

Marine Policy and Environmental Management in Taiwan

**Thesis submitted in candidature for the degree of
Philosophic Doctor of Cardiff University**

By

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ABSTRACT

Taiwan, has a population of more than 23 million. It has a land area of only 36,000 square kilometers of which more than two-thirds are occupied by rugged mountains. The population density of Taiwan is over 632 persons per square kilometer. Due to the scarcity of land, marine areas in Taiwan are under heavy pressure from rapid development and diverse uses. Thus, the central government has begun to devote much time and effort to improving marine management practices. The pressures and consequent problems and challenges that are increasing in the marine areas deserve high priority in order to address issues relating to the marine environmental management of Taiwan. It is essential to adopt a holistic approach to integrate the mechanisms for marine environmental management in Taiwan and figure out the relationships between marine policy and marine environmental management in order to address and alleviate the existing and emerging problems. Global and national marine policies and integrated marine management principles and practices of developed nations would be useful lesson for the Taiwanese case.

Using the qualitative case study research design and research method, inclusive of questionnaire surveys and semi-structured interviews, this thesis examines marine policy and marine environmental management system with regard to fisheries, waste disposal and pollution, as well as marine environmental protection and conservation. In order to conduct a study of the relationships between marine policy and marine environmental management in Taiwan, and focused on the study in three domains and four research themes. Four management tools as the management assessment have been used to evaluate government's organisation and legislation, human resources, policy development, technical management, implementation and enforcement. The framework of a marine policy and environmental management is established in the

findings. Further, this research is an applied study, with outcomes of practical value in dealing with the issues concerned.

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LIST OF ACRONYMS

APEC	Asia Pacific Economic Cooperation
AS	Academic Sinica
BEA	Basic Environmental Act
BOD	Biochemical Oxygen Demand
CGA	Coast Guard Administration
CIMA	China Institute for Marine Affairs
COA	Council of Agriculture
COS	Canada's Oceans Strategy
CPA	Construction and Planning Agency
CPAMI	Construction and Planning Agency of the Ministry of the Interior
Defra	Department for Environment, Food and Rural Affairs
DEST	Department of Education, Employment and Workplace Relations
DFO	Department of Fisheries and Oceans
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EPA	Environmental Protection Administration
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
EU	European Union
FA	Fisheries Agency
FCCC	Framework Convention on Climate Change
FMG	Bay of Fundy, the Gulf of Maine and Georges Bank
GIS	Geographic Information Systems
ICZM	Integrated Coastal Zone Management
IUCN	International Union for Conservation of Nature
IWHE	Important Wildlife Habitat Environment
LOMAs	Large Ocean Management Areas
LSPRC	Land Subsidence Prevention and Reclamation Corps
MLIT	Ministry of Land, Infrastructure, Transport
MMO	Marine Management Organisation
MND	Ministry of National Defence
MOE	Ministry of Education
MOEA	Ministry of Economic Affairs
MOF	Ministry of Finance
MOI	Ministry of the Interior
MOTC	Ministry of Transportation and Communications
MPA	Marine Protection Area

MPCA..... Marine Pollution Control Act
NCSD..... National Council for Sustainable Development
NERC..... Natural Environment Research Council
NGO..... Non-Governmental Organisation
NOAA..... National Oceanic and Atmospheric Administration
NOC..... National Ocean Council
OA..... Oceans Act
OC..... Ocean Commission
OPSAG..... Oceans Policy Science Advisory Group
OR 2000..... Ocean Rescue 2000
PDMAP..... Proposal for the Development of Marine Affairs and Policies
PFA..... Provincial Fishermen's Association
RDEC..... Research, Development, and Evaluation Commission
SEA..... Strategic Environmental Assessment
TAC..... Total Allowable Catch
U.S. United States
UK..... United Kingdom
UN..... United Nations
UNCED..... United Nations Conference on Environment and Development
UNCLOS..... United Nations Convention on the Law of the Sea
UNESCO..... United Nations Educational, Scientific and Cultural Organisation
USCOP..... U.S. Commission on Ocean Policy
USOAP..... U.S. Ocean Action Plan
WSSD..... World Summit on Sustainable Development
WWF..... World Wildlife Fund

