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GAINING AN UNDERSTANDING IN THE MULTI-LEVEL GOVERNANCE OF MARINE PROTECTED AREA MANAGEMENT IN VIETNAM – CASE STUDY OF THE CON DAO ISLANDS



Gaining an understanding in the multi-level governance of marine protected area management in Vietnam – Case study of the Con Dao islands

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PREFACE/ACKNOWLEDGEMENT

The first focus of this thesis was on the coral reefs within the marine protected area of the Con Dao National Park. During the field study many challenges were encountered on performing research, which related to the multi-level governance of marine protected areas in Vietnam. Therefore, the multi-level governance of marine protected areas in Vietnam and that of the Con Dao National Park became the new focus point of this thesis.

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ABSTRACT

In 2010 the decision was made to approve for the establishment of 16 marine protected areas in Vietnams national system. One of the established marine protected areas is the Con Dao National Park where this field study took place between 21 March and 11 May, 2018. Marine protected areas in Vietnam have been established under different national, provincial, and local jurisdictions with different objectives, rules and management approaches. The original purpose of this study was to conduct a first assessment of the coral reefs on Con Dao. However, due to challenges faced during the field study on Con Dao, the purpose of this study became to find out how the complex multi-level governance of marine protected area designation and management in Vietnam works and how this related back to the encountered challenges. This thesis study looked into the roles and relationships of the organizational governance structure of marine protected area designation and management in Vietnam and that of the Con Dao National Park. The study also looked into the observation made about the current ecological status of coral reefs surrounding the Con Dao islands.

The study found that the complexity of responsibility allocation and collaboration between multiple institutions involved in marine protected area management and governance has affected their efficiency and objectives in a negative way and has created challenges for the approval process of research. It was found that when wanting to conduct research in Vietnam it is important to consider the process for research approval first as this can be complicated and long, especially for the Con Dao islands. The definition of the marine protected area concept in Vietnam overlaps with the concepts of other protected areas. Hence, there have been confusions and overlaps within institutions, which are directly responsible for the protection of these areas. The governance institutions involved with the Con Dao National Park seemed relatively organized, although complex. It was found that marine protected areas in Vietnam function as government business enterprises, where it seemed that socio-economic development has been favored over conservation activities, which was also the case with the Con Dao National Park. It was found that the coral reefs surrounding Con Dao based on observations seemed in a good condition (50-75% live coral coverage). Overall, the impacts observed at every location are fishnets and the number of fish species was low.

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List of Abbreviations

CDNP	Con Dao National Park
DANIDA	Danish International Development Agency
DARD	Department of Agriculture and Rural Development
DOFI	Department of Fisheries
EEZ	Exclusive Economic Zone
IUCN	The International Union for Conservation of Nature
MARD	Ministry of Agriculture and Rural Development
MEE	Management Effectiveness Evaluation
MOFI	Ministry of Fishery
MONRE	Ministry of Natural Resources and Environment
MOSTE	Ministry of Science Technology and Environment
MoU	Memorandum of Understanding
MPA	Marine Protected Area
NGO	Non-governmental organization
PC	People's Committees
PM	Prime Minister
PPC	Provincial People's Committee
SCS	South China Sea
UNEP	United Nations Development Program
VASI	Vietnam Administration of Seas and Islands

1. INTRODUCTION

The coastal region is an important area for many people with an estimated 60% of the world's population living near the coast. It yields around 90% of global fisheries with up to 90% of marine species existing within the coastal zone and contains some of the most complex and productive ecosystems including; mangroves, estuaries, seagrass beds and coral reefs. Therefore, the marine and coastal ecosystems are very productive and create many social and economic benefits for communities (Thi Minh Hang, 2015).

Around the world, the human activities that benefit from the coastal zone have been overexploiting the region thereby threatening its sustainability and degrading coastal habitats with climate change exacerbating the situation (Thi Minh Hang, 2015) (Harley, et al., 2006). Coastal governance has been identified worldwide as a challenge for marine management with failures related back to governance such as institutional and budgetary support, and commitments (Bennett, et al., 2017) (Thi Minh Hang, 2015). The degradation of the important coastal region has set off a global commitment towards marine conservation. The following viewpoint was agreed upon by most policymakers, managers, scientists, and other participants across 154 countries and territories who attended the World Park Congress in 2003; *"the benefits of protected areas including marine protected areas (MPA's) can extend beyond the limits of spatial, temporal and social boundaries of protected areas"* (Van Trung Ho, 2011).

A large semi-enclosed coastal marine ecosystem is the South China Sea (SCS), which is seen as the global center of shallow water biodiversity that has provided coastal communities at bordering countries to rapidly develop (UNEP, 2007). Vietnam borders the whole Eastern half of the SCS making the SCS of great geostrategic importance for the country (Vu, 2013). Vietnam has a large marine area that is adjacent to over 3200 kilometers of coastline and contains over 3000 islands (UNEP, 2007). Coastal and marine areas have become very important in the economic development of Vietnam due to the high value of diverse marine resources and their large exclusive economic zone (EEZ) of appx. 1000.000km² - threefold the mainland area (Van Trung Ho, 2011). Coastal communities in Vietnam have the fastest economic development of the country as well as a rapid growing population. Coastal activities such as; oil exploration, fisheries, marine environment-based tourism and maritime transport, contribute to approximately half of Vietnam's annual GDP. The fisheries industry has been one of the fastest growing industries in Vietnam since 1990. The fast marine-resource based economic growth of the coastal region has produced challenges for the governance and management of the over-exploitation of the countries marine resources (Thi Minh Hang, 2015) (Thi Gam, 2013) (Van Trung Ho, 2011).

To add to global marine conservation efforts and management of its coastal activities, the government of Vietnam has committed itself to environmental protection and biodiversity conservation through policy making and practical implementation across different levels and scales. The government has joined international conventions on environmental protection and in 1998 a list of 15 MPA's were designated to form a national marine protected area network (Thi Minh Hang, 2015) (Van Trung Ho, 2011). The approval for the establishment of these MPA's was made in 2004 and in 2010 a masterplan for now 16 MPA's to be established through 2015 with a vision to 2020 was approved (fig. 1) (Thi Minh Hang, 2015). Up to 2014, 9 of the 16 MPA's have been established

including Con Dao, Nha Trang Bay, Con Co, Phu Quoc, Cat Ba, Hon Cau, Bach Long Vi, Cu Lao Cham, Nui Chua (Ministry of Natural Resources and Environment, 2014).

One of the MPA's that has been established is the Con Dao National Park (CDNP), created in 1993 and under the jurisdiction of the Ba Ria – Vung Tau province (CDNP, 2013) (UNDP, 2006-2010). Management of the marine area environment of Con Dao is conducted by the CDNP management board. The Con Dao archipelago is a conservation area that includes many important marine ecosystems with a large variety of species. The islands contain mangroves, seagrass beds, and about a 1000ha of coral reefs with a high diversity of more than 300 coral species and over 200 coral reef fish that have been recorded by previous studies (Van Trung Ho, 2011) (UNDP Viet Nam, 2011) (UNEP, 2007).



PROBLEM DESCRIPTION

MPA's in Vietnam are established under different national, provincial, and local jurisdictions with different objectives, rules and management approaches. The multi-level institutions involved in MPA designation, in combination with complications within the institutions, create challenges for conservation, management and governance processes within individual MPA's and the coordination between them (Van Trung Ho, Woodley, Cottrell, & Valentine, 2014). Some of these challenges were also faced during the field study on the Con Dao islands. Legislative frameworks, regulations, enforcement on regulations of Con Dao's MPA are unclear with only limited descriptions available. Even though the CDNP is an important conservation area containing essential coral reefs and high biodiversity, information on the coral reefs ecological status and reef management on Con Dao is limited and out-dated (Thi Thu Hien, et al., 2015) (UNDP, 2006-2010) (Huong Thuy Phan & van der Meeren, 2009) (CDNP, 2013).

PROBLEM STATEMENT

Due to the involvement of the complex multi-level governance of the marine protected areas in Vietnam and specifically on Con Dao, only limited recent data is available on the health of coral reefs and management of the MPA in Con Dao.

1.1 RESEARCH GOAL- AND QUESTIONS

RESEARCH GOAL

The aim of this study is to gain insight in three different components. (I) To gain an understanding in the organizational governance structure related to marine protected area management in Vietnam, (II) to provide an understanding in involved governance and stakeholders related to the field study and the Con Dao National Park (III) provide a description of observations made of the current ecological status of coral reefs surrounding the Con Dao islands.

MAIN QUESTION

How does the complex multi-level governance of MPA designation and management in Vietnam work and how does this relate to the challenges faced during the assessment of the current ecological status of coral reefs in the Con Dao National Park?

SUB-QUESTIONS

1. What are the roles and relationships of the organizational governance structure of MPA designation and management in Vietnam?
2. What are the roles and relationships of the organizational governance structure and stakeholders related to the Con Dao National Park?
3. What observations were made about the current ecological status of coral reefs surrounding the Con Dao islands?

2. METHODS & MATERIALS

2.1 STUDY SITE

The field-study took place on the Con Dao islands, which lie in the Ba Ria - Vung Tau Province in Southern Vietnam. There are a total of 16 islands and inlets that are centralized around the main island Con Son. The CDNP was established in 1993 and includes 5.998ha land area, 14.00ha marine area, and a marine buffer zone area of 20.500ha (fig. 2). The CDNP is very well known for its high biodiversity values that include tropical forests and a variety of important marine ecosystems such as coral reefs. Records of the islands have shown to have fringing coral reef areas of a 1000ha and coral reef fish densities ranging from 71 to 5.143 individuals per/500m². This is one of the highest reef fish densities compared to other shallow coral areas studied in Vietnam (Van Trung Ho, 2011) (CDNP, 2013) (Thi Thu Hien, et al., 2015). The research took place at seven locations within the MPA of the Con Dao islands (fig. 3).

All research locations are corals reefs, 4 of which were around Con Son Island, 2 around Hon Cau Island and 1 around Bay Cahn Island. A map of the research locations is shown in figure 3 and table 1 provides further details about the research locations. The locations were chosen because it was either a dive site, snorkel site and/or was easy accessible.

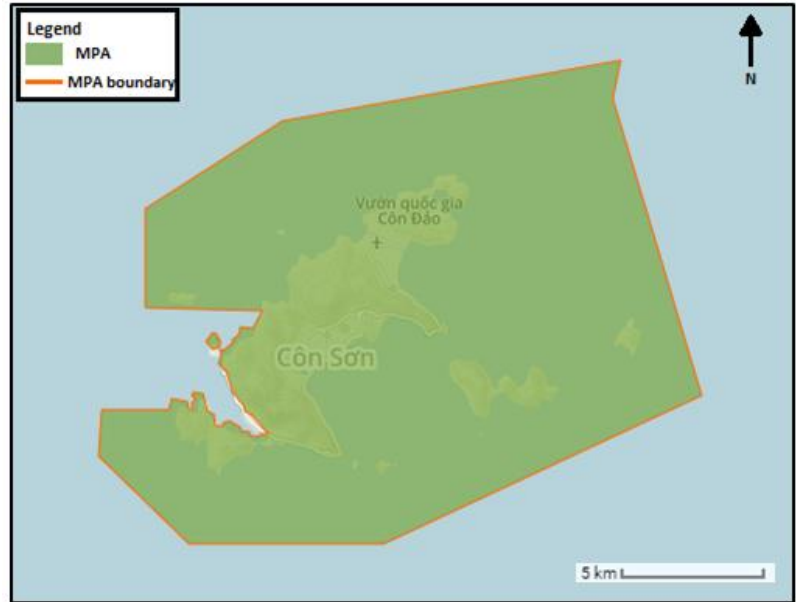


FIGURE 2 MPA OF CON DAO (MAPBOX - OPEN STEET MAP, 2014-2018)

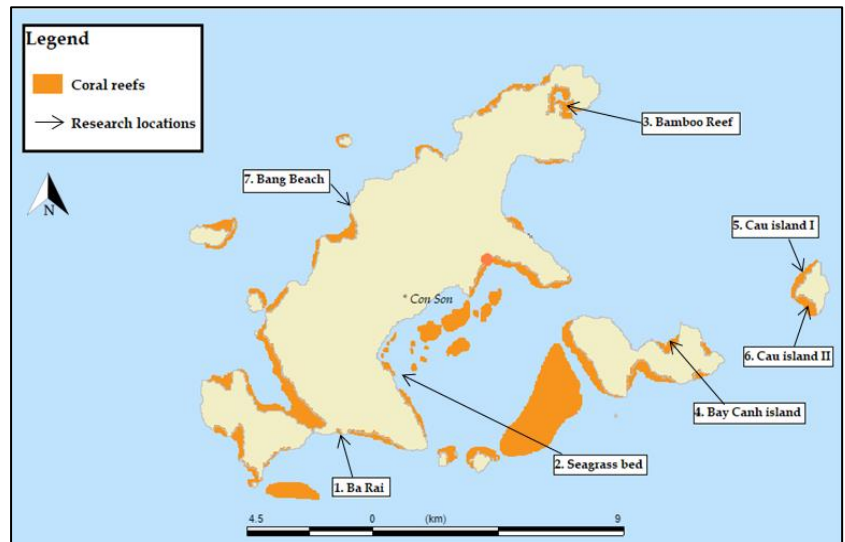


FIGURE 3 THE LOCATIONS OF THE SEVEN RESEARCH SITES AROUND THE CON DAO ISLANDS (REEFBASE, 2018)

TABLE 1 BASIC INFORMATION OF THE SEVEN CORAL RESEARCH SITES AROUND THE CON DAO ISLANDS

Site	Coordinates	Date	Sea water Temperature	Distance to nearest “city”	Designated zone*
1.	8.646487, 106.584107	01/05/2018	29°C	1.8km (Ben Dam)	Buffer zone
2.	8.653458, 106.608697	26/04/2018	-	2.8km (Con Son)	Buffer zone
3.	8.749322 106.657840	03/05/2018	28°C	9.2km (Con Son)	No-take zone
4.	8.672311 106.691969	03/05/2018	29°C	9.5km (Con Son)	Ecological development zone
5.	8.692536 106.735086	10/05/2018	29°C	14.2km (Con Son)	No take zone
6.	8.686059 106.736047	10/05/2018	29°C	14.5km (Con Son)	Ecological development zone
7.	8.722433 106.592350	05/05/2018	-	4km (Con Son)	Ecological development zone
* A detailed map of the Con Dao islands with designated zones can be found in Attachment I					

The MPA of the CDNP has 4 zones: No-take zone, ecological recovery zone, development zone and sea buffer zone (see Attachment I). According to the Biodiversity Law containing general rules for protected areas in Vietnam, MPA’s must have 3 basic zones. When designating a protected area, a buffer zone must also be determined for the prevention and decrease of negative impacts from outside the area. For instance, in the strictly protected area, most exploitation activities are forbidden including the passage of boats. In the development area exploitative activities are, in principle, allowed if they do not cause any harm to the habitat and species in the MPA. In the ecological recovery zone, resource collecting and fishing is not allowed (Vu, 2013).

2.2 DATA COLLECTION & ANALYSIS

The data collected for this study were both qualitative and quantitative using different methods. The qualitative data included an interview with the CDNP, document reviews and for the quantitative data, coral reef field observations and the ReefCheck method were used.

(I) Literature review

For this study information was mainly gathered through literature. It started with collecting as much reports as possible in the fields of MPA management in Vietnam, MPA designation in Vietnam, zoning plan of MPAs, the Con Dao National Park, governance processes in Vietnam, coral reef management in Vietnam and the Con Dao islands.

The data used for this study was analysed using the following steps:

- I. *Brief scanning for information:* Study reports, literature, government documents, national archive records were used to find information about the mentioned themes, but time of publication was not yet taken into account.
- II. *Summarizing information gathered from literature:* Before the research questions could be answered, the researchers selected the information and summarized the gathered information from the most recent and reliable literature sources to gain a better understanding of the topics and the history of MPA designation and coral reef research.
- III. *Identifying problems, gaps and differences in literature:* In this step the researchers compared the gathered data and identified the problems, gaps and differences between the literature sources.

(II) Interview

An in-depth interview was conducted with the CDNP to gain information and a better understanding on current coral reef management within the MPA and the CDNP activities. Only the CDNP was interviewed. The interview was conducted via oral intake and was semi-structured. The interview was conducted by other students still staying on Con Dao since the students of this thesis research had already left the island. Not all questions were answered. The interview guide and partial answers can be found in Attachment II.

(III) ReefCheck method and Field Observations

Observations and data was collected at the seven research locations between the 21st of March 2018 and the 11th of May 2018 using SCUBA GEAR and snorkelling gear. Only at location 1 the ReefCheck method was used due to time limitation and resources. This method is a standard method used for coral reef monitoring, e.g. in Vietnam and also on Con Dao (Reef Check Foundation, 2018) (Van Nguyen, 2011) (Van Nynguyen & Phan, 2007) (UNEP, 2007) (Hodgson & Waddell, 1997) (English, Wilkindson, & Baker, 1997).

The ReefCheck survey is conducted along a 100 meter transect line marked by a measuring tape laid at a constant depth. The transect line is divided into four 20m long segments with 5m interval between segments. This way, sufficient data can be obtained with a mean and standard deviation for each transect (Reef Check Foundation, 2018). The four segments are replicates that are used to understand the variability of the coral reef (Hill & Wilkinson, 2004). The first segment started at the beginning of the transect line, the second segment after an interval of at least 5m from the end of the first segment (similarly for the last two segments). A transect line diagram is presented in figure 4 (Hill, 2002).

