Ocean & Coastal Management 123 (2016) 66–73

Contents lists available at ScienceDirect

Ocean & Coastal Management

journal homepage: www.elsevier.com/locate/ocecoaman

Capacity building for tourism development in a nested social–ecological system—A case study of the South Penghu Archipelago Marine National Park, Taiwan

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ARTICLE INFO

Article history:
Received 25 July 2015
Received in revised form
31 December 2015
Accepted 4 February 2016
Available online xxx

Keywords:
Islands
Nested social–ecological system
Marine protected area
Community-based MPA
Penghu archipelago

ABSTRACT

In subnational small-island settings with a relatively undisturbed natural environment and an outmigration population, tourism development is often used as an alternative development strategy for economic and social regeneration. When such tourism development entails place-based management, such as in a marine protected area (MPA), tourism development can also be used as a strategy for alleviating the conflict between conservation and development as well as for increasing community participation. Local support and capacity building prior to tourism development are essential for involving local communities. Local communities are often complex and heterogeneous, and tourism development must be tailored to match their diverse needs. In this case study, three communities within the South Penghu Archipelago, where a marine national park and development of the tourism industry has been proposed, were investigated. This study assessed the perception of tourism development among community actors and the demands for capacity building to cope with future changes by conducting a social–ecological system (SES) analysis wherein the South Penghu MPA was considered a nested SES composed of subsystems. The subsystems focused on in this study were fishermen and nonfishermen at the functional scale and individual communities at the spatial scale. The results showed that the perceptions on tourism development varied substantially among the community actors and the different sub-SESs because of their different experiences in social–ecological interactions. Therefore, tourism development in a regional place-based management, such as in a MPA, must consider the various perceptions of such subsystems on tourism development. Rather than considering all local communities as a general unit, capacity building should be tailored to the needs of the community actors from the various sub-SESs. In addition, support from governmental agencies is essential for the success of community-based MPA policies.

1. Introduction

Coastal and marine regions are highly productive but also vulnerable social–ecological systems (SESs) (Ferrol-Schulte et al., 2013; Glaser et al., 2012), and the numerous global threats to such systems, such as climate change, overfishing, land-based pollution, and migration, are complex and interlinked. Among such SESs, subnational small islands are particularly vulnerable to these threats primarily because of their small land size and insularity (Baldacchino, 2006; Holdschlag and Ratter, 2013). The social systems in such islands are often characterized by declining economic activity, outmigration population, and a peripheral social–political status, whereas their ecological systems remain relatively unexploited. Such ecological systems are not only advantageous for tourism development (Briedenhann and Wickens, 2004; Kerr, 2005; Niles and Baldacchino, 2011) but also present valuable conservation opportunities. In certain regions of the world, tourism is frequently used as an alternative strategy for social–economic regeneration of small islands (Baldacchino, 2011;

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http://dx.doi.org/10.1016/j.ocecoaman.2016.02.001
0964-5691/

Cinner et al., 2009). Tourism generates job opportunities on the islands, which can reduce outward migration. Moreover, tourism may increase the income level, thus improving the livelihood of local communities. In the case of the South Penghu Archipelago, tourism is also considered a strategy for reducing the conflict between conservation and development because a marine protected area (MPA), in the form of a marine national park, and tourism development have been proposed in this region (Marine National Park Headquarters, 2010).

Glaser et al. (2012) stated that a SES "is a complex, adaptive system consisting of a biogeophysical unit and its associated social actors and institutions. The spatial or functional boundaries of the system delimit a particular ecosystem and its problem context." An MPA can be understood as a linked social–ecological system with a defined geographical boundary (Pollnac et al., 2010); its institution is a place-based management that regulates social and ecological interactions by restricting access to the marine natural resources in the focal region (Hilborn, 2012, p. 106; Jentoft et al., 2007). Tourism is often developed as a strategy to compensate the local communities for such restrictions. For example, fishermen can engage in tourism activities to compensate for losses caused by the limited access to fish (Charles and Wilson, 2009; Gjertsen and Niesten, 2010; Goodwin and Roe, 2001; Kelleher, 1999; McCay and Jones, 2011; Oracion et al., 2005, p. 2; Strickland-Munro et al., 2010; Walpole and Goodwin, 2001). Moreover, the general community members can generate income from tourism (Fabinyi, 2010; Walpole and Goodwin, 2001). The income earned through the tourism industry can instill in the local communities a sense of pride in their environment as well as highlight the connection between tourism and their livelihood. This relationship can be developed substantially to facilitate the success of the MPA (Agardy, 1993). In addition, the support and involvement of local communities in the tourism industry would bring in traditional knowledge and culture, which enriches the quality of the tourism experience (Jamal and Stronza, 2009; Muganda et al., 2013). However, tourism development without the participation of the local communities may contribute little to the local people (Aref and Ma'rof, 2009; Moscardo, 2008; Clark and Tsai, 2012; Tsai and Hong, 2014) and may undermine local livelihoods and threaten the effectiveness of the MPA policy.