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

1.1.1 Global

For a long time, marine resources have been considered as inexhaustible, but with overuse, indirect causes of human development and more direct forms of destruction, the degree of damage has exceeded the earth's capability for self-healing (NUEP, 2005). Marine pollution is closely related to our daily life and the marine environmental damage caused by the waste discharged into the sea is increasing and it is leading to the destruction of the marine environment (Clark, 1997). The degradation of the marine environment is being further worsened by the exhaustion of fishery resources (Jackson *et al.*, 2001; Suárez *et al.*, 2004). Environmental organisations and governments are alarmed and have been appealing for protection of the marine environment and moderation in the use of its resources. As oceans are a common wealth of the world, protecting the marine environment is a common responsibility of countries all over the world (Cicin-Sain and Knecht, 1998).

In 1982, the United Nations (UN) adopted the *United Nations Convention on the Law of the Sea (UNCLOS)*. This convention has a series of provisions dealing respectively with marine biological resources conservation and management, marine environmental protection, maritime space compartmentalisation, adequate marine usage and marine system maintenance. The *UNCLOS* which came into effect on the 16th November 1994, stresses international marine resource utilisation and management. By the 7th of November, 2000, 135 signatories had acceded. Marine resource utilisation and management together with marine protection provides a more all-encompassing framework than that provided by the concept of control and

utilisation of the marine resources above.

Most national marine policies (including fish culture, marine space, petroleum mining and exploitation, marine environmental protection, marine biological resources protection and management and shipping) are based upon *UNCLOS*, and other Conventions relating to international environmental protection, resources conservation, and management.

Furthermore, Agenda 21 for Sustainable Development adopted on June 1992 in Rio de Janeiro, Brazil, has placed great emphasis on the protection of the oceans, all kinds of seas, including enclosed and semi-enclosed seas, and coastal areas and the protection, rational use and development of their living resources. This is regarded as a cardinal measure for sustainable global development.

Recognizing the importance of the earth's oceans and the marine environment to human life, the United Nations Educational, Scientific and Cultural Organisation (UNESCO), under the recommendations of the Intergovernmental Oceanographic Commission endorsed the International Year of the Ocean in 1993. This was adopted in the 49th United Nations General Assembly, and 1998 was designated as the International Year of the Ocean. The aim of this activity was to focus global attention on human community assets represented by the ocean together with protecting the ocean. It encouraged governments to make efforts in harmonising governance and appropriating funds for the protection of marine resources, prevention of marine pollution, and improvement of marine development and management. Governments were also encouraged to strengthen marine education and improve their constitutional basis.

From a global perspective, focus on the development of marine environmental protection and protection of marine life by international organisations, has had positive results. Through efforts made by international society to regulate fishery operations on high seas in meetings, forums and agreements like the International Conference on Responsible Fishing in Cancun in Mexico in May 1992; the United Nations Conference on Environment and Development (UNCED), Rio de Janeiro, Brazil, in June, 1992; *the Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea* of 10 December 1982, and the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, approved in August, 1995 following the United Nations Consensus on World Fisheries, approved by the ministerial meeting held at the Food and Agriculture Organisation of the United Nations in March, 1995, a clear purpose has been communicated: sustainable utilisation of fishery resources.

With the increasing importance of the ocean, for the governance of marine affairs including marine fisheries, mining, transportation, tourism, exploitation of resources, ecosystem protection, environment protection, and management of coasts, the sectoral administrative system does not meet today's demanding requirements. Institutions which are more enhanced and better coordinated are needed.

A marine policy administration system which promotes and enhances the coordination of related units, reduces conflicts, decreases overlap and duplication and merges administration, research and technology is required. The goal is to prepare, plan and execute a coordinated approach to marine affairs. To achieve this goal, close cooperation of the related departments and coordination from central to local authorities is needed.