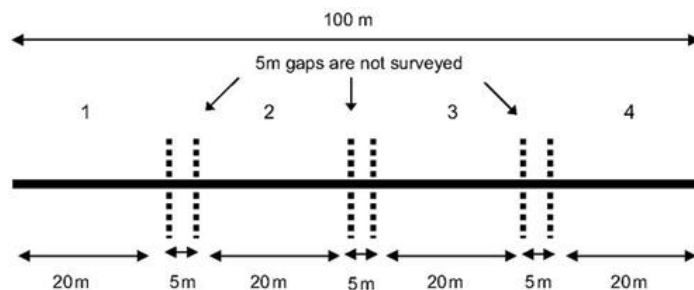


FIGURE 4 DIAGRAM OF A TRANSECT LINE. THIS 100M LINE IS DIVIDED INTO FOUR 20M SEGMENTS WITH A 5M GAP IN BETWEEN TO ENSURE SAMPLE INDEPENDENCE (HILL, 2002)

The following data is collected with the ReefCheck method:

- **Site description:** Before conducting data underwater, a site description is performed containing information on protection and basic information about the location. If the site has protection (e.g. zoning or banned activities) it will be recorded.
- **Physical parameters:** Depth and temperature was recorded with a dive computer (ZOOP Suunto Black). To avoid bias, the same diving computer will be used to record the physical parameters. The researcher will estimate visibility with their own eyes and will use the transect line as reference.
- **Anthropogenic data:** During the invertebrate abundance survey, anthropogenic impacts are assessed for coral damage via anchors, dynamite, or other factors and trash from fishing nets or general (e.g. plastic bags). The impact will be represented by median abundance ratings (0=non 1=low 2=medium 3=high) (Young, Harborne, & Raines, 2011). Additionally, bleaching and coral diseases are recorded, because of the potential impact on the coral reef.
- **Substrate coverage:** Collected by the Point Intercept method whereby the substrate category will be noted every 0.5m on the transect line (Reef Check Malaysia, 2013).
- **Fish abundance:** Fish is recorded along four 5 m wide (centred on the transect line, belt transect) by 20 m long segments. Fish seen up to 5m above the transect line are included (Reef Check Foundation, 2018) (Van Nguyen, 2011).
- **Invertebrate abundance:** One diver counted the indicator invertebrates along the same four 20 m x 5 m belt transect (Reef Check Foundation, 2018) (Reef Check Malaysia, 2013).

In Attachment III the substrate categories, fish species and invertebrate species are listed for more details and the field sheets used during the field study are in Attachment IV

Additionally, for all locations, field observations about fish abundance, invertebrate abundance, site and anthropogenic impacts were gathered by multiple (5) researchers and are described in paragraph 3.3.3. The method used for the observations is rating scales. This method asks the researchers to make judgements about the variables important to determine the current ecological status also used with the ReefCheck method (Cohen, Manion, & Morrison, 2000). The researchers were asked to make a judgement about the percentage of hard coral coverage, soft coral coverage and dead coral (0% = rating 0, <25% = rating 1, 25-50% = rating 2, 50-75% = rating 3, >75% = rating 4). The researchers were also asked to make a judgement about how many of the impact damage they observed (Anchor damage, dynamite damage, fish nets, general trash or other) and if any of the following species has been observed Sea Urchins (*Diadema*), Sea Cucumbers (*Holothuriidae*), Giant Clam (*Tridacna spp.*), Butterflyfish (*Chaetodontidae*), Sweetlips/Grunts/Margates (*Haemulidae*), Snappers (*Lutjanidae*), Parrotfish (*Scaridae*) and Groupers (*Serranidae*).

The ReefCheck method was used at research site 1, Ba Ria. Ba Ria is located on the Southside of the main island Con Son. There was no available data on this reef and the map from the National Park including snorkel and diving areas (Attachment II) did not show a reef at this location Data at this location was collected with the ReefCheck method while snorkeling. For the locations 2 and 6; Seagrass bed & Hon Cau Island II, comparisons with previous results from reefcheck were made with results of secondary data sources.

3. RESULTS

3.1 RESEARCH QUESTION 1

Before getting into the current roles and relationships between organizational governance structures in Vietnam regarding MPA designation it is important to understand the history of how MPA's were introduced in Vietnam to better comprehend its current status.

3.1.1 STARTING POINT OF MPA DESIGNATION IN VIETNAM

With international awareness on environmental protection, Vietnam recognized the significance of increasing the protection of the marine environment to enhance its quality and sustainability (Thi Minh Hang, 2015).

1986	Renovation policy (Doi Moi) commenced a change towards a market-orientated economy. During Doi Moi, development was included by new perspectives on the sea, coastal area and the environment. These areas became important factors in the national economic development of the country.
1989	Starting point for MPA's in Vietnam began with the ratification of the Ramsar convention. First environmental protection regulations relating to coastal areas were established (Thi Minh Hang, 2015).
Beginning 1990s	Start of formulating and enforcing environmental protection policies and regulations. New policies focused more on environmental protection, resource conservation and sustainable development. Country still lacked integrated policies and laws for efficient management. Planning, management policies and insufficient investment for management activities meant the country was unable to keep up with the demands of economic development. Coastal development activities occurred rapidly without coastal resource planning within sectors (Thi Minh Hang, 2015).
1995	National System on Marine Environment Monitoring established at the local level and has provided valuable data for coastal zone management (Thi Minh Hang, 2015).
1997	Coastal and Marine Policy Directive implemented which acknowledged the need to build a strong coastal- and marine related economy. The General National Marine Development Policy was formulated in 1997 to ensure the efficient exploitation of renewable and non-renewable coastal and marine resources (Thi Minh Hang, 2015).
1999	15 MPA's were introduced and identified within the national system of Vietnam. Ordinance of Tourism enacted. Focusses on coastal tourism and ecotourism as important economic services. Further, it links tourism with coastal and marine conservation activities (Thi Minh Hang, 2015).
2001	First MPA approved: Hon Mun (Nha Trang Bay) (Ngoc, Flaaten, & Nguyen, 2009).
2003	Enactment of the Fishery Law (Decree 43/2003/ND-CP) made the approval of the 15 MPA's official (Thi Minh Hang, 2015).
2007	Former Ministry of Fisheries (MOFI) merged into the Ministry of Rural and Agricultural Development (MARD) to become the Department of Fisheries (DOFI) (Thi Minh Hang, 2015) (Vu, 2013).

2008	Establishment of the Vietnam Administration of Seas and Islands (VASI) (Thi Minh Hang, 2015).
2010	Masterplan for the establishment of 16 MPA's to 2015 with vision to 2016 approved by the Prime Minister (PM) (Thi Minh Hang, 2015).

Between 2001-2009

Over the years Vietnam has received support from highly developed countries and international organizations for the protection of its marine ecosystems (Thanh, Lan, & Van Luong, 2005). With the support from international organization such as The Danish International Development Agency (DANIDA), World Bank-Global Environment Facility (WB-GEF) and the International Union for Conservation of Nature (IUCN), the first 5 pilot MPA's of Vietnam were established (Thi Minh Hang, 2015). Between 2001 and 2009 5 pilot MPA sites, as part of the 15 MPA's identified in 1999 (Hon Mun 2001, Nui Chua 2003, Cu Lao Cham 2005, Phu Quoc 2007, Con Co 2009), were established (Thi Minh Hang, 2015) (Kimura, Tun, & Chou, 2014). In 2001, Hon Mun (Nha Trang Bay) was the first pilot MPA to be established. The site was selected, because at the time it had the highest biodiversity in Vietnam.

The pilot MPA sites were based on the marine biodiversity regions in Vietnam. The regions were based on the distribution of reef-building coral species. The MPA's were established as pilot models to share experience and lessons learnt to other MPA's that would follow in the future. Most of the MPA's were established based on biological values rather than social-economic conditions for local communities. Each MPA was established within a specific context, ex. MPA managers and practitioners relied much on experience of international human resources and mostly followed the learning by doing approach (Van Trung Ho, 2011).

3.1.2 CURRENT MASTERPLAN FOR MPA ESTABLISHMENT

In 2010 the masterplan for the establishment of now 16 MPA's to 2015 with a vision to 2020 was approved by the Prime Minister (table. 2) (Decision 742/TTg-) (Thi Minh Hang, 2015) (Vietnam Law & Legal Forum, 2010). The total planned area of the marine network system consists out of 270.271ha and 169.617ha of marine area. 57% of known coral reef area's in the coastal waters is represented and supported inside the declared MPA's (Kimura, Tun, & Chou, 2014). It is stated in the decision that for the 5 pilot MPA's detailed plans will be revised and adjusted. The decisions viewpoints are as follows:

1. To plan the system of marine conservation zones aiming to protect and conserve aquatic resources, protect marine eco-environment, serve the sustainable development of the fisheries sector and importantly contribute to the protection of marine eco-environment.
2. To regard construction and development of marine conservation zones as an urgent and long-term task of all branches and authorities as well as the responsibility and interest of coastal and island communities.
3. To step by step diversify forms of investment to encourage and attract domestic and foreign investors, scientists and international organizations and, at the same time, promote the participation of coastal and island communities so as to ensure sustainable and effective management of marine conservation zones.

The full decision document can be found in Attachment V (Vietnam Law & Legal Forum, 2010).

MPA's in Vietnam can be categorized into 3 groups: (I) externally funded from their time of establishment (II) existing MPA's within National Parks (III) newly established by the government (Thi Minh Hang, 2015). Cat Ba and Con Dao were established by extending the marine component of the existing National Parks; these are under the jurisdiction of MARD. The first two official MPA's were Hon Mun (Nha Tranh Bay) and Cu Lao Cham in the early 2000's, which had the same institutional model under administrative jurisdiction of the PPC and technical supervision by the former MOFI. Both were supported financially by international organizations and had strong commitment by the Government through MOFI. Phu Quoc MPA was established as a demonstration site funded by the United Nations Environmental Program (UNEP) and supplemented by technical and financial support of DANIDA. The MPA's jurisdiction lies with the provincial sectoral department- Department of Agriculture and Rural Development (DARD). Some other small MPA's (not listed, ex. Ran Trao), were formed by local authority initiatives and communities with support from Non-Governmental Organizations (NGO) (Van Trung Ho, Woodley, Cottrell, & Valentine, 2014).

Up to 2014, 9 MPA's have been established and planned based on the 2010 masterplan (table. 2) (Ministry of Natural Resources and Environment, 2014).

TABLE 2 LIST OF VIETNAM'S 16 MARINE CONSERVATION ZONES TO 2015 AND VISION TO 2020. ESTABLISHED 9 MARINE CONSERVATION ZONES ARE SHOWN IN GREEN (THI MINH HANG, 2015) (MINISTRY OF NATURAL RESOURCES AND ENVIRONMENT, 2014) (VIETNAM LAW & LEGAL FORUM, 2010)

No.	Name of marine conservation zone/province	Year of estbl.	Support of establishment	Implementation by	Total area (hectare)	Sea area (hectare)
1	Cat Ba/Hai Phong*	1986*	MARD	DARD	20,700	10,900
2	Con Dao/Ba Ria - Vung Tau*	1993*	MARD	PPC	29,400	23,000
3	Nha Trang bay (Hon Mun)/Khanh Hoa	2001	DANIDA/IUCN	PPC	15,000	12,000
4	Nui Chua/Ninh Thuan*	2003	DANIDA/IUCN	PPC	29,865	7,352
5	Cu Lao Cham (Cham islet)/Quang Nam	2005	DANIDA/IUCN	PPC	8,265	6,716
6	Phu Quoc/Kien Giang	2007	DANIDA/IUCN	DARD	33,657	18,700
7	Con Co/Quang Tri	2009	DANIDA/IUCN	DARD	2,490	2,140
8	Hon Cau/Binh Thuan	2011	DANIDA/IUCN	DARD	12,500	12,390
9	Bach Long Vi/Hai Phong	2013	MARD	DARD	20,700	10,900
10	Phu Quy/Binh Thuan		MARD	n/a	18,980	16,680
11	Ly Son/Quang Ngai		MARD	n/a	7,925	7,113
12	Hai Van-Son Tra/Thua Thien Hue - Da Nang		MARD	n/a	17,039	7,626
13	Nam Yet/Khanh Hoa		MARD	n/a	35,000	20,000
14	Co To/Quang Ninh		MARD	n/a	7,850	4,000
15	Dao Tran (Tran island)/Quang Ninh		MARD	n/a	4,200	3,900
16	Hon Me/Thanh Hoa		MARD	n/a	6,700	6,200

*First established as National Parks having a marine component

3.1.3 INVOLVED GOVERNMENT INSTITUTIONS AND CHALLENGES

3.1.3.1 GOVERNMENT STRUCTURE

Figure 5 shows the government's organizational structure of Vietnam. The governance system is hierarchically organized into four levels: National (central) level; Provincial level; District level; Commune level. The hierarchy shows the vertical division of power and responsibility is shared between the government system, state system and national assembly system (Thi Minh Hang, 2015).

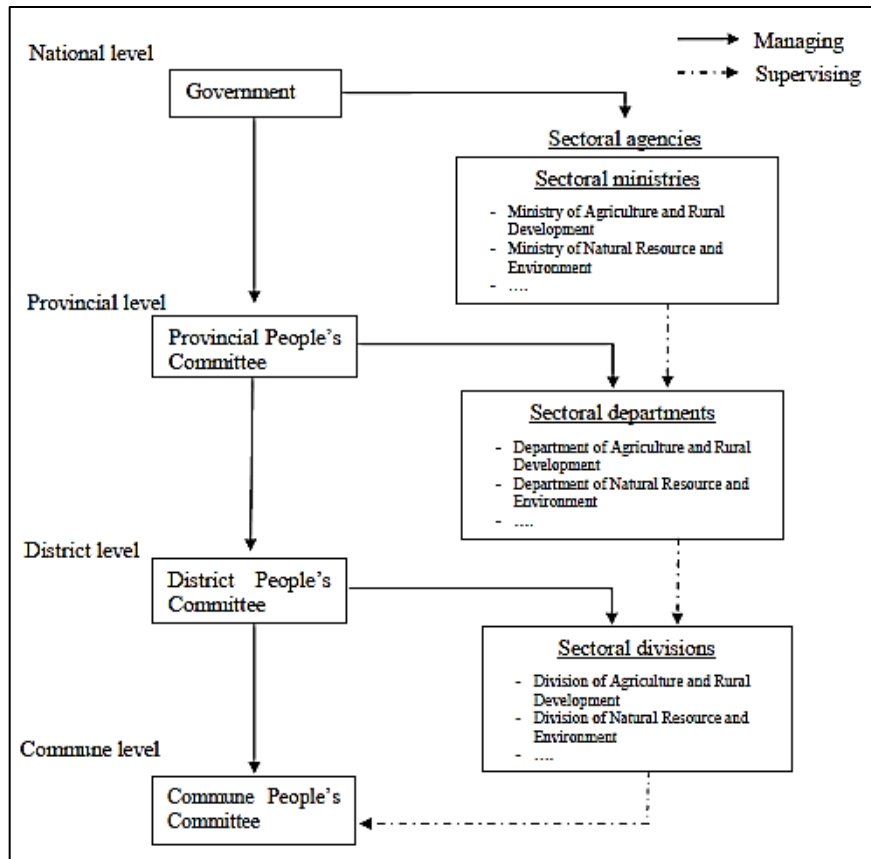


FIGURE 5 THE VIETNAM GOVERNMENT ORGANIZATIONAL STRUCTURE (VAN TRUNG HO, 2011)

The establishment, management and planning of MPA's in Vietnam is shared between the Prime Minister (PM), the Government (national level), MARD and the PPC.

- I. PM – must adopt the planning of the MPA's system. The PM makes the decision to establish national parks, MPA's of an international and/or national importance, MPAs which are managed by different ministries, and MPA's that are located in the territories of more than two provinces.
- II. Government (national level) – Issues the management statutes for MPA's of international/national importance.

- III. MARD – Responsible for submitting proposals for MPA planning to the PM as well as organizing the management of MPA's that the PM establishes.
 - IV. PPC – May designate, issue management statutes and manage MPA's other than those falling within the competence of the PM.
- (Vu, 2013)

According to administrative management regulations of Vietnam, a government agency can be designated as one of 3 types: (I) administrative management agency, (II) government enterprise, or a (III) government business enterprise. They have different mandates and legal rights and are constrained by specific regulations. Administrative agencies consult People's Committees (PC) in the execution of formal regulations, other functional departments and enterprises assist PC's in implementing and delivering socio-economic activities and services. Usually, a MPA is set-up under one agency such as a PC for general administrative management, and another sectoral agency for technical guidance and regulations. When a MPA is established, its management board can be under national, provincial or lower levels and can also be designed as an administrative agency, government enterprise or a government business enterprise (Van Trung Ho, 2011).

A management board is established for each MPA. Tasks include;

- Organize aquatic species conservation and development activities in the MPA;
- Prevent pollution, outbreak of+ diseases, other harmful activities;
- Monitor and regularly report to relevant authorities on the biodiversity and environmental status of the MPA;
- Educate the communities living in the MPA and the surrounding area and assist them to find activities for alternative income.

(Vu, 2013) (Minh Khue, 2009)

Financing for the MPA's come from; State budget, revenues from tourism/other service activities, donations and fees for administration and use of the MPA. The State encourages individuals and organizations to invest in the protection and development of MPA's (Vu, 2013).

3.1.3.2 CHALLENGES RELATED TO MPA GOVERNANCE AND MANAGEMENT

In Vietnam there is a complexity in formal institutions that creates challenges for MPA governance. The country has committed itself towards environmental protection by signing several international conventions, implementing environmental protection strategies at national level, and by securing socio-economic development closely to environmental protection and improvement (Van Trung Ho, 2011).

