Stakeholder Engagement in the Designation Process of the Marine Protected Areas in Taiwan: A Social-Ecological System Perspective

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Abstract

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There are many islands in the ocean surrounding Taiwan which can provide rich resources for the people such as fisheries. However, Taiwan is facing environmental issues from increasing human activities and the functions of natural systems that are weakened large anthropogenic disturbances. The concept of resilience is introduced to explain the unbalanced interactions and feedbacks between social and ecological system would impede recovery in the natural process and negatively impact on the social system. This study examines the Social Ecological System （SES）approach as a tool, which gives the decision maker a holistic picture of the complexity of the interactions between the human system and the natural environment system regarding the Marine Protected Areas (MPA) designation.

To apply this idea to a real world case, this research examines three case studies in Taiwan, i.e., the Green Island case as a failure in establishing a MPA; the Dongsha Atoll National Park as a successful case of marine national park establishment in Taiwan. By reviewing these two examples, this study applies lessons two cases to the proposed Four Islands of Southern Penghu National Park.

Among the key factors that affect the Marine Protected Area (MPA) designation in Taiwan, stakeholder engagement is the focus of this study. Stakeholder analysis is a main method to clarify different perspectives of stakeholders toward the MPA development because stakeholder support was critical in defeating the Green Island proposal but important in the success of Dongsha National Park. Stakeholder interviews are performed to better understand the conflicts among different parties and how they are involved in the designation processes. The results are mainly based on discussion of the stakeholders' perspectives and engagement in the case of the Four Island of Southern Penghu National Park. In the end, the conclusions show the importance of the enhancing adaptive capacity of the government, including stakeholder engagement in the designation process, and the Socio-Ecological System (SES) framework application in the context of MPA designation.

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Chaper 1 Introduction and Background

When faced with degradation of a marine ecological system, designation of Marine Protected Areas (MPAs) is one of the tools available for the purpose of environmental conservation and sustainable development in Taiwan. However, conflicts from stakeholders and lack of experience are factors that have challenged the government capacity in the MPA development. This thesis performs case study research in the Dongsha Atoll Marine National Park, Green Island, and Four Islands of Southern Penghu in Taiwan to explore the use of MPAs in Taiwan.

Section 1 Roadmap of the Research and Thesis Organization

This research begins with a literature review (Chapter 2) of MPA definition and function, as well as several key concepts such as MPA governance and the roles of stakeholders in the MPA policy making process. Then, we apply social-ecological system (SES) as a conceptual framework to help look into interactions and linkage between ecosystem and the human activities in the research area. This research uses three case studies in Dongsha Atoll Marine National Park, Green Island, and Four Islands of Southern Penghu in Taiwan to understand the current status of the designation of MPAs development in Taiwan. The background information reveals the key factors which could influence the MPAs. We recognize the stakeholder's perceptions and concerns are important for government agencies to consider when they are designating the MPAs. Stakeholders may turn against to the MPAs because they are worried their interests would be impacted negatively, and this situation brings challenges for MPAs implementation and management. Building a strong government-stakeholder relationship during the designation process, can be advantageous for creating well-functioning MPAs. Therefore, this research focuses on the stakeholder engagement in the designation process in the Four Islands of Southern Penghu which has recently successfully completed the designation process

The methodology of research (Chapter 3) is designed as a qualitative analysis approach employing with semi-structured interviews and stakeholder analysis. The research questions target on the main theme: how to engage stakeholders in MPA processes. Different questions are developed for government agency interviews and local stakeholder interviews. (Appendix A) Using the information gathered in the interviews and literature reviews, I develop three case studies (Chapter 1)

The findings of this study represent the outcome of stakeholder analysis using the three case studies. The final part of this research (Chapter 5) summarizes the research, reviews recent outcomes in the Penghu case and provides recommendations to better design the marine protected areas for future sustainable development in Taiwan and elsewhere.

Section 2 Background of Government and Institutional Structure in Taiwan

At the beginning, it is useful to set the stage by reviewing the government and institutional structure for National Park MPA in Taiwan. In Taiwan, the government has two levels; the central government and the local government. The central level government is composed of the Executive Yuan, the Legislative Yuan, the Judicial Yuan, the Examination Yuan, and the Control Yuan; the local government has provincial and municipal, county, and city components. With respect to MPA planning, designation, implementation and management, all processes involve both central and local governments.

Under the Executive Yuan, there are several cabinet-level organizations which have shared authority for managing MPAs. First is the Construction and Planning Agency Ministry of the Interior (CPAMI) which is responsible for the administrative tasks of the National Park Planning Committee whose duties include planning, establishment, supervising, and managing national parks.

Under the CPAMI, there are eight headquarters as subordinate agencies for each National Park, such as Yushan National Park, Kinmen National Park, and Marine National Parks.(CPAMI, 2013) “Although the Marine National Park Headquarters (MNPH) has been set up under the Dongsha Atoll National Park Project, the Marine National Park Headquarters is also in charge of not only the management of Dongsha Atoll National Park, but also the assessment of possibility of setting up a marine national park at Green Island, or Penghu Islands.” (MNPH, 2010) One of important missions of MNPH is to complete the system of marine national parks.

The park police from the National Police Agency, Ministry of Interior, are responsible for security, maintaining the natural environment, punishing violations, and disaster emergency assistance. Complying with the National Part Act, the park police are supervised and managed by the national park headquarters. In addition, the MPAs also have the Fishery Agency and Coast Guard Administration of the Executive Yuan involved. The Coast Guard is authorized to enforce maritime law, take on marine conservation services, and investigate illegal activities on the sea. (Li and Zhou, 2010).

This research is looking into the interaction of central and local government regarding MPAs in three places, Green Island, Dongsha, and Four Islands of Southern Penghu. Therefore, the local governments introduced here are County government, for example Green Island Township is under the Taitung County government, Dongsha is under the jurisdiction of Kaohsiung City government, and Four Islands of Southern Penghu are under the Wangan Township of the Penghu County Government. The Wangan Township is under local level, because it has no authority in MPA project planning, but it often plays the role of implementing the policy regulation from upper level government. The Agricultural and Fishery Agency under the Penghu County Government is a local level government which has

jurisdiction over the county wildlife reserve and nature conservation areas as well as fishery affairs administration in Penghu. (Penghu County Website in Chinese, 2014)

In general, the process of establishing National Park begins with the Construction and Planning Agency Ministry of the Interior to formulate a proposal. CPAMI then consults and coordinates with Coast Guard, Fishery Agency and local government Based on the CPAMI feasibility assessment, the proposal is sent for evaluation by Taiwan National Parks Committee to evaluate. Finally, after Executive Yuan approves the action, it will be sent to the National Park Headquarters for implementation. From above description, it shows the marine national park MPA establishment process is a very top-down approach. It is apparent this approach toward national park establishment has little room for stakeholders to participate during the process.

Section 3 The Ocean Governance and Policy Development in Taiwan

According to the study from Miller et al. (2011), governance is given definition based on three perspectives: The World Bank perspective, A Nonprofit Organization perspective and an administrative science perspective. Each is addressing the concept of governance involving decision-making process, institutional capacity and social interaction. In other words, governance is considered as a dynamic mechanism which develops based on the culture structure (Miller et al. 2011) In other words, power can create internal force to steer the negotiation among institutions, like the communication of cross level government agencies. In addition, power also refers to external force to generate influence from outsiders who are indirectly involved in the decision making process such as public media and environmentalists. This implies that the vertical and horizontal coordination among the institutions and agencies represents the power flow of governance. To holistically manage the marine resources and dealing with the marine environmental issues, ocean governance has

been targeted as a national mission in Taiwan since the President Chen Shui-Bian's administration from 2001 (Zhou and Xu, 2007).

The increasingly strong political motivation, more attention on ocean governance in Taiwan has been several times addressed in official documents. For instance, according to the "Biodiversity Promotion Plan" which was approved by Taiwan's Executive Yuan in 2001 (Forestry Bureau of Taiwan, 2007), it was requested that 5% of coastal waters be established as Marine Protected Area (MPA). The area of total territorial sea and a certain percentage of these MPAs should be designated as "no-take" or "marine conservation zones". The "National Ocean Policy White Paper" was published in 2006 to show the ambition of the government in marine biodiversity protection (Chiau, 2010). Since then Taiwan has been aiming toward becoming an "Ocean Country" as well as making efforts on comprehensive strategies for sustainable development. Lin Chih-Chi (2009), points out that "in addition to Dongsha Marine National Park, Penghu and Green Island both have abundant coral resources and also need to be protected." (Lin, 2009). However, at present, Taiwan has failed to achieve this goal and the MPA area in Taiwan is still less than 5% (Shao and Lai, 2011). The government lacks experience in MPA development because most of the protected and reserve areas are terrestrial in Taiwan (Chiang et al., 2008).

Ocean governance exhibits challenges and problems in Taiwan. To take MPA development as an example, the Green Island and the Lanyu Island (about 49 nm off the east coast from Taiwan) are proposed to create national parks as MPAs (Hsu, 2008). It turns out that the government has insufficient knowledge in agency coordination as well as stakeholder interaction when facing the more dynamic issues regarding marine conservation and MPA development.

The reasons that policy does not work very well may be attributed to the fundamental

problem which occurs in the cross agencies and administrative levels because the MPAs in Taiwan have been designated by different ministries based on different laws, and regulations such as the Fisheries Act, National Park Law, Wildlife Conservation Act, Cultural Heritage Preservation Act, and Act for the Development of Tourism (Shao and Soong, 2012). In other words, lack of coordination or conflicts exist in the administrative divisions and different groups such as government agencies and local communities, or anyone whose interests would be affected

In addition, the gap between the planning stage and implementation which involves different management methods, tools and authorities increases the need for alternatives in order to improve the effectiveness. Apparently, unsound governance of MPAs will indirectly reflect negative outcomes on the ecosystem status. Importantly, the literature review below shows there are many studies about reviewing the designation process will point out that establishing marine protected areas will not only provide protection for the ecosystem but also help people gain benefit from the ecosystem.

Chaper 2 Literature Review

Section 1 Marine Protected Areas

2.1.1 MPAs definition and function

Marine Protected Areas have been established for the purpose of protecting fishery resources and biodiversity from human activities over many decades and by many countries worldwide. The concept of MPA has attracted more attention since The World Congress on National Parks meeting in 1982, even though the first MPA had been established in 1935 in Florida, United State. (Gubbay, 1995) However, the continuing degradation of the marine environment and increasing exploitation of fish evoked the significance of MPA for many countries. The marine ecosystem is facing more challenges and more complex problems.

Dia (2009) concluded that there are four main threats to marine ecosystems: 1) overfishing, 2) marine pollution- eutrophication, toxic chemicals, oil, wastes, thermal effluent, 3) habitat fragmentation and degradation, 4) climate change. Each threat requires different types of management. In some cases MPAs can be an effective management tool.

WWF has given a general definition of MPA: *"An area designated to protect marine ecosystems, processes, habitats, and species, which can contribute to the restoration and replenishment of resources for social, economic, and cultural enrichment"* (WWF, 2005, p.3).

An effective MPA needs to be adaptive based on the problem and purpose. In other words, the designation and management of MPA can vary depending on its purpose. According to IUCN guidelines there are several categories of MPAs (Table. 1) (IUCN, 2014). Looking into these different categories can provide a basic understanding of the form and function of MPAs. Taiwan Green Island, for example, has been proposed as a National Park according to the IUCN category V.

Table 1: IUNC Protected Area Category System

IUCN Category	Definition	Primary Objective
Ia Ib	Category Ia are strictly protected areas set aside to protect biodiversity and also possibly geological/geomorphic features, where human visitation, use and impacts are strictly controlled and limited to ensure protection of the conservation values.	Strict Nature Reserve
	Ib protected areas are usually large unmodified or slightly modified areas, retaining their natural character and influence without permanent or significant human habitation, which are protected and managed so as to preserve their natural condition.	Wilderness Area
II	Protected areas are large natural or near natural areas set aside to protect large-scale ecological processes, along with the complement of species and ecosystems characteristic of the area, which also provide a foundation for environmentally and culturally compatible, spiritual, scientific, educational, recreational, and visitor opportunities.	National Park
III	Protected areas are set aside to protect a specific natural monument, which can be a landform, sea mount, submarine cavern, geological feature such as a cave or even a living feature such as an ancient grove.	Natural Monument or Feature
IV	Protected areas aim to protect particular species or habitats and management reflects this priority.	Habitat/Species Management Area
V	A protected area where the interaction of people and nature over time has produced an area of distinct character with significant, ecological, biological, cultural and scenic value.	Protected Landscape/ Seascape
VI	Protected areas conserve ecosystems and habitats together with associated cultural values and traditional natural resource management systems.	Protected area with sustainable use of natural resources

Source: adapted from IUCN website, 2014.
http://www.iucn.org/about/work/programmes/gpap_home/gpap_quality/gpap_pacategories/

In the past, the MPAs were considered as rigid means to preserve natural resources and environment. For example, the most restrictive way is to create the no-take areas, either as

zones within MPAs or as entire MPAs. There can be important tools for biodiversity conservation and fisheries management especially when implemented in close consultation with the stakeholders. In practical application, the MPA serves many functions; explicitly the MPA is a means to "enhance the long-term sustainability of coastal fish resources," the purpose is recover the damaged ecosystem to avoid overexploitation. (Forcadal et al., 2009, p. 197) Moreover, it is important that the MPA is not seen merely as a tool for the government to manage marine resources and ecosystems, it also serves socioeconomic functions.

In a sense, the consciousness about MPAs has shifted in recent years. MPA development is more dynamic instead of only serving environmental purposes. A description from World Wildlife Fund emphasizes that human activities are one of the important components in MPAs:

> *"Marine protected areas (MPAs) offer a range of benefits for fisheries, people and the marine environment. They work by providing safe havens for depleted fish stocks to recover. They also provide services to local communities who depend on the sea and its resources, increasing food security and reducing poverty. MPAs can also benefit local people by opening new opportunities to gain income. Countries with coral reefs attract millions of SCUBA divers every year, yielding significant economic benefits to the host c*ountry." (WWF, 2005, p.2)

As mentioned above the WWF report says the MPA is potentially beneficial to the local people from the economic point of view. For instance, a MPA may minimize the negative interference from human activities which can allow the ecosystem to maintain healthy function. Within the MPA, Aitor Forcada1 et al., (2009) point out that "the types and quality of habitats, both inside and outside the MPAs, may determine the likelihood of migration by fish to surrounding unprotected areas where spillover to fisheries occurs" (Forcadal et al., 2009, p.197). The spillover effect can enrich the ecosystem in the surrounding areas, so it's expected to bring more fishery resources for the people. This feedback loop reflects the linkage of the ecosystem and social system. Understanding the MPA function involves the interaction of social and ecological system contributing to proper designation and effective implementation.

2.1.2 Stakeholders in MPAs

In any process of MPA development, the stakeholder has different degrees of importance and influence. The MPA often times is created to achieve multiple goals such as coral conservation, sustainable uses of natural resources, and scientific research and education. More diverse activities require involvement by more and different types of stakeholders. The broad range of stakeholders can be seen from the government actors and organizational representatives, to indigenous people. It is useful to categorize these along the lines of local residents, brokers and tourists in the sense of Miller (2008). In the process of establishing an MPA, stakeholder interests could be affected. In many cases, it is identified that one of main difficulties of creating an MPA results from the conflicting interest problem. Jentoft et al. (2012) point out that MPAs are often met with reluctance by affected stakeholders. Jentoft et al further argue that this results from "insufficient understanding of the function of MPAs, and the value of marine conservation" (Jentoft et al., 2012, p. 186).

Because the exclusion of local populations from numerous protected areas has led to situations of conflict and dispute, the attention shifts toward public participation. As Fabinyi (2008, p.6) says, "Tensions over different understandings about the purpose of MPAs among stakeholders undermined its success. Aforementioned the challenges result from the different exceptions of locals, brokers and tourists; it's significant to reconsider the value of MPAs which should be containing biotelic, extractive and aesthetic conservation."