To enhance community participation in tourism management, not only should capacity building involve local communities in the business but the communities must also adapt to the change generated by the new regulations (Aref and Ma'rof, 2009; Mason and Cheyne, 2000; Moscardo, 2008). Therefore, tourism development as a strategy for social–economic regeneration and communal participation in the MPA should focus on capacity building rather than tourism development itself. Moreover, the local communities' perceptions on capacity building and their willingness to adapt to the changes caused by tourism development must be understood prior to the development (Mason and Cheyne, 2000). In addition, although members of local communities in the focal region are usually considered justifiable actors in tourism development (Haukeland, 2011; Jamal and Stronza, 2009; Muganda et al., 2013), they are not a general unit but a complex and heterogeneous composition whose constituents may differentially interact with the marine ecosystems. As Ostrom and Cox (2010) pointed out, the dynamics of structured SESs are different and may be influenced by interventions differently. Therefore, the MPA and tourism development–driven transformation of local communities may differentially affect the local communities. Hence, capacity building that satisfies the different needs of these communities is essential (Wu, 2013; Wu and Tsai, 2014).

This study investigates the perceptions of different community actors within the focal SES and assesses their capacity for tourism development in the South Penghu islands, where a marine national park has been proposed. A nested SES concept that considers the focal SES as a composition of its subsystems on functional and spatial scales was applied, and interviews were conducted.

1.1. Case study area

The Penghu Archipelago, also known as the Pescadores ("fishermen" in Portuguese) consists of nearly 90 islands with a total land area of approximately 127 sq. km and coastline totaling nearly 320 km. The islands are spread across the middle of the Taiwan Strait (23°47′–23°12' N, 119°19′–119°43′ E) over a region spanning 60 km long (north–south) and 40 km wide (east–west) (Tsai, 2009).

The focal region of this study is located in the south of the Penghu Archipelago (Fig. 1) and is approximately 30 km from Magong, the capital city of Penghu County, and nearly 50 km from Taiwan's closest port. The islands in the focal region, with a total land area of nearly 3.7 sq. km, are spread over a region of approximately 355 sq. km. Four main islands—Xiyuping, Dongyuping, Xiji, and Dongji—and many small islets and wave-swept rocks are present in this region, which is part of the Wangan Township of Penghu County.

1.2. Population and economy

People inhabiting the islands in the focal region were attracted by the abundant fishing resources in the surrounding waters and settled in these islands around the 18th century (Hsu, 2008). The population in this region peaked in the 1960s and has been declining rapidly since 1970, akin to the migration pattern of entire Penghu Archipelago. This decline can be attributed to the decreasing fishing resources in the waters surrounding the archipelago and the high labor demand in Taiwan's main island following industrialization and urbanization in the middle of the 20th century (Cheng, 2010; Hsu, 2005, 2008; Yin, 1969). Moreover, the limited land area and remoteness of the islands of the focal region made the living condition harsher than that in the other islands of the archipelago. Xiji has been uninhabited ever since the local residents sought assistance from the government and were relocated to Magong in 1978 (Hsu, 2008). Furthermore, the government conducted a survey to gauge the willingness of the many island communities in the archipelago, including those in the other three communities in this focal region, to relocate. Most communities decided to stay on their home island (Hsu, 2005). However, the year-round population declined. On Xiyuping, Dongyuping, and Dongji, the registered population[1] in 2010 was 244, 608, and 264, respectively, but only a few dozen residents[2] live year round on each island (Table 1). However, people who have obtained a new resident registration certificate and have settled elsewhere continue to be recognized as community members of the islands. Irrespective of whether their registrations are on the islands, many members of this "travel-out" population are fishermen who frequently travel to this focal region for fishing. Many others who are not fishermen return to their islands only a few times each year,

[1] According to the Household Registration Act of Taiwan, every individual must obtain a registration certificate made on a household basis in a jurisdictional area (township, city, or district). Official demographic data (i.e., the "registered population") is based on this registration data. The law states that individuals must update their registration within 3 months of a change in their residence, but it is not strictly enforced, meaning that an individual may be registered in one location but reside in another.