THE MPA CONCEPT

The establishment and management of MPA's have been a difficult process due to underdeveloped institutions and a limited knowledge of the MPA concept. The MPA concept remains quite new in Vietnam. This was also shown during the establishment of the first 5 pilot MPA's. Challenges with governance and management was encountered were policy makers were confused with the new MPA concept. Meanwhile MPA managers were concerned about an incomplete formal institutional framework. Depending on the function of responsible organizations different definitions are

comprehended creating an overlap in protected areas and involvement of institutions (Van Trung Ho, 2011).

A MPA defined according to the Fishery Law (Decree No. 27/2005/ND-CP, *ibid.*, art. 2) is: *“a sea area (including islands inside the area) which possesses fauna and flora systems of national and international significance regarding the scientific, educational, tourist or recreation and need to be protected and managed in accordance with the management statutes of the protected area”* (Breese & Hai, 2008) (Vu, 2013) (Van Trung Ho, 2011). Meanwhile, coastal wetlands are defined as: *“permanently or temporarily submerged in water... with a depth of no more than six meters at ebb tide”*. Meaning wetlands can also be classified as an MPA. Furthermore, forests which *“encompass islands and marine ecosystems”* are defined as a special-use forest, which must be regulated by different institutions responsible for its protection. Islands are mentioned to be part of an MPA and marine ecosystems are mentioned to be a part of a special-use forest area. Each type of protected area is managed by different sectoral jurisdictions and several institutions causing confusion in developing strategies and policies and assigning responsible agencies over the area (Van Trung Ho, 2011).

GOVERNANCE AND MANAGEMENT

Belonging to the PM, the Sea and Islands Commission functions as a consultative organization that is headed by the vice-prime minister. Within this commission the members are representatives from ministries and sectors at central and provincial level. Adding to this, coastal and marine management is shared between several ministries and sectors. Consequently, functions and missions overlap and the formation of policy, enforcement, and collaboration in coastal and marine management are deficient (Thi Minh Hang, 2015).

Two main ministries at central level are directly involved in MPA management: Ministry of Natural Resources and Environment (MONRE) and MARD. Adding to that, under MONRE is the ministerial agency of the Vietnam Administration of Seas and Islands (VASI), only established in 2008. VASI is responsible for the integrated management of islands and seas in Vietnam. Even though it's a coordinating body for coastal management, its power and influence is still unclear (Thi Minh Hang, 2015). Another relevant Ministry includes the Ministry of Culture, Sport and Tourism (MCST) (Thi Minh Hang, 2015) (Van Trung Ho, 2011).

MONRE	Responsible for the proposal for protected areas and planning at national level. It initiates the establishment of, and manages national protected areas in wetland, limestone, unused land and ecologically mixed areas that straddle the territories of many provinces (Vu, 2013).
MARD	Able to propose the establishment of, and manages national protected areas in special-use forest and marine areas that straddle the territories of many provinces (Vu, 2013).
PPC	Is responsible for the planning and proposal for the establishment of national protected areas. Responsible for the designation of provincial protected areas and is

responsible for the management of both national and provincial protected areas located totally in its provinces (Vu, 2013).

MCST Under the MCST is the National Administration of Tourism agency. This agency and its sectoral agencies at lower levels have the responsibility for managing tourism-related activities (ex. Permits for business operators, tourism services) over the nation. Tourism activities in MPA's are managed by this sectoral agency as well, unless special regulations or legal documents are in effect for the particular area (Van Trung Ho, 2011).

The former MOFI was responsible for the introduction of MPA's as an effective coastal management tool when still separated and in full ministerial status from MARD. When MOFI was restructured and merged into MARD in 2007 to become the Directorate of Fisheries (DOFI), there was a significant reduction in its power and scope; consequently there was a direct reduction in MPA investment. Within MARD, less attention was given the MPA's and more to land protected areas.

Having two ministries at the same level responsible and involved in MPA management add to the complexity of Vietnam's administrative structure. The roles and responsibilities are perceived to be overlapping and conflicting (Thi Minh Hang, 2015). There is no collaborative mechanism amongst these government agencies to operate responsibilities which creates problems for governance when some responsibilities are undertaken by more than one agency or be totally overlooked because each assumes the responsibility is undertaken by the other (Van Trung Ho, Woodley, Cottrell, & Valentine, 2014).

Legal mandates for marine resource conservation and governance can be inconsistently assigned to responsible agencies which are then disordered with sectoral agencies at lower levels. When looking at the transfer of MOFI into MARD, the mandates related to marine conservation were transferred and then also partly shared with VASI. This has been causing confusion for the in charge policy makers, MPA managers, practitioners and local communities at MPA sites to make decisions to organizational structure for the effective governance of MPA's (Van Trung Ho, Woodley, Cottrell, & Valentine, 2014).

ORGANIZATIONAL TYPES

Most MPA management boards are designed as government business enterprises while sectoral agencies at provincial and district level are formed as administrative management agencies. As a government business enterprise, the authority of a MPA management board does not have strong legal mandates to complete tasks related to administrative management of the MPA. The MPA management board is excluded from the network of administrative agencies. Provincial sectoral departments can ignore the activities of the MPA management board because they do not want to support the type of government business enterprise and are reluctant to get involved in the activities of the MPA management board. The influence of the board on government processes at provincial level for activities operated within the MPA is weak with responsible government agencies (PPC's) usually favoring development over conservation. The lack of communication and collaboration reduces the effectiveness of governance processes (Van Trung Ho, 2011).

If a MPA management board would be designed as an administrative management agency, the finance and power for management and governance of the site would be shared between the board and other agencies, which would result in competition in financial allocation and shared management power (Van Trung Ho, Cottrell, Valentine, & Woodley, 2012). When designed as a business enterprise, MPA management boards play two roles, for conservation but also for socio-economic development. The MPA management board, as described in legal documents, has the rights to collect entrance fees and operate economic services within the MPA's. This can make communities view the MPA management board as a beneficiary of conservation, while the community has not received the benefits or reinvestment from the process. The MPA management board has no legal mandate to enforce and fine illegal activities and relies on other administrative agencies to complete those tasks. Even though the MPA management board is there to manage the MPA site, the focus of the board is more on the economic benefits provided by the MPA. This has weakened the mutual trust between the MPA management board, local communities and other state agencies in the governance of the MPA (Van Trung Ho, Woodley, Cottrell, & Valentine, 2014).

3.2 RESEARCH QUESTION 2

The Con Dao National Park is one of the nine established MPA's (table. 2) and lies in the South of Vietnam encompassing 16 islands and inlets as is part of the Ba Ria – Vung Tau Province. This chapter first describes the establishment history of the CDNP, then the government institutions and stakeholders related to the CDNP.

3.2.1 ESTABLISHMENT OF THE CURRENT CDNP

- 1984 Chairman of the council of Ministers approved for a special-use forest area of 5,400ha and a marine buffer of up to 4km of shore to be added to the Con Dao islands in 1984 and decreed the establishment of the Con Dao Prohibited Forest (Decision No. 85/HDBT) (CDNP, 2013) (Viet Nature Conservation, 2004) (Minh, K. H., 2002).
- 1993 Prime Minister approved for a site name change to National Park (Previously Con Dao Prohibited Forest). According to the Prime Minister's decision, the total area of the national park was 15,043 ha, comprising terrestrial component of 6,043 ha and a marine component of 9,000 ha. Subsequently, a national park management board was established, following Decision No. 396/QD-UB of Ba Ria - Vung Tau Provincial People's Committee (Viet Nature Conservation, 2004) (Minh, K. H., 2002).
- 1997-2002 Based on a revised investment- and development plan for CDNP approved by the Ba Ria – Vung Tau PPC (Decision No. 1165/QD-UB) the total area of the national park became 19,998 ha, comprising a strict protection area of 5,446 ha, a forest rehabilitation area of 500 ha, an administration and services area of 52 ha and a marine protected area of 14,000 ha. The CDNP was also assigned to manage a buffer sea area of 20,500ha (Viet Nature Conservation, 2004) (Minh, K. H., 2002).

3.2.2 CDNP – INVOLVED GOVERNMENT INSTITUTIONS AND STAKEHOLDERS

ROLES OF GOVERNMENT INSTITUTIONS RELATED TO THE CDNP

The jurisdiction of the Con Dao MPA lies directly under the People's Committee of Ba Ria – Vung Tau Province, and is under administration of the Con Dao District PC and is professionally instructed by the Ministry of Agriculture and Rural Development (MARD) (CDNP, 2013). The CDNP Management Board was formed in 1993 with the objective to “conserve and recover ecosystems and their values, and rare fauna and flora species of the islands and marine areas within the park”. The MPA of Con Dao was established under the decision of the Prime Minister and is regulated by a higher level meaning that the CDNP cannot intervene in decision making for development activities operated within the national park boundary. Therefore the CDNP can have interventions, support and influence from national level as well as provincial level (Van Trung Ho, Cottrell, Valentine, & Woodley, 2012). Activities within the MPA boundary, such as tourism and scientific research, can only be carried out under the authorization of the MARD and the supervision of the CDNP management Board (Vu, 2013).

Most MPA authorities in Vietnam have been approved as government business enterprises, as such is the case with the CDNP. This means that the board can subject their opinions in discussing related

issues, but they do not have the authority and resources for making and implementing decisions. The CDNP has been constrained by a framework for special-use forest, this framework has been formed for a long time so related government agencies better understand and accept how to work and collaborate with CDNP. Because the CDNP is of national significance the MPA board can also collaborate with agencies from higher levels and are not limited to the provincial administrative agencies (Van Trung Ho, 2011).

The CDNP management board oversees the activities within the MPA and provides operational and overall instruction of the activities, including those of stakeholders. The management board consists out of 72 members of staff supporting the following departments and functions:

- Dept. of Organization and Administration: in charge of the park organization, planning, finance and administration.
 - Dept. of Scientific and Environmental Education: in charge of scientific research and environmental education for the community.
 - Dept. of Tourism and Services: in charge of the development of eco-tour and eco-tour relating services.
 - Local forest protection department: in charge of protecting the park and its national resources and environment. This department comprises of 9 forest protection stations and 1 mobile forest protection brigade.
- (CDNP, 2013)

In 2015 the first management effectiveness evaluation (MEE) was made by the International Union for Conservation of Nature and Natural Resources (IUCN) in collaboration with Mangroves for the Future to provide consistent data and information about management of Vietnams MPA's (repeated every 5 years). The following information was derived from this MEE. The CDNP has the authority in enforcing laws of the MPA (patrolling, imposing administrative sanctions). They can also conduct scientific research and adopt legal provisions to give some regulations on marine conservation (Thi Thu Hien, et al., 2015).

The budget for the MPA comes from the local government and funding for infrastructure of the national park comes from the central government. Government funding to the CNDP for regular activities each year is USD 440.000 and for irregular activities USD 140.000 (including sea patrol and research). In 2014 the direct tourism income from the MPA was USD 220.000. The CDNP does several activities for the enhancement of marine conservation including: marine spatial planning; developing of management plans; regular enforcement activities; awareness raising for community; international and domestic corporation; eco-tourism; community involvement (Thi Thu Hien, et al., 2015).

There are different stakeholders involved in the MPA including; local communities, tourism operators and tourists (Thi Thu Hien, et al., 2015).

Tourism

The CDNP management board offers several tourism activities to undertake within the MPA which include watching sea turtles lay eggs, releasing sea turtle hatchlings, and snorkeling tours (fig. 6). Tourist can also stay in the Ranger Stations of the CDNP. Besides this there exist several other independent snorkel tour operators and two dive schools (Rainbow divers, Con Dao Scuba Diving Center), to operate activities within the MPA a small fee needs to be paid to the CDNP (CDNP, 2018). To operate and conduct tourism activities, authorization needs to come from MARD (Vu, 2013).

Fisheries

Ben Dam port lies on the Southwest side of Con Son and is not included into the MPA of Con Dao. The Fisheries Resource Protection Agency of MARD has the primary responsibility for enforcement of marine areas under the Fisheries Law. They are supported by Border Army Station on Con Dao in terms of patrolling international borders and control of illegal activities and the CDNP role is to patrol and report any illegal issues in the park (Huong Thuy Phan & van der Meer, 2009). Ben Dam has a planned capacity for 5000 outsider boats per year. Approximately 15.000 fishing vessels register a year to fish in the Con Dao waters. The majority fishes offshore, but some fish within the buffer zone. In the MPA of Con Dao the marine resources, in particular fish, have been severely depleted which was also reported by local fishers who's catches have reduced over the years (Breese & Hai, 2008) (UNDP-GEF, 2003). Illegal and destructive fishing practices such as; fishing in closed of zones, trawling, use of high pressure lamps and cyanide are known to have taken place in the MPA (Thi Thu Hien, et al., 2015). The local fishing boat numbers at Con Dao are a lot less than those of outsiders coming to the islands to fish outside the MPA. It was found on Con Dao that conflict exists between local resource users and outsiders. Local fishers have smaller boats making it easier to enforce and fine by MPA staff, while outsiders have bigger boats that catch more fish and are harder to enforce (Van Trung Ho, 2011).

Local communities

Not a lot of information could be found on local community involvement in conservation activities. The following activities were based of the interview (Attachment II) held with one of the staff members of the Ecotourism and Environmental Education Department of the CDNP: The National Park tries to improve awareness with locals and tourist using brochures, signs in the park itself, and once a year a meeting with stakeholders and local people. The community will help by keeping the national park informed about for example outside fisherman, and endangered species. And if the national park has new plans for conservation they will discuss it with local people. The national

THE PRICE OF ECOTOURISM SERVICES IN CON DAO NATIONAL PARK
(Issued with Decision number 50/QĐ-BQLVQG dated on February 2, 2017 by Con Dao National Park)

Order	Services	Unit	Price (VND)	Note
1	Guide rental for watching sea turtles laying eggs at night:			
	- Group of 1 visitor	Time/person	600.000	- Maximum 6 people per group.
	- Group of 2 visitors	Time/person	550.000	- Maximum time is 60 minutes.
	- Group of 3 visitors	Time/person	500.000	- Discount 50% if visitors can not watch sea turtles laying eggs.
	- Group of 4 visitors	Time/person	450.000	
	- Group of 5 visitors	Time/person	400.000	
	- Group of 6 visitors	Time/person	350.000	
2	Guide rental for releasing baby turtles into the sea	Time/person	50.000	
3	Vietnamese ecotourism guide rental	Full day	600.000	
		Half-day	300.000	
4	English ecotourism guide rental	Full day	700.000	-Half-day: maximum 4 hours.
		Half-day	350.000	-Full-day: maximum 8 hours.
5	Mat and mosquito-net rental	Full day	200.000	
6	Projector rental	Full day	1.000.000	
7	Camp bed rental	Time	25.000	
8	Hammock rental	Time	20.000	
9	Snorkle and diving glasses rental	Time	70.000	
10	Life-Jacket rental	Time	15.000	
11	Freshwater bath in islands	Time/person	30.000	
12	Package tour for ecotourism routes and sites	-	-	Under Agreement
13	Guide rental for practicing scientific research	-	-	Under Agreement

Note:
- The above price applied from March, 1, 2017.
- The above price is not inclusive of entrance fee as prescribed by law.
- Contact us for more information on: 0983830669 or 064.3630563.

FIGURE 6 CDNP ECOTOURISM SERVICE FEES (POST, J. 2018)

park has and education program. They will inform tourist, students, and soldiers. They will go to the students 2 months a year every week.

Figure 5 shows the relationships between the involved governance institutions and stakeholder related to the CDP. MARD has the management over the CDP Board and also gives instruction to the PPC and must authorize activities related to scientific research and tourism activities within the national park boundaries. The district PC is the administrative agency of the CDP. Directly under MARD is the Fisheries Protection Agency that together with the Con Dao Border Defense control illegal activities within the National Park boundaries.

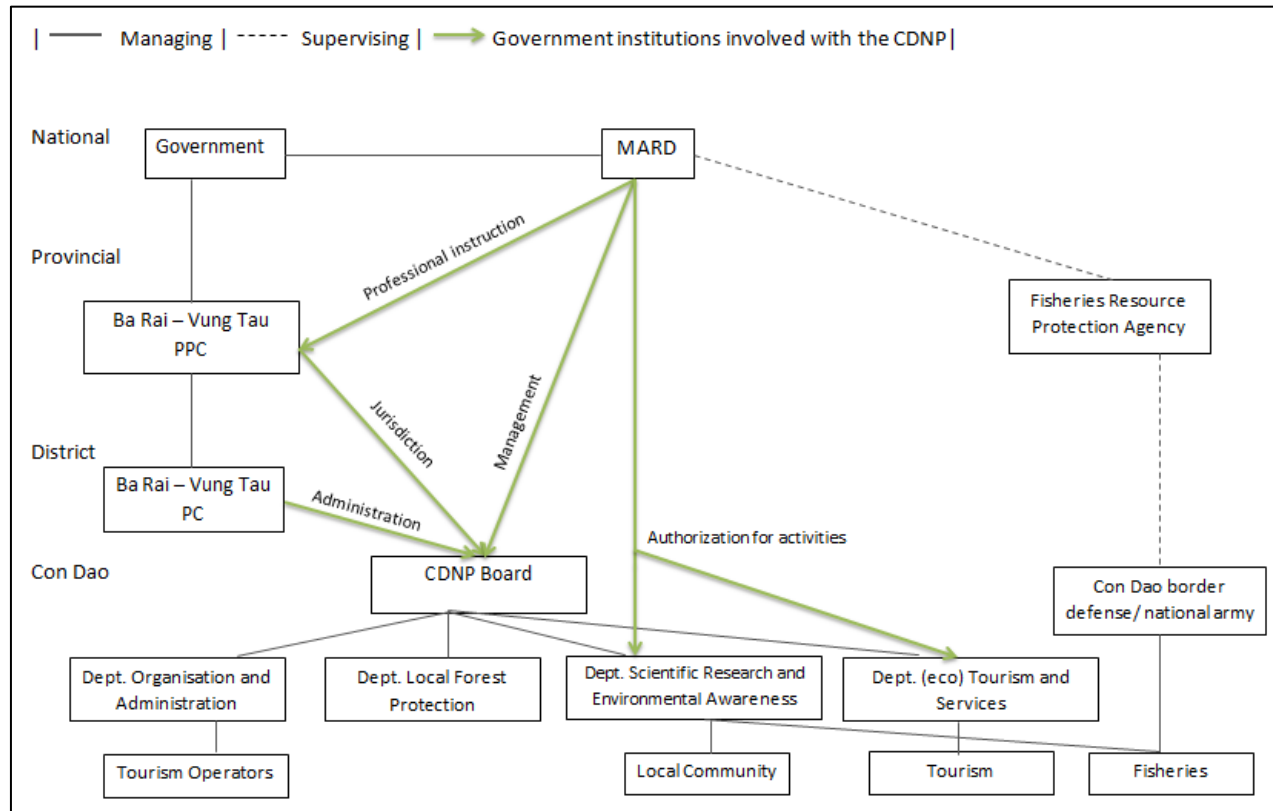


FIGURE 7 SCHEME OF GOVERNMENT INSTITUTIONS AND STAKEHOLDER RELATIONSHIPS OF THE CDP (POST, J. KLERKS, F. 2018)

3.3 RESEARCH QUESTION 3

The following chapter describes the history of previous coral reef research, the results of the ReefCheck method (including results from previous research) at research location 1, 2 and 6, and the results of the observations at the 7 research locations made during the field study.