This research aims to find the answer of what the role of stakeholders should be and how their voices may be heard in the process of marine national park designation in Taiwan. It is assumed that with better understanding of stakeholder perspectives, the government is able to work with them cooperatively in the MPA designation process and in long-term management. The increasing efforts to communicate by the government can bridge the gap resulting from

the different stakeholders' perceptions of MPAs. The importance of coordination with different groups is rising

2.1.3 MPA Governance

Response to the threats to marine resources and ecosystems requires sound governance in MPAs development. MPA governance is a key engine to facilitate environmental conservation and sustainable development with inputs of human institutions. Borrini-Feyerabend et al. (2013) explain that "the conservation takes place strongly depends on human values, knowledge and skills, policies and practices, which combine into a variety of human institutions." (Borrini-Feyerabend et al., 2013, p13). Bogaert et al.'s concept of governance highlights the processes and functioning of policy making. (Bogaert, Cliquet and Maes, 2009). They further argue that "the designation of MPAs is not restricted to one policy domain; it is more like adjacent policy domains." (Bogaert Cliquet and Maes, 2009, 2009, p.880) That means MPA governance not only can steer environmental policy but also steer economic policy like encouraging eco-tourism. For purposes of this thesis, I use a concept of MPA governance which recognizes considerable inputs of human institutions in MPA development to steer a series of policy decision using a holistic lens.

Jones et al. (2011) has noted, "A variety of governance incentives are employed in MPAs adopting this [holistic] approach, which include the provision of alternative livelihoods to local communities, re-investing tourism revenue to support both MPA management and community development, and promoting community participation in park planning, monitoring and enforcement" (Jones et al., 2011, p.29). In terms of MPAs under the governance, finding the solutions to the conflicts between tourism development and MPAs and understanding the form and function of tourism and MPAs are significant.

Jones et al. (2011) have categorized the weaknesses of MPA governance. In their study, "one

of the main weaknesses identified is the lack of political will and national and/or local government capacity for the effective enforcement of MPA regulations, providing for economic development and sources of food perhaps being more important political priorities. The other key weakness of MPA governance is a lack of incentives for ensuring fairness and equity in the sharing of benefits derived from the MPA." (Jones et al., 2011, p30)

Looking at this research area, in Taiwan, Sun (2013) also addressed the challenges of MPAs governance. She said that "Taiwanese legislation more often than not lacks of mechanism that ensures the regular participation of the general public and interest groups in both the designation and operation phases of MPAs. Furthermore, laws do not unequivocally define the enforcement agency operating within MPAs" (Sun, 2013). Given the regulatory and legislative issues, Borrini-Feyerabend et al. (2013) also explain that "the MPA designating a protected area usually entails new or enhanced regulations and restrictions on aspects such as access to natural resources and development activities" (Borrini-Feyerabend et al., 2013, p.13).

Based on the statements from several scholars above, we can conclude that MPA governance has common issues about the regulatory legitimacy, balance between environmental conservation and socioeconomic development, and government coordination with stakeholders. These challenges in governance impede MPA development. To narrow the scope of MPAs governance for this study, this research is focused on the MPA designation of the policy making process in Taiwanese marine national parks.

2.1.4 MPA Policy Making Process: Top Down and Bottom Up

Kraft and Vig (2013) use the "policy cycle" model to explain that the policy making process can be divided in to five stages; policy formulation, policy legitimation, policy implementation, policy evaluation, and policy change. With reference to this policy cycle

model the MPA designation process takes place during the policy formulation stage. Although this research has mentioned the MPA planning, implementation and management, the focus is on the designation process.

In terms of the policy making process in Taiwan, normally the government tackles the issue by a top-down approach, which means that the government agency imposes its plans by using its authority to make rules and regulations to control natural resources as well as social activities. However, a report from Federal Advisory Committee (2005) indicates the top down approach in the MPA development is unlikely to succeed (Federal Advisory Committee, 2005, p,13). The bottom up approach involves the concept that "individuals closest to the marine resource or area have customary or local knowledge to contribute to planning and management. These individuals often depend on the marine environment and this brings interest and commitment. The bottom-up approach creates opportunities for full participation and a sense of ownership and stewardship on the part of local people or dedicated resource users" (Federal Advisory Committee, 2005, p. 13).

The WWF Malaysia Project is a practical example to help us gain insight into how bottom-up approach works in the real world. "The project was assisting with a consultation process to provide stakeholders with an opportunity to provide input into the draft plan, facilitate a transparent zoning process, and build support for gazetting the Park"(Green et al., 2012, p. 48).

As a consequence, more studies have the shown trends that a bottom-up approach can build up stronger relationships, better management by adopting traditional knowledge, and more positive MPA outcomes. Thus, this research is to clarify that approach of stakeholder engagement in the MPAs designation process. Bogaert et al. (2009) have described that "designation processes can no longer be initiated top-down, but requires a more interactive

style of governance" (Bogaert et al., 2009, p. 884).

However, it can be argued that both approaches have advantages and disadvantages; it is hard to say which one is better because it depends on the government capacity, cultural background, and also other social factors. Top-down and bottom-up are two perspectives represented in the more specific context of protected area governance; therefore, understanding the social context is important to help the decision makers to choose which one is more suitable for the situation.

Section 2 Social-Ecological System

2.2.1 Social-Ecological Systems framework

Because there are difficulties in MPA design task due to the complexity of social-ecological interaction and feedbacks, (Pieraccini**,** 2013) the concept of the social-ecological system (SES) provides a lens with which to view the dynamic socioeconomic activities integrated in the feedbacks of the natural system.

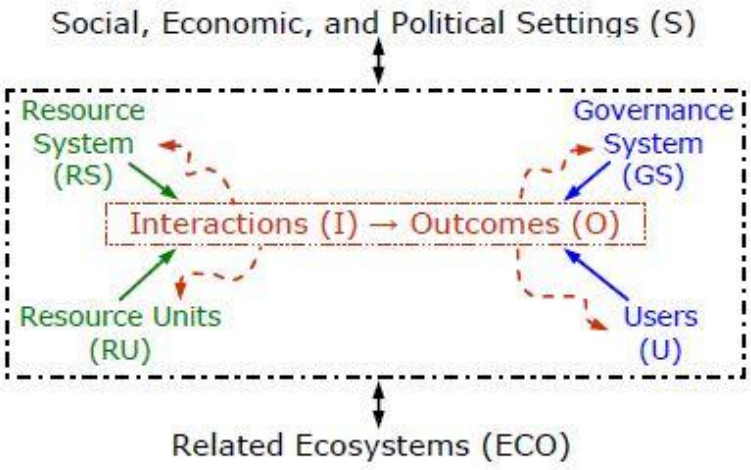

Fig.1 the Social-Ecological System Framework. Source: Ostrom (2007)

The SES is used to present that "dynamic of human behavior in response to ecological changes vitally determined the overall dynamics of the system." (Lade et.al. 2013, p.359)

Ecological systems can refer to "self-regulating communities of organism interaction with one another and their environment" (U.S. National Research Council, 2012, p.42). The ecosystem function produces resources that humans can utilize as life support elements like fisheries, or forest products. Obviously, human activity under the social system is tightly bonded to the ecosystem. The growing population causes an increasing need of natural resources. In terms of scale, Cumming et al. (2006) have studied the scale mismatches in social-ecological systems. To date, the complexity of environmental problems results from the mismatch of the social process scale and the natural process scale. Cumming and other scholars explained that the natural process within the ecological system would take a much longer time but human action could change the environment rapidly. In other words, the mismatch of special and temporal scales has happened because an environmental problem is sometimes cumulative and unpredictable. (Cumming et al., 2006) Thus, resilience is one of the key concepts of SES. For purposes of this thesis resilience is introduced to broadly describe the dynamic interaction of social activities and the ecological environment. Theoretically resilience has defining characteristics as Resilience Alliance addressed (2002):

- The amount of change the system can undergo while retaining the same control on function and structure
- The degree to which the system is capable of self-organization
- The ability to build and increase the capacity for learning and adaptation (Resilience Alliance, 2002).

"Increasing social complexity may have reduced the resilience of social-ecological systems and increased vulnerability to perturbations" (Janssen, 2006, p.128). In Folke's study (2006), he addressed a point from Berkes and Folke (1998) "the interplay and problem of fit between social and ecological systems by relating management practices based on ecological understanding to the social mechanisms behind these practices, in a variety of geographical settings, cultures, and ecosystems" (Folke, 2006, p.262). Technically, the SES is given as a

broad lens to examine human-environment interaction within a certain cultural and geographical area.

Holliday and Glaser (2011) have argued that the common SES definition is problematic because the human and natural are not separated from each other. In this sense, where to draw a boundary to separate the social-system from the ecological environment is a fundamental question. Nevertheless, Holliday and Glaser (2011) further explain the boundary based on a study in 2006 from Blackmore and Morris (cited in Holliday and Glaser, 2011) applying different views of the social-ecological system. Holliday and Glaser believe that "the SES is generic system where practitioners step outside to gain a more complete view of different perspectives, ideas, and actions interact. People inside SES could change the structure and become part of system's relationships." (Halliday and Glaser, 2011, p.9) This quotation emphasizes the importance of decision makers to look at the social and environmental issues with SES point of view.

From the social aspect, the lack of institutional capability and cooperation with stakeholders is contributing to poor designation of MPAs in managing natural resources. The resilient SES evokes a shift of adaptive management because the traditional management needs to be improved in respond to the dynamic ecosystem interacting with social mechanisms. The importance of the institutional adaptive management has been widely discussed by scholars. Janssen (2006) has conducted a study about the historical institutional analysis of social-ecological system; he said "the institutions can change as a response to changes in resource availability, or motivations for efficiency improvements" (Janssen, 2006, p. 127).

Adaptive management defined by Lee (1999) is an organizational learning and human dimensions approach in the natural resources management. He wrote the meaning of adaptive approach 'is bioregional in scope, and collaborative in governance, as well as adaptive in

managerial perspective."(Lee, 1999, p. 2) Further, Folke et al. (2005) used the term "Adaptive co-management" to emphasize the "collaboration of various stakeholders, operating at different levels, often through networks from local users to municipalities, to regional and national organizations" (Folke et al. 2005, p. 448).

From the above discussion we can learn that the adaptive management allows institution to change, improve and work with stakeholders in respect to environmental management. All of this amounts to saying that the adaptive management can strengthen the MPA governance by applying the SES in the decision making process. Similarly Holliday and Glaser (2011) suggest "A systemic view includes the different perspectives that people have on the system; the actions they take to control; and how ideas and actions interact to give rise to emergent properties of system" (Holliday and Glaser, 2011, p.9). Reviewing these scholars' work in the SES theoretical concepts enables this research to be developed from a holistic viewpoint toward the complex issues of human-environment interaction.

2.2.2 Social-ecological systems approach to MPA planning

In the 2.2.1 we have discussed the general main concepts of the SES. This section reviews how apply SES to the case of MPAs to better understand the MPAs designation and stakeholder engagement under the big picture of social-ecological system framework. Marine Protected Area management is designated as a tool to manage the natural environment and sustain the ecological system. No-take areas are one of the most effective tools in MPA management. MPAs are often designated for the purpose of excluding any anthropogenic influence. The stakeholders may also be concerned about the natural resources within a MPA if it is controlled by the government so that their economic activities and right to access are prohibited.

It can be argued that the MPA cannot totally exclude human activities because humans are part

of nature which is tightly connected to the environment within certain space, time and place. The following quotation shows other angles to look at MPAs:

> *"Whereas space refers to the structural, geometrical qualities of a physical environment, place is the notion that includes the dimensions of lived experience, interaction and use of a space by its inhabitants."* (Harrison and Dourish as cited in Hornecker 2005, p.1)

There is clear statement that MPA is a physical space, meanwhile it can also be seen as a place that allows human interaction with the environment. Explicitly speaking, every place is uniquely embedded by its cultural background, socioeconomic structure and dominated by its unique geographic features. Hence, the designation of MPAs should be more flexible and diverse depending on the purpose. In the sense of the social ecological system "to design for supporting collaboration and social interaction within existing environments" (Hornecker, 2005, p.1) can help MPAs to meet the goal of conservation, and meanwhile to satisfy different stakeholders. .

On the ground, an innovative form of MPAs is allowing tourism development within that area. This seems to offer a promising way to balance economic development and environment conservation. Fish and Walton (2012) agree that the MPAs can provide advantageous opportunity to achieve multiple social and environmental outcomes such as the sustainable tourism. (Fish and Walton, 2012, p. 110) They concluded that "the success of MPA and aligned sustainable tourism relies on social processes and opportunities for local stakeholders to access, participate in, and influence decision-making."(Fish and Walton, 2012, p. 110) Their strong statement of emphasis on the stakeholder engagement in the MPAs' decision making process gives this research a concrete foundation.

Section 3 Summary

According to the literature review, the MPAs governance involves the policy making process, regulatory system, and coordination among agencies and stakeholders. The dynamic

interactions of human institutions and environmental feedbacks bring more challenges for MPAs development. Therefore, this research uses the social-ecological system framework which provides a comprehensive viewpoint for decision-maker in dealing with the dynamic environmental issue. We find that during the MPA policy making process, especially in the designation stage, the government has to cope with the stakeholders so that the MPAs can be designated to meet the objectives and be established on the basis of a cooperative direction. As we know, sometimes a strong institutional support and with legitimacy can lead to successful MPA designation; however, not in every circumstance. MPAs development would have difficulty when people are against this issue because of low attention to stakeholder engagement during the process. Hopefully, the need for stakeholder involvement triggers the government motivation of seeking to reach to mutual agreement with stakeholders in order to enhance the MPAs governance. With support from stakeholders, it can help government to improve the MPAs designation process and create a solid project plan, ultimately leading to success. (Kennon et al., 2009) The significance for this thesis is that it establishes the importance of the stakeholder engagement as an element of the designation process. As a result, the research is based on this standpoint to review Dongsha Atoll Marine National Park as a successful MPA case (at least for biodiversity conservation) and the Green Island National Park process as a failed case of MPA in Taiwan. Then we take a close look at the stakeholder's participation in current MPA proposal with, the Four Islands of Southern Penghu[1] is the core study field of this research.

[1] The Four Island of Southern Penghu National Park was officially established in June 8th, 2014.

Chaper 3 Research Questions and Methods

This study applies a socio-ecological system (SES) as a conceptual model to represent the interaction between socio-economic and ecological factors in environmental decision making process. (Ostrom, 2007) The focus of the study is especially on the role of stakeholders in designation process of MPA in Taiwan. It is based on an analysis of official documents, academic literature and interviews with key informants.

Under the SES conceptual model, this thesis uses Marine Protected Areas as a vehicle to illustrate the linkage between social structure and ecological environment surrounding designation and management of MPAs. The strengths of the SES linkage are determined by the positive or negative feedbacks from the interaction of human activities and environment. Explicitly, the SES model provides a broad picture to show that how decision-making on MPA establishment policy and processes change the linkages in a SES. One example would be the likely outputs in terms of social and cultural change as a result of MPA designation. The MPA designation is an action plan that would change existing human activities, for example, to impose fishery restriction in order to encourage increasing eco-tourism. The purpose would be to balance economic development and environmental conservation, and it would result in changes in SES. The various the stakeholders play a vital role in the process and also have strong influence in the SES in Taiwan. Hence, to further illustrate the stakeholders' engagement in the MPA within the social-ecological system, this study will use literature review, interviews and examination of governmental documents and survey reports. With the multiple sources of information mentioned above, it is possible to identify the concerns, interests and perspectives among the stakeholders.

Ultimately this study will help researchers understand what the situation on the ground with the problem of the gap of expectation for marine protected areas among government agencies, local residents and other stakeholders. The findings of this study will identify the social structure and administrative capacity impacting the process of establishing National Park

MPAs in Taiwan. Furthermore, the anticipated outcomes will assist the designation of marine protected areas for sustainable marine development.

Section 1 Major Research Questions

For the purpose of clarifying how the MPA works in SES with various parties and actors, this research project will attempt to answer the key question of how to engage stakeholders in MPA processes by looking into cross agency challenges and opportunities. To make the argument more clear, the questions are addressed in this study to explain how to achieve the implied goal of involving a wide range of stakeholders and increasing transparency in MPA decision making in Taiwan.