1.1.2 Taiwan

Taiwan is surrounded by seas, and has a total coastal line of 1,652 km. The island is located between the East China Sea, the South China Sea and the Pacific Ocean. Due to the busy international sea traffic around this area, Taiwan's marine transportation industry is highly developed. Furthermore, owing to the large geographical scale of surrounding waters, Taiwan is in possession of rich marine resources. The surrounding seas are the regular migration routes of fish. The quantities of shellfish seaweed, sea cucumber and other various types of high-value products are also large. There are also substantial quantities of gas and oil reserves within Taiwan's territorial waters. As the island's usable land is relatively small and yet over-populated, earth resources and living space are extremely limited. Therefore, any industrial, economic and daily activity on the island brings significant impact on its marine environment. As a result, marine policy is an issue of paramount importance for the proper management and utilisation of the rich and valuable marine resources. The enforcement authority of the territorial waters plays a very important role in developing implementing and administering all related and relevant policies. One of the top priorities is to ensure quality marine management and usage. To achieve this goal, necessary actions must be taken in accordance with appropriate laws and policies such as regulations governing smuggling, illegal entry and unauthorised departure, coastal control, security of fishing harbours, sea rescue, marine traffic control, and marine pollution. Equally important, policies relating to protection of the biological and natural environment must be implemented.

There is very limited or non-existent interaction between marine policy and marine environmental management in Taiwan. The problem is not simply that the integrated environmental management at sea is lacking, though sometimes it is the case for the

administration. Issues such as ambiguity and unclear jurisdiction among ocean-related agencies are common. The lack of strategic planning too contributes to the absence of a more coherent and systematic approach to marine environmental management. Therefore, sometimes conflicts occur among the government, sea users, and non-governmental organisations (NGOs). Even in instances where the government's policy decisions are good it is argued in this thesis that problems still occur as a result of institutional weaknesses in the marine affairs sector. This includes political factors, legislation, organisations, and marine education. If the Taiwanese government would pay more attention to the interrelationships between marine policy and marine environmental management and establish good relationships and interactions between these then, perhaps it could alleviate the problems.

It was announced by the Taiwanese government in April 2002 that ocean-related organisations of marine affairs will be reorganised to form a new Ministry of Marine Affairs, or Marine Affairs Committee. There are many ocean-related academics, government officers, and stakeholders who argue about this policy decision because of their different perspectives, including the benefits. This thesis will discuss this issue because it also relates to the comprehensive development of marine affairs in Taiwan.

1.2 AIM AND OBJECTIVES

This study aims to assess and analyse the very limited interaction between marine policy and marine environmental management in Taiwan which has led to the deterioration of its marine environment. There are conflicting views between the government, sea users, and NGOs on the current approach. As a consequence the Taiwanese government proposes to establish a new organisation on marine affairs (the

Ministry of Marine Affairs or Marine Affairs Committee) for solving the existing problems. A considerable number of cases of global and national development of marine policy and marine environmental management such as UN, the United States (U.S.), Australia, Canada, the United Kingdom (UK), Japan, and China (Chapter 2) have been reviewed for this study. After analysing the global and national literature, three marine domains have been chosen for use in this research (Chapters 5-7). They are fisheries, waste disposal and pollution, and marine environmental protection and conservation.

1.2.1 Aim

The aim of this research is to conduct a study of the relationships between marine policy and marine environmental management in Taiwan with regard to fishery, waste disposal and pollution, and marine environmental protection and conservation.

1.2.2 Objectives

The objectives of the thesis, as follows, are considered and examined in turn.

1. To construct a conceptual and methodological basis of the study, taking into account the wider literature and the particular relevant circumstances in the Taiwan geographical region;
2. To apply the concepts and methodology to the study of marine policy and marine environmental management in Taiwan within its East Asian context, taking into account global and regional development in other parts of the world as appropriate;
3. To conduct field studies on the above themes with regard to specific marine sectors, including fisheries, waste disposal and pollution, and marine environmental protection and conservation.

4. To evaluate the relationship between marine policy and marine environmental management in Taiwan based upon the findings from the field study.

1.3 CONCEPTS AND METHODOLOGY

It is important to understand the definitions of marine policy and marine environmental management for a more comprehensive appreciation of the relationship between them and for the selection of the methodological approach.

