects of resource-based use and  
426 land use transferrals in the NTB-MPA<sup>10</sup>.

427

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<sup>10</sup> 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.

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568

569 **Appendix**

570

571 **Table A.1:** Individual incomes among various economic activities (standard errors in parentheses)

572 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)

573

574



575

**Table A.2:** Goodness-of-fit evaluation for the binary specification

576

Andrews and Hosmer-Lemeshow Tests

577

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		

578

579

**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			

	Estimated equation			Constant probability		
	Dep=0	Dep=1	Total	Dep=0	Dep=1	Total
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			

581 \*Change in “% Correct” from default (constant probability) specification

582 \*\*Percent of incorrect (default) prediction corrected by equation

584

**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

585