The research questions address the challenges and opportunities in current MPAs designation processes. This study identifies to the question of what the perspectives of different stakeholders with regard MPAs. It also shows how the Social-Ecologic System applies to marine policy process and management. Lastly this study is looking for the recommendations for of future policy making in developing MPAs in Taiwan.

Section 2 Research Methods

The case studies of Green Island and Dongsha Atoll national park are developed through search of government documents; the case of Southern Four Islands National Park is the main research target. This section introduces the types of data and information collection method for the Penghu Islands process. This research project is based on a qualitative analysis approach. The techniques employed include document analysis, semi-structured interviews and stakeholder analysis. The data collection is divided into three phases. Phase I is research reviewing the background, the concept of SES, and identifying potential interviewees. Phase II is conducting interviews with state agencies and stakeholders and collecting information. Phase III is to use stakeholder analysis including stakeholder identification.

Phase I: Review of MPAs, demographics, governance structures and policies in Taiwan.

Phase I was conducted during the period of 2013 spring to 2014 spring. This stage is focused on literature review of human, natural, and institutional activities, including current governance structures as required to understand present form and function of Taiwan institutions and governance structures. This includes the government jurisdictions of the central and local agencies. Beyond legally defined roles, organizational structures, missions, and goals will be explored to identify overlaps and differences.

This literature review includes the past practices of MPAs. Studying the present stage oceanic policy developments benefits by review of Taiwan's past insufficiencies and defects, which are presented in National Ocean Policy White Paper (2006). The review also covers relevant literature such as research papers from scholars (see literature review). It is vital and necessary in doing this with respect to the specific issue of conflicts in MPAs from the perspective of dealing with stakeholders in the process of implementation and management.
For the purpose of specifying how agencies would participate in the designation of MPA, the literature review is also discussing the policy making process as a whole including the designation, implementation and management. However, this study is limited to the designation process of MPA. This phase explores the theoretical concept of SES Reviewing different SES models and how SES is applied to MPAs can clarify why SES is chosen to be a framework in this study.

Phase II: Three Cases-identify the conflicts in policy making process and implement outcomes of MPAs in Taiwan from the past and current practice experiences. These data were obtained in two ways.

1. Archival records and documents are publically available data including fishery year book, biological assessments and resources management plans, news reports, and government publications.
2. Interviews

Interviews were conducted with community members and government agency staff. All the interviews were conducted in the month August 2013. Interviewees were identified in Phase I (see the next paragraph). Additional interviewees were identified using the snowball strategy for informant identification (Lecy and Beatty, 2012). In the field, if the researcher is an outsider, there is limitation of reaching the potential interviewee. The advantage of snowball sampling method is it can help find other potential respondents by using the social network (Biernacki and Waldorf, 1979; Browne , 2005). (More detail in Chapter 5 Stakeholder Analysis)

Interview process

It is typical to use a snowball sampling method for local community residents starting by asking the first person met, usually a hostel owner of recommended.

The strategy I used is to walk on the shopping districts where many tourists, restaurants, souvenir shops and commercial activities are located. On each block I randomly chose three to five residents to ask their willingness of participating interviews. To find the fisherman respondents, I went to the Makung fish wholesale market and port of Makung. Makung is main city of Penghu County. (Makung is main city of Penghu County.) I asked a fisherman who was on the boat, or on the land gathering, washing, fixing the gears and nets for an interview. Most of identified targets are reluctant to respond due to the sensitivity of this topic. This situation caused limitation on collecting information from stakeholders. Therefore, in this case, I have followed up on the recommendation of the person just interviewed. I was unable to interview the residents on the southern four is lands in Penghu due to transportation limitations. The ferry only goes once to twice a month on an irregular schedule. Thus, the resident interviews were targeted on locals who live on the Makung, the

main city of Penghu.

For interviews with government agency personnel, the respondent must either have authority to make the policy for marine protected areas or be in charge of management plan drafting or implementation or enforcement of relevant regulations. The identification of government agency based on reviewing the jurisdictions of central and local governments associated to National Park authority in development plan and implementation, the key four interviewees were identified as following:

- Marine National Park Headquarters (MNPH)
- Penghu County Government Agriculture and Fisheries Bureau
- Wangan Township Hall
- Penghu National Scenic Area Administration under Tourism Bureau (Penghu NSAA)

Two MNPH and Penghu County Government Agriculture and Fisheries Bureau were considered as key informants, all with considerable experience in working in the public sector and with direct involvement in designation, implementation and management and policy settings for Marine National Parks. The officials were contacted by email and asked to participate. The first person I contacted usually was not the one either working on the development plan or having experience in the research topic. Therefore, I was referred to the officials representing the voice of agencies or who have involving in the MPA's policy making process. Four agencies were identified as targets for interview (see list above) but only MNPH and Penghu County Government Agriculture and Fisheries Bureau participated in the interviews. The Wangan Township Hall and Penghu NSAA refused to provide any relevant information because they do not have direct authority over the MPA policy and no officials were willing to be representative of the agencies to provide opinions.

The lack of first-hand information from two of the above four agencies, as well as the missing information from the stakeholders who live within the proposed marine national park

area, was offset by access to the official publication of surveys of the opinions from different stakeholders and relevant agencies conducted by MNPH in the period of 2011 to 2013. (MNPH, 2011-2013)

Phase III: Stakeholder Analysis.

As Schmeer (1999) says *"Stakeholder analysis is a process of systematically gathering and analyzing qualitative information to determine whose interests should be taken into account when developing and/or implementing a policy or program"* (Schmeer , 1999, p. 3). This study uses stakeholder analysis because it can allow us to gain insight into the interactions among different stakeholders, as well as power and influence of stakeholders within the MPA designation process. World Wildlife Fund described the role of stakeholder analysis as below:

> *"Stakeholder analysis identifies all primary and secondary stakeholders who have a vested interest in the issues with which the project or policy is concerned. The goal of stakeholder analysis is to develop a strategic view of the human and institutional landscape, and the relationships between the different stakeholders and the issues they care about most."(*WWF, 2005, p. 1)

To put it another way, stakeholder analysis can systematically present the roles of different stakeholders in the processes of designating, implementing or managing a MPA. This research sets up a three step stakeholder analysis process. The first step is to identify the stakeholders. The next step is to assess stakeholders' influence and importance from the results of interviews and documents. The last step is to demonstrate stakeholder's perspectives of MPAs and their concerns. The results of stakeholders' analysis address different stakeholders' influences as well as their thoughts on effectiveness of MPA, and that will reflect how they anticipate outcomes of MPA implementation.

This research uses stakeholder analysis to find out the stakeholders' perspectives and influence during the designation process of the MPAs, and how they are participating to voice themselves regarding the MPAs development. The first step of the stakeholder analysis is to identify who is the stakeholder. There are many way to categorize the stakeholders, for

example, Miller (2008) has used the "Broker-Local-Tourist (BLT) Model" in the study of recreational activities in marine environment. This model works well in the context of marine national park designation in recognizing the high importance of tourism as an element of policy goal by central and local governments and some, but not all, stakeholders. The BLT model is about the relationship among these three sectors (groups of stakeholders). The brokers are defined as persons or entities who work in the public sector like government agencies, private sectors like any business owners, and non-governmental organization sector that provide a broker-like function in connecting tourist services. The locals include traditional residents and new residents who are not engaged in tourism. Most of the time the private sector brokers, like tour agency or cruise owners are also residents. However, this research is to distinguish the locals and brokers in order to have clear standing of the perceptions from different groups' perspectives, the locals is who do not make a living or have income from any profit-making activities related to marine tourism. "The tourist is the person who has motivation to visit the destination and subsequently return home" (Miller, 2008, p. 71).

There are four different levels of the stakeholder influence as reported from NOAA in 2007 as shown in Table 2. The degree of participation which ranges from Agency-controlled to stakeholder-controlled reflects how the stakeholder is influentially involved in the designation process of MPAs. The full Agency-controlled refers to a top down approach; in contrast, the stakeholder-controlled refers to bottom up approach in MPAs development process. Nevertheless, "In between these two situations lie many of the more complex and commonplace participatory designs used by agencies today" (NOAA, 2007, p. 9).

Table 2: Simplified Continuum of Stakeholder Influence

Agency-controlled			Stakeholder-controlled
1 Agency has authority, makes the decision, and then informs stakeholders	2 Agency gathers input from stakeholders before making decision	3 Stakeholders decide and recommend actions for agency to take	4 Stakeholders decide to act and then implement with agency agreement?/approval?

Source: (NOAA, 2007, p.10)

With respect to SES conceptualization, stakeholder analysis provides tools for the identification and description of stakeholders by analyzing their interrelationships, and interests related to a given issue or resource. From the policy making aspect, this analysis is to explain the correlation between degree of stakeholders' engagement in the MPA designation and anticipated outcomes of MPA implementation. Then the SES framework is applied as a broader framework to better understand that how the stakeholders' engagement in the MPA's designation impacts on the ecological system and how changes occur in the interactions with the SES when establishing a MPA.

Section 3 Conceptualization of MPAs as a Social-Ecological System

As mentioned in the section 2.2.2, the functioning of the social system is tightly linked to the ecological system, and these two systems cannot be separated from each other because

humans are a part of nature. Thus, it's important to gain insights of the relationships and the interactions between human society and the environment especially when there more crises occur such as climate change, marine pollution, and fishery depletion. Generally, the MPA is designated as a tool to deal with the problems related to the fishery resources and species biological diversity issues.

The marine national park MPA development is an outcome of institutional decision and planning efforts. During the planning process, the decision makers should not consider the social factors and the ecosystem process separately. For example, decision makers would need to understand the consequences of establishing the MPAs, such as the potential job opportunities, economic impacts, and government-stakeholder's cooperation from the social aspect; additionally they also need to evaluate the environmental impacts, biomass of marine species and natural resources from the ecosystem point of view. Figure 2 shows the author's view of a conceptual model of the Social Ecological System (SES) development process involving four steps in order to explain the why the SES can benefit the decision maker in the designation of a sound MPA.

This conceptual model is based on the theoretical statement about ecological resilience from the Swedish scholars, Bodin and Wiman (2004). They believe that "over long time-horizons, systems not only change, they also change how they change."(Bodin and Wiman, 2004, p.39) From that standpoint, this research further expands on the existing SES model by identifying the potential steps to explain the dynamic change of the social-natural interactions.

1. The first step (Fig 2) shows the idealized interaction between the anthropogenic influence on the environment and the ecological feedbacks to the social system before any policy change takes place. With strong resilience of the natural process, balanced integration can lead to sustainable development. However, this model islimited in its ability to explain the

complex concept of the resilience approach to the human-environmental interaction because this model shows a static situation approach. The back and forth arrows show impacts of human activities on the environment, to which the ecosystem gives feedback either positive or negative, and then how the society reacts to the feedbacks. The next three steps explain the possible system reactions to the changes from establishment of a MPA.

2. The second step is to explain the changes of ecosystem when there is a large pollution event produced by human activities or other usage of natural resources. The growing population size and economic activities are happening within the current social system. Humans become more reliant on the natural resources. However, without taking the natural resilience process into account, the increasing overutilization of natural resources would gradually result into depletion. At that time the ecosystem function is getting weaker and unable to provide ecosystem service to meet human needs. Eventually it would break the balance of social and ecological system. This figure shows a smaller circle of the ecological system which means the constrained function of the ecosystem; the dotted arrow means the ecosystem provides weaker function and fewer services for human society because of the natural resources depletion and damaged natural environment. The thicker red arrow is reflecting the larger magnitude of human impacts on the environment and the utilization of natural resources.
3. When the ecological system is significantly damaged by human interference, it undermines its' function of providing basic living elements for human-being (step three). This situation will become worse and irreversible if the society does not face this problem properly or take the right actions to prevent it happening. Over time, when more social or natural events occur within the systems have exceed the ability of the systems to return it back to the previous condition, the concept of resilience is introduced here to say that it is harder

to absorb the various changes from the disturbance for both the social system and the ecological system.

4. The fourth step shows how the MPA governance is introduced to maintain the balance of SES system. Take this research as an example; the National Park MPA is to be designated to ultimately achieve this goal. To date, a more diverse set of the functions in the social system complicate environmental issues and requires an integrated approach to resolve by maintaining the resilience. Thus, the SES approach to the MPA development can strengthen the relationships among the government, stakeholders and the environment. The cumulative impacts would be taken into account in terms of the resilience so that the interaction of the human activities and the ecological environment can stay balanced to achieve the goal of the sustainability. The MPA development would involve both the social and dynamic environmental issues. Applying the SES framework can give the decision maker the ability to comprehensively evaluate the multiple interactive factors with in the social ecological system during the MPA designation and planning process. The SES framework provides them with understanding of how the environmental issues interact with the social factors. We will test these ideas in the case studies.

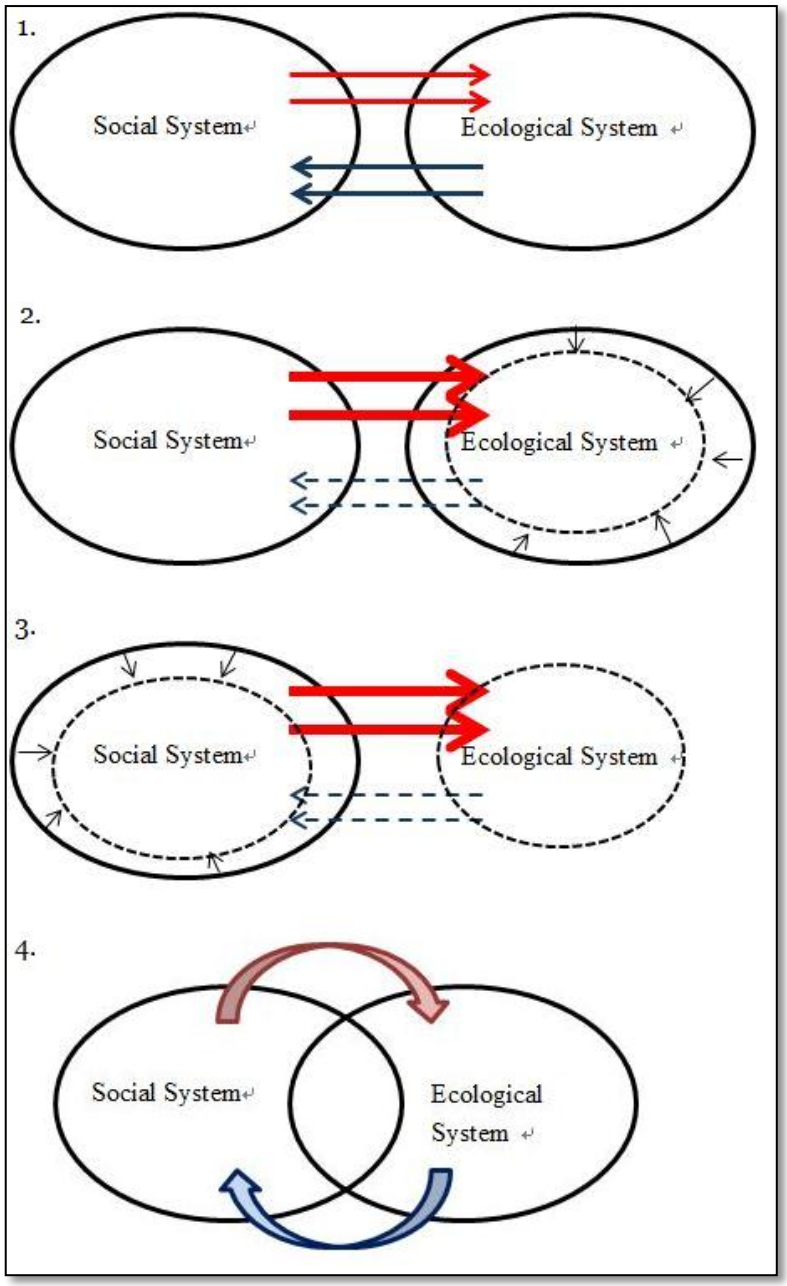

Fig. 2 The Four Steps of the SES Framework: from Huang (2014)

Section 4 Interview Questions

The interviews are designed as semi-structured interviews which allows the interviewer to pose a set of questions based on the preselected topics to the participant, and are to be combined with open discussion (See Appendix 1 Research Question). In this study, "the semi-structured interview is well suited for exploration of the perceptions and opinions of respondents regarding complex and sometimes sensitive issues." (Barriball and While, 1994, p.330) By one-to-one interviewing using semi-structured interviews, I was able to gain access

to identify several target groups such as residents, recreational businesses owners and fishermen. The interviews started with the general questions to both officials and local stakeholders which are developed based on the "focus around the research question, and topic." (Angus, 2003) More specific questions to certain stakeholders were created according to their roles and their responses during the interviews. The responses to interview questions are addressed in Chapter 5 on stakeholder analysis.