Gamble (1977) states in his definition of marine policy – ‘*marine policy is a set of goals, directives, and intentions formulated by authoritative persons and having some relation to the marine environment*’. William and Sullivan (1985) thought of marine policy as the guideline of country to pursue the entire benefits of ocean, including safety, resources, environment, commercial affairs of navigation, and science. Song (1989) wrote the definition of marine policy as the action and the process of the measures that are adopted by governments for the sake of utilisation, development and realisation of the ocean resources. Hu (1997) thought marine policy is a public policy or national policy that deals with the utilisation of the marine affairs of the state. This shows that there are two important concepts in marine policy. Not only is it an international issue, but also highly related to other policies.

Marine management has acquired scientific importance since the early 1970s (Vallega, 1992). Armstrong and Ryner (1981: 7) state ‘*ocean management involves the extension of control over ocean space, resources, and/or activities, as well as over the individual governmental efforts to exert that control*’. Cicin-Sain and Knecht (2000: 14) thought ‘*ocean management means the process by which specific resources or*

areas are controlled to achieve desired objectives'. In addition, marine environmental management has become an important issue because of the increasing pressures on the marine environmental areas from rapid urbanisation, pollution, tideland reclamation, coastal aquaculture, and tourism development (Cicin-Sain and Knecht, 1998). Marine environmental management is an issue of paramount importance as marine resources are increasingly becoming a means for the sustenance of life.

The marine environment in Taiwan is under heavy pressure from rapid development and incompatible uses, and marine environmental management has become one of the most important issues. This is because of the scarcity and high value of available land, the coastal zone seems to provide the potential sites to meet various needs of further development and to attract both public and private developers (Chiau, 1998).

To sum up, marine policy comprises a set of goals, directives and intentions of country to pursue the entire benefits of marine and protection of marine environment. In addition, marine environmental management is the process by which marine environment are controlled to achieve the desire objectives of marine policy. Therefore, it is important to figure out the relationship between marine policy and marine environmental management in order to solve the emerging problems being faced in Taiwan, especially in formulation, adoption and implementation of marine policy to protect the marine environment.

After due consideration of the options available, based on the nature of the study, a qualitative research method, inclusive of questionnaire surveys and semi-structured interviews, has been adopted. The primary areas identified, pertaining to Taiwan, are investigated. The results of fieldwork on fisheries, marine pollution, and marine

environmental protection and conservation in Taiwan are analysed. Field research data has been used to investigate the relationship between marine policy and marine environmental management by ocean-related government authorities, sea users, and NGOs. The scope of discussions on the institutions includes legislation, organisational matters, and marine education.

1.4 THESIS STRUCTURE

The thesis is divided into nine chapters as follows:

Chapter 1 establishes the scope of the research and broadly defines marine policy and marine environmental management. Marine policy and marine environmental management initiatives and regional frameworks are identified as central elements of the investigation. A brief introduction of Taiwan and its reliance on the marine environment are highlighted. This is followed by the aims and objectives, concepts and methodology adopted and finally the structure of the thesis.

Chapter 2 is the literature review. It introduces the process of institutional development and discusses the relationships between marine policy and marine environmental management, and considers the phenomena in greater detail. The six countries identified in Chapter 1, i.e. U.S., Australia, Canada, UK, Japan, and China are reviewed from the above perspective

Chapter 3 is the research methodology. It describes the research strategies and methods; the research design selected for this study (the case study approach); choice of research themes; management elements; management assessment; the data collection and management, which include a pilot study, interviews and questionnaire

survey; and the analysis of qualitative and quantitative data derived.

Chapter 4 is the situational review of Taiwan. It describes the historical aspects and present day situations of marine affairs in Taiwan so that fundamental problems and difficulties may be identified and analysed. The results of the questionnaires are also shown in this chapter.

Chapters 5, 6, and 7 discuss and analyse the institutional development of marine policy and marine environmental management in Taiwan in the three marine domains – fisheries, waste disposal and pollution, and marine environmental protection and conservation.