[2] Resident population here refers to the actual number of people who live in the specified location.

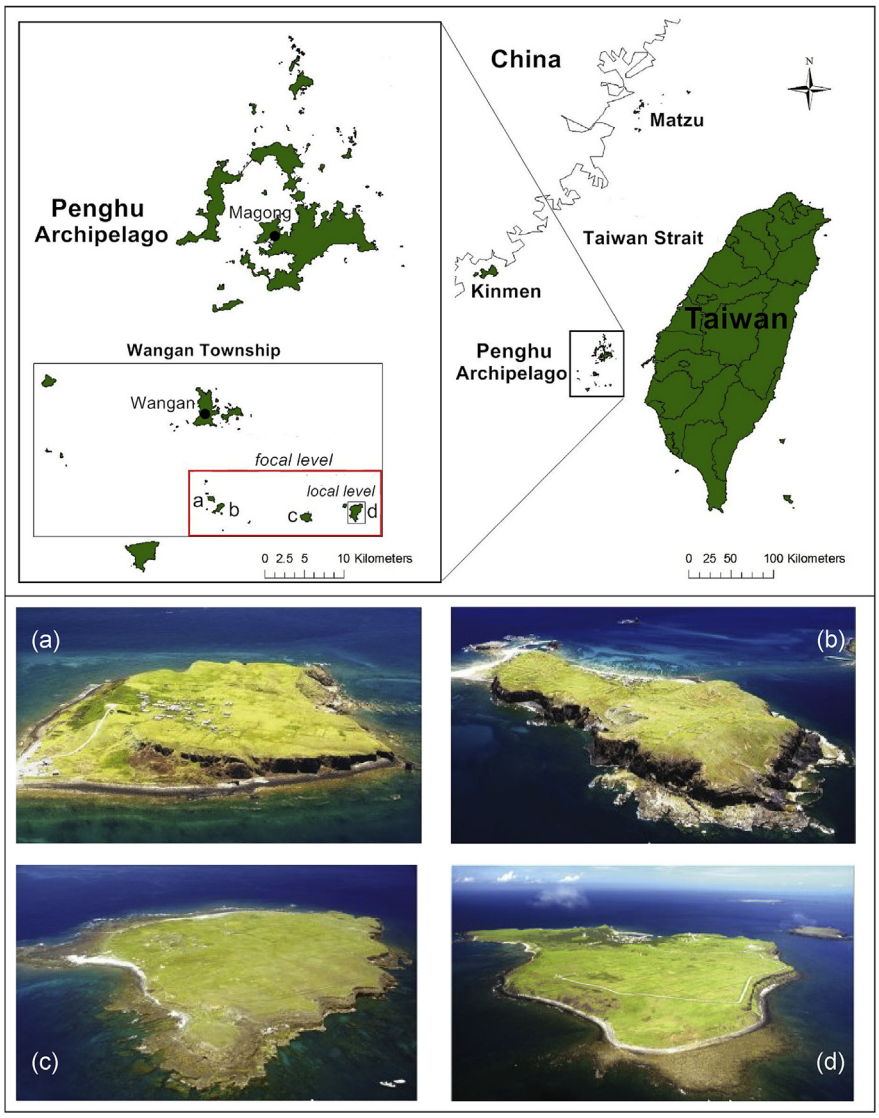

Fig. 1. The four main islands in the South Penghu Marine National Park: (a) Xiyuping, (b) Dongyuping, (c) Xiji, and (d) Dongji. Aerial photographs (Penghu Nature Science Study Society).

Table 1
Land area, population, and membership in the fishermen's associations of Xiyuping, Dongyuping, and Dongji (2010).

Background information	Xiyuping	Dongyuping	Dongji
Land area (km^2)	0.3477	0.4792	1.7712
Registered population[a]	244	608	264
Resident population[b]	9	10	30
Number of fishermen' association members	83	196	10
Percentage of registered population working in fishery	34%	32%	4%

[a] According to the Household Registration Act of Taiwan, every individual must obtain a registration certificate made on a household basis in a jurisdictional area (township, city, or district). Official demographic data (i.e., the "registered population") is based on this registration data. The law states that individuals must update their registration within 3 months of a change in their residence, but it is not strictly enforced, meaning that an individual may be registered in one location but reside in another.
[b] Resident population here refers to the actual number of people who live in the specified location.

particularly during festivals such as temple fairs (Wang, 2012a, b). In a broad sense of "community", the local community includes both the residents and the travel-out population and hence is larger than the registered population.