3.3.1 PREVIOUS CORAL REEF RESEARCH

- 1990's In 1922 the Institute of Oceanography of Vietnam was established and since that time surveys of coral reefs been carried out (UNEP, 2007). The detail study of coral reefs on Con Dao started in the early 1980s (Latypov & Selin, 2010). During the 1990s, the coral studies that were conducted gathered data and information for management and decision-making about topics such as biodiversity conservation, determination of sustainable resource use levels and the establishment of MPA's (UNEP, 2007). After 1994, the researcher surveys provided more in-detail surveys on coral reefs at Con Dao (Tuan Vo, 2002). After the bleaching event in 1998, 37% of the coral colonies were bleached on Con Dao. This was additional to the 10% of corals killed previously due to typhoon Linda in 1997 (Nguyen & Vo, 2014) (Chou, et al., 2016) (Tuan Vo, 2002).
- Early 2000 Previous studies have shown that coral reefs are declining due to anthropogenic and environmental stressors risking ecosystem services in the Vietnamese waters (Forrester, Ferguson, O'Connell-Rodwell, & Jarecki, 2012) (Tuan Vo & Van Nugyen, 2013) (Latypov & Selin, 2010) (Australian Institute of Marine Science, 2002) (UNEP, 2007) (Tuan Vo, 2002). A survey showed that in general the conditions of coral reefs at Con Dao in 2000 were still worse than before typhoon Linda and the bleaching event (Tuan Vo, 2002). Between 1994 and 2002, the Con Dao islands had a decline of 32.3% coral coverage (UNEP, 2007).
- 2005-2006 In 2005, a mass mortality of the corals and benthos occurred on the Northwest side of the Con Dao Islands due to high temperatures (>30°C) and low salinity (<25%) during a short period. In the period between 2000 and 2006 on Con Dao it was estimated that 12.5% of the reef had an improved condition, 75.0% of the reef has declined and 12.5% remained unchanged (Nguyen & Vo, 2014).
- 2010-2012 In 2010, the conclusion from "Current Status of Coral Reefs of Islands in the Gulf of Siam and Southern Vietnam" stated that the coral communities including that on Con Dao were in good condition with high species richness (Latypov & Selin, 2010). The overall decline of hard coral coverage was - 18.8% between 1994 and 2012. On Con Dao this was a degradation rate of - 2.09% per year (Nguyen & Vo, 2014) (Nguyen & Vo, 2014).

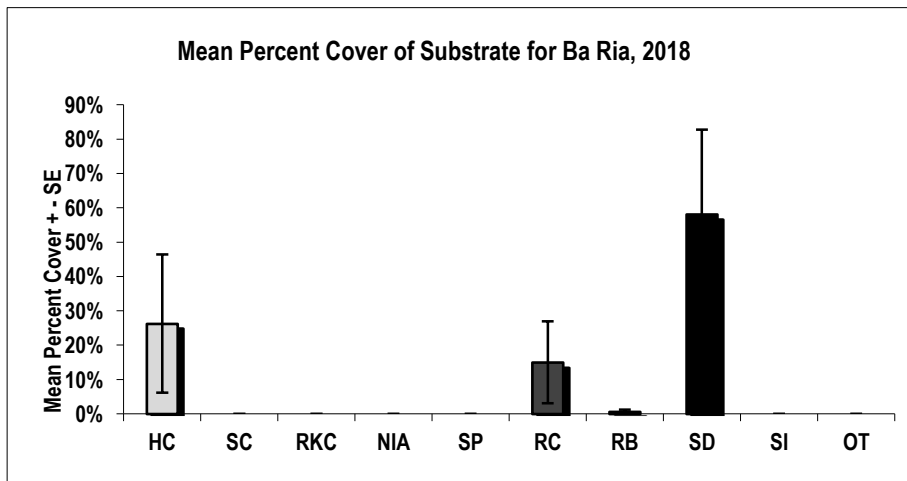
In 2012 research was being conducted, but data on the coral reef status was not published and information about reef management on Con Dao is still limited. Information is needed to solve potential problems surrounding the coral reefs and for the application of management that aims towards the sustainable use of the reef. In spite of previous research being conducted, information on the current coral reef status of the Con Dao islands is out-dated and contains research methods that lack validity and reproducibility (Tuan Vo, 2002) (Son, et al., 2006) (UNEP, 2007) (Van Long & Si Vo, 2013) (Latypov & Selin, 2010).

3.3.2 RESULTS REEF CHECK

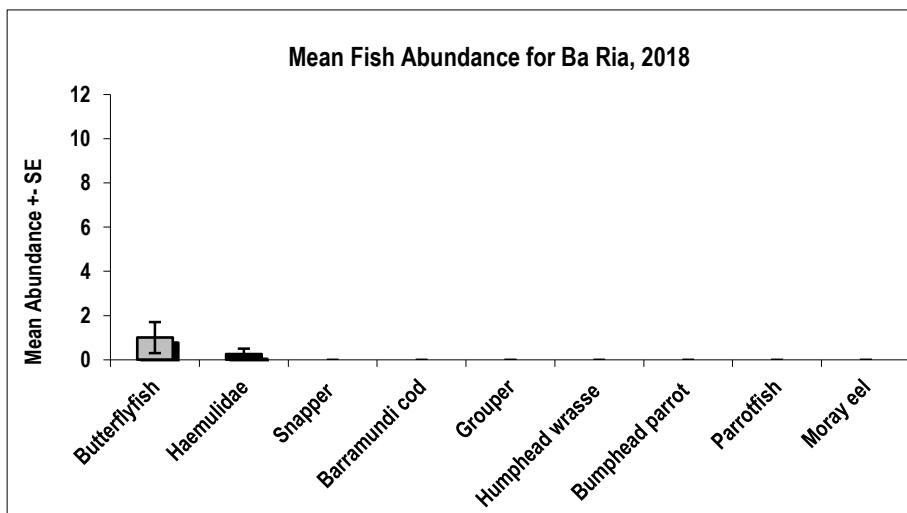
This paragraph details the results from the ReefCheck data collected at location 1 during the field study and results from previously collected ReefCheck data from secondary sources at research locations 2 and 6.

Location 1, Ba Ria

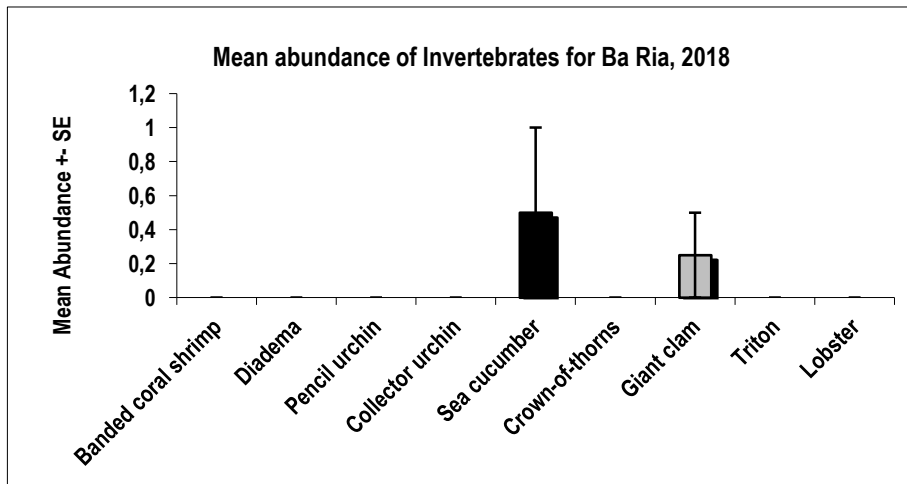
The results from the reef monitoring can be found in graphs 1-4. At Ba Ria a hard coral cover of 26% was found, which is a fair condition (25-50%). Besides hard coral, only rock (15%), rubble (1%) and sand (58%) were found as substrate type (see graph 1). The percentage of sand is high, because the reef ended after approximately 40 meters, so the last two segments only contained sand. The overall fish abundance was low, with a mean abundance for Butterflyfish of 1 and the mean for Haemulidae 0.25 (graph 2). The fish encountered on the reef were small (0-10cm). Graph 3 shows the mean abundance of invertebrates for Ba Ria. The Sea Cucumber shows a mean abundance of 0.5 and the Giant Clam shows a mean abundance of 0.25. The Giant Clam observed was in the category 10-20 cm. Graph 4 shows the impact rank of each variable at Ba Ria. Fishnets and trash were observed, fishnets were ranked as medium impact (mean=2.25) and trash as low (mean=1.75).



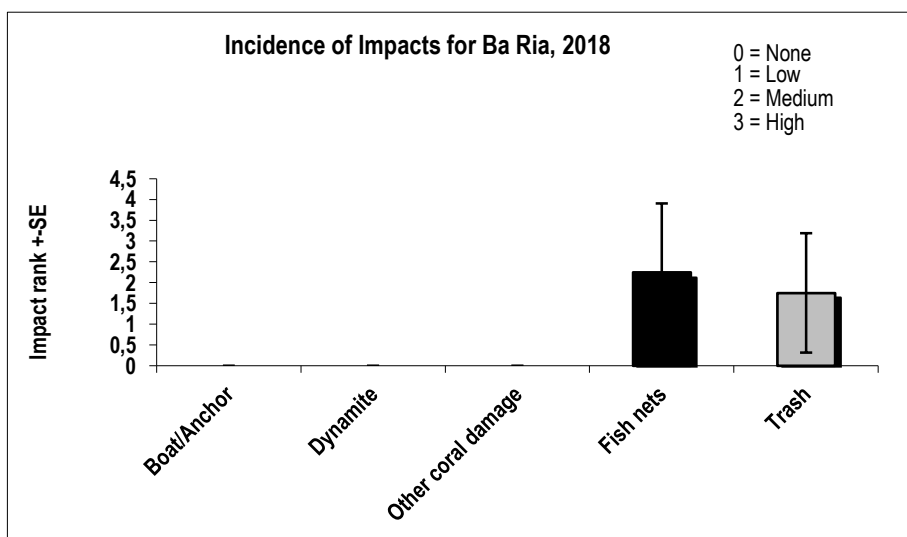
Graph 1 The mean percent of substrate per segment with SE for Ba Ria



Graph 2 The mean percent of fish abundance with SE for Ba Ria



Graph 3 The mean percent of invertebrate abundance with SE for Ba Ria



Graph 4 The incidence of impact for Ba Ria with SE where 0 = none, 1 = low (1 piece), 2 = medium (2-4 pieces) and 3 = high (5+ pieces)

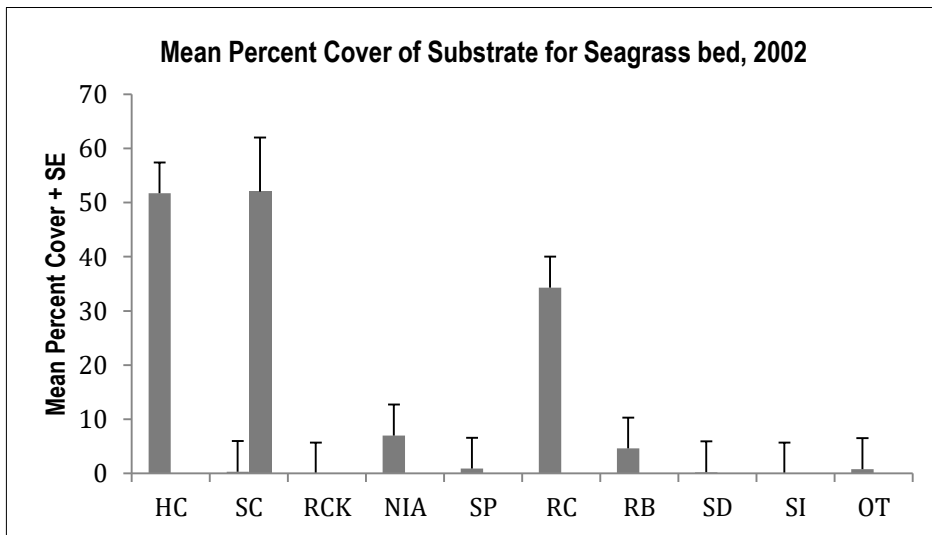
Location 2 Seagrass bed

Data has been conducted from 1999 until 2002 using the ReefCheck method by Vo Si Tuan, NV Long and Nguyen Xuan Hoa (Reef Check Foundation, 1999-2002). Graphs 5-8 show the results. Graph 5 shows the mean percent cover of the substrate cover in 2002 at Seagrass bed. The mean percent of hard coral is 51.7%, soft coral (0.3%), nutrients indicator algae (7%), sponge (0.9%), rock 34.3%, rubble 4.6%, for sand 0.2% and for "other" 0.8% per segment.

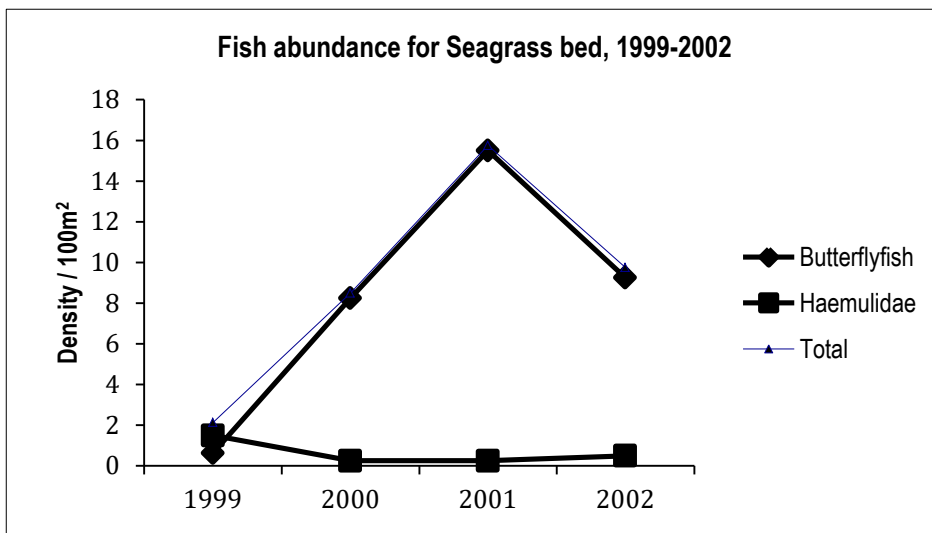
Graph 6 shows the fish density/100m² for Seagrass bed in the period of 1999 and 2002. Only Butterflyfish and Haemulidae were observed during the surveys. Between 1999 and 2002 the total density increased with 358% due to the big increase of Butterflyfish.

Graph 7 shows the invertebrate density per 100m² for Seagrass bed in the period of 1999 and 2002. Between 1999 and 2002 the total density decreased with 0.7%.

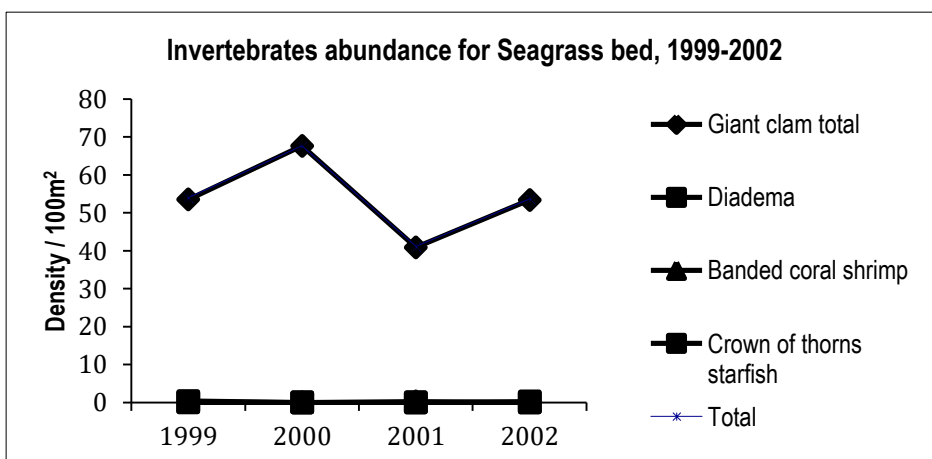
Graph 8 shows the impact rating for Seagrass bed in the period of 1999 and 2002. Between 1999 and 2002 the rating for 'trash fish nets' decreased from a rating of 0.75 to 0.63, while the impact of 'other' went from 0 to 0.13 between 2001 and 2002.