Chapter 8 is the analytical chapter. The result of questionnaires and interviews are discussed. It discusses and analyses the relationships between marine policy and marine environmental management in Taiwan from the perspective of the three research domains.

Chapter 9 is the conclusion. It summarises the contribution of the research to the existing body of knowledge. It concludes by briefly discussing some limitations of the study and provides some potential future research directions.

CHAPTER 2

MARINE POLICY AND MARINE ENVIRONMENTAL MANAGEMENT

2.1 INTRODUCTION

Oceans are made up about 70% of the total earth's surface; they are not only the important habitat of organisms but also have closely linked in the global climate change. Rational exploitation and sustainable utilisation of marine resources along with marine environmental protection management have been considered as a very important international issue at all times in each country. Each country plans goal of national ocean development depends on its need, and transfers goal to specific standard of activity. Moreover, the *UNCLOS* has a series of relative prescripts in marine biology resources conservation and management, marine environmental protection, maritime space compartmentalization, adequate marine usage and marine system maintenance. The UNESCO declared the year 1998 to be the International Year of the Ocean. The aim of this activity has been to aroused the global attention to the human communion assets – ocean as well as blaze idiographic activity on protecting the ocean. Therefore, coastal states all paid much attention to the development of marine policy and marine environmental management. The content of marine policy is different according to the difference between background of national conditions and progress of development in the global coastal sates. Developed coastal states adjust the marine management system for effective management. They also carry out marine legislation and operation mechanism in harmony with measures of marine science research and marine protection toward integrated marine management and sustainable development in accordance with marine demand and limitation (Ye, 2005).

Although background of national conditions in each country is different, the positive

conduct of main coastal states for marine policy and management can be the reference by the author. It is known that many coastal states re-organise ocean-related organisations, draw up marine specific Acts/regulations, and focus on marine science research and education as well as training then draft integrated marine management of the whole for solving more and more management issues. In accordance with data collection, the author adopted 'organisation', 'legislation', 'technical management and implementation', and 'human resources and capacity building' to be the framework of analysis, and chose the marine policy development and adjusting conduct of marine management mechanism of six countries (U.S., Australia, Canada, UK, Japan and China) for the research of literature review. The author collected progress of development and important conducts in the marine states mentioned above through the methods of the analysis of literature review, depth interview, and brainstorm, and then assessed the progress and effects of these countries in the national marine policy and management mechanism by 'issue', 'factor', 'obstacle', and 'improvement' for the lesson of Taiwan's integrated marine policy development in the future.

2.2 GLOBAL DEVELOPMENT

Before the 1970's, the international effort in the context of marine environmental protection was sparse and the focus was only on certain issues, for example, migrant wild creatures or oil spill pollution. A holistic approach to marine environmental issues was not considered until the United Nations Conference on the Human Environment at Stockholm held on 16th June 1972. One of the most crucial actions taken by the Conference was the establishment of a permanent institution within the UN coordinating all the environmental activities, i.e., *United Nations Environment Programme*, and was subsequently approved at the *London Dumping Convention and the International Convention for the Prevention of Pollution from Ships*.

As of 1982, coastal states are permitted to claim marine areas of various widths. The *UNCLOS* grants different territorial seas to coastal states, and oceans around the world are divided into national territorial seas and High Seas in order to prevent tragedies relating to public properties from happening (Van Dyke, 1996). Such a complex structure, however, is in conflict with the need to sustainably utilize marine resources and maintain the integrity of the ecological system, because the ecological system and marine resources are not divided according to various jurisdictions of coastal states (Vallega, 2001).