Access to the islands is not easy because of the lack of regular public transportation. For example, the Wangan Township operates ferries, but these ferries are only utilized during such special events as elections and temple fairs. In normal circumstances, the community members use their own fishing vessels or those owned by acquaintances and occasionally hire boats for transportation.

According to the Fishery Association, 83, 196, and 10 members of the registered population of Xiyuping, Dongyuping and Dongji, (i.e., 32%, 32%, and 4% of the total registered population) respectively, were engaged in fishery in 2010 (Table 1). Although fishing was the

main reason the communities settled in these islands, the development trajectories of the different communities differ and their extent of current dependency on fisheries varies. For instance, the dependency of Xiyuping and Dongyuping on fisheries is much higher than that of Dongji. Fishermen may fish in an extended area, but most fishermen from the focal region are from Dongyuping (Tsai, 2011), and the waters surrounding the focal region are one of their primary fishing grounds; their livelihood is highly dependent on the fishing resources in this region.

Over the past decade, the focal region has attracted tourists as a special tourism region mainly because of its abundant fishing resources, which facilitates recreational fishing. Small-scale tourism activities are operating on the islands and are run by tourism operators in Magong and Taiwan's main island in collaboration with local residents, who could offer basic accommodation and food. However, tourism development is limited in this region because of its relative remoteness and access difficulties.

1.3. Marine environment and the proposed MPA

With its abundant marine natural resources, the islands are traditional fishing grounds for coral reef fish. In winter, *Scomberomorus commerson*, a migratory species, is the main fishery product in this region. Although the abundant marine natural resources are opportune for fishermen, the remoteness of the islands presents a challenge for the management authorities and has facilitated illegal fishing (e.g., electrofishing and cross-border mainland Chinese bottom trawling) for more than ten years (Tsai, 2011; Wang, 2012a, b).

According to marine scientists, the coral reef ecosystem in the waters surrounding the southern Penghu islands is more biodiverse and healthier than are many other region in Penghu and the rest of Taiwan (Dai et al., 2004; Hsieh et al., 2007; Jeng, 2009). Furthermore, with the northward Kuroshio current, this region serves as spawning aggregation sites for the entire Penghu archipelago. Because of the ecological significance of this coral reef ecosystem, scientists have recommended that this focal region be declared a MPA and placed under the administration of the Marine National Park (Dai et al., 2004). The idea of a marine national park on the southern Penghu islands was evaluated by the Marine National Parks Headquarters in 2007 and the related regulations were promulgated in June 2014. The primary objectives of this newly established multiple-use MPA includes conservation of marine natural resources, maintaining the rights of the local communities, promoting marine environmental education, and assisting the regional development with emphasis on tourism (Marine National Park Headquarters, 2014, 2010). The magnificent underwater coral ecosystem, spectacular basalt geomorphology, well-preserved cultural landscape (e.g., "Caizhai," a traditional stone-walled vegetable garden for protecting crops from wind), and traditional Penghu houses are natural and cultural resources for tourism development (Tsai, 2009; Yu, 2011).

The survey in this study was conducted during 2011–2012, when the marine national park was in its planning stage and the potential restrictions on human activities and their effects were unclear. Nevertheless, the preliminary feasibility evaluation indicated that limitations would be placed on fishery activities (e.g., closed areas and seasons) and fishing methods (Marine National Park Headquarters, 2010). Tourism development was considered an alternative development strategy not only to compensate the fishermen for the income lost because of MPA but also to create job opportunities, which can reverse the trend of outward migration.