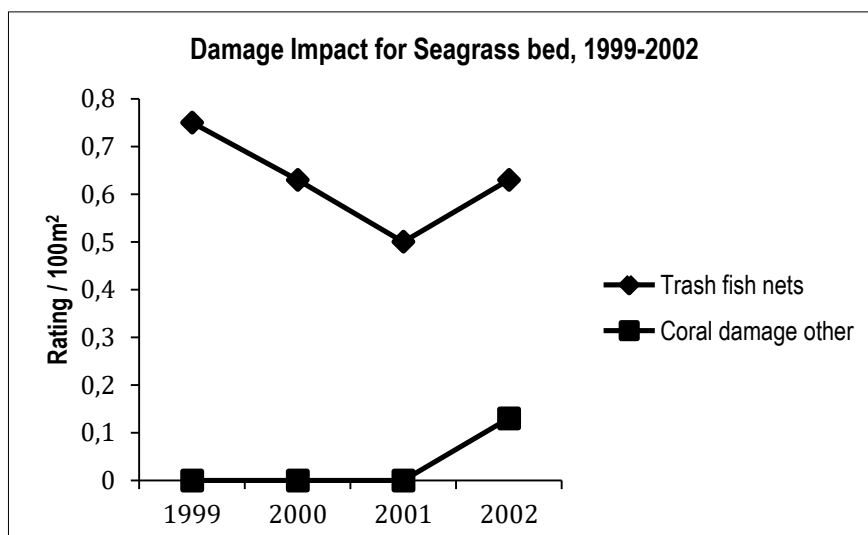
Graph 5 Mean percent of substrate cover per segment with SE for Seagrass bed in 2002



Graph 6 Density of fish/100m² between 1999 and 2002 for Seagrass bed



Graph 7 Density of Invertebrates/100m² between 1999 and 2002 for Seagrass bed

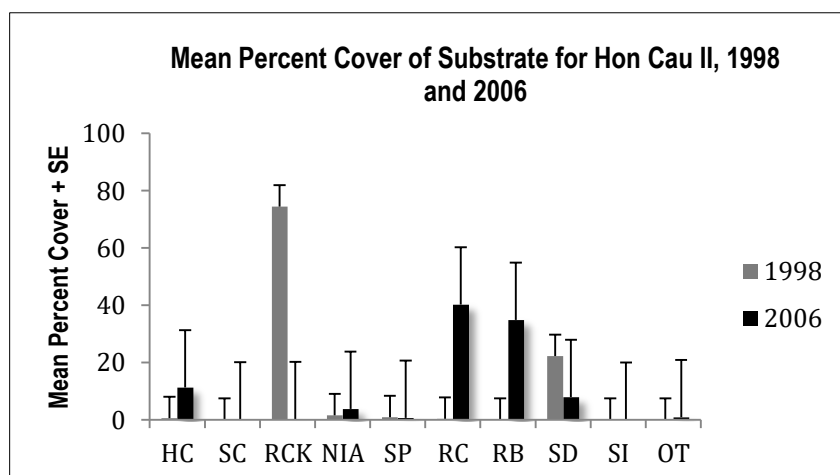


Graph 8 The rating of damage impact/100m² between 1999 and 2002 for Seagrass bed

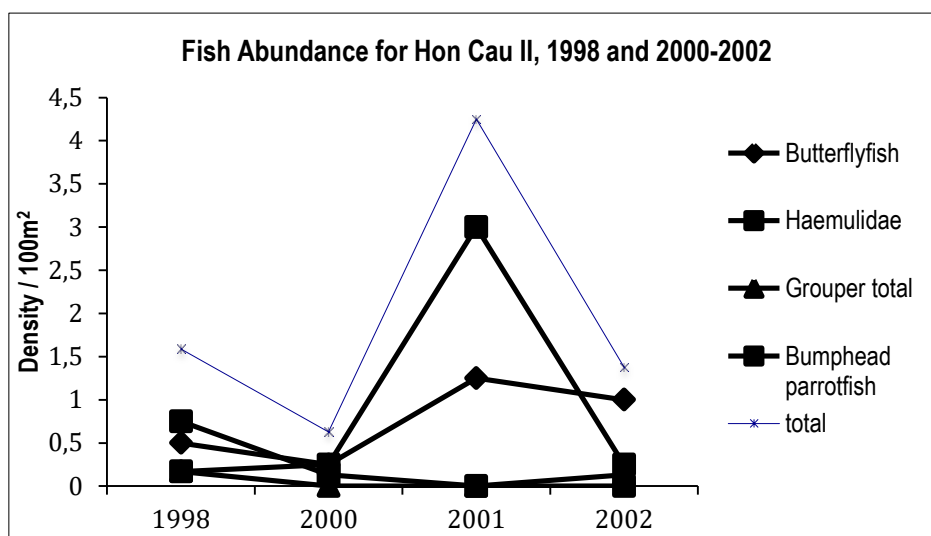
Location 6 Hon Cau II

Research site 6 is located on the Southside of Cau Island. The reef is only accessible by boat. The location is a dive site.

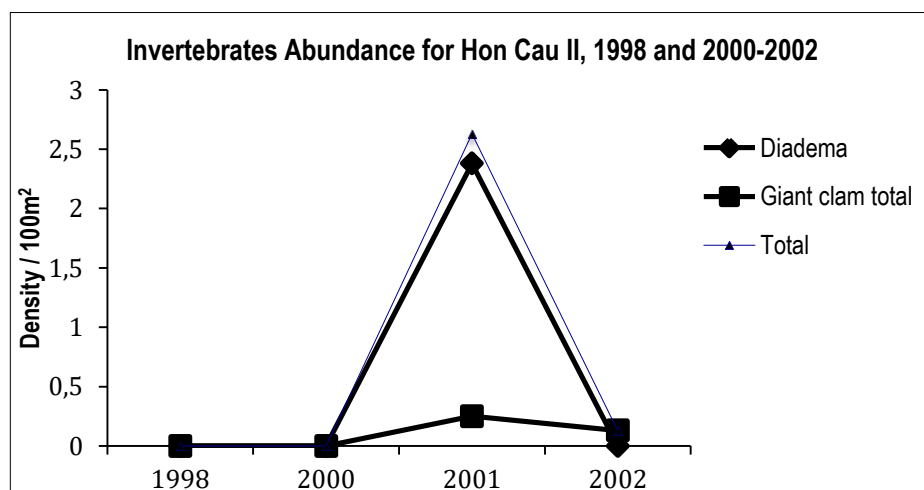
Data has been conducted from 1998 and 2000 until 2002 using the ReefCheck method by Dinh Hue and Nguyen Xuan Hoa (Reef Check Foundation, 1998-2006). Graph 9 shows the mean percent cover of the substrate cover in 1998 and 2002 at Hon Cau II. The total coral coverage in 1998 was 0.6%, which is stated as a poor condition and the total of coral coverage in 2006 was 11.4%, which is also stated as a poor condition. However, the coral coverage is increased in this period. Graph 10 shows the fish density/100m² for Hon Cau II in the period of 1998 and 2000-2002. Between 1998 and 2002 the total density decreased with 13.2%. In Graph 11 the invertebrates' density/100m² for Hon Cau II in the period of 1998 and 2000-2002 can be seen. Between 2000 and 2001 the total density increased due to the increase in the abundance of *Diadema*, but in 2002 it immediately decreased to almost zero. Graph 12 shows the impact rating for Hon Cau II in the period 2000 and 2002. Between 2001 and 2002 the rating for 'trash fish nets' decreased from a rating of 0 to 0.13, while the impact of other went from 0 to 0.5 between 2001 and 2002.



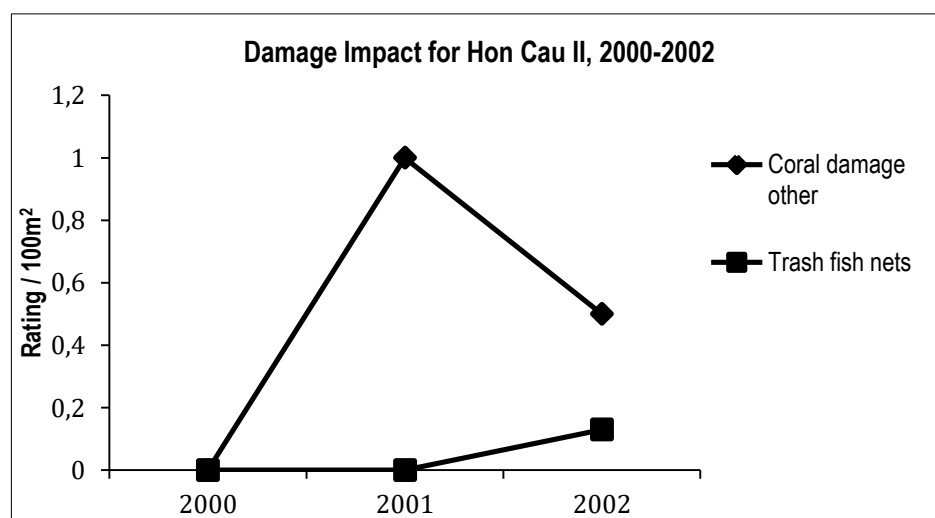
Graph 9 Mean percent of substrate per segment with SE for Hon CAU II in 1998 and 2006



Graph 10 Density of fish/100m² between 1998 and 2000-2002 for Hon Cau II



Graph 11 Density of invertebrates/100m² between 1998 and 2000-2002 for Hon Cau II



Graph 12 The rating of damage impact/100m² between 1998 and 2000-2002 for Hon Cau II

3.3.3 OBSERVATIONS

The tables below show the observations about the substrate, fish and invertebrate occurrence and the incidence of impact for the observations during the field study on the Con Dao islands in 2018. The observations could not make an indication about the abundance of fish and invertebrates, however what was encountered during the observations is documented in table 4.

For Ba Ria, both ReefCheck and the observations were used. The results from the Reefcheck method match the results from the observations, except for the occurrence of Snapper and Parrotfish. During the observation of Seagrass bed during the field study, the hard coral coverage was estimated at less than 25%, which shows that the hard coral coverage decreased since 2002. Soft coral coverage has been low in 2002 with 0.3%, with nowadays 0% coverage. Based on this data, the reef went from good condition to poor condition. During the surveys between 1999 and 2002, Sea Cucumber and Parrotfish were not documented, but during the field study they were. Between 1999 and 2002 fishnets occurred at the reef and decreased to 0.63, but on the basis of the observations in 2018 this impact seemed to have increased to have a medium impact (Rating=2). Hon Cau II compared to 2006 is in a better condition. Back then the live coral coverage was 11.4% and thus in poor condition. The fish and invertebrate data is different from the data from 1998 and 2000-2002. In these years Sea Cucumbers were not observed, but Groupers and Parrotfish were. The observation only documented fishnets and anchor damage. With both fishnets and anchor damage ranked as a low impact, both have increased since 2002.

TABLE 3 THE OBSERVATIONS OF SUBSTRATE COVERL DURING THE FIELD STUDY WITH SUBSTRATE IN PERCENTAGE AND THE CONDITION OF THE CURRENT STATUS WITH <25% LIFE CORAL COVERAGE AS POOR, 25-50% LIFE CORAL COVERAGE AS FAIR, 50-75% LIFE CORAL COVERAGE AS 50-75% AND >75% LIFE CORAL COVERAGE AS EXCELLENT.

Location	Hard coral coverage (%)	Soft coral coverage (%)	Dead coral coverage (%)	Condition of the reef
1. Ba Ria	25-50%	0%	25-50%	Fair
2. Seagrass bed	<25%	0%	<25%	Poor
3. Bamboo Reef	>75%	<25%	<25%	Excellent
4. Bay Canh	>75%	0%	<25%	Excellent
5. Hon Cau I	50-75%	0%	25-50%	Good
6. Hon Cau II	50-75%	0%	25-50%	Good
7. Bang Beach	>75%	0%	<25%	Excellent

TABLE 4 OBSERVED FISH AND INVERTEBRATE SPECIES DURING THE FIELD STUDY WITH X AS OBSERVED AND - AS NOT OBSERVED.

Location	Sea Urchins	Sea Cucumber	Giant Clam	Butterflyfish	Haemulidae	Snapper	Parrot fish	Group er
1. Ba Ria	X	X	X	X	X	-	-	-
2. Seagrass bed	X	X		X	X	-	X	-
3. Bamboo	X	X	X	X	X	X	X	-

Reef								
4. Bay Canh	X	X	X	X	X	X	X	-
5. Hon Cau I	X	X	X	X	X	X	X	-
6. Hon Cau II	X	X	X	X	X	X	X	-
7. Bang Beach	X	X	X	X	X	-	X	-

TABLE 5 THE INCIDENCE OF IMPACT WITH 0 = NONE, 1 = LOW (1 PIECE), 2 = MEDIUM (2-4 PIECES) AND 3 = HIGH (5+ PIECES)

Location	Anchor Damage	Dynamite damage	Fish nets	General trash
1. Ba Ria	None	None	High	High
2. Seagrass bed	None	None	Medium	High
3. Bamboo Reef	None	None	Medium	Low
4. Bay Canh	None	None	Low	Low
5. Hon Cau I	Medium	None	Low	Medium
6. Hon Cau II	Low	None	Low	None
7. Bang Beach	None	None	Low	Medium

Some pictures from the reef observations can be found in Attachment VI.

3.3.4 EXPERIENCE CONDUCTING CORAL REEF RESEARCH ON THE CON DAO ISLANDS

The initial proposal of this project was about doing coral reef research on the Con Dao Islands as part of a Masterplan for Sustainable Island Management for the Con Dao Islands. The initial proposal for the Masterplan of the Dutch client was rejected by the Ba Ria – Vung Tau PPC. During a meeting with the Ba Ria - Vung Tau PPC a new proposal was presented. The new proposal was pre-approved but needed to be converted into official documents for official approval. The field study (21 March, 2018 – 11 May, 2018) for the initial coral reef research was already planned to be conducted during the approval process, not intentionally. The approval of the project took up the entire planned study period which meant that no data could be collected on Con Dao. The approval process first went from the Ba Ria – Vung Tau PPC to the Fisheries Association of the PPC. After approval of the Fisheries Association and the PPC the Department of Forestry needed to approve the documents (because other students were also conducting research in the National Park). The final approval came on April 17, 2018 and the approval document was received a few days later by the CDNP. On April 23, 2018 a meeting was set-up with the students and the CDNP to discuss the students research activity plan.

The students had permission to start their research when a Memorandum of Understanding (MoU) would be signed based off the meeting. In the MoU mistakes were made and some agreements were conflicting. Due to communication difficulties, language barriers and disagreements between the CDNP, the client, and the students it took a long time for the MoU to be signed. During the discussion about the MoU, the CDNP also informed that the research activity plan of the students was send to the Border Security Guard Station and that the students could not divert from that plan. However, the activity plan was no longer achievable due to the

long waiting period. At the end the researchers from this report did not sign the MoU, because the field study period was over.

4. DISCUSSION

This chapter will discuss the challenges and issues that were encountered during the field study, writing of this report, the methods and the results.

Literature study

During the literature study it was found that a lot of changes in the governance of MPA's over the years have developed. Most literature found on MPA management was found between 2000 and 2015 when a lot of these changes took place. Therefore a lot of sources contain unreliable information and needed to be checked with the most recent sources making this literature study challenging. It was also thought that literature could not be found because it might only be available in the Vietnamese language.

It was also found that different literature sources contain conflicting information. One example of this is on the established MPA's from the 2010 decision. Management effectiveness evaluation of Vietnam's MPA's from 2015 says only 8 MPA's have been established namely: Cat Ba, Con Co, Cu Lao Cham, Nha Trang Bay, Nui Chua, Hon Cau, Con Dao, Phu Quoc (Thi Thu Hien, et al., 2015). While a 2014 source of the Convention on Biological Diversity and the Ministry of Natural Resources and Environment states that up to 2014, 9 of the 16 MPA's have been established including Con Dao, Nha Trang Bay, Con Co, Phu Quoc, Cat Ba, Hon Cau, Bach Long Vi, Cu Lao Cham, Nui Chua (Ministry of Natural Resources and Environment, 2014). It was chosen to use the 2014 source since this seemed to be more reliable. No sources on the current status (2018) of established MPA's could be found.

Another example of conflicting information comes from the area size of the MPA of Con Dao. In the 2010 decision, the Con Dao MPA is listed as having a total area of 29.400ha and a sea area of 23.000ha (Vietnam Law & Legal Forum, 2010). It was found that different sources, and the CDNP website states that the MPA has 14.00ha marine area, and a marine buffer zone area of 20.500ha (CDNP, 2013) which is still based on the 1998 investment plan. It is still unclear what the exact current area size of the MPA is.

Interview & CDNP

To gather information about MPA management, coral reef management and coral reef research it was chosen to conduct an in-depth, semi-structured interview with the CDNP. Due to the fact that the approval documents were missing, the students of this thesis could not conduct the interview. Other research students on Con Dao conducted an interview which was used to answer the questions in the original interview guide. More interviews could not be conducted due to time limitations and the absence of more English-speaking staff members.

One of the causes of bias in interviews comes from alterations of questions and the documentation of the results. For this study, this cannot be checked, because other researchers that are not a part of this study conducted the interview and documented the results before sending them. The interview was not recorded, so the answers could not be double-checked. However, through pre-formulated questions bias can be reduced. One way of controlling for reliability is to have a highly structured interview, however that not chosen for this interview method (Cohen, Manion, & Morrison, 2000). But, before the interview was conducted, the interview questions were sent to the designated staff member. A way to test the validity of the

output from the interview is to compare the output with other values that already proved to be valid or true (convergent validity) (Cohen, Manion, & Morrison, 2000).