Section 5 Human Subjects Exemption

Considering the protection of human research subjects, subjects were also be given the chance to ask any questions at any time during the study. Any subject who feels uncomfortable during a session was be allowed to end his/her participation. The interview record is only maintained in case a subject requests to remove their data at a future date or in case we need to follow up with a subject. Overall, the risk of the research procedure is minimal so this study fulfilled the Human Subjects Exemption from the University of Washington. The Exempt Status Request #45343 and qualifies for exempt status under 45 CFR 46.101 (b) (2) from all 45 CFR requirements. The determination period is from July 19th 2013 to July18 th 2018.

Chaper 4 Designation of Marine Protected Areas in Taiwan

In order to better understand what forces have driven the governance of MPAs in Taiwan, this chapter begins with overview the MPAs in Taiwan, and then examines three case studies in Dongsha Atoll National Park, Green Island, and Four Islands of Southern Penghu National Park. The Dongsha Atoll National Park represents a successful MPA establishment by top-down approach; Green Island is a failed attempt to establish a MPA using a top down approach, and the Four Islands of Southern Penghu is in the proposal review process at the time of writing this thesis (designated July 2014). By identifying the key factors in the MPA designation process, it is possible to provide insights to improve current and future MPA designation.

Section 1 Overview

In Taiwan, Lim has pointed out that "the small islands are regarded as powerless, politically and economically fragile, and unstable" (Lim, 2009). In 2006, the Premier Su Tseng-Chang was facing pressure from competing parties, and therefore he decided to make frequent visits to local towns in order to gain trust from people (Hsu, 2008). The Executive Yuan, which is the central government, intended to protect the ecosystem on Green Island so there was a proposal at that time that included a plan to limit the number of tourists. Unfortunately, the local government and people were against the proposal so they bucked it through their opposition. In 2007 the Marine National Park Headquarters was formally founded in Kaohsiung City with the mission to oversee the operation of Dongsha Atoll National Park. Meanwhile the Dongsha Atoll National Park was successfully established as marine national park. This marks an important milestone for Taiwan's sustainable development of marine resources.

4.1.1 Marine Protected Areas in Taiwan

The many types of MPAs are designated with different levels of legal protections, as well as

for different purposes Bauer et al. (2008). There are several types of MPAs designations in Taiwan, including Wildlife Refuge, National Scenic Area, Nature Reserve, and National Park (Shao and Lai, 2011). Table 3, modified from Shih and Chiau (2009), provides a systematic introduction of the MPAs in Taiwan. Each has different levels of restriction and purposes, for example, the National Scenic Areas such as East Coast National Scenic Area and Penghu National Scenic Area is under the jurisdiction of the Tourism Bureau. According to the Statute for the Development of Tourism, the main purpose is to protect distinctive ecologies and landscape as well as tourism development.

Another type of MPA is Wildlife Refuges; the Wildlife Conservation Act allows the government a legislative basis to protect of Taiwan's species diversity. Next, in terms of the Nature Reserves, Chiang et al. (2008) said "Nature Reserves mean that a place has a unique ecology system, landscape, or geological structure. It also means that the area's inhabited rare animals and plants are worth preserving for the value of gene reserve, permanent observation and research." (Chiang et al., 2008, p.7).

Table 3: Categories of Protected Areas in Taiwan

Type	Number	Purpose	Law /authority
National Scenic Areas	13 Terrestrial:6 Marine:7	• Landscape protection and tourism	Statute for the Development of Tourism Bureau of Tourism, the Ministry of Transportation and Communications
Wildlife Refuges	19 Terrestrial:15 Marine:4	• Protection of wild animals like sea turtles	Wildlife Conservation Act. Council ofAgriculture
Nature Reserves	22 Terrestria15 Marine7	• Maintain ecosystem functions and biodiversity • Ensure the sustainable use if these areas in the future	Cultural Heritage Preservation Law Council for Cultural Affairs. Council of Agriculture(COA), Forestry Bureau, The Executive Yuan

National Park	8 Terrestrial7 Marine1	• Protect natural scenery and resources • Preserve wildlife and historic sites • Research • Education • Recreation	National Park Act. Construction and Planning Agency Ministry of the Interior (CPAMI)

Source: adapted from Shih and Chiau (2009).

The focus of this study; the national park MPS is under the National Park Act, which was passed in 1972 to protect the nature, wildlife, and history. There are administrative and judicial procedures to be implemented by central and local governments. The lead agency of National Parks is under the jurisdiction of the Ministry of the Interior (within CAPMI). The major goal of National Parks is "to protect natural scenery, wildlife and historic sites unique to Taiwan and provide them to the people for entertainment and research" (Article 1, National Park Law). Moreover, "The National Park Act stipulates that national parks have the responsibility to preserve natural and cultural resources, and development for human utilization" (Article 6, National Park Law). National parks also have functional goals which are environmental conservation, providing education and recreational development, and for scientific research. Within the National Park, the protection areas can be designated by different functional zones such as No-Take area, No-Access or Impact area, and Multiple-Use area for the purpose of management.

The difference between a National Park and National Scenic Areas as Wieman (1995) further explainsis:

> *"The philosophies that govern the development of the two types of areas differ. For a national park the emphasis is on the preservation of natural and cultural resources, and development for human utilization is definitely a secondary priority. For a national scenic area, the priorities are more balanced between preservation and tourism utilization."* (Wieman, 1995, website)

Shao (2012) has concluded that there are many problematic issues of MPAs in Taiwan. He says "the MPAs were designated by different ministries according to different laws," and "the actual levels or intensities of management and protection vary greatly among the above MPAs."(Shao, 2012) Obviously, a good designation and management of MPA need a clear

definition and purpose. However, the definition of MPA has been discussed in Taiwan but it has not reached a common unified definition. MPA system can be adapted depending on the purposes and the institutional culture from country to country.

Section 2 Dongsha Atoll Marine National Park

4.2.1 Historical and Geographic Features

The Dongsha Marine National Park is located in the South China Sea includes the atolls and surrounding areas which total 3,537 square kilometers. Dongsha is under the geographic jurisdiction of the Ministry of National Decency, and has been co-managed by Kaohsiung City Government since 1982. (Hsu, 2008) It located in the sea southwest of Taiwan and 240 nautical miles from Kaohsiung, Dongsha Atoll Marine National Park is the front gate for the strategic entrance to Taiwan. For military purposes, Dongsha Island is of strategic importance because it controls the gateway to the Taiwan Strait and Bashi Channel, and thus controls the transportation between East and Southeast Asia. Dongsha was first officially recorded in documents in 1867, and the first weather and navy tower was built in 1925. (Hsu, 2008) It was briefly colonized by Japan as an Air Force base during World War II.

However the island has historically been uninhabited because of the lack of soil and difficult agriculture. Geographically, Dongsha Atoll is tropical with abundant sunshine and nutrients so its strong primary production has benefits to marine biodiversity. (Hsu, 2008) One of the purposes to establish the Dongsha Atoll Marine National Park is that it also means declaration of the competence and resolution to maintain sovereignty in the South China Sea. (Dai, 2004)

4.2.2 Ecological Features and Economic Activities

Without a large intervention from human activities on the island, “Dongsha atoll is the only fully-developed coral atoll in the Northern South China Sea, with Dongsha Island being located on the northwestern of the lagoon.” (Lai and Chen, 2008) The atoll is rich in a variety of coral fish and other diverse marine life because of the upwelling (Lai and Chen, 2008). A

Dongsha Atoll National Park exhibition was held in 2013 by MNPH to present the large biodiversity, and outcomes of preservation:

> *"303 varieties of coral, 679 species of fish and 283 types of mollusks, echinoderms and crustaceans, as well as seven kinds of sea grass and 148 species of seaweed had been identified in its environs, in addition to 211 types of land plants and 257 varieties of birds, some of which are extremely vulnerable" (Ministry of Foreign Affairs, 2013)*

The ecosystem is of very high environmental value and is rich in living natural resources in the waters outside the MPA that are the basis for a considerable level of economic activity. There is known for rich in fishery so many fishing vessels would come from other countries like China. The ecosystem has been protected for the conservation of biodiversity. However, some excessive fishing and natural causes such as the El Nino weather phenomenon have contributed to rapid degradation. An article has pointed out that "In 1994, one reef site had 45 species of coral, but four years later, the number had been reduced to just three." (Harmsen, 2010) The mass bleaching event in 1998 might also play a significant role for mass mortality of corals at the atoll. (Dai, 2004) Dongsha Marine National Park relies on a comprehensive understanding of the reef ecosystem and a sound monitoring system to boost MPA's enforcement and management. (Dai, 2004)

4.2.3 Current Management

Since 1998, the scientists had studied about the global warming resulting in the bleaching of coral reef worldwide . "The government decided to establish a national park in Dongsha with the aim of protecting the precious natural resources and marine life at the atoll." (Lee, 2013) Importantly, because of restricted access for national defense purpose, no visitation is permitted as one would normally expect in a National Park but only scientific researchers are allowed on the island.

In 2004, the proposed Dongsha Atoll National Park Strategic Plan Draft contains the introduction of the Dongsha Atoll ecosystem and history of the park's designation, the vision

and principle of the management, and the Dongsha Atoll National Park Action Plan (MOI, 2007). In 2007, the Dongsha Atoll National Park Action Plan was officially established. (See Appendix B1 Dongsha Atoll National Park Development Timeline) In addition to increased enforcement to reduce illegal fishery activities, the primary actions to be undertaken are "sea floor mapping, infrastructure completion on the island to deal with its intrinsic shortage of fresh water and natural resource, launch of a marine station, and the establishment of the Dongsha Eco-volunteer system." (Lai, Chen 2008) Currently, Dongsha National Park is off-limits to tourists, and a permit is required for scientific research granted on a case-by-case basis.

In general, there are two factors to show that the management tasks in Dongsha Atoll National Park are relatively simple. One is the geographical remoteness; also the accessibility is controlled by the government so the public is not allowed to visit. The other is that the conflicts from stakeholders are less, because there are no residents and resource users on the island. Both factors and the strong political reason led the Dongsha National Park to success in the designation and legislative process as well as the management.

In terms of the enforcement of the conservation on the ground, "the Coast Guard Administration is not only responsible for the island's security; they also in partnership with the MNPH authorized to take on tasks of preservation and restoration project. Because the Marine National Park lacks an operational park office, it asks for help from CGA's task force to enforce restriction within the park area" (Lu, 2012, p49).

Section 3 Green Island

4.3.1 Historical and Geographic Features

Green Island is a small volcanic island located 18nm off the southeastern coast of Taitung County, Taiwan. (Fig.3)

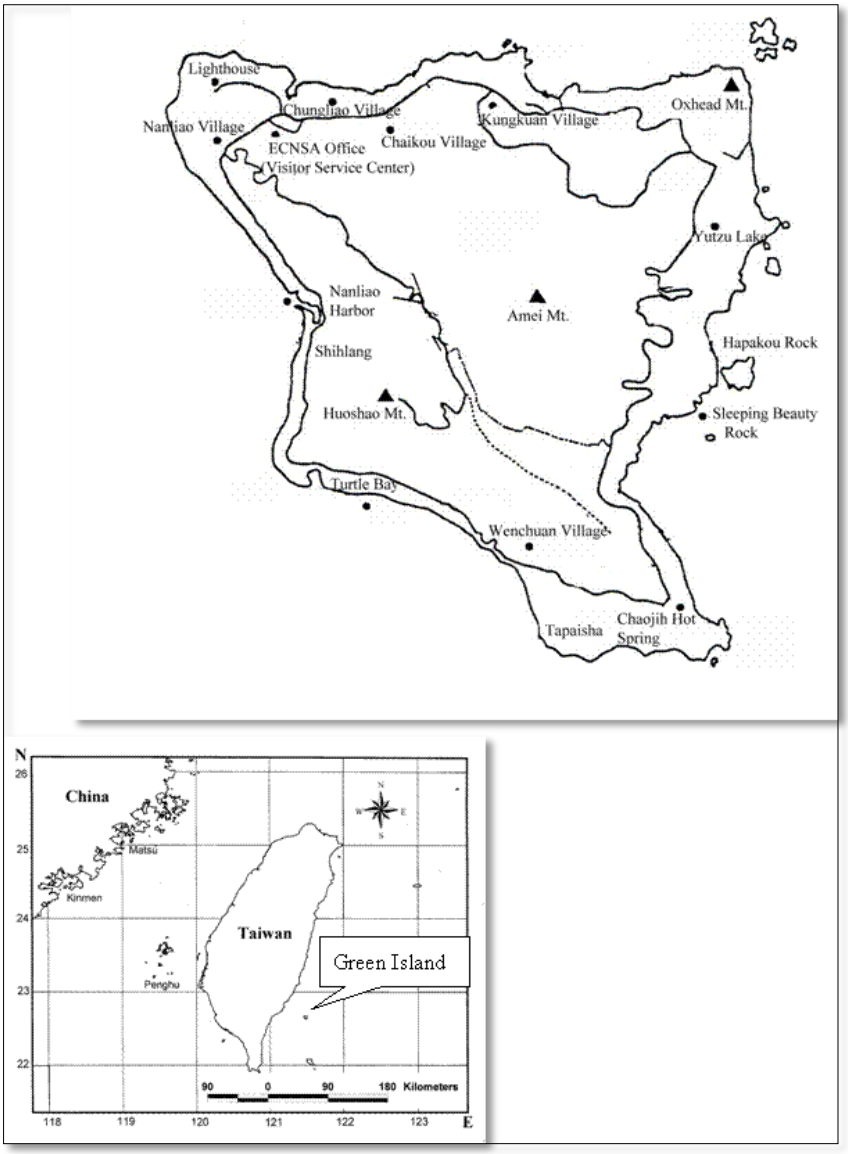

Fig. 3: Green Island. Source: Coconut Crab Conservation Website (2013).

It covers only 16.2 km^2, with a population of 3,591 people in 2014. (Tourism Bureau, 2014; Householder and Registration Office of Taitung County, 2014) The warm, humid weather is beneficial to tropical plants and animals, moreover, a northerly flowing warm-water current called Kuroshio current brings advantages to the marine ecosystem (Hsiao et al., 2011). The plentiful ecological resources of Green Island are well-preserved due to its unique historical development. Two thousand years ago, aboriginal people began living on the island. "A mere 200 years ago, Han (Chinese) people began arriving. The basic economy of the island has traditionally been fishing but the recent development of tourism has involved many people in

this industry" (Taiwan County Website). Green Island is accessible by airplane landing in the Lyudao Airport in eight to 12 minutes from Taitung City. There are also ferries capable of carrying over 250 passengers. Green Island is now a locally popular scuba-diving destination for both locals and expatriates living in Taiwan. Administratively, Green Island is a township of Taitung County.

4.3.2 Ecological Features and Economic Activities

The waters surrounding Green Island are one of the areas which are rich in coral reef coverage. It is abundant in fish species, some of which have high economic value like tuna. The most important resource of Green Island is the high biodiversity of the surrounding seas. "There are records of 176 species of hard corals, 27 species of soft corals, and 602 species of fishes" (cited in Coconut Crab Conservation Network, 2013), as well as numerous seaweeds, sponges, shells, shrimp, crabs, sea urchins, starfish, etc. However, local people mostly rely on tourism and fisheries; they disagree with establishing MPAs because they argue that the MPAs will have huge negative impact on their lives and they will lose sources of income.