1.4. Nested social–ecological system with subsystems on functional and spatial scales

A SES is an integrated system with various levels and scales delineated using different spatial and functional boundaries (Glaser et al., 2012; Wu, 2013). It can be understood as a system composed of subsystems with different social and ecological interactions at different scales (Walker et al., 2002; Wu, 2013). The focal SES of South Penghu Marine National Park (Fig. 2a) can be understood as a cluster of subsystems on functional and spatial scales (Fig. 2b and 2c). On the functional scale, which refers to beneficial products of the ecosystem services (Wu, 2013), community members in the focal region are actors with different levels of dependency on marine ecosystem services. In this case, fishermen and nonfishermen are different actors on the functional scale and form two subsystems in the focal SES because of their different interactions with the marine ecosystem (Fig. 2b). Fishermen acquire marine ecosystem services for their livelihoods and therefore, compared with the nonfishermen, their livelihoods may be directly influenced by the new restrictions in accessing marine natural resources. On the spatial scale, which is delimited by their spatial boundaries, each community within the focal SES is a subsystem that may be affected differently by the new restrictions (Fig. 2c). The members of the three communities in this case study are actors of three subsystems on the spatial scale.

2. Methodology

A survey for assessing the perception and capacity of the focal communities was conducted using a semistructured questionnaire. Data was collected through fieldwork over a four-month period (November 2011–February 2012) coupled with the author's four-year participatory observation within the wider community.

From the 49 residents of the three islands (Table 1) and a few of travel-out population who would return to the islands more often than did the others, thirty-five community members (18 commercial fishermen and 17 nonfishermen) were sampled through purposive sampling (Marshall, 1996; Onwuegbuzie and Leech, 2007). The interviewees were primarily community members

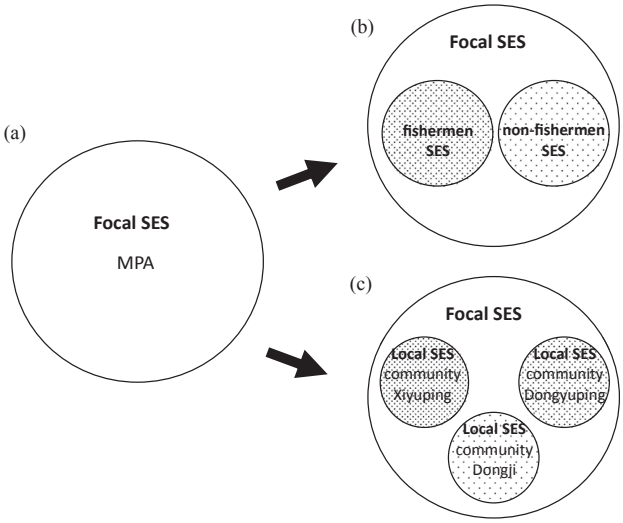

Fig. 2. A nested social–ecological system (SES). (a) A marine protected area (MPA) is the focal SES in this study. It can be understood as a composition of its subsystems, namely the (b) functional scale subsystem, which comprises the fishermen and nonfishermen SESs, and the (c) spatial scale subsystem, which comprises the Xiyuping, Dongyuping, and Dongji SESs.

who were fishermen, lived on the islands year round, and were part of the travel-out population but were active participants in community affairs. Of the 35 participants, 11, 12, and 12 were from Xiyuping, Dongyuping, and Dongji, respectively.

Although the sample size was relatively small, the employed purposive sampling technique helped focus on the particular characteristics of the population that were of interest in this study; the sample size for each target characteristic (fishermen, nonfishermen, and the three communities) was selected such that their comparability was high.

The data was collected during the planning stage of the MPA, when clear or detailed information regarding the proposed tourism development strategy was not yet available. Nevertheless, the interviews used "tourism" as an inclusive term for all possible tourism activities that can occur within the MPAs.

The following questions were used to gather detailed information on each participant's perception on tourism development in the proposed marine national park, their willingness to engage in tourism activities for their livelihood, the reasons for their willingness (or lack of it), and what they would need to engage in the tourism business. Other specific questions are listed herein:

1. Are you in favor of or opposed to tourism development in your home island. Why?
2. Are you interested in engaging in the tourism business. Why?
3. Are there any required capacities that you think would be required for you to adopt tourism for your livelihood?

Human-made capital is the main driver for societies to adapt to changes (Walker et al., 2006). The capital-based framework for assessing capacity building developed by Bennett et al. (2012) focuses on tourism. However, tourism is not the only external disturbance to the focal SES. This study considers both tourism and MPA as external disturbances in the focal SES. The capacity of community members was appraised using the more comprehensive framework developed by Wu and Tsai (2014), which emphasizes understanding the adaptability of actors to diverse external disturbances, such as human capital (e.g., labor force, knowledge, and skill), physical capital (e.g., tools, equipment, techniques, and facilities), and social capital (e.g., trust, norms, rules and networks).