Due to new and urgent issues arisen since the 1980's, such as the deterioration of the environment because of the poverty, high birth rate of developing countries, and the unsustainable production and consumption of developed countries, as well as the damage done to the global climate and life-support system because of industrialised society, the UNCED was held again two decades later, in which the following documents were produced: (1) Rio Declaration on Environment and Development (Rio Document); (2) Framework Convention on Climate Change (FCCC); (3) Convention on Biological Diversity; (4) Agenda 21; (5) Forest Principle. The change in thinking and role modeling as reflected in all the actions taken lies in interdependence and integration (Cincin-Sain, 1993). The integration of the environment and development (i.e., sustainable development), interdepartmental integration and national integration (northern, southern hemispheres) are seen as unavoidable trends. The Commission on Sustainable Development was officially established by the Economic and Social Council in 1993 to closely monitor the integration of the environment and development within the UN system, as well as progress of execution of Agenda 21 on international, regional and national levels (Cincin- Sain, 1996),

It is explicitly stated in Chapter 17 of Agenda 21 that coastal states should take actions in the following areas: (1) Integrated management and sustainable development of coastal areas, including EEZ; (2) marine environmental protection, especially the control of land-based pollution sources; (3) sustainable use and conservation of marine living resources of the High Seas, (4) sustainable use and conservation of marine living resources under national jurisdiction; (5) addressing critical uncertainties for the management of the marine environment and climate change; (6) strengthening international, including regional, cooperation and coordination; (7) sustainable development of small islands. Therefore, coastal states should conduct integrated management and sustainable development of coastal areas and marine environment within their respective national territorial seas; the content should emphasize achieving integrated management (e.g., the confirmation of existence and planned use, as well as the interaction thereof, the fostering of compatibility and balance amongst all uses), the application of preventive and advanced-warning measures, and full public participation. In order to achieve the said purposes, countries should establish or strengthen their respective integrated management mechanisms for their national or regional coastlines. Such mechanisms are in charge of planning and preparation, the handling of Environmental Impact Assessment (EIA), the adoption of coastline management guidelines, the improvement on the measures managing coastal immigrants, the preservation of key habitats, integrated compartmentalized planning, the maintenance of biological diversity, and the cultivation of the ability pertaining to the execution of integrated coastal and marine management.

In response to the excessive harvesting of fisheries resources at High Seas by the fishery industry, Chapter 17 also demands that states should conserve and sustainably

make use of far sea fisheries resources. Thus *UNCLOS* also becomes the foundation for the management of far sea fisheries resources. Over 95% of all the fisheries harvests come from territorial seas governed by coastal states. Therefore, Chapter 17 also covers the issues pertaining to the fisheries management of these marine areas, including: regional overfishing, illegal entry and fishing of alien fishing boats, the surplus of fishing capability, the dispute between household-based and business-based fisheries, the destruction of habitats. Therefore, these states are also demanded to develop fisheries and marine culture, strengthen the legal framework in regards to fisheries management, opt for alternative fishery tools, use friendly environmental technologies, foster leisure and touring activities based on the development and utilisation of marine based resources, as well as protect the marine ecological system, such as coral reefs, estuaries, wetlands, seaweed beds. (Cicin-Sain and Knecht, 1998).

In 2002, the World Summit on Sustainable Development (WSSD or Earth Summit 2002) was held in Johannesburg, South Africa, emphasizing that the UN should establish a normalised process to report and evaluate the status of the marine environment, and apply ecologically oriented methods to achieve sustainable marine utilisation by 2010. Also agreed is the establishment of Marine Protection Areas (MPAs) (including territorial seas not of national jurisdiction) in order to be consistent with the *International Law*. From 'An Assessment of Assessments report' (AOA report), the Group of Experts considered that there are major issues relating to the marine environment that cross regional boundaries and are global or ocean-wide in scope. These issues have been the subject of important assessment activities that could contribute to the Regular Process. Some of these assessments are ongoing and continuous and will provide a foundation for a Regular Process (UN, 2009).

In regards to global fisheries, a commitment was also made in the WSSD that by 2015, currently declining fisheries resources should be maintained or restored to achievable maximum sustained productivity (Haward and Vince, 2008).