Currently, the ecosystem in Green Island is under high pressure by human activities, and this situation can be attributed to both market failure and government failure (Weimer and Vining, 2011). The natural resources in the Green Island are common goods and open access, which means sellers are unable to exclude non-buyers from using a product. For example, one of the most popular tourism activities is snorkeling which can create negative externalities because the underwater scenery is common property. In other words, the popular snorkeling activities attracts more people to come might potentially hurt the ecosystem, for example, many tourists feed the fish, they bring more trash to the beach, and they can break the coral reefs by direct contact. Therefore, such damage would impose external costs to third parties such as local residents, agencies, or even next generations for beach cleaning. Between producers and

consumers, the tourism activities are an important revenue source for locals, but they produce negative externalities such as discharge of sewage pollution and a heavy load of traffic impacts in the environment.

4.3.3 Current Management

About one fifth of the people on the island make their living by fishing, which can also be viewed as their traditional cultural activity. The mean annual catch was valued at $1,292,708 US dollars during 2005-2008. The fishery management is under the jurisdiction of Taitung County Government. Figure 4 shows the Taitung County fishery production (all species) has been decreasing since 2007. Apparently, fishery plays a vital role in the local economy.

Ou et al. (2008), point out the two main reasons why fishers in Green Island are against the proposal designation of MPA. First, they think the MPA would restrict their economic activities. Second, they think the government was planning the policy without taking their interests into account. Therefore that results in weak trust between the public sector and fishermen.

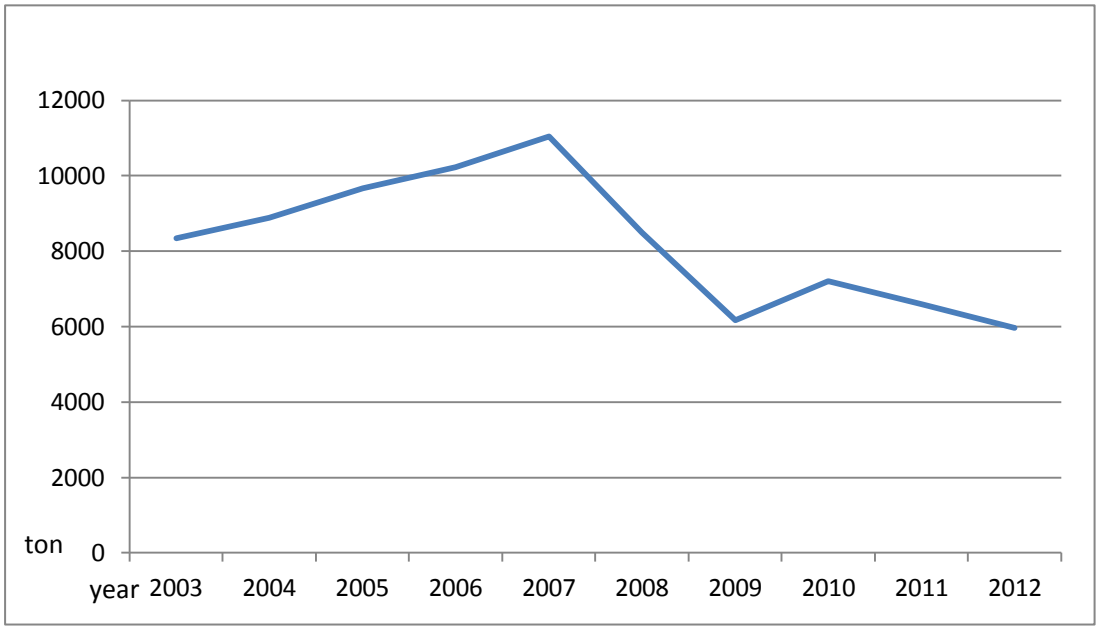

Fig 4. Taitung County Fishery Production in total 2003-2012
Source: Fishery Agency ,The Year Book 2003-2012
http://www.fa.gov.tw/cht/PublicationsFishYear/index.aspx

Due to the population growing at a rate of about 12% from 2003 to 2014 February, higher than the Taiwan average 3% (Statistical Yearbook of Interior, 2003 and 2014), the rapid growth in population is resulting in increased natural resources usage and degradation of the ecosystem. The statistical data from the East Coast National Scenic Area Administration reports that the number of tourists visiting was 319,116 in 2011. A large load of human activities inevitably produces pollution and other environmental problems such as trash at the beach. The purpose of establishment of the National Park with visitor facilities and management was intended to help to control the situation.

After the central government had announced its intent to start the process of establishing an MPA, the fishermen and locals were concerned about their interests would be hurt. It is noticeable that the lack of public involvement is a key challenge for effective and efficient policy making. Because without considering the perspectives of the locals, the policy would face obstacles from different parties and have difficulty to implement it.

Currently Green Island is under the administration of the Northeast Coastal Scenic Areas, which functionally belongs to a Multiple-Use area. The current situation does not satisfactorily protect the ecological environment and does not provide enough information for the public. With low transparency in the National Park designation process, the proposed national park policy would eventually turned out to be infeasible. Maintaining the status quo might keep the economic development but it would make the environment worse. In recent years, the Taitung government aims to develop the ecotourism of Green Island. The objective of ecotourism has focused on developing low-carbon emission and environmental friendly industry as targets by setting up green energy system development, but the benefits and outcomes of the ecotourism are still questionable.

Section 4 Four Islands of Southern Penghu

4.4.1. Historic and Geographic Features

Penghu County consists of 64 islands, but most of them have no people living on them. This archipelago is located in the south of the Taiwan Strait. This geographical location brings advantages for fishery resources because the cold meets warm current in Penghu are would make this area productive in biomass. The county government is located on the main Island called Makung city where majority of the population resides.

> *"The real record of people living in Penghu started during the Nan-Song dynasty in 1225, after occupation by pirates and The Netherlands during the 17th century, and the geographical location of Penghu has brought the significance for not only business but also for the territory's security. With respect to the historic development in Penghu, it's known that the traditional building method which used local architectural materials such as lao-gu stones and basalt is valuable cultural resources."* (Penghu Government Website in English, 2012)

The four islands of southern Penghu are Dongyuping Island, Xiyuping Island, Dongji Island and Xiji Islands along with a few natural islets surrounding them. (See Figure 5 and Table. 4)

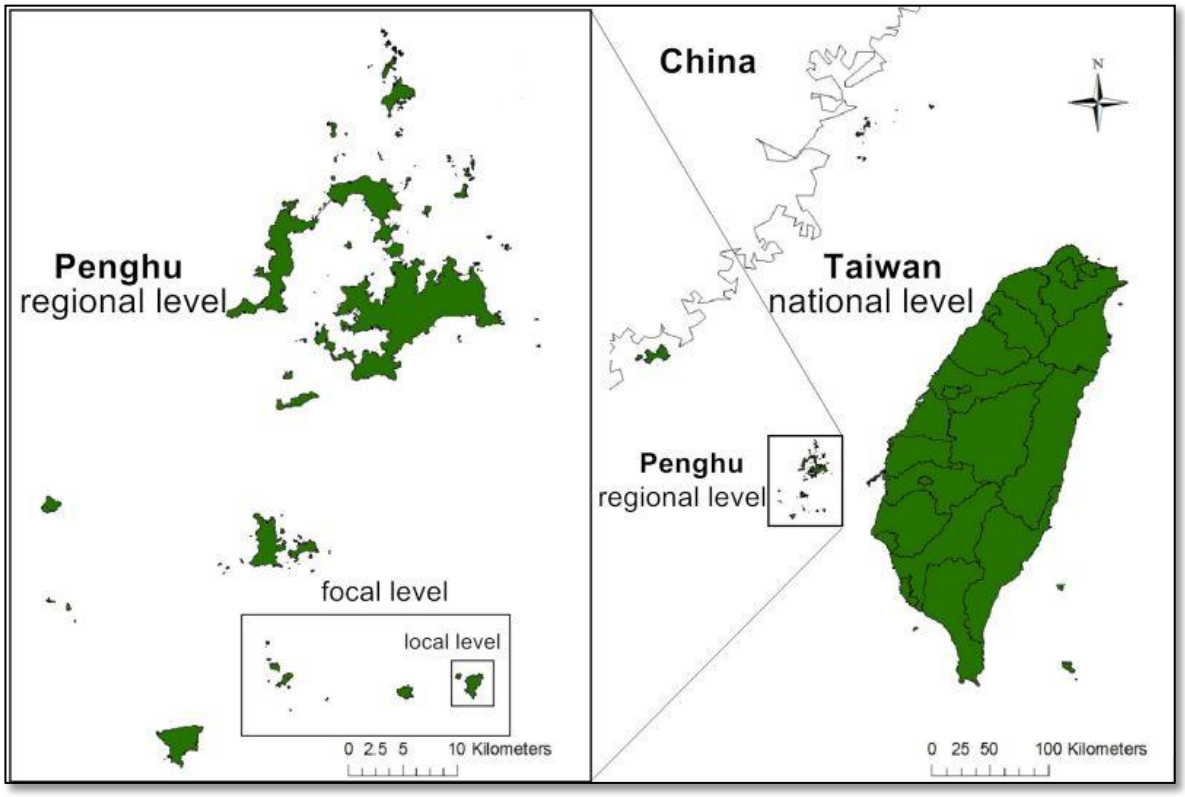

Fig. 5 Four Islands of Southern Penghu, a Proposed National Park MPA: From Wu (2013)

Table 4: The Population and Size of the Four Islands of Sourthern Penghu

Islands	Area	Population
Dongyuping	0.48km^2	Residents:10 Registered pop:603
Xiyuping	0.35km^2	Residents:7 Registered pop:240
Xiji	0.90km^2	Relocated
Dongji	1.77km^2	Residents:30 Registered pop:253

To better understand the stakeholders within the proposed MPA areas, their /occupation can give as a basic glimpse of how they would be affected by the policy of MPAs. As the Southern Four Islands of Penghu National Park Project Draft Plan addressed (MNPH, 2012a), people on the Dongyuping are making their living by fishery; however, residents on Xiyuping rely on the subsidy of elderly welfare and disabled welfare to support their living. On Dongji, government agencies like Coast Guard, police, nurses, weather center and power generation provide basic services, and otherwise, the majority of resident is elderly. The young generation has immigrated to the Makung city in Penghu County and Taiwan mainland for jobs. Local inhabitants immigrated from Xiji Island in 1978, making the island completely unpopulated (MNPH, 2012a).

4.4.2 Ecosystem Feature and Economic Activities

The Four Islands of Southern Penghu features fishery resources, without overexploitation by human activities, so the ecosystem is in good condition. However, there are still some threats resulting in degradation: illegal fishing by local residents and an intermittent cold current that damages resources and an outbreak of crown-of-thorns in 2010 (Cheng, 2010).

- Illegal fishing

Bottom trawl: the government has banned the bottom fishery within 3 nautical miles along the shoreline since 1989 in order to resolve the by-catch problem, which also damages the fishery resource. Nevertheless, the problem of illegal fishing still exists. There are local entities who engage in bomb fishing and spearfishing and there are Chinese fishing vessels engaged in illegal transactions. The above activities are not able to be adequately controlled with the limited resources of the Coast Guard. Greater enforcement by the Coast Guard is needed to reduce the threats of illegal fishing. (Li. and Zhou, 2010)

- Cold current

In February 2008, massive numbers of marine fishes were killed due to the cold front at northern Penghu Island. (2009) It is noteworthy that the extreme weather results from climate change as explained in the first draft of the Four Island of Southern Penghu National Park Project Draft Plan. (MNPH, 2012a) It has brought damage and become a potential threat to humans and the ecosystem.

- Outbreak of crown-of-thorns

Cheng (2010) has studied the outbreak even of crown-of-thorns in 2010 The study has pointed out that:

> *"Crown-of-thorns feeds on the coral polyps of living stony corals, causing a large impact on coral reefs. According to the investigation performed by Taiwan Coral Reef Institute in June 2010 near the offshore area of Xiji Island in southern Penghu, there was a warning sign that the number of crown-of-thorns had far exceeded the number recorded in the past few years."* (Cheng, 2010)

Therefore there were several crown-of-thorns starfish removal activities from 2010 to 2013, "the survey shows the result that coral coverage along all eight survey routes reaches an average of 50.6% and large trumpet tritons over 30cm were discovered, which indicates that coral colonies in the area are quite healthy" (MNPH, 2013).

4.4.3 Current Management

According to the Fishery Year Book from 1999 to 2012, the fishery production has declined considerably since 2005. (Fishery Agency, 1999-2012) The lowest harvest of the offshore fishery is in the 2008 period because the cold current caused severe damage to the fishery. A

research report from Fishery Agency in 2009 says the frequency of cold current events in the Penghu area would increase because of the more serious degree of global warming, and the larger amplitude of global temperature. The study also indicated that "recovery from the cold current damage could be faster without human interference. Therefore, the habitats needed more protection and less interference to revive the original ecology." (Fishery Agency, 2009)

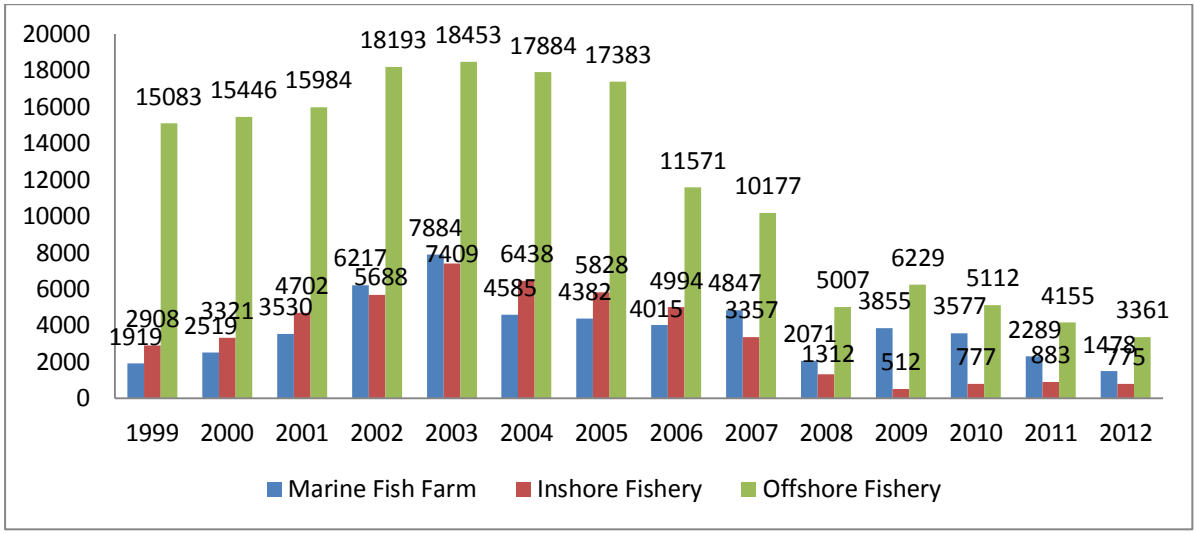

Fig. 6 Fishery Production of Penghu County Source: Fishery Year Book 1999-2012

The need of protection has been brought up and discussed. Thus, in December 2006, the feasibility of the assessment and scope of the designation manual of the Four Islands of Southern Penghu Marine National Park have been reviewed and passed by the Executive Yuan. In October 2007, the Marine National Park Headquarters (MNPH) was established with authority to conduct a series of evaluations, resource investigations and marine conservation seminars (MNPH, 2013). MNPH's authority is at the central government level, while the Penghu County Department of Agriculture and Fishery is at the local level, responsible for undertaking the Southern Penghu Islands Marine National Park Development Program. The coordination between the two agencies represents a top-down approach in MPA establishment. Southern Penghu Island Marine National Park is designed to "achieve sustainability by maintaining the integrity of the ecology and resources, establishing an adaptive management system, and ensuring that the rights of local residents (fishermen) are

protected.” The ultimate goal is to create a biogenic pool to enrich biomass by the spillover effect. (MNPH, 2012b)

In 2013, the Southern Four Islands of Penghu National Park Program, with emphasis on the preservation the value of scenic recreation, and marine education and ecotourism has passed through the legislature. In March 2013, the local county government has declared 69 hectares near the Xiyuping area (See Figure 7) as a no take area where fishing and other human activities are prohibited in the Southern Four Islands of Penghu by legislation. (Fig. 7) However, as distinguished from the past experiences, the MNPH realized that it is necessary to work with stakeholders to reduce the conflicts so MNPH has worked with fishermen on the issue of where is the boundary of the no take area. From 2011 to 2013, MNPH has organized public hearings to allow local residents to understand the process and goals of the Southern Penghu Islands Marine National Park Development Program. During the public hearings, the government obtained feedback from the public as a result of creating for a mutual communication.