The results from the interviews were disappointing. Before the interview was conducted the interview questions were sent to the CDNP, but still not every questions could be answered. Due to the fact that other researchers had to conduct the interview for this study, some questions were not asked because of the lack of knowledge about the goal of the interview. However, more knowledge was obtained about the CDNP, but those raised more questions. The CDNP stated for example that the coral coverage is 60%, which matches the estimated coral coverage in this study. The questions raised by this information, is that they conduct research and they also mentioned it, but why is the current data not being found? Maybe the results are published in Vietnamese and were therefore unable to find it. A legal framework has been set up to protect the coral reefs from anchor damage, however anchor damage was found at both locations on Cau Island. The CDNP could decrease the damage of anchoring by simply put in mooring lines. The observations showed that trash occurred in high quantities, which the CDNP tries to clean up every day and they organize an annual beach clean up. However they see human impact as a low threat to coral reefs, but an anthropogenic stressor like human plastic waste increases the likelihood of disease on coral reefs with 4-89% (Lamb, et al., 2017).

Coral reef research

The intention of this study was to provide a first assessment on the coral reefs status on Con Dao using the ReefCheck method because of the lack of information and outdated research results. It was not clear if the CDNP was meeting their objective to “conserve and recover ecosystems and their values, and rare fauna and flora species of the islands and marine areas within the park”. After facing many difficulties on site, research about the current ecological status was postponed week after week.

After adjusting the method for coral research in this study, still many limitations were faced resulting in little data and only descriptive results. For the observations made about the coral reefs, limitations were encountered for example; the accessibility of the reefs, time and budget. The reefs suitable for this research were in big quantities located around different islands. To go to these reefs you either have to hike through the national park on the main island Con Son or rent a boat and guide, both of which required payment. The research could not begin from the start and in the end this caused research limitations. Coral reef research could only be conducted with official approval documents for the research. Approval from the CDNP was also needed and the research could only be conducted under the supervision of the national park for which certain fees were required.

Results from the observations and ReefCheck method estimates that Bamboo reef, Bay Canh Island and Bang Beach have a live coral coverage of more than >75% and thus 42.9% of the observed coral reefs in this study are in an excellent conditions. Both research locations on Cau Island have an estimated live coral coverage between 50%-75%. Thus 28.5% of the observed coral reefs are in good condition. Only 14.3% of the observed coral reefs are in fair condition idem ditto for the coral reefs in poor condition. For the indication of the condition of corals reefs, the same standard is used as in other studies about the coral status in Vietnam and Con Dao (Tuan Vo & Van Nugyen, 2013) (Chou, et al., 2016) (Latypov & Selin, 2010) (Nguyen & Vo, 2014).

Overall, the condition of the coral reefs in the CDNP seemed to be in good condition (50-75% live coral coverage) which is similar to the information of the CDNP who states a coral coverage of

60%. This outcome however, was not expected when looking into the history of environmental events have previously led to a decrease in live coral coverage. Results obtained after the bleaching event in 1998 showed that 37% of the coral colonies bleached on Con Dao (Chou, et al., 2016) (Tuan Vo, 2002). The previous research showed that especially Cau Island (location 5&6) was damaged badly, with live coral coverage near zero. This could be the cause of the poor condition of location 6 in 2006. A survey showed that in general the conditions of coral reefs at Con Dao in 2000 were still worse (from 41.0% to 20.1% coral coverage) then before typhoon Linda and the bleaching event (Tuan Vo, 2002). In 2005, a mass mortality of coral reefs on Con Dao happened due to high temperatures ($>30^{\circ}\text{C}$) and low salinity ($<25\%$) during a short period of time, however results from 2006 showed that the mean hard coral coverage was 22.2% and thus increased since the bleaching event in 1998 (Nguyen & Vo, 2014). The overall degradation rate of live coral coverage on Con Dao between 1994 & 2007 was the highest of all coral reef areas in Vietnam with a 2.97% annual (yearly) degradation rate. In 2010 another bleaching event happened, however data on Con Dao's coral reefs is absent, but data from other areas in Vietnam shows that the quantity of reef in excellent, good or fair condition decreased, while coral reefs in poor conditions have increased (Tuan Vo & Van Nugyen, 2013) (Nguyen & Vo, 2014). Since there were also a bleaching event in 2015 and 2016, it was not expected to find the coral reefs on Con Dao during this study in a good condition (Son, et al., 2006) (Vietnamnet Bridge, 2016).

The coral reefs observed during the field study with an excellent or good condition are at Bamboo Reef, Bay Canh Island, both sites at Cau Island and the site at Bang Beach. It is assumed that this has to do with the accessibility of the reefs. Almost all the reefs with the good or excellent condition are only accessible by boat and two of the reefs were also accessible with a hike through the national park. When the observations were made, the reef site at Bamboo reef just opened. The closure of this reef could be a reason for the reef to be in an excellent condition. The results from the observations do not indicate any pattern between the condition of the coral reefs and the ranking of impact or the presence of fish/invertebrate species. Unfortunately, the exact abundance of fish species has not been determined with observations. It would have been interesting to conduct quantitative data due to the extremely low presence of fish that was observed. It is estimated, in theory that the low abundance of fish is due to the growth-rate of the fishing industry. The growth-rate of this sector is 7.9% per year and the total fishing capacity grows with 18.3% for the last two decades (Lebailly, 2017) (Nguyen D. T., 2010). The decline of larger species is a serious problem in Vietnam. A target was set under the Master Plan of Fisheries Development of 2010 to help solve this problem, however the Master Plan only advocates vessel reduction. If the target would have been achieved, which was not the case, it may not have led in fishing capacity reduction due to the modernization of the vessels (Nguyen D. T., 2010). The overexploitation of herbivores fish e.g. Parrotfish can lead the coral reef system to shift to an algae dominated system.

For location 1, Ba Ria, both the ReefCheck method and observations were used for this study. From the results of both methods, it can be observed that the results differ a little from each other. The coral coverage concludes the same condition of the reef for both methods. For the fish and invertebrates the abundance of the species was not documented, only the presence. The difference in fish species can be explained by the possible disruption by the presence of researchers in the water column and by the observatory skills of the researcher to determine the species. Both the ReefCheck method as the observation only documented fishnets and other

trash as impact, but during the observations the ranking turned out higher, this has to do with the ReefCheck method only looking at 500m², while observations can be made of a bigger surface area and thus resulted in a higher count of trash and fishnets. Overall, there were no great differences in results between the methods, so it seems that the observations will provide an indication of what can be expected during a ReefCheck survey in the future.

Observations

Observations are a powerful tool, but it often leads to issues with validity and reliability due to researcher bias. The issues occurring about validity in observation-based methods is the observer judgments itself. It is not sure if the observations from the observant are representative of the real world situation. Within this study another issue for the results was the interference with marine species and therefore a possible disruption of the behavior or occurrence of species while diving and/or snorkeling. An effective strategy to overcome problems with the researcher bias was the use of multiple researchers to collect and interpret the data (investigator triangulation). The use of multiple researchers can lead to more valid and reliable data. To ensure the validity even more it is suggested that a pilot study is conducted to ensure the observational variables themselves. Fortunately, the ReefCheck method has been used before on Con Dao and other locations in Vietnam. Furthermore, research has been done about this method and it's variables to ensure the datasets were appropriate for the research on Con Dao. Because this research collects quantitative data and thus structured by nature, the outcome is more reliable than observations about behavior. However, the researchers were not only asked to simply report the observation, but also to make a judgement about e.g. the percentage hard coral coverage. The documentation of the observations had a time gap of a couple weeks. This can lead to a decrease in reliability. (Cohen, Manion, & Morrison, 2000) (Johnson, 1997) (explorable.com, 2018).

5. CONCLUSION

To conclude, the complexity of responsibility allocation and collaboration between multiple institutions involved in MPA management and governance have affected their efficiency and objectives in a negative way. This has also had an effect on the difficulty for the approval of research projects.

History has shown that Vietnam has been making changes in its policies for the sustainable development of its coastal and marine resources. The most recent demonstration has been the approval for the establishment of 16 MPA's within the country's national system including 57% of known coral reef areas in the coastal waters being represented and supported inside the declared MPA's. Although progress is being made, the basis on which the MPA's have been established is still weak affecting their efficiency.

One source of this has been the MPA concept. The definition of the MPA concept overlaps with the concepts of other protected areas. Hence, there have been confusions within institutions, which are directly responsible for the protection of these areas. A similar challenge has been encountered with the particular involvement of multiple government agencies in MPA management. Management is being shared with different sectors without a collaborative mechanism leaving MPA's with inconsistent legal mandates.

Also, the organizational type of MPA authorities have left them isolated from the bureaucratic system of the Vietnamese government. The MPA authorities have been characterized by both conservation and socio-economic development responsibilities and weak influence on the government process for activities developed within the MPA. Responsible agencies of MPA's (PPC's) have been favoring development over conservation, as is also the case with the CDNP.

The CDNP and the roles and relationships between involved government institutions seem to be relatively organized even though it is quite complex, this is most likely due to its long history and previous establishment as a special-use forest. However, based on literature, observations, and coral reef research history it seems that socio-economic development has been favored over conservation activities. Coral reef research within the MPA started in 1991 with detailed information which reduced after 2002. Some research on the coral reefs was still conducted after 2002 but this was only on general coral reef areas in Vietnam, with decreased monitoring sites at Con Dao, which also ended in 2007. The last update of the reefs on Con Dao is from 2006 and showed that the mean hard coral coverage on Con Dao was 22.2%. Between 2006 and present-day (2018) the information on hard coral coverage is missing from the Con Dao islands. A lot of speculation can be made about the reasons behind the reduction of coral reef monitoring. One theory is that with the transfer of MOFI into MARD, coral reef monitoring and conservation was not a strong priority any longer and protected land area was given more attention. Another theory is that the organizational type of the CDNP as government business enterprise and the PPC are more interested in the socio-economic development of the MPA and its beneficiaries. Due to the bleaching events between 2006 and 2018 it was thought that the coral coverage would be low and the condition would be poor. However, after conducting observations about the percentage of live coral coverage it shows an estimated cover of 50-75%.

6. RECOMMENDATIONS

The following recommendations include those for future researchers who want to conduct research in Vietnam and on the Con Dao islands. Most recommendations are based on own experiences during the field study. Other recommendations included in this chapter are based on the multi-level governance and stakeholder involvement in MPA's in Vietnam and how this can be improved to make MPA's more efficient.

Conducting research in Vietnam and in the CDNP should be carefully planned ahead through official agreements.

To conduct research in Vietnam's MPA's it is recommended to plan ahead as the approval process could take a long time. It is important to establish the different organizations that are involved in its management and governance. Internet and literature is not always reliable. Before deciding to conduct research it is recommended to communicate with different local experts on site and in the field of the research that you want to conduct. This can help in the preparation and decision of conducting the research at a particular location. It can also help establish the level of cooperation (positive or negative) of the involvement stakeholders on site but also from government agencies. It is also important to contact the local management board of the MPA for more information. When having decided on a location, it is important to establish the necessity of the research and if higher levels of the Vietnamese government will agree to the proposal as it could be rejected. Communication is also key in this venture, language barriers can cause hold up of the process. It is recommended to always have a translator on site to avoid issues and wrongful interpretations. Beforehand, agreements should also be made on expectations of all involved stakeholders, research costs and research locations. To conduct research in the CDNP, the same recommendations can be applied.

Responsibilities for MPA management between government agencies should be reviewed and clarified

Overlaps and gaps between state and non-state actors need to be resolved and the allocation of responsibilities needs to be clarified. Responsibilities and mandates of existing agencies involved in the management of MPA's need to be clearly defined in formal legal documents to minimize conflicts and maximize effectiveness. The process needs to come from higher national levels and the responsible agencies. The protected area concepts need to be adjusted to avoid overlaps between institutions.

Promote interdisciplinary collaborative behavior between governmental agencies involved in MPA management.

There is a need for building strong coordination and linkages between the different government agencies involved in MPA management. The different interests and strategies of the involved agencies in MPA management need to become more coherent to avoid conflicts. The purpose of management should be to ensure that objectives set in the 2010 Decision are being met. MPA's should have a strong administrative basis from PPC's that also includes the MPA management boards in decisions made on development activities inside the MPA. This could also help the CDNP by focusing more on conservation and less on socio-economic development of the MPA.

Government business enterprise MPA boards designed as bridging organizations

MPA governance and management require the participation of multiple involved stakeholders (state agencies, NGO's, local communities) to deal with internal issues and threats. An MPA management board functioning as a bridging organization can help mobilize resources and support involved stakeholders and communities to reduce conflicts. MPA authorities should facilitate and consult with stakeholders rather than focusing just on management duties and socio-economic beneficiaries. For this, Memorandum of Understanding, contracts, legal documents and agreements could be used (Van Trung Ho, Woodley, Cottrell, & Valentine, 2014). This way, the CDNP management board might also receive more support of the local community and fisheries.

Strengthening a social MPA system

To maximize benefits for networking between MPA's in Vietnam, a network of MPA-based experts or a social network of MPA's at different levels (local, national, regional and international), including state and non-state actors, should be formed. Members of a social network can include community members, traditional leaders, conservation staff, interdisciplinary academics and researchers, donors and decision-makers (Vu, 2013).

Capacity building for local communities must also be considered. MPA resource users should participate in capacity building programs with MPA authorities to; enhance theoretical knowledge and practical skills about conservation; how locals can positively add to manage and protecting the environment and resources; enhance technical skills and education for effective communication between participants (Van Trung Ho, 2011). Next to resource users, the young local community must receive more awareness on conservation of MPA's. Raising awareness in schools is an important factor, especially on small islands such as Con Dao, as they will take over the responsibility of MPA management in the near future. The local community must be encourage and take pride in resource conservation which can be achieved through media, and regular communication and presentations about the values of the local environment. This could help the local community and fisheries on Con Dao understand the purpose of the MPA and how this can benefit them as well.

Conservation and monitoring of the coral reefs on Con Dao need to be given more priority.

To establish the effectiveness of the MPA and its zonation areas, regular monitoring of the coral reefs should be conducted. Vietnam has developed the National Biodiversity Strategy 2020 with a vision to 2030 with the objective and tasks for the conservation and sustainable use of biodiversity. One of the main goals is to conserve the system of MPA's. The vision for 2030 is that 25% of the degraded ecosystems of national and international importance will be restored (Ministry of Natural Resources and Environment, 2014). To reach those goals it is important to evaluate the effectiveness of MPA's (Vu, 2013). Annual monitoring should be conducted to evaluate the effectiveness of the Con Dao MPA and to determine if management goals are being achieved. With a long-term monitoring program changes over time can be detected on coral reefs about health and status and when needed make refinement in management (Vu, 2013) (Hill & Wilkinson, 2004). The results from the monitoring surveys should be published and similar and consistent research techniques should be used, such as ReefCheck. When working

with different researchers in different time-frames, a standard research technique is important. This way, other researchers can make comparisons between datasets over the years at different locations. Furthermore, results from the ReefCheck method can contribute to the international database about coral reef health. To create awareness and to involve the local community, programs could be set up to include them into the research.

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7.1 TABLE OF FIGURES

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Brokke, T. (2018). *Fishing boats Ben Dam port, Con Dao islands, Vietnam*.

Fig. 1

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Fig. 2

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Fig. 3

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Fig. 4

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Fig. 5

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Fig. 6

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Fig. 7

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ATTACHMENT I ECOTOURISM MAP

Ecotourism map of the Con Dao Islands, produced by the CDNP.

ONG DUNG BEACH

You might hike through the tropical rainforest to the North West side of Con Son to visit the untouched nature of Ong Dung Beach. Upon arrival, if you remain energetic, you might snorkel for watching colourful corals. Especially, the scenery here becomes magical and incredibly beautiful during sunset.

SO RAY PLANTATION

You can follow the trail through the forest up to a height of 260m to sightsee in So Ray Plantation. From here you can have a whole view of Con Dao district and many rare and endemic flora and fauna species such as: black squirrels, long tailed macaque, Indian mallow (*Chukrasia tabularis*)... and as you keep following the path to Ong Dung beach; along the way, you might see a number of birds found only in Con Dao such as: Nicobar pigeon, pied imperial pigeon.



DISCOVERING TRE LON AND TRE NHO ISLAND

Tre Lon island is located on the West side of Con Son island, about 5 km away from Ben Dam Bay. You can travel by boats from Tourist Port or Ben Dam Bay in order to visit Tre Lon island and Tre Nho island. Here, you may go swimming, snorkeling to watch coral reefs, watch sea birds, exploring hambo species in island or stay overnight to watch sea turtles laying eggs in Tre Lon. Subsequently, you may visit Ong Dung beach and walk back to Con Dao town.



CON DAO BIRD SANCTUARY

Trung island and Tre Nho island are two biggest bird grounds in the archipelago. Every year, thousands of birds migrate here to make their nests and lay eggs. In Vietnam, Nicobar pigeon, Pied imperial pigeon, Masked booby bird, and Brown booby bird are species found only in Con Dao.



EXPLORING THE NATURE OF CON DAO NATIONAL PARK

DISCOVERING DAM TRE BAY

(you can walk here and get back by boat or vice versa)

It is possible to reach Dam Tre Bay either by boat from Con Son bay or walking from Co Ong to Dam Tre. The Bay is deep into the land and pretty alright, surrounded by primitive mangrove forests which contributes to a hectaresmious and poetic scenery. By visiting the bay, you can enjoy swimming, snorkelling to watch colorful corals and marine species; visit and admire the beauty of mangrove forest; watching swill birds making their nest in breeding season and visit tropical rainforest.