3. Results and discussion

Respondents in the three communities in the focal region generally responded positively to tourism development in the marine national park. Overall, 22 of the 35 interviewees (62.9%) considered tourism development as a livelihood opportunity and perceived job creation and a higher level of economic welfare of the islands as its positive effects (Table 2). Perceived negative impacts included more noise and garbage, which would influence their quality of life. Similarly, 15 of the 35 interviewees (42.9%) were willing to engage in tourism activities for their livelihood (Table 3); the others stated that they were satisfied with or preferred their current jobs. These perceptions varied among the subgroups (i.e., fishermen, nonfishermen, and the three communities).

(1) Differences in the perceptions of fishermen and nonfishermen on tourism development in the MPA

Respondents who were fishermen had a higher percentage of negative perception regarding the effect of tourism. Overall, 47.1% of the 17 interviewed fishermen had a negative outlook on tourism development, whereas the corresponding proportion among the 18 nonfishermen was only 5.6% (Table 2). Many fishermen did not prefer tourism development on their islands because they believed that their quality of life will be influenced by the tourists. One interviewee stated, "Tourists are noisy and bring garbage to our island. I would rather our island stay in its current tranquil state. Though I know tourism will bring development, to me, the disadvantages outweigh the benefit." The perceptions among the fishermen were that they would not benefit from tourism but will have to bear it costs (e.g., noise, garbage). Furthermore, 64.7% of the 17 interviewed fishermen preferred to continue fishing for their livelihood rather than switch to tourism-related jobs (Table 3). Another interviewee stated, "As a fisherman, my time is under my control, but when serving tourists, my time is in their control." These opinions indicate that the fishermen prefer their current lifestyle and are reluctant to change; this result is consistent with the findings Pollnac et al. (2001) obtained in three Southeast Asian fishery regions, where most fishermen stated that they would rather be fishermen than adopt alternative sources of livelihood. Therefore, fishermen appear to be generally uninterested in tourism, as is evident from this statement from an interviewee: "I only know how to make a living off fishing. I have no idea about what I can do in the tourism business." Moreover, the expected economic benefit from tourism was uncertain, as summarized by an interviewee: "I won't invest my money in tourism because I cannot foresee the returns." These statements reveal that most fishermen are reluctant to change careers because of a lack of interest in and a lack of knowledge and skills necessary to adopt tourism-related businesses.

By contrast, nonfishermen interviewees had a highly positive perception of tourism development (Table 2). Of the 18 nonfishermen, 77.8% considered tourism development as a means to increase the level of economic welfare and encourage people to return to the island. An interviewee said, "Tourism development is good. It can generate job opportunities for the local people." Half of the 18 nonfishermen interviewees were interested in fully or partly engaging in the tourism-related business (Table 3). Another interviewee opined, "I am always looking for opportunities [to run tourism businesses]. However, without some basic infrastructure, such as a good harbor and public transportation, it is not possible

Table 2
Perceptions on tourism development: fishermen and nonfishermen.

Perceptions on tourism development		Xiyuping		Dongyuping		Dongji		Subtotal	
Fishermen	Positive	80.0%	N = 5	25.0%	N = 8	50.0%	N = 4	47.1%	N = 17
	Negative	20.0%		75.0%		25.0%		47.1%	
	No opinion	0		0		25.0%		5.9%	
Non- fishermen	Positive	66.7%	N = 6	100.0%	N = 4	75.0%	N = 8	77.8%	N = 18
	Negative	0		0		12.5%		5.6%	
	No opinion	33.3%		0		12.5%		16.7%	
Subtotal	Positive	72.7%	N = 11	50.0%	N = 12	66.7%	N = 12	62.9%	N = 35
	Negative	9.1%		50.0%		16.7%		25.7%	
	No opinion	18.2%		0		16.7%		11.4%	

Table 3
Willingness to adopt tourism as a livelihood: fishermen and nonfishermen.

Willingness to adopt tourism as a livelihood		Xiyuping		Dongyuping		Dongji		Subtotal	
Fishermen	Positive	20.0%	N = 5	37.5%	N = 8	50.0%	N = 4	35.3%	N = 17
	Negative	80.0%		62.5%		50.0%		64.7%	
	No opinion	0		0		0		0	
Non- fishermen	Positive	33.7%	N = 6	75.0%	N = 4	50.0%	N = 8	50.0%	N = 18
	Negative	66.7%		25.0%		50.0%		50.0%	
	No opinion	0		0		0		0	
Subtotal	Positive	27.3%	N = 11	50.0%	N = 12	50.0%	N = 12	42.9%	N = 35
	Negative	72.7%		50.0%		50.0%		57.1%	
	No opinion	0		0		0		0	

[to develop tourism]." Although the interviewed nonfishermen respondents were highly interested in tourism development, they raised concerns regarding the lack of experience in running businesses, which might make them incompetent service providers and render them noncompetitive in a market with experienced "foreign" tourism operators.