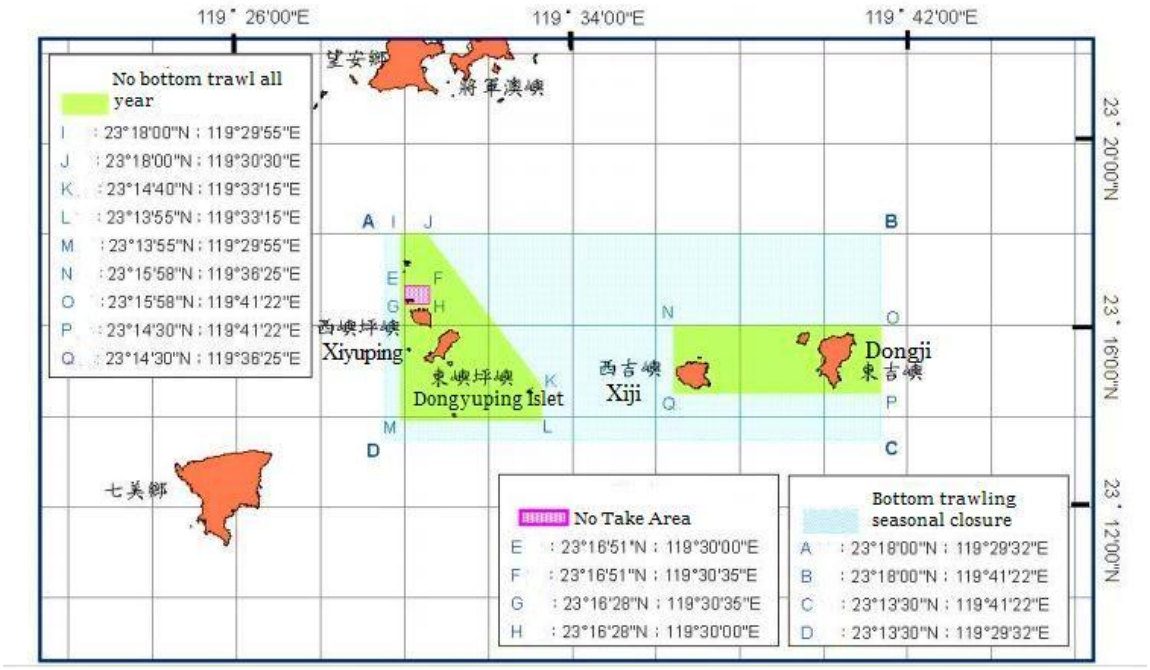

Fig. 7 No Take Area of Four Islands of Southern Penghu. Adapted from (MNPH, 2012a)

Chaper 5 Findings

After exploring the literature review with respect to MPA designation, role of stakeholders, resilience and SES and the background research of the three cases. This chapter summarizes the four key factors that influence the MPAs development in Taiwan, i.e., population, remoteness, local government support. This chapter explores lessons we can learn from the case studies with special focus on the failures experienced among the three cases remaining issues remain. After comparing the three cases, it can be concluded that the three key issues are information asymmetry, the role of ecotourism development, and need for cross-levels coordination among governments.

Section 1 Stakeholders Analysis Results

5.1.1 Stakeholders Identification

In this analysis we use the BLT method to identify the stakeholders (Miller 2008). The private sector stakeholders within the brokers' category are restaurants, accommodations, ferry owners in the Penghu County; the public sector of the brokers is including the agencies who participated in the designation and planning process of MPAs:

- Marine National Park Headquarter (MNPH) -- Broker

  Central level government under the Construction and Planning Agency Ministry of the Interior is the lead agency with authority in developing the plan and enforcement.
- Penghu County Government Agriculture and Fisheries Bureau Broker

  Local administrative level in fishery and conservation sectors
- Penghu National Scenic Area Administration (NSAA) under Tourism Bureau (Penghu NSAA) – Broker

  No indent for sentence belowThe marine area to 20m of bathymetric around southern four islets and the territorial areas are overlapped by the jurisdictions of Penghu NSAA.

The Locals is geographically the residents currently live in the Penghu County including the four islands and the Agriculture and Fisheries Bureau representing local stakeholder. Tourist is defined here the travelers from Taiwan mainland and foreign tourists.

This study clarifies the influence of the stakeholders during the designation process of MPAs. According to the qualitative information from the interviewees and published documents, the MPAs decision making process in the cases of the Dongsha Atoll National Park and Green Island is agency-controlled. The participation of BLT stakeholders is low; there was not much opportunity for people to present their voices and not much power given to the people to make decisions. Since then the government (Marine National Parks Headquarters) has noticed the importance of stakeholders' influence because the Green Island National Park MPA proposal did not work well by the top-down approach. Looking at the current case of the Four Islands of Southern Penghu, the government is starting to have more communication with stakeholders even before the designation process. The government agency has learned a lesson and improved its methods. It shows evidence that the governmental approach is moving gradually from agency control toward a balance with stakeholder control through increased communication, public hearings and greater transparency.

5.1.2 Stakeholders Perspectives on Four Southern Islands of Penghu Marine National Park Proposal

In this section, the collected interview responses from stakeholders are categorized in a matrix. (Table 5) The BLT model is used to categorize three different types of stakeholders, then to identify the individual and organizational interviewees. The total interviewee is 38 people.

Table 5: Matrix of Stakeholder Analysis for Four Islands of Southern Penghu Marine National Park Proposal

Type of Stakeholders	Actors/Organizations	Influence	Knowledge	Perspectives
Brokers	Govern Agency Agriculture and Fishery Bureau Penghu County	High	High	Support
	Govern Agency Marine National Park Headquarter	High	High	Support

	Other Govern Agency (not involved in the process) Penghu County Water Resource Agency	Low	Some	Support but concerns
	Hotel Owner	Low	No knowledge	Slight support but has concerns
	Restaurant Owners	Low	No knowledge	Against
	Ferry Owner	Low	No knowledge	Slight support but has concerns
	Tourism agency	low	No knowledge	Slight support but has concerns
	Fishing retailer	low	No knowledge	No opinion
Locals	Local resident-house holder	low	No knowledge	Support but has concerns
	Student	low	No knowledge	Support but has concerns
	Fishman	Medium to low	No knowledge	Against
Tourists	Students	Low	No knowledge	Support
	Other publics	Low	No knowledge	Support

Brokers' perspectives

We can divide the brokers in to two different groups to talk about their perspectives separately. The public sector interviewees including the government agencies which have direct authority, or participate in the planning and designation process; the private sectors include, service industries such as restaurants, the tourism agencies and any business related to tourist services.

We begin with a discussion of different perspectives on the policy making process from

which we can learn the importance of the stakeholders by examining how they influence and engage in the designation process of National Park MPA. We can get a clue from the governments' perspectives. The flow chart of the designation process (see Appendix C) has shown the governments indeed consulted with the local stakeholders during the whole policy make process, even before drafting the first assessment report. During the designation process, the MNPH also consulted with relevant agencies and stakeholders to develop the national park project plan. The local stakeholders' voice can be presented to the government through the four public hearings that were held during February 2013 in Penghu County and Taiwan mainland. The lead agency is proud of having more stakeholders' inputs and engagement than the before.

With respect to zoning the no take area within the National Park MPA, the representative of Agriculture and Fishery Bureau Penghu County believes the government has made a great concession to allow the fisherman representatives to join in the decision making process of zoning no take area. Agriculture and Fishery Bureau Penghu County released the news of establishing no take area on the website. (Agriculture and Fishery Bureau Penghu County, 2012) However, because it would affect livelihoods of many fishermen, the fishery stakeholders suggested that they needed to understand the content before further discussion. After negotiation with the stakeholders, the government agency took their suggestion to set up the boundary of the no take areas which are using small and protect unique control assembling.

The representatives of fishermen have pointed that want to narrow the no take area to 0.3 nautical miles, and they want the Coastal Guard to take enforcement actions against illegal fishery and expel Chinese fishing boats. However, it is an important issue involving their fishery right so they expect agencies, no matter the government of Penghu County or MNPH

can provide more communication and explanation about the detailed plan of the National Park MPA. Moreover, government agency should inform local community development association about upcoming issues. As shown in Table 6 the stakeholders who participated in the public hearings brought out the issue of government communication.

Table 6: Summary of the Four Public Hearings of the Four Island of Southern Penghu National Park

Location	Date	Number of people participation	Main issues and concerns
Makung city in Penghu County	2/06/2012	123 total 53 fisherman 40 unidentified Others:	● Question on the necessity of the MPA ● Government didn't notify the locals about this policy ● Infrastructure ● Accessibility of the fishing boats in the MPA area ● The gap between the proposed plan conducted by the scholars and real practical implementation ● Income impact if limiting on the fishery activities ● Locals would support it if the government provides subsidy
Wangan Township is Penghu County	2/07/2012	8 total 3 tourism agency 2 police office 1student Others unidentified	● Illegal fishery ● Job opportunity ● Infrastructure ● Improvement government communication ● Limit future tourist number
Kaohsiung city in Taiwan mainland	2/11/2012	43 total 9 fisherman Other 34 are: businessmen and scholars	● Transportation ● Infrastructure ● Illegal fishery ● Government efforts on communication with fisherman about the no-take area relief their nerves
Tainan city in Taiwan Mainland	2/12/2012	60 total 2 fisherman Majority participants are retired	● Illegal activity like bomb fishery is still happening and damaging the coral reef ● Support ecotourism ● Infrastructure and sewage ● Transportation problem ● The government enforcement of the policy ● Even the national park can create job opportunity, but the willingness of tourist for traveling is unsure.

Source: Summary from the meeting summary of the MNPH final report in August 2012 –

translated and compiled by the author.

In terms of the issue of fishery interest conflicts there are two different perspectives expressed in the interviews. Only few interviewees showed a positive perspective toward National Park establishment. Most of the fishermen opposed the Four Islands of Southern Penghu National Park. One captain said “If that is good for most people, the decision of the MPAs establishment should not be changed or influenced by mine or just for their own interests.” Surprisingly, the majority of fishermen agree with the view that the fish catch is getting less year by year, but the fishermen only care about their interests instead of environmental conservation and fishery resources shortage. Facing this fish resources depletion, some retailers think this situation will result in the market price going up so that they can make more money.

This interview research has found an interesting perspective from those who are not favorable of the marine National Park. Even before the Four Islands of Southern Penghu National Park was proposed, there was no large scale commercial fishery activity in that marine area. The interviewees also explain that they do not go fishing in that marine area, but when they were asked about their thoughts on the Four Islands of Southern Penghu National Park, they all strongly disagree with it and complain that the government did not hear their voices. Many local stakeholders and fishermen complained about that illegal fishery activities such as using spear gun and blast fishing usually happened in the proposed no take zone. This reaction can explain that the lack of understanding in National Park MPA development and low trust in the government. The fishermen still protest it even though the MPA development does not directly impact on their interest and fishery activities, one interviewee said “I don’t go fishing there, but I still don’t like the idea of National Park MPA because I don’t even trust the government would consider fishermen’s feelings and the loss of both revenue and fishing opportunity.

Vertical Coordination

The other finding is about the governmental vertical coordination in the designation and planning process of the Four Island of Southern Penghu National Park. The proposal began in 2006; in 2007 the MNPH has been authorized by the Executive Yuan as lead agency to conduct investigations, perform research, develop a project plan, and design future management. After five years, the proposal has been combined with the suggestions from the experts and stakeholders, and then been reviewed by the National Park Committee.

The government representative of the MNPH said that "the first draft of project plan is been reviewing in the late August of 2013 by the Executive Yuan. The whole process is smoothly, and hopefully the plan will be passed and announced by the end of 2014. It has taken longer time to reach the discussion in comparison to the case in Dongsha, because this time the government has consulted with the stakeholder in the designation process, unlike the fully top-down case in Dongsha. The other point is that with the local government support, the government vertical coordination has streamlined the process.

Private Sectors

Next discussion is about the other private sectors; according to the interview results we can observe that they tend to be neutral aspect in the National Park MPA development. They are all hoping the national park establishment will bring more economic benefits to them, and meanwhile they also agree on the National Park MPA development for the purpose of ecological environment protection. One tourism agency interviewee said: "of course we would like to see there are more benefits form the national park in Penghu, the idea of ecotourism is good but the government should educate the tourism agency and tour guides." However, they also address concerns about the feasibility of the national park project, implementation outcomes because they think the location of the proposed national park is too

far from Taiwan and local population centers and the transportation is a very real problem. Their responses implicitly show they doubt the government capability to achieve the goals of the national park. They do not feel the central government gave these limitations sufficient acknowledgement of the National Park MPA development so they don't know how the government's action can achieve the goals.

Local Perspectives

When it comes to the local perspectives, the author interviewed stakeholders who live on the Penghu main island and people from the other islands of the Penghu County. Due to the transportation limitation, the author could not access to the four islands, the Dongyuping, Xiyuping, Xiji, and Dongji, which are located within the proposed national park area. Fortunately the official documents from the designation process, including the meeting summary of the public hearings and national park project planning draft from the MNPH provide additional documentation.(Table 6) All the local residents, who participated in an interview, show a common response that they have not heard anything about the Four Islands of Southern Penghu National Park. Some of them even do not know where the Four Islands are. This result is surprising because the government has released the relevant news via newspaper, on the website, and also held public hearings four times. However, we can observe that the information gap still exists because most of the interviewees feel that they are not informed directly. Without basic understanding of national park project plan, they have several concerns which are explained in detail in the next paragraph. Therefore, the acceptance of National Park MPAs is low from the locals' point of view.

Local representatives state that they do not have many opinions on the proposal that the territorial areas on the islands would become National Park for the purpose of ecotourism development. Because the ecotourism is seen as a green economy which can balance

ecosystem conservation and community development, the MNPH conducted preplan for ecotourism development for future cooperation with local communities. Both governments and local communities expect to boost local development by holding cultural events or environmental education activities. The locals insist that these events should be held by the local community so that it can create job opportunities. However, some of them think the marine national park proposal would be good but they are not in favor of limiting the fishery activity. Furthermore, they are also worried about the increasing noise and trash if the National Park brings a lot of tourists.

Last but not least, the locals and tourism agencies are both worried about the transportation problems such as the ferry and flights are too expensive as well as irregular. The transportation problem has been talked about for a long time and that is a big concern for local residents. In addition, transportation is important for local development, and so, many times, the local residents have requested enhanced transportation. The local resident and tourist brokers want a ferry scheduled twice a week for Dongyuping and Xiyuping and once a month for Dongji. In addition, the central government or province level government should be put in charge of ferry management. It will be more convenient for people if it can inform the residents about the schedule. More importantly, the locals all clearly state that they questioned the government's promise of environment protection and ecotourism development to boost the local economy. Not only the local residents but also tourist and private sectors are showing this concern.

Tourist Perspectives

The tourist interviewees are students, family and retired seniors from Taiwan mainland. Their trip duration is around 5 to 7 days. None has heard of the Four Islands of Southern Penghu National Park. Most of the tourist interviewees have high acceptance of the National Park

MPAs development, they believe in a long term, the national park will be beneficial to environment and society. However, they are not always having optimistic attitude toward the national park establishment. The tourists also addressed their doubts on the government ability to properly manage the national park. Stakeholders, especially when they do not have any sense of the purpose of the national park, want to know what the goal is and what subjects the government wants to protect. As noted above, tourist stakeholders usually do not participate in the National Park MPA policy making process or attend the meetings like the public hearing, so their opinions are seldom presented to the government. Thus their influence is lower than the local residents and brokers.