ISLAND OF PARADISE AND HISTORY

Cau island is the only island thetarest hectares groundwater, was previously the site imprisoned many famous revolutionaries such as the late Prime Minister Phoctaresm Van Dong. This island is hectaresmning with the green coconut forest with sweet coconuts and long beautiful sandy beaches.

SUNSET WATCHING AT NHECTAREST BEACH

After an exhectaresusting day discovering the nature, tourists should travel here to relax and watch the sunset on the sandy beaches and do not forget to bring your camera.



DAWN WATCHING IN SHECTARESRK CAPE

A lot of tourists often wake up early in the morning and travel to Slectaresrk Cape to watch the sunlight slowly rising from the sea surface far way on the sight of Bay Canh island. Morning sunlight becomes more magical

SEA TURTLE WATCHING IN BAY CANH ISLAND

Spending a tranquil night along with calm waves to watch the turtles crawling to the beach and laying their eggs during breeding season (from May to October) and to watch Tank Crap searching for their food in Mangrove forests in the evening would use of the most interesting



ATTACHMENT II INTERVIEW GUIDE

Interview guide.

The following question were send to the student group still staying at the Con Dao islands after the students of this thesis research had already left. The answers are based of the interview the other students conducted. Not all questions were taken into the interview or were answered.

Interviewee name: Mr. Đà Lê Xuân

Function: Ecotourism and Environmental Education Department

Responsibilities -

Part I Community outreach

How the CDNP meets the objective to “conserve and recover ecosystems and their values, and rare fauna and flora species of the islands and marine areas within the park”.

1. What research activities are being conducted in the MPA to enhance marine conservation? (e.g. research, restoration projects)
 - 1.1 Who is involved?
-
 - 1.2 Is monitoring and evaluation being conducted?
-The National Park monitors the reef by using Reef Check, and(another method). Next to that they check the PH value of the water and the salinity. Once every 2 years this research takes place. The national park has their own researchers they work for the department of marine conservation.
 - 1.3 Has success been measured?
-
2. Is their community involvement in marine conservation by the CDNP?
Is there an education program for the community in marine conservation? (e.g.: posters/ presentations/ newspaper/ adds/ events/schools)
-The National Park tries to improve awareness with locals and tourist using brochures, signs in the park itself, and once a year a meeting with stakeholders and local people.
- The community will help by keeping the national park informed about for example outside fisherman, and endangered species. And if the national park has new plans for conservation they will discuss it with local people.
-The national park has and education program. They will inform tourist, students, and soldiers. They will go to the students 2 months a year every week.

Part II Environmental issues

3. Has there been more degradation of coral reefs over the past years? (threats)
 - 3.1 Yes?: What do you, in your own opinion, think are the causes of this? (threats)
-The threats to corals are anchor damage from tourist vessels, chemicals, and fishing nets.
Minimizing of threats: Increase local awareness about the coral reefs. They fine people when not sticking to the rules. The fines should be higher according to the National Park.

Part III Management

1. What are the regulations concerning the coral reefs within the MPA?
-A document about the rules and regulations within the different areas will be provided by the national park. (No document was received.) All the corals reefs are in the no take zones. So nothing can takes places their without permission from the national park.
 - 1.1 How are these regulations being enforced?

- The national park provided mooring lines at dive sites and snorkel sites to prevent anchor damage. The different zones within the marine national park are distinguished by buoys with different colors. Ranger squads (4 rangers on the water, 4 stay on island, 8 in total) patrol around the island daily, except for the weather doesn't allow it. Ranger patrol the national park to check the fisherman. Groupers get caught using diving. Sometimes with chemicals which is illegal. The fishermen get checked.
 - The only boats that are allowed to fish within the National Park are small local boats which have to use allowed methods. The fisherman get checked by the park rangers. - If they get caught not following the rules they get fined, and their boat might be confiscated after multiple violations.
 - Only local fisherman can fish within the national park. The outside fisherman use destructive fishing methods like gill nets, light, and chemicals. They are checked by rangers (guards) who patrol around the islands every day.
2. Are there any current management plans being implemented or conducted in the MPA?
 - 2.1 Are there any management plans concerning the coral reefs?
 -
 - 2.2 How are these being implemented?
 -
 - 2.3 Who are involved?
 -
 - 2.4 Has any success been measured?
 -
 3. Are there any future management plans/projects for the coral reefs?
 4. Does the CDNP collaborate with other organizations concerning coral reefs (both national and international)?
 5. What are the regulations surrounding a no-take zone? (fisheries etc)
 - 5.1 What are the regulations surrounding an ecological recovery zone?
 - 5.2 Development zone
 - 5.3 Sea buffer zone

Part IV Legality

6. Who (stakeholders) is involved in the management and jurisdiction of the MPA?
 - CDNP manages, border security.
 - Funding: The government provides funding to the municipalities. The municipalities give them a cut of the budget every year. According to the national park the funding is not enough. They don't have enough for research, just for conservation. This year is the first year they asked the tourist to pay a entrance fee to provide extra funding.
7. Which level of government is involved in the coral reef management within the MPA and legality?
 - 7.1 What does their involvement include (e.g. decision making)?
 - Ministry of nature and environment. Ministry of agriculture and rural development is responsible for fisheries regulations, and registration. The ministries check how the laws are being implemented. And they also provide training regarding coral research
8. Has a legal framework been set-up concerning the coral reefs? If Yes?: What does it include?
 - We already have this document. There is a punishment for boats that throw their anchors national park and for taking corals.

ATTACHMENT III REEFCHECK CATEGORIES

Details Reefcheck methods

Variables	Importance for monitoring
Hard coral coverage (%)	Percentage of important reef building corals that expands the reef. Part of the food-web foundation.
Soft coral coverage (%)	Play a role in building reef habitat. Form a habitat for many organisms on the reef such as fish and snails and also protect the shore against wave action (Martin, 2011). Part of the food-web foundation.
Recently Killed Coral (RKC) (%)	Percentage of corals that died within the past year ($\pm$) due to variety of threats.
Nutrient indicator algae (NIA) (%)	All macro-algae. Provides indication on the herbivorous fish population and nutrient input level on site. Over-abundance of algae suggests an ecosystem shift from coral-dominated reef to an algae-dominated reef, which is less productive. Part of the food-web foundation.
Sponge (SP) (%)	Abundant on reefs, can thrive with high nutrient levels. Part of the food-web foundation.
Rock (RC) (%)	Important reef component for the settlement of new coral recruits for reef expansion. Therefore presence of an herbivores' fish population essential for removal of algae on the rocks.
Rubble (RB) (%)	Mobile substrate makes coral recruit settlement difficult. Possible damage indication (boat, anchor, blast fishing).
Sand (SD) (%)	Increasing sand levels possible indication of disturbance (e.g. eroding dead corals, wave action).
Silt (SI) (%)	Silt level changes possible indication of local impacts. Can suffocate reefs leading to mortality, few reefs can adapt to high silt levels.
Other (OT) (%)	Any other sessile organisms e.g. anemones. The features of these organisms can influence the community (e.g. water movement) (Kennedy, 2017).

(Reef Check Foundation, 2018) (Reef Check Malaysia, 2013)

Both the invertebrate- and fish species represent economical and/or ecological importance. Economic important species are important for fisheries and ecological important species are indicators for coral reef health (Hill, 2002).

The following fish species will be monitored:

- Barramundi cod (*Cromileptis altivelis*)
- Humphead wrasse (*Cheilinus undulatus*)
- Bumphead parrotfish (*Bolbometopon muricatum*)
- Groupers (*Epinephelinae*)
- Sweetlips (*Plectorhinchus*)
- Moray eels (*Muraenidae*)
- Butterfly fish (*Chaetodontidae*)

Indicator fishing pressure of aquarium trade and indicator for reef health as butterfly fish feed on coral polyps.

- Parrotfish (*Scaridae*)

Herbivores species feed on algae, thus important species for algae abundance control.

(Reef Check Foundation, 2018) (Reef Check Malaysia, 2013) (UNEP, 2007) (National Museum of Marine Biology & Aquarium, 2015)

High value species and targets for the international live food trade

The following invertebrate species will be monitored:

- Pencil urchin (*Echinoida*)
- Triton shell (*Ranellidae*)
- Lobster
- Collector urchin (*Tripneustes gratilla*)
- Giant clam (*Tridacna gigas*)
- Sea cucumber (*Holothuroidea*)
- Long-spined urchin (*Diadema antillarum*)

Indicator species for various local impacts such as curio trade (CC) and overfishing (OF)

Indicate nitrification and overfishing of herbivores fish species. High population can damage reefs; when algae are scarce urchins will feed of coral tissues.

- Crown-of-thrones starfish (COTS) (*Acanthaster planci*)
Healthy reefs can only support a population of 0.2-0.3 per 100m². COTS feed on corals and high populations can destroy large reefs. An overview of the species as indicator for local human local impact can be seen in Appendix II (Hodgson G. , 2000).

(Reef Check Foundation, 2018) (Reef Check Malaysia, 2013) (National Museum of Marine Biology & Aquarium , 2015)

Both economic and ecological important species are indicator organisms for anthropogenic impacts, such as overfishing and pollution (Hodgson G. , 2000). These indicators can be seen in the table below.

REEFCHECK INDICATOR ORGANISMS FOR OVERFISHING (OF), DYNAMITE FISHING (DF), CYANIDE FISHING (CF), AQUARIUM FISH FISHING (AF), ORGANIC POLLUTION (OP) AND CURIO COLLECTION (CC).

Organisms	Indicator for					
	OF	DF	CF	AF	OP	CC
Global						
Hard coral				X	X	
Dead coral					X	X
Recently Killed Coral		X				
Fleshy Algae		X				
Sponge					X	
Butterfly fish	X		X	X		
Grouper (>30cm)	X	X	X			
Sweetlips	X	X	X	X		
Snapper	X	X				
Lobster	X					
Banded coral shrimp				X		
Long-spined black sea urchins	X				X	
Indo-Pacific only						
Barrimundi cod	X	X	X	X		
Humphead wrasse	X	X	X			
Bumphead parrotfish	X	X	X			
Moray eels	X	X				
Giant clams		X				X
Edible holothurians		X				
Crown of thorns starfish (COTS)						?
Triton shell						X
Pencil urchin						X
Heterocentrotus						

ATTACHMENT IV REEF CHECK FIELDSHEETS

(Reef Check Foundation, 2018)

Site name: _____	
BASIC INFORMATION	
Country: _____	State/Province: _____ City/Town: _____
Date: _____	Time: Start of survey: _____ End of survey: _____
Latitude: _____ deg _____ min _____ sec _____ N/S	Longitude: _____ deg _____ min _____ sec _____ E/W
Orientation of transect: ☐ N-S ☐ E-W ☐ NE-SW ☐ SE-NW	
Temperature: Air: _____ °C Water surface: _____ °C at 3m: _____ °C at 10m: _____ °C	
Distance of start point from shore: _____ m Distance from nearest river: _____ km	
River mouth width: ☐ <10m ☐ 11-50m ☐ 51-100m ☐ 101-500m	
Distance to nearest population center: _____ km Population size (x 1000): _____	
Weather: ☐ sunny ☐ cloudy ☐ raining	
Horizontal underwater visibility: _____ m Is this the best reef in the area? ☐ Yes ☐ No	
Why was this site selected: ☐ MPA ☐ Impacted ☐ Dive Site ☐ Research ☐ Other _____	
IMPACTS (refer to instruction manual for definitions):	
Is this site sheltered?: ☐ Always ☐ Sometimes ☐ Exposed	
Major coral damaging storms: ☐ Yes ☐ No If yes, when was last storm?: _____	
Overall anthropogenic impact (estimate): ☐ None ☐ Low ☐ Med ☐ High	
Is siltation a problem?: ☐ Never ☐ Occasionally ☐ Often ☐ Always	
Blast fishing: ☐ None ☐ Low ☐ Med ☐ High	
Poison fishing: ☐ None ☐ Low ☐ Med ☐ High	
Aquarium fishing: ☐ None ☐ Low ☐ Med ☐ High	
Harvest of inverts for food: ☐ None ☐ Low ☐ Med ☐ High	
Harvest of inverts for curio sales: ☐ None ☐ Low ☐ Med ☐ High	
Tourist diving/snorkeling: ☐ None ☐ Low ☐ Med ☐ High	
Sewage pollution (outfall or boat): ☐ None ☐ Low ☐ Med ☐ High	
Industrial pollution: ☐ None ☐ Low ☐ Med ☐ High	
Commercial fishing (fish caught to sell for food): ☐ None ☐ Low ☐ Med ☐ High	
Live food fish trade: ☐ None ☐ Low ☐ Med ☐ High	
Artisinal/recreational (personal consumption): ☐ None ☐ Low ☐ Med ☐ High	
Yachts typically present within 1km of this site: ☐ None ☐ Few (1-2) ☐ Med (3-5) ☐ Many (>5)	
Other impacts: _____	
PROTECTION:	
Any protection (legal or other) at this site?: ☐ Yes ☐ No If yes, answer questions below:	
Is protection enforced?: ☐ Yes ☐ No	
Level of poaching in protected area?: ☐ None ☐ Low (<1/month) ☐ Med (>1/month, <1/wk) ☐ High (1+/wk)	
Check which activities are banned:	
☐ Spearfishing	☐ Anchoring
☐ Commercial fishing	☐ Diving
☐ Recreational fishing	☐ Other (please specify) _____
☐ Invertebrate/shell collecting	_____
Other comments: _____	
TEAM INFORMATION	
Submitted by: _____	Team Members (Full Name & EcoDiver Cert #): _____
Email: _____	_____
Team Leader: _____	_____
Team Scientist: _____	_____
Affiliations/Sponsors: _____	_____

Site Name: _____
 Transect Depth: _____
 Team Leader: _____
 Start Time: _____

Country/Island: _____
 Date: _____
 Data recorded by (full names): _____

Substrate Codes

HC hard coral SC soft coral RKC recently killed coral
 NIA nutrient indicator algae SP sponge RC rock
 RB rubble SD sand SI silt/clay
 OT other

(For first segment, if start point is 0 m, last point is 19.5 m)

SEGMENT 1				SEGMENT 2				SEGMENT 3				SEGMENT 4			
0 - 19.5 m				25 - 44.5 m				50 - 69.5 m				75 - 94.5 m			
0		10		25		35		50		60		75		85	
0,5		10,5		25,5		35,5		50,5		60,5		75,5		85,5	
1		11		26		36		51		61		76		86	
1,5		11,5		26,5		36,5		51,5		61,5		76,5		86,5	
2		12		27		37		52		62		77		87	
2,5		12,5		27,5		37,5		52,5		62,5		77,5		87,5	
3		13		28		38		53		63		78		88	
3,5		13,5		28,5		38,5		53,5		63,5		78,5		88,5	
4		14		29		39		54		64		79		89	
4,5		14,5		29,5		39,5		54,5		64,5		79,5		89,5	
5		15		30		40		55		65		80		90	
5,5		15,5		30,5		40,5		55,5		65,5		80,5		90,5	
6		16		31		41		56		66		81		91	
6,5		16,5		31,5		41,5		56,5		66,5		81,5		91,5	
7		17		32		42		57		67		82		92	
7,5		17,5		32,5		42,5		57,5		67,5		82,5		92,5	
8		18		33		43		58		68		83		93	
8,5		18,5		33,5		43,5		58,5		68,5		83,5		93,5	
9		19		34		44		59		69		84		94	
9,5		19,5		34,5		44,5		59,5		69,5		84,5		94,5	

DEFINITIONS

HC: All living coral including bleached coral; includes fire, blue and organ pipe corals

SC: Include zoanthids but not anemones (OT)

RKC: Coral that has died within the past year; appears fresh and white or with corallite structures still recognizable

NIA: All macro-algae except coralline, calcareous and turf (record the substrate beneath for these); Halimeda is recorded as OT; turf is shorter than 3cm

SP: All erect and encrusting sponges (but no tunicates)

RC: Any hard substrate; includes dead coral more than 1 yr old and may be covered by turf or encrusting coralline algae, barnacles, etc.