(2) Differences in perceptions among communities on tourism development in the MPA

Half of the 12 interviewees from Dongyuping negatively perceived tourism development, whereas only 9.1% and 16.7% of 11 and 12 interviewees from Xiyuping and Dongji, respectively, had a negative outlook on tourism development (Table 2). This difference can be explained by the differences in the extent of their dependence on marine natural resources. Generally, the Dongyuping community is more dependent on marine natural resources for fishery than are the other two communities (Tsai, 2011). Notably, while fishermen from both Dongji and Dongyuping opined that tourists are noisy, fishermen from Dongji understood that this inconvenience is a trade-off with the anticipated development and that they are willing to embrace it. This difference in attitude implies that generalizing and treating all communities as a single unit during tourism development planning in this focal region would oversimplify and misrepresent the problem, thus pointing to a need to address the collective perceptions of the individual communities during planning.

Furthermore, the results showed that considering the community as a whole can be misleading. In Dongyuping, 50% of the interviewees had positive perceptions on tourism development and were willing to engage in tourism-related businesses (Tables 2 and 3); however, fishermen had much less positive perceptions (25%) than nonfishermen (100%) (Table 2) and their willingness to engage the business were much lower (37.5%) than were nonfishermen (75%) (Table 3). This indicates that different perceptions on tourism development might exist within a community because of the individual's skills and livelihood preferences.

Moreover, that the interviewees positively perceived tourism development does not mean that they are willing to engage in tourism-related businesses. Interviewees from both Xiyuping and Dongji highly positively perceived tourism development (72.7% and 66.7%, respectively) (Table 2) but exhibited lower and similar willingness to engage in the business (27.3% and 50%, respectively) (Table 3). Most interviewees from Xiyuping and Dongji perceived tourism development as good for their prosperity; nevertheless, they were satisfied with or preferred their current jobs. Therefore, identifying the actors who are willing to engage in tourism-related businesses is crucial to develop their capacity to embrace tourism development as an opportunity for creating sustaining livelihoods and to adapt to the changes resulting from MPA implementation.

(3) Capacity building for local communities and their different needs

Perceptions on tourism development and the willingness to participate in tourism development differed substantially among fishermen, nonfishermen, and the three communities. The results of this study revealed that without capacity building and policy protection for local communities, tourism development may add some new actors because many interviewees assumed that an open market may be created by the economic transformation, which may negatively affect the livelihoods of local communities and reduce their support for or compliance with the conservation efforts. Such a situation counteracts the objective of the marine national park, which is to involve local communities.

Tourism development policies should emphasize the transformation process rather than tourism development itself in order to contribute to local livelihoods and increase the effectiveness of the marine national park. Tourism development should also focus on the capacity building of local communities to enable the community members to secure and use the opportunities for sustainable development. In the capital-based concept, local social adaptability to change can be built through investing in human-made capital (Wu and Tsai, 2014). In general, human capital in the form of knowledge and skills, including the ability to engage in tourism as an alternative source of livelihood, is required for adapting to tourism development. Similarly, physical capital in the form of infrastructure, such as harbor and tourism facilities, developed considering the conditions of the communities and islands is necessary for facilitating tourism development. Finally, social capital for forming cooperation and institutions within and between the communities for a community-based management in the focal region is also critical in enhancing the social resilience of the involved communities to the change that tourism development entails (Adger et al., 2002, 2005; Keck and Sakdapolrak, 2013).

In addition, as Berkes (2007) emphasizes, by recognizing the effect of restricted access to resources on the local communities (in this case, the marine national park), the government should formulate policies that i) support community-based management systems and ii) protect local communities' interest in tourism by making these communities more competitive rather than leave the capacity building of local communities to the free market forces (Lane and Stephenson, 2000).