Section 2 Lessons Learned and Remaining Issues from the Cases

The matrix below (Table 7) shows the influence of the four factors in each case study area based on the background research as well as the outcome. The different levels of influence are marked by three colors: red means a high degree of constraint on the MPA development; green means a low degree of constraint on the MPA development, yellow is in between. Based on the previous discussion, the four most influential factors of the outcomes of MPA designation process are identified for the MPA development; they are population, economic activities, remoteness, and local government support. The outcomes in the matrix of the three cases present the progress of National Park MPAs with respect to whether it has been established or not.

Table 7: Four Factors of National Park MPAs Development and Their Influence on Stakeholder Processes in National Park Designation

	Dongsha	**Green Island**	**Four Islands Southern Penghu**
Population(local residents)	Medium 200 (Military Base)	High 3591	Low 30

Economic activities	Low	High	Medium
Remoteness	Far	Nearest	Medium
Local government support	Medium	Low	High
Outcome	Success	Failure	In process Later success

First, the population refers to local residents. According to the background research, most of the issues involve local stakeholders' opinions. They are directly affected by the MPA establishment either positively or negatively because MPA may change their socioeconomic activities, life style or even social culture. People have different opinions and perspectives, so we review the populations in Dongsha, Green Island and Four Islands of Southern Penghu.

It obviously shows that the highest population is in Green Island with 3,591 in January 2014, then the second is Four Islands of Southern Penghu with around 30 people, and then Dongsha is a military base so there are no local residents on the Island only scientists and soldiers numbering about 200 people.(Ting, 2009) In a report, Cheng (2010) also says "Since the total number of inhabitants on the Four Islands of Southern Penghu is fewer than 50, it will be helpful to conservation of Penghu fisheries resources and the aquatic species reservoir if a marine protected area or national park is established in this area" (Cheng, 2010). One of the characteristics in MPA development based on the case studies is that the success or failure of establishing MPA is related to the number of residents. High numbers of local residents with more diverse interests that would be impacted, might contribute failure in establishment of MPA especially when the government does not seem to care about the stakeholders' opinions. In contrast, low number of residents is easier for the government is communication, and is a less diverse set of interests.

The second factor is economic activity; here we discuss the numbers of types of economic activity and refer to the tourist's number but not economic values, because there are many types of economic activities, however there is very little information on the economic values of each type of activity. The Green Island has the greatest diversity of economic activities including restaurants, accommodations, car rental business, scuba diving, fishery, stores, and travel agencies and so on. In Four Islands of Southern Penghu, the economic activities are only fishing, one accommodation and scuba diving. Dongsha Atoll National Park is not open to tourists so there are only fishery activities from Taiwan, China and several other Southeast Asian countries in the surrounding ocean area. Generally we can see the pattern that the more various economic activities result in more conflicts during the policy making process. Some groups of stakeholders might be benefit from diverse economic activities, but more different groups of stakeholders would be concerned that their interests would be damaged due to the uses of natural resources being non-exclusive.

The third factor, remoteness is a function of the distance and accessibility by public transportation. The geographic remoteness will bring challenges in stakeholder's engagement and central-local government coordination toward MPA. A study from Damian and Zowghi (2007) has pointed out that due to the geographic remoteness, several challenges come up. They said "Distance makes it more difficult to deal with problems of organizational, political and social nature" (Damian and Zowghi, 2007 p.7). They also said that "the challenge was the ability to deal with the different and most often conflicting interests in the development" (p.7). Therefore, a collaboration and communication between headquarters and remote development sites would be time consuming and considerably more difficult (Damian and Zowghi, 2007). Understanding the factor of remoteness, the remoteness is not only about distance but also the accessibility by transportation. Green Island has shortest distance to Taiwan mainland, also with higher frequency of regular cruises, ferries and flights. Dongsha

Atoll Marine National Park only allows scientific researchers and soldiers transported by irregularly scheduled flights or ferry. Also there are about 30 residents on the Four Islands of Southern Penghu, but the only public transportation is a ferry with an inconsistent schedule. Overall, in this study one of the findings is the remoteness does not necessarily affect the governments' willingness to communicate and coordinate with stakeholders and agencies. For example, the distance of the Penghu to Taiwan mainland is longer than the Green Island to Taiwan mainland; the MNPH still shows efforts in the stakeholder's engagement by holding public hearings in four different places. Instead, in this area remoteness results in less number and diversity in stakeholders, which leads fewer pullbacks in MPA establishing process.

The role of local government is significant, in the case of Green Island; the lack of local government support made the MPA process more difficult. The communication between central and local government has a huge gap due to interest conflicts and failure of achieving common understanding. (Hsu, 2008) In contrast, the case of Four Islands of Southern Penghu has strong support from local government so the plan was going smoothly during the MPA planning and communication process. Likewise, during a long preparation period, the plan of Dongsha Atoll Marine National Park had consulted with experts and government officials, and had been facilitated by the Council for Economic Planning and Development. One of reason for the success of Dongsha Atoll Marine National Park is attributed to the facilitative efforts to connect agencies. (Hsu, 2008)

After discussing the influence of above factors in the three case study areas, we can conclude that the remote location and inconvenient transportation will influence the willingness of tourists for traveling, so the tourism-oriented economic development would be limited by the factors of remoteness and transportation problems. However, this situation has brought an

advantage for MPA because of fewer different interest groups and number of stakeholders within the site area, the fewer complexities would be in communication and cooperation between government and people. Furthermore, the less hindrance establishing process from stakeholders contributes to efficient achievement of agreement and MPA designation.

In short, there are several issues needed to be considered for a success MPA development: 1) Stakeholders' perspectives and engagement are vital to MPA, especially when there are more numbers of residents and diverse in interests groups. In order to avoid strong opposition from stakeholders, understanding how to engagement stakeholder in the designation process, and what their perspectives are the keys to resolve the issues of conflicts between stakeholders and MPA development. 2) A strong relationship of cross level government is required, a vertical government communication and cooperation to form a unified position streamlines the MPA development.

Understanding the four key factors can give as a clearer picture and help reveal crucial challenges in the designation process of the MPAs. Based on the four factors, the next section is to discuss the challenges including information asymmetry, ecotourism development, and cross level coordination. The information asymmetry (Weime and Vining, 2011) may result from the insufficient transparency of the designation process in addition to the factor of remoteness. In terms of economic activities, the ecotourism development with in the National Park is considered as a solution balancing environment protection and social economic activates. Moreover, the local government support is importation to the designation of MPA as mentioned above; the Green Island and Four Island Southern Penghu National Park are the opposite cases show the cross level coordination problem. The following section will give a detailed-discussion of the challenges in the Designation of the MPAs.

Section 3 Challenges in the Designation of the MPAs

5.3.1 Information asymmetry

Information asymmetry (Weimer and Vining, 2011) which means information is not equally accessible to all those affected by it, and this is generally attributed to lead to unsuccessful MPA development. The information asymmetry causes from the low transparency in policy making or planning processes, lack of understanding, and poor communications. In the case of Green Island, the policy to establish a national park in Green Island has been halted in recent years, in part, due to the information asymmetry. A strong top-down approach by the order from Executive Yuan left no room for public participation during the process. Therefore, without sufficient communication, it's hard for stakeholders to voice on the concerns of conflicts interests and misunderstanding grows more serious.

Consequently, the information asymmetry causes some people to distrust the government due to the limited understandings from each side. The people are strongly against the policy often times because the government did not encourage high transparency in the designation process and offered sufficient information in support of its proposal. One interviewee has said that the government has kept low transparency for the purpose of "The less people know, the less conflict". From the past experiences, people do not trust that the government would take their needs into consideration. It turns out that the Green Island MPAs was unable to be set up because of local government and other opposition.

In contrast we can find efforts to decrease the information asymmetry during the MPAs designation process. The government agencies have informed the local groups about public hearing and announced the news about the Four Islands of Southern Penghu National Park process taking place through the public media such as newspaper, and internet. Despite these efforts most of the local people said they do not know anything about the Four Islands of

Southern Penghu National Park. Before it is going to be established, the government has created a no take area by legislation (MNPH, 2012a). However, only very few local fisherman have heard that.

In short, since the central government had announced the end of efforts to establish a MPA for Green Island it has become unable to preserve the values of ecosystem services and prevent negative impacts in the waters surrounding the Island. The recent situation does not satisfy the goal of protecting the ecological environment but it is responsive to the local opposition. The continuing lack of open information and transparency in the process makes the policy unfeasible. Maintaining the status quo might keep the economic development but it would make the environment worse. Overall, by addressing these possible causes of the problem and public concerns, it can be concluded that the difficulties existing in MPAs development in Taiwan result from two dimensional conflicts. One is the conflict among central and local governments; the other one is between environmental protection and economic development.

5.3.2 Ecotourism development

The second issue is that the ecotourism has been promoted by the government as a solution to balance the environmental conservation and economic development. The Green Island as an example was encouraged to promote bicycle usage to replace motorcycle usage on the island and creating specialty industries to comply with the sustainable development of local businesses on the island as well as to reduce the carbon emissions (Ministry of Foreign Affairs, 2010). At present, it is notable that certain traditional businesses would be affected by developing ecotourism like motorcycle rental business, the government has tended to diversify marketing to create added value on current industry which could create better net benefit outcomes by creating revenue and jobs opportunities.

The fishery activity is not the major sources of income, so the negative impact caused by overfishing is less than other cases. The main impact is on the terrestrial ecosystem of Green Island instead of marine ecosystem, because there are up to 2000 tourists visiting Green Island per day during the peak season. The major transportation sector on the island is motorcycles and it is unclear how much shift to bicycle traffic could be anticipated. Although in recent years the local government has encouraged replacing motorcycles with bikes to achieve the goals of ecotourism, unfortunately the outcome is not as optimistic as expected. The coastal roads cross the seasonal migration pathways of endangered species like coconut crabs which are threatened since most crabs migrate landward from the sea during the mature stage, and then return to the sea during the spawning period. Therefore, the populations of crabs on Green Island are declining at an unprecedented rate due to anthropogenic interference. (Coconut Crab Conservation Network, 2006) Some tourists and locals have mentioned that they think the ecotourism still has limited benefits to them as well as the environment in the case of Green Island during the interviews by the author in Green Island. The lessons for the future MPA development such as the Four Islands of Southern Penghu National Park is that the government needs to consider how to designate the MPAs for the purpose of ecotourism to balance the environmental conservation and economic growth.

5.3.3 Cross Level Coordination

The third issue is that the traditional cross levels of government sectors approach do not work well due to the political positioning of various sectors, and the poor coordination based on geographical district-based government system. Without the support by local agencies and people, the MPA designation policy in practice becomes infeasible. A top-down only approach cannot make it work either; in fact, environmental management requires agencies to be cross-scale integrated.

The political positioning is one of the reasons for the problem of cross-level governmental coordination. The top-down approach is based on the motivation of political competition without a sound consideration and planning. This condition was apparent in Green Island case in which the leading government administration was being asked to meet conflicting goals from different interest groups but it resulted in political choices failing to maximize social values.

Moreover, the geographical district-based government system reflects the private self-interest motivation for the government to participate. It is also involved in the implementation problems which exist in central-local government power division with different types and levels of authorities. The central government often relies on lower levels of governments to implement policies (Weimer and Vining, 2011). For instance, the Executive Yuan which is part of the central government intended to protect the natural environment of the Green Island which resulted in a plan for national park designation which, among other things, would limit the number of tourists. The Green Island local government and residents were unwilling to lose the revenue source of tourism. Therefore it is hard to seek agreement between central and local governments about designation of a national park especially in the geographical district-based representation system.

A collaborative approach can be applied to the current governance structure in order to promote a sense of unity and teamwork among managers and supervisors within a project the establishment of a marine national park. Promoting a bottom-up approach from local communities is a significant step that could be attempted. Community-based management which relies on stakeholder collaboration is associated with willingness to confront the fundamental causes of the ecological decline (Layzer, 2008). This approach can start with establishing a focus group and workshops to engage stakeholders and officials. The

communities can gather through directed communication with relevant organizations, interest groups, and individuals during meetings. They can share knowledge, information, and techniques to minimize the disconnections, and also look for win-win solutions for all. In the Green Island case, the Taitung County Government could have played a key role as a bridge to build up the trust and connections between central government and locals but it did not. The roles of local government are two: one is to implement the national level policy on-the-ground, and provide adequate information to locals; the other is to bring public voice to the table to help central government take public opinion into consideration, and then adopt proper management goals and objectives in the designation of a marine national park.

The central-local government had a unified voice and no effective local government or stakeholder opposition in the case of designating the Dongsha Atoll National Park. The big question is if the central government proposal for the Four Islands of Southern Penghu marine national park can learn from the previous cases how to design the process to take advantage of favorable local government and stakeholder interests to obtain a more successful result. It appears that this is working.

The lesson we have learned is that both central government entities and local groups need to have deeper understanding and acceptance of good practices in transparency and accountability, e.g., by sharing traditional environment knowledge and better evaluation of environmental and social impact. Building trust and open access communication are very important to effective establishment of protection measures in marine environments. Although a bottom-up approach might increase the social cost, and also might involve some conflicts between different interest groups of their preferred usage in natural resources, it makes sense to allow the public to participate in the planning process and make sure they have sufficient information to successfully overcome the difficulties in implementation on the

ground by enhancing collaborative capacity among the multi agencies and groups.

5.3.4 Summary

In summary, the Four Southern Islands of Penghu National Park proposal case is different than the other cases of Dongsha Atoll National Park and Green Island that resulted from conflicts in fishery activities. On the contrary, it encounters less fishery conflicts because the no-take area is created based on the agreement from the negotiation between the government and fisherman representatives. An dditional reason for less fishery conflict is that the marine area with in the proposed national park is not a commercial fishery site, only illegal fishery activities by locals occurred there. Under the agreement the government would pay more attention to regulation enforcement in the proposed marine national park.

To sum up**,** after interviewing stakeholders who live in the Penghu, local government agencies and tourists, I can make three conclusions: 1) the lack of understanding of the National Park MPA development would result in low acceptance from stakeholders. 2) The trust between governments and people should be built on communication, education and cooperation in order to reduce the conflicts during the process. The case of Four Islands of Southern Penghu National Park shows a good example of communication in negotiating the agreement on the no-take area boundary between the government and fisherman representatives. Although the government has been aware of importance of the stakeholder engagement and has consulted with the locals during the designation process, there still is room for improvement such as increasing the policy transparency for the public. The government should give the stakeholders confidence by great efforts on educating them about what is the National Park MPA about and how it is planned to implement it. 3) The general public which has no directly impacted interest would oftentimes be supportive in the MPAs development and expects recovery of marine natural resources to result. They are happy to

see the government create more tourism destinations that protect the natural environment.

Section 4 Application of the SES Conceptual Model in the Four Island of Southern Penghu National Park case

5.4.1 The Four Steps of SES Model Application

As discussed in the literature review, the SES can explain the change of ecosystem characteristics when there are increasing social activities imposed on the environment in a specific area. The SES can also help us to understand and envision how the social system reacts to the feedbacks from the ecosystem changes. Based on this principle, this study attempts to apply the SES framework to the Four Islands of Southern Penghu National Park case. This research has outlined four steps of the SES changes in practical terms. (See Chapter 3, Figure. 2) Here we examine the application of the SES in the Four Islands of Southern Penghu National Park case to address the potential outcomes.

The first SES step shows an ideal situation that the interactions between the social system and ecological system in a balanced condition. In the Four Islands of Southern Penghu National Park, the human impact does not bring much pressure on the environment. Currently, the population in the Four Islands of the proposed national park is very low, and there is a not large commercial fishery activity within the surrounding waters. The other point we found from the interview is that the government and stakeholders have been aware of the serious impact of illegal fishery activities.