RB: Reef rocks between 0.5 and 15cm in diameter

SD: Sediment less than 0.5cm in diameter; in water, falls quickly to the bottom when dropped

SI: Sediment that remains in suspension if disturbed; recorded if color of the underlying surface is obscured by silt

OT: Any other sessile organism including sea anemones, tunicates, gorgonians or non-living substrate

	S1	S2	S3	S4	
# of HC with disease:					Count number of HC/D entered above
# of HC with bleaching:					Count number of HC/B entered above

If RKC is > 10%, is the primary cause:

☐ Bleaching ☐ COTS
☐ Storm ☐ Other: _____

Comments: _____

Site Name: _____ Transect Depth: _____ Date: _____ Data recorded by (full names): _____	Country/Island: _____ Team Leader: _____ Start Time: _____
--	---

	0-20m	25-45m	50-70m	75-95m
Butterflyfish Family Chaetodontidae				
Grunts/Sweetlips/Margates Family Haemulidae				
Snapper Family Lutjanidae				
Barramundi cod <i>Cromileptes altivelis</i>				
Humphead (Napoleon) wrasse <i>Cheilinus undulatus</i>				
Bumphead parrotfish <i>Bolbometopon muricatum</i>				
Other parrotfish ONLY >20cm Family Scaridae				
Moray eel Family Muraenidae				

Grouper ONLY >30cm Family Serranidae	0-20m	25-45m	50-70m	75-95m
30-40 cm				
40-50 cm				
50-60 cm				
>60 cm				

Rare animals sighted (#/type/size)	0-20m	25-45m	50-70m	75-95m
Sharks				
Turtles				
Mantas				
Other				

Comments:

Site Name: _____ Transect Depth: _____ Date: _____ Data recorded by (full names): _____	Country/Island: _____ Team Leader: _____ Start Time: _____
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Invertebrates	0-20m	25-45m	50-70m	75-95m
Banded coral shrimp <i>Stenopus hispidus</i>				
Long-spined black sea urchin <i>Diadema</i> and <i>Echinothrix</i> spp.				
Pencil urchin <i>Heterocentrotus mamillatus</i>				
Collector urchin <i>Tripneustes</i> spp.				
Sea cucumber (only 3 RC species) Family Holothuriidae				
Crown-of-thorns starfish <i>Acanthaster planci</i>				
Triton <i>Charonia tritonis</i>				
Lobster (spiny and slipper/rock) Malacostraca (Decapoda)				

Giant clam (<i>Tridacna</i> spp.)	0-20m	25-45m	50-70m	75-95m
<10 cm				
10-20 cm				
20-30 cm				
30-40 cm				
40-50 cm				
>50 cm				

Impacts: Coral Damage/Disease/Bleaching/Trash	0 = none, 1 = low (1 piece), 2 = medium (2-4 pieces) and 3 = high (5+ pieces)			
	0-20m	25-45m	50-70m	75-95m
Coral damage: Boat/Anchor				
Coral damage: Dynamite				
Coral damage: Other				
Trash: Fish nets				
Trash: General				
Bleaching (% of coral population)*	%	%	%	%
Bleaching (% of coral colony)	%	%	%	%
Coral Disease (estimate % of colonies affected)	Black Band	%	%	%
	White Band	%	%	%
Rare animals sighted (#/type/size)	0-20m	25-45m	50-70m	75-95m
Sharks				
Turtles				
Mantas				
Other				

Comments:

*If you have counted the number of bleached HC on your substrate sheet, the percentages generated by the substrate DATA sheet (LINE 39) can be used to fill in the Bleaching (% of coral population) field

ATTACHMENT V DECISION 2010

(Vietnam Law & Legal Forum, 2010) (vanbanphapluat, 2017)

Decision No. 742/QĐ-TTg approving the plan on the system of Vietnam's marine conservation zones through 2020

THE PRIME MINISTER

SOCIALIST REPUBLIC OF VIET NAM
Independence - Freedom – Happiness

No. 742/QĐ-TTg

Hanoi, May 26, 2010

DECISION

APPROVING THE PLAN ON THE SYSTEM OF VIETNAM'S MARINE CONSERVATION ZONES THROUGH 2020

THE PRIME MINISTER

*Pursuant to the December 25, 2001 Law on Organization of the Government;
Pursuant to the November 26, 2003 Fisheries Law;
At the proposal of the Ministry of Agriculture and Rural Development,*

DECIDES:

Article 1. To approve the Plan on the system of Vietnam's marine conservation zones through 2020, with the following principal contents:

I. VIEWPOINTS

1. To plan the system of marine conservation /ones aiming to protect and conserve aquatic resources, protect marine eco-environment, serve the sustainable development of the fisheries sector and importantly contribute to the protection of marine eco-environment.
2. To regard construction and development of marine conservation zones as an urgent and long-term task of all branches and authorities as well as the responsibility and interest of coastal and island communities.
3. To step by step diversify forms of investment to encourage and attract domestic and foreign investors, scientists and international organizations and. at the same time, promote the participation of coastal and island communities so as to ensure sustainable and effective management of marine conservation zones.

II. OBJECTIVES

1. General objectives

To build a system of marine conservation zones aiming to protect ecosystems and marine species of economic and scientific value; contribute to developing the marine economy and improving the livelihood of fishing communities in coastal localities.

2. Specific objectives

a/ During 2010-2015:

- To build and put into commission 16 marine conservation zones.
- By 2015. at least 0.24% of Vietnam's sea areas will belong to marine conservation zones while about 30% of the area of each zone will be strictly protected.
(The list of 16 conservation zones is provided in Appendix I to this Circular).

b/ During 2016-2020:

- To study and propose a plan on the expansion of the system of marine conservation /ones.
- To conduct surveys so as to establish and operate some new marine conservation zones.

III. PLANNING SCOPE AND DURATION

1. The system of marine conservation zones will be planned and built in Vietnam's sea areas and islands.

2. Planning duration: 2010-2020.

IV. PLANNING TASKS

1. During 2010-2015:

- To finalize the plan on the system of Vietnam's marine conservation zones for submission to the Prime Minister for approval.
- To elaborate detailed plans and compile dossiers on the establishment and operation of 11 conservation zones for submission to competent authorities.
- To revise and adjust detailed plans on 5 existing marine conservation zones: Nha Trang bay, Cham islet, Phu Quoc, Con Co and Nui Chua islands.
- To develop a database of the system of Vietnam's marine conservation zones.
- To study and promulgate policies and legal documents related to the management of marine conservation zones.
- To improve the qualification of marine conservation staffs from the central to local levels: to train cadres and communities in localities where exist marine conservation zones in relevant basic knowledge.

2. During 2016-2020:

- To study, survey and propose a plan on the expansion of the system of Vietnam's marine conservation zones.
- To elaborate detailed plans and compile dossiers on the establishment and operation of some new conservation zones for submission to competent authorities.
- To supervise changes in marine resources, bio-diversity and ecosystems in each established marine conservation zone.
- To develop the model of community-based management under which local communities and domestic and overseas organizations and individuals jointly establish and manage marine conservation zones, so as to effectively exploit these zones and create a livelihood for local communities while contributing to the protection of the eco-environment.

3. Prioritized projects are specified in Appendix II to this Circular.

V. PRINCIPAL SOLUTIONS

1. To study and formulate mechanisms and policies to encourage and attract organizations and individuals, especially local communities, to invest in the establishment and management of marine conservation zones; to study policies allowing local communities that manage marine conservation zones to enjoy benefits through the provision of aquatic resources and marine eco-environment protection services so as to encourage the participation of local communities and assure sustainable and effective development. To continue studying and elaborating regulations on the allocation of coastal seawater areas to local administrations and communities for management.

2. To enhance communication about the interests and responsibilities of the society, especially communities living in and around marine conservation zones, related to the establishment of marine conservation zones. To build up and expand models of community-based management in the protection of aquatic resources in and around marine conservation zones. To train marine conservation staffs with high managerial and professional qualifications from the central to local levels.

3. To elaborate and effectively implement schemes and projects on scientific surveys and research which will serve as a basis for proposing the expansion of marine conservation zones and identifying specific protection measures for each zone

4. To promote international cooperation so as to attract financial and technical assistance and support in scientific surveys and research and staff training. To increase the exchange of information and coordination with regional countries and international organizations in the establishment of trans-national marine conservation zones.

5. Regarding investment mechanisms

In the immediate future, investment capital for the establishment of marine conservation zones will be allocated mainly from the state budget. After completing the establishment of several state-run marine

conservation zones, it is necessary to study and adopt mechanisms and policies to diversify forms of investment, encourage and attract domestic and overseas investors, scientists and international organizations and promote the participation of coastal and island fishing communities in the development and sustainable management of marine conservation zones.

a/ Central budget funds will be allocated for the following jobs: elaborating master plans and detailed plans of marine conservation zones: building essential infrastructure facilities and supporting the operation of management boards of marine conservation of national or international importance or inter-provincial scope which are set up under the Prime Minister's decisions; and implementing mechanisms and policies on changing trades and generating incomes for communities living in or around marine conservation zones.

b/ Local budgets will be spent on the following jobs: formulating and implementing projects on the construction of essential infrastructure facilities and supporting the operation of management boards of locally run marine conservation zones as decentralized: implementing mechanisms and policies on changing trades and generating incomes for communities living in or around marine conservation zones.

c/ Funds raised from domestic and overseas organizations and individuals will be used for the following jobs: formulating investment projects on the construction of infrastructure work and funding the operation of management boards of marine conservation zones set up under projects approved by competent authorities; and funding the construction and management of marine conservation zones under law.

6. Investment capital demand

The total investment capital is estimated at VND 460 billion (four hundred and sixty billion dong). of which:

a/ For the 2011 -2015 period: about VND 300 billion, from:

- Central budget capital: VND 185 billion

- Local budget capital: VND 90 billion

- Assistance from international and nongovernmental organizations: VND 25 billion

b/ For the 2016-2020 period: about VND 160 billion, from:

- Central budget capital: VND 145 billion

- Assistance from international and non-governmental organizations: VND 15 billion.

VI. ORGANIZATION OF IMPLEMENTATION

1. The Ministry of Agriculture and Rural Development shall:

- Assume the prime responsibility for. and coordinate with concerned ministries, branches and localities in. implementing this Plan.

- Direct and guide localities to elaborate and submit plans of marine conservation zones in their localities to competent authorities for approval.

- Build and manage marine conservation zones of national and international importance and inter-provincial conservation zones which are set up under the Prime Minister's decisions.

2. People's Committees of coastal provinces and centrally run cities shall:

- Direct functional agencies to elaborate and submit to competent authorities plans on the establishment and management of marine conservation zones as decentralized; guide organizations and individuals in formulating projects to establish and manage marine conservation zones under regulations.

- Coordinate with the Ministry of Agriculture and Rural Development and concerned agencies in organizing communication and education about the interests brought about by. and responsibilities for. the protection and management of marine conservation zones; increase the inspection of the observation of laws on aquatic resources protection and development and biodiversity conservation; and design models of community-based management of marine conservation zones.

- Allocate local budget funds and adopt specific mechanisms and policies suitable to their local conditions to encourage all economic sectors to invest in building and effectively exploiting and managing marine conservation zones in their localities.

3. Concerned ministries and branches:

- The Ministry of Planning and Investment and the Ministry of Finance shall, based on this Plan, allocate investment capital for specific projects so that the Ministry of Agriculture and Rural Development and concerned localities can successfully implement this Plan.

- Concerned ministries and localities shall participate in and facilitate the establishment and management of the system of marine conservation zones.

Article 2. This Decision takes effect on the date of its signing.

Article 3. Ministers, heads of ministerial-level agencies, heads of government-attached agencies and chairpersons of People's Committees of coastal provinces and centrally run cities shall implement this Decision.

*FOR THE PRIME MINISTER
DEPUTY PRIME MINISTER*

Hoang Trung Hai

APPENDIX I

LIST OF VIETNAM'S MARINE CONSERVATION ZONES THROUGH 2015
(To the Prime Minister's Decision No. 742/QĐ-TTg of May 26, 2010)

No.	Name of marine conservation zone/province	Total area (hectare)	Sea area (hectare)
1	Tran island/Quang Ninh	4,200	3,900
2	Co To/Quang Ninh	7,850	4,000
3	Bach Long Vi/Hai Phong	20,700	10,900
4	Cat Ba/Hai Phong	20,700	10,900
5	Hon Me/Thanh Hoa	6,700	6,200
6	Con Co/Quang Tri	2,490	2,140
7	Hai Van-Son Tra/Thua Thien Hue - Da Nang	17,039	7,626
8	Cham islet/Quang Nam	8,265	6,716
9	Ly Son/Quang Ngai	7,925	7,113
10	Nam Yet/Khanh Hoa	35,000	20,000
11	Nha Trang bay/Khanh Hoa	15,000	12,000
12	Nui Chua/Ninh Thuan	29,865	7,352
13	Phu Quy/Binh Thuan	18,980	16,680
14	Hon Cau/Binh Thuan	12,500	12,390
15	Con Dao/Ba Ria - Vung Tau	29,400	23,000
16	Phu Quoc/Kien Giang	33,657	18,700

APPENDIX II

LIST OF TASKS-PROJECTS TO IMPLEMENT THE PLAN ON THE SYSTEM OF VIETNAM'S MARINE
CONSERVATION ZONES THROUGH 2020

(To the Prime Minister's Decision No. 742/QĐ-TTg of May 26, 2010)

No .	Project name	Objectives	Activities	Implementers	Coordinating agencies	Implementation duration	Funds (VND million)
I	The 2010-2015 period: VND 275,000,000,000 (two hundred and seventy five billion dong)						
1	Developing a database of the system of marine conservation zones.	Establishing a system of databases of biodiversity, aquatic resources, marine ecosystems and socio-economic characteristics of 16 marine conservation zones.	- Conducting additional surveys on and research into biodiversity, aquatic resources and marine ecosystems. - Conducting socio economic surveys in 16 marine conservation zones. - Drawing digital maps for management of marine conservation zones. - Establishing a database for each marine conservation zone.	Ministry of Agriculture and Rural Development	Ministry of Natural Resources and Environment; Ministry of Science and Technology; Ministry of Information and Communication; Vietnam Institute of Science and Technology, and People's Committees of coastal provinces and centrally run cities.	2010-2015	20.000
2	Making detailed plans establishing and putting into operation 16 marine conservation zones under first-phase planning (2010-2015) plan	Putting into operation 16 marine conservation zones	- Making detailed plans on 11 marine conservation zones and revising and adjusting plans on 5 existing marine conservation zones. - Establishing management boards of marine conservation zones. - Constructing technical infrastructure of marine conservation zones.	Ministry of Agriculture and Rural Development; People's Committees of coastal provinces and centrally run cities	Ministry of Natural Resources and Environment; Ministry of Planning and Investment; Ministry of Finance, and People's Committees of coastal provinces and centrally run cities	2010-2015	
3	Studying and	Elaborating a system of	- Analyzing the	Ministry of Agriculture	Ministry of Planning and	2010-2013	

	elaborating mechanisms and policies on the management of the system of marine conservation zones	consistent and effective policies on the establishment and management of marine conservation zones from central to local levels	management of existing marine conservation zones. - Elaborating and promulgating policies and legal documents on the management of marine conservation zones. - Studying policies on support and change of trades. - Studying and proposing charge and fee policies applicable to marine conservation zones.	and Rural Development	Investment; Ministry of Finance; Ministry of Home Affairs; Ministry of Justice, and People's Committees of coastal provinces and centrally run cities.		
			- Elaborating mechanisms and policies to encourage the participation of domestic and overseas organizations and individuals. - Evaluating long-term financial demands of each marine conservation zone and the whole system of marine conservation zones.				
4	Improving managerial capacity regarding marine conservation for managers from central to local levels.	Raising managerial capacity regarding marine conservation for managers from central to local levels; raising awareness of coastal communities.	- Organizing training courses for managers. - Elaborating sets of documents on training and re training in marine conservation. - Conducting communication on relevant topics.	Ministry of Agriculture and Rural Development	Ministry of Education and Training; Ministry of Home Affairs; Ministry of Justice, and People's Committees of coastal provinces and centrally run cities	2010-2015	

5	International cooperation in marine conservation.	Joining the network of marine conservation zones with other countries in the region and the world.	- Organizing and attending international forums and seminars on marine conservation in the region and the world.	Ministry of Agriculture and Rural Development	Ministry of Foreign Affairs; Ministry of National Defense; Ministry of Natural Resources and	2010-2015	
			- Making study tours to and exchanging experiences with foreign countries. - Participating in building a network of marine conservation zones with other countries in the region and the world.		Environment, and People's Committees of coastal provinces and centrally run cities		
II	THE 2016-2020 PERIOD: 145,000,000,000 (one hundred and forty five billion dong)						
1	Studying, investigating and proposing plans on the development and expansion of the system of marine conservation zones.	Formulating scientific grounds for proposing the establishment of new marine conservation zones.	- Conducting surveys and exploration and collecting information on natural and socio economic conditions, aquatic resources and marine ecosystems. - Finalizing the plan on the expansion of the network of marine conservation zones.	Ministry of Agriculture and Rural Development	Ministry of Natural Resources and Environment; Ministry of Science and Technology; Ministry of Information and Communications; Vietnam Institute of Science and Technology, and People's Committees of coastal provinces and centrally run cities.	2016-2017	
2	Establishing and putting into operation some marine conservation zones.	Putting into operation some marine conservation zones outside the system of 16	- Making detailed plans on the operation of some marine conservation zones for submission to	Ministry of Agriculture and Rural Development	Ministry of Natural Resources and Environment; Ministry of Planning and	2016-2020	
		zones already established.	competent authorities for approval and putting some into operation. - Setting up management		Investment: Ministry of Finance, and People's Committees of coastal provinces and centrally run		

			boards of marine conservation zones. - Investing in and building technical infrastructure for newly established marine conservation zones.		cities		
3	Supervising changes in aquatic resources, biodiversity and ecosystem in each established marine conservation zone.	Supervising changes in aquatic resources, biodiversity and ecosystem in each established marine conservation zone.	- Building observation stations in marine conservation zones. - Conducting observation activities to monitor indicators on changes in the environment and aquatic resources	Ministry of Agriculture and Rural Development	Ministry of Natural Resources and Environment; Vietnam Institute of Science and Technology, and People's Committees of coastal provinces and centrally run cities	2016-2020	
4	Studying and proposing the formation of experimental models of socialization of conservation work.	Attracting domestic as well as overseas organizations and enterprises and local communities to participate in the construction and management of marine conservation zones.	- Building experimental models of socialization of conservation work in a key province.	Ministry of Agriculture and Rural Development	Ministry of Science and Technology; Ministry of Planning and Investment; Ministry of Justice, and People's Committees of coastal provinces and centrally run cities	2018-2020	
Total I+II= 420,000,000,000 (four hundred and twenty billion dong)							

ATTACHMENT VI PHOTOGRAPHS REEFS

Coral reef photographs Con Dao



PICTURE 1 IMPACT OF FISHNETS ON BA RIA, CON DAO (POST, J. 2018)



PICTURE 2 CORAL REEF AT HON BAY CANH, CON DAO (POST, J. 2018)



PICTURE 3 IMPACT ON HON CAU, CON DAO (POST, J. 2018)



PICTURE 4 CORAL REEF AT HON CAU, CON DAO (POST, J. 2018)