Although capacity building in general may incentivize and motivate fishermen to engage in tourism-related businesses, it should not be considered the only way to sustain their livelihoods. Rather than force fishermen to adopt tourism as an alternative source of livelihood, the government should enact appropriate policies that can mitigate the concerns associated with designating fishing grounds as a protected area. For instance, using the positive term "fish reserve bank" to refer to the nursing and spawning grounds in this coral reef area for ensuring the sustainability of the

fisheries industry (Jeng, 2014) may encourage local fishermen's participation in conservation actions and instill in them pride in adopting to the changes. In addition, the new policies should create mechanisms that add value to the products or assist the communities find other income-generating opportunities (Allison and Ellis, 2001; IMM, 2008a, 2008b; Marshall et al., 2009). Social capital within the community is essential for the community members to solve the conflict that may arise between the various marine natural resources users, such as fishermen and tourism operators, especially for the community that is heavily reliant on fishing (e.g., Dongyuping in this case study).

4. Conclusion

The interview results indicate that most community members positively perceived tourism development in the MPA, but only a few were interested in engaging in tourism-related businesses. Identify the actors who are willing to engage in the tourism industry in the communities is essential for understanding how the objectives of tourism development (i.e., compensating for the loss of fishermen's income and creating job opportunities for reversing outward migration) in the MPA can be realized. Moreover, the survey revealed that the perceptions of different actors from different subsystems (i.e., fishermen, nonfishermen, and the three communities) on tourism development and the marine national park differed substantially because of the differences in their dependencies on marine natural resources in the focal region (i.e., their social–ecological interactions). Although the livelihood of fishermen will be most affected by the restrictions accompanying the marine national park, most fishermen were reluctant to change careers than were nonfishermen. Because the perceptions on tourism development are directly influenced by the actors' dependency on fishery, the perceptions vary substantially within the community. At the local community level, the more a community relies on fisheries for its livelihood, the more it is reluctant to embrace tourism development and the marine national park. When a community largely relies on fishing in this focal region for their livelihood, its members may negatively perceive tourism development, as was the case in Dongyuping.

In addition, the results showed that for communities to participate in the MPA, tourism development should be considered a process for capacity building rather than for the development itself. Through capacity building, the communities should acquire not only the ability to sustain their livelihood but also adapt to the changes that the MPA and tourism development entail. Moreover, the local communities' investment in tourism-related businesses must be protected through governmental policy during capacity building.

While capacity building for tourism development may increase the willingness and ability of fishermen to be involved in tourism, tourism development itself may not adequately compensate for the fishermen's lost income; different approaches to adapt to the change, such as using the fish reserve bank concept to replace prohibition in the MPA, adding value to their products or assisting them create other income generating opportunities, are necessary.

Although the fishermen may not engage in tourism-related businesses for their livelihood, tourism development in the MPA can still create livelihood opportunities for local communities who are interested in such activities. However, without capacity building in the local communities for securing the opportunities, tourism development may not contribute to their livelihoods but further threaten them. Human, physical, and social capitals are required for the general local communities to be involved in tourism development and adapt to the changes entailing the new regulations. Capacity building must also account for the diverse needs of actors from the different subsystems. Moreover, capacity building should target deliberate contribution to the transformation of social–ecological interactions through community-based management. Since the dynamics of structured SESs may be influenced by interventions differently (Ostrom and Cox, 2010), understanding the complexities of nested subsystems within focal SES may help design an enhanced and appropriate policy that satisfies the diverse local needs and therefore the entire focal system.

The results of this study report the situation in South Penghu Marine National Park at a particular timepoint (2011–2012), whereas the dynamic nature of the local SESs in this focal region and their trajectory to current different condition are not. Nonetheless, the results provide a basic understanding of the local communities by using the nested social–ecological system concept, which can help monitor the socioeconomic conditions in the communities after MPA implementation and tourism development in the focal SES. A follow-up study for evaluating the effect of tourism on the long-term development of local communities in these small islands of South Penghu Archipelago as well as assess its contribution to the sustainable management of MPA is recommended.

Acknowledgments

The authors express deep gratitude to all interviewees who shared their experience and opinions, the Taiwan Environmental Information Association for facilitating the fieldwork, Yun-Chin Chang and Pi-Tsen Kao for their assistance in data collection, and Dr. Marion Glaser for her valuable suggestions. The authors thank the anonymous reviewers for their valuable comments that helped improve the manuscript. This study was partly funded by the Marine National Park Headquarters, Taiwan, under a project for local empowerment. This article is partly based on a PhD thesis by the first author.

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