The second SES step illustrates the situation when the proposed marine national park MPA is designed and being implemented in Penghu. The national park project is to develop ecotourism and infrastructure and transportation are the main topics that the government has to face. This SES step describes how the planned social activities would impact on the environment, as well as change the interact patterns. The ecological system will adjust to the changes. The natural resilience cannot always keep the system in balance. If there is an

overload of anthropogenic disturbance, it might constrain ecological system function.

Looking at the case in Penghu, if there are not adequate tools for ecotourism management of the national park such as the control of the number of tourists and the environmental assessment for the construction plan, the national park MPA would find it hard to achieve its conservation goals. The example of fishery can also explain this situation. Although the national park MPA is proposed to designate a small area as a no-take area, the fishery problem is not about overfishing within that area. Instead, the problem is illegal fishery, e.g., blast fishing and spearfishing. These activities have destroyed the coral reef and resulted in the fish habitats being damaged. Therefore, the enforcement of law by the Coast Guard to prohibit illegal fishery activities is the key to reduce the negative impacts on the ecosystem. By doing so, the appropriate social input such as a feasible policy or sound regulations would allow the ecosystem to recover, which would further provide positive feedbacks and service for human society. The interaction would strengthen the relationship of the social and ecological system.

In contrast, if the social inputs like National Park MPA cannot really solve the environmental problem or even bring more serious impacts on the natural system, the consequence of constrained ecosystem function would lead to negative feedbacks on the social system as shown in the third SES step of the model. An explicit example of the national park project would be if the ecotourism development plan lacked a scenario about the incidents of pollution from increasing ferry transportation and did not plan for how to deal with the issue.

Finally, the last step represents a new model of the social-ecological framework which can provide the decision makers a comprehensive picture to develop the national park plan and relevant management policy. This framework emphasizes sound MPA governance which requires taking the complex interaction between the human society and environment into

account during the MPA designation process. Some questions would be raised such as how the stakeholders' behaviors and perspectives change after the National Park MPA established, e.g., changes in fishery activities, and how these changes influence the environment. This research anticipates practical application of the SES concept to the future MPAs development cases. Therefore, the Four Islands of Southern Penghu National Park is preliminary testing the four steps of the SES frameworks.

Here, we can see that the four steps of the SES approach can explain series ongoing changes of the social system and ecosystem when the marine national park proposal process is taking place. The SES framework can also help the decision maker to develop scenarios or policy alternatives by listing different potential consequences of the social-ecosystem interaction.

5.4.2 Summary

In conclusion, when the decision makers look into the environment issues, they often fail to have an integrated approach to really understand the problem itself and consider the cumulative impacts. For example, the fishery shortage would cause the reduction in revenue that the fisherman can earn, but the action that the government would take is to help fishermen shift fishery industry to the ecotourism development to increase their revenue. This would also reduce damage to the coral habitats to which visitors are attracted because to keep the coral habitats can bring more fish species. That is the purpose of visitors coming to experience the beauty of the ocean.

Frankly speaking this is a beneficial policy alternative from the social perspective, but what really matters is the fishery problems resulting from illegal fishery activities and abnormal climate change like cold current. The question is how to fix that problem and restore ecosystem function? Does the decision maker find the solution in protection of fisheries? Would the ecotourism development bring the negative impacts and possibly make the current

situation worse? These questions are being raised and are difficult to answer, but a sound MPA designation has to take all these into account. Therefore, the SES framework emphasizes how the cumulative influences affect the resilience which could strengthen or weaken the social-environmental relationship. Ultimately the SES can give the decision makers a more comprehensive idea to designate the National Park MPA with consideration of unique social context and the ecosystem features.

Chaper 6 Conclusion and Recommendations

To better understand the stakeholders' engagement in the process of the MPA designation, and to assess the roles and degree of the stakeholder influence, this research applies a qualitative approach by using literature review concerning stakeholder processes in MPA designation. This study uses the semi-structured interview technique to collect information in Penghu. The methodology is used to provide an insight of stakeholders' perspectives on the marine national park as MPAs.

In the review of the three cases, this study identifies four key influential factors for developing the marine national park as MPAs in Taiwan. After looking into the failure case of Green Island and the successful case of Dongsha Atoll National Park, this study shifts to focus on what we can learn from the past experience to apply to the current case of the recently designated Four Islands of Southern Penghu National Park. MPAs are designated not only as a no-take areas for full ecosystem preservation, but also they can be designated as marine national parks for ecotourism development as a destination for the public. Lastly, this study applies the SES framework to the National Park MPA designation by introducing the concept of resilience.

This research concludes with several key findings:

1. Agreement on the boundary of the no take area within the National Park MPA in Penghu between the government and the locals is represented as the outcome of their efforts through the negotiation and communication.
2. As for MPAs, the stakeholders expect that the government would create more opportunities such as educational activities and a platform for them to make their voices heard. This filled the gap of insufficient information for them to understand the policy. Also they expect the MPAs establishment will bring the improvements in the environment,

transportation and economy for local people. The trust between government and people may be built by more communication and transparency of the designation process.

3. Lack of cross level coordination is challenging to national park designation. The support from the local government plays a dominant role because it can facilitate the process and serve as a bridge between the local stakeholders and the central government.
4. The Social Ecological System framework can be applied to the designation process of the National Park MPA in order to have a larger picture for the decision maker to clarify the complex problem.

Based on the findings, this study is to provide some recommendations in terms of the stakeholders' participation in the policy planning and National Park MPA designation process. First, a degraded ecosystem can be attributed to impropriate designation and poor collaboration between government agencies and the locals, because the MPA cannot tackle to the core elements of the problem. To create a rigid MPA is not always the effective way to protect environment because the decision maker may not take into the stakeholders' concerns into account. To balance the social development is equally important as ecosystem conservation.

Unsound governance of MPAs will indirectly reflect negative outcomes on the ecosystem status. Importantly, many studies about reviewing the designation process have already pointed out that establishing marine protected areas will not only provide protection for the ecosystem but also help people gain benefit from the ecosystem. Hence, this issue is critical in marine environmental affairs and requires experts to find solutions. In other words, this study recommends a creative designation of MPA, taking the local features of environmental and social conditions into account by the SES lens can really meet the goal of environment conservation and satisfy the needs of different parties.

Second, the lead agency has to obtain the adaptive capacity which allows government agencies to learn and adjust the tools and methods for the policy in the decision making process. For example, the government did learn a lesson from the Green Island so it changed it approach in the case of the Four Islands of Southern Penghu National Park by talking and listening to stakeholders during the designation process. Moreover, no matter what the policy is in the planning stage or in the implementation stage, the whole process is dynamic, so taking stakeholder's thoughts and combining of the strengths from these recommended alternatives can assist the government agencies to create win-win outcomes.

The SES model might not applicable to every case. The use of the SES framework for MPAs development needs to be tested and studied. The social context and geographic features are key elements to dominate the interactions of the social system and the ecological system. Although this research has shown the advantages of SES framework in the MPA designation and decision making process in dealing with the complex problems involving both social and dynamic environmental issues, the SES framework might leave room to be adjusted based on differences in the social context and geographic features. In the end, this study also suggests the SES framework applies to the MPA development not only for the fishery issues, but also can be used in the ecotourism development issues for future research.

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Appendix A. Interview Questions

1. What do you think the about current situation in marine natural resources management?

   [if positive] Why? Who will be benefit from current situation?

   [if negative] Could please describe the situation? [Probe for details about temporal trends, circumstances, where, with whom, etc. Why do they think that way?]

2. How do you give your opinions or suggestions to the government agency? By what approach?
   [Probe: , how?]

   Are there types of communication or interaction with government agency you have experienced?
   [Probe: What are they?]

3. What do you think about marine protected areas? Do you understand the purpose and values of protected areas?
   [Probe: what is the core value of MPAs to you in terms of marine natural resources ?]

4. Do you think a marine protected areas would bring benefits or conflicts for you?
   [Probe: Imagine how your life will be affected by establishing marine protected areas?]

5. What the challenge you imagine about the on-the-ground implementation of fishery regulatory restrictions within the MPA?

6. What is the best way you think to enhance the communication between by government and locals?
   [Probe: why? And what is your expectation?]

7. Do you any suggestion or comments on improving the marine environmental condition on the islands?
   [Probe: How do you think that likely is?]

8. Thank you for your time. We're just about done with the interview, but before we wrap up, I want to ask if there was anything else you would like to tell me about your feelings for MPAs, or anything you would like to share with me about MPA designation, policy making process?

Appendix B1: Dongsha Atoll National Park Designation Timeline

2003/8/6	Council for Economic Planning and Development, Executive Yuan, instructed that “the restoration and conservation of the Dongsha Atoll is of high importance. Hence, the Coast Guard Administration’s law enforcement power should be enhanced. Also, taking practicality, specialty and performance into consideration, it is suggested that the Ministry of the Interior and relevant agencies should deliberate upon whether it is necessary to set up a marine national park and designate a specific agency to manage it. A feasibility plan should be drawn and sent to the Executive Yuan for approval.”
2004/1/9	The Construction and Planning Agency, Ministry of the Interior submitted the “Feasibility Assessment and Zoning Area of Dongsha Marine National Park” to Executive Yuan.
2004/2/2	The report was referred to the Council for Economic Planning and Development for discussion at the 1163rd committee meeting.
2004/2/25	Based on the Executive Yuan Tai Nei Zi No. 0930006751, the Executive Yuan approved the “Feasibility Assessment and Zoning Area of Dongsha Atoll National Park” proposed by the Ministry of the Interior.
2004/3/31	On the “1st Meeting of Steering Committee on Marine Affairs, Executive Yuan” held by the Executive Yuan, it was also pointed out that the Executive Yuan’s approval of the setting up of a “marine national park” in Dongsha had declared that the marine ecological environment of outlying islands would be protected. It was listed as a sub-project of the marine resources unit. The bio-diversity unit of the National Council for Sustainable Development, Executive Yuan also put it on the list of projects to be implemented.

2006/12/19	Executive Yuan approved the “Dongsha Marine National Park Project (draft)” proposed by the Ministry of the Interior. Also, based on the discussions concluded at the 1273rd committee meeting held by the Council for Economic Planning and Development, the Ministry of the Interior should modify the name of the project to “Dongsha Atoll National Park Project” in order to emphasize the conserved Dongsha Atoll ecosystem and landscape features. The “Marine National Park Headquarters” was established to oversee the Dongsha Atoll and assess the possibility of setting up a marine national park at Green Island, the Three Northern Islands or Penghu Islands in order to achieve the function of integrated management.
2007/1/17	The Ministry of the Interior formally publicized the “Dongsha Atoll National Park Plan and Drawing”. The Dongsha Atoll National Park has become the seventh national park in Taiwan, and it is also the first marine national park.
2007/10/4	Marine National Park Headquarters was formally founded in Kaohsiung city. This marks an important milestone for Taiwan’s marine conservation.

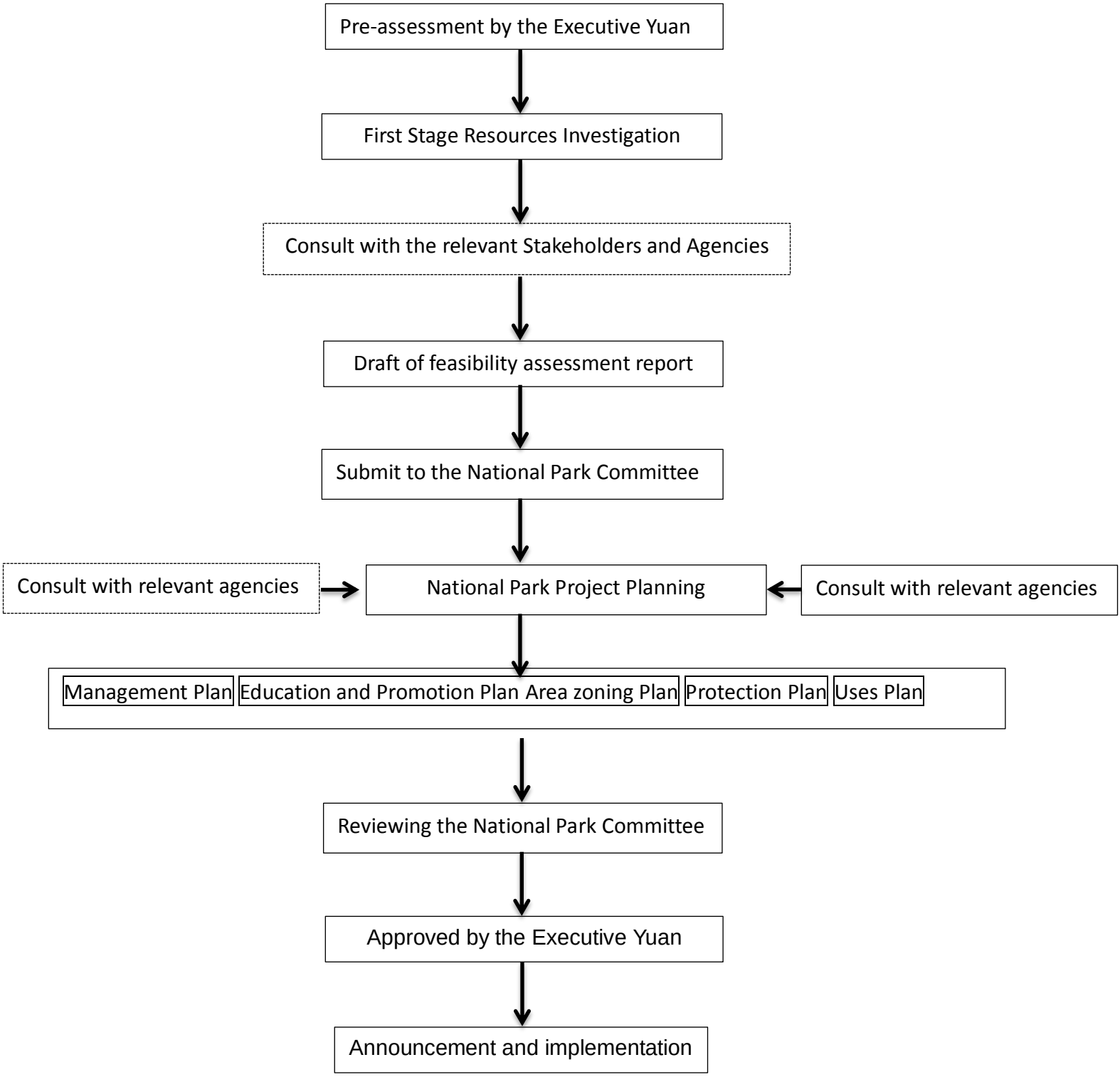
Source: Modified From Marine National Park Headquarters Website (2013)

Appendix B2：Four Islands of Southern Penghu National Park DesignationTimeline

2003/8/6	Marine National Park Headquarters was created to take over the task of planning the Four Islands of Southern Penghu National Park
2009	Marine National Park Headquarters conducted the investigations of ecological resources, terrestrial ecosystem, landscape of the Four Islands of Southern Penghu and surroundings.
2010/12/21	The Construction and Planning Agency, Ministry of the Interior submitted the “Feasibility Assessment and Zoning Area of Four Islands of Southern Penghu National Park” to Executive Yuan.
2011	Marine National Park Headquarters conducted a series of investigations including researches on historical cultural resources, ecotourism planning, fishery resource and ecological sensitive areas.
2011/12/29	The report was referred to the Council for Economic Planning and Development for discussion at the 1163rd committee meeting.
2012/1/30	Based on the Executive Yuan Tai Nei Zi No. 1010121882, the Executive Yuan approved the “Feasibility Assessment and Zoning Area of Four Islands of Southern Penghu National Park” proposed by the Ministry of the Interior.
2012	Marine National Park Headquarters has held four public hearings to directly communicate with stakeholders and share information.
2013, August	The first draft of the Four Islands of Southern Penghu National Park project submitted to the Executive Yuan for reviewing

Source: Adapted from the first draft of the Four Islands of Southern Penghu National Park project (2012)

Appendix C: Flow chart of the designation and planning process of the Four Islands of Southern Penghu National Park



Sources: Adapted from the first draft of the Four Islands of Southern Penghu National Park project (2012)