The problems of the administration of conventional marine laws are: (1) the disparity between the law and nature; (2) the administration of marine law, conventionally speaking, is compartmentalized that ignores the interconnection amongst issues relating to the ocean; (3) jurisdiction and the principle of freedom on the High Seas. With such said background, therefore, newer methods are needed for the management of the ocean. There is a growing emphasis on integrated management methods or integrated marine management in recent international literature, demonstrating the importance of integrated methods. Although these frameworks and structures emphasize different aspects of integrated marine management (such as protecting biological diversity to slow down the change in climate), there is a fair degree of commonality in terms of the scope, purpose and primary methods, principles adopted concerning integrated marine management (UNESCO, 2006). What is worth noting is that Agenda 21 believes that the ocean is a holistic unit that marks the beginning for the new methods of the *UNCLOS*. Because of Agenda 21 addressed the pressing problems of today and also aims at preparing the world for the challenges of the next century. It also reflected a global consensus and political commitment at the highest level on development and environment cooperation (UN, 2002). From this, States, in accordance with the provisions of the United Nations Convention on the Law of the Sea on protection and preservation of the marine environment, commit themselves, in accordance with their policies, priorities and resources, to prevent, reduce and control degradation of the marine environment so as to maintain and improve its life-support and productive capacities, will be implemented easily.

Moreover, the term 'integrated marine management' was explicitly used in United Nations Resolution No. 28 drafted in November, 2001. Integrated management methods are also emphasized at the regional level; for instance, United Nations Resolution 57/261 dated December, 2002 has another title, namely '*Promoting an Integrated Management Approach to the Caribbean Sea Area in the context of Sustainable Development*'. From the standpoint of actual practice, integrated management can be extended from the 1990's to 2030's, in which primary compartmentalized management methods will continue to be developed, but integrated methods will be incorporated into them (Smith, 1994). That is, integrated methods are not to take the place of zoning management methods, but can be used to solve the issues that are unable to be resolved by zoning management me. Therefore, the *UNCLOS* has gradually evolved into a two-tier legal system combing zoning and integrated management methods (Pullen, 2004; Tanaka, 2008).

2.3 NATIONAL DEVELOPMENT

In recent years, the main marine states not only pay attention to marine policy and marine environmental management systems but have also made them a key point of national development. Owing to the difference between background of national conditions and progress of development, the key point of development of marine policy and marine environmental management in each country are different. This chapter discussed U.S., Australia, Canada, and UK where marine management is more advanced and remarkable, as well as marine policy and marine environmental management in Japan and China, which being located in East Asia because of their national conditions are similar to Taiwan. U.S. marine policy adopted integrated protection and management planning, and formulated a sound *Ocean Action Plan*. Australia adopted an ecosystem-based management for marine management. Canada

devoted to marine environmental management, and already had remarkable effects in the MPAs. UK implemented the protection of marine ecosystem through the protection area mechanism. Japan changed its existing multi-distributed marine management system to establish a dedicated agency in charge of the marine management, and formulated national marine development plan. China implemented reform on the marine management system to build an integrated marine management system. Therefore, the study referred to the experience of development of six countries that mentioned above for the reference of development direction of marine policy and environmental management in Taiwan. The details of six countries will be discussed below.

The U.S. development

As early as in 1969, U.S. published '*Our Nation and the Sea*' from Stratton Commission to lead the coastal/marine policy development of the nation. It also led to the enactment of the '*Coastal Zone Management Act*' in 1972 and the establishment of National Oceanic and Atmospheric Administration (NOAA). At the National Oceans Conference in 1998, President Clinton requested the Senate to ratify '*UNCLOS*' as well as to commit to sustainable fisheries, ports, coral reef protection, oil drilling, and global warming etc., and proposed a preliminary draft for 'a coordinated, disciplined, long-term federal oceans policy' (Wescott, 2000). In order to remedy the current situation of lack of management system, Congress ratified and President Clinton signed '*the Oceans Act of 2000*'. The *Act* stipulates that the U.S. Commission on Ocean Policy (USCOP) shall assess the U.S. coastal and marine condition and its management and propose plans to establish and coordinate effective marine policies (Cicin-Sain, 2005). The Commission mentions the value of the oceans and coasts and confirms 'trouble in paradise'. In order to overcome these troubles, the

Commission proposes to proceed with an ecosystem-based management approach; there are three main themes: (1) a new, coordinated national ocean policy framework to improve decision making; (2) cutting edge ocean data and science translated into high-quality information for managers; and (3) lifelong ocean-related education to create well-informed citizens with a strong stewardship ethic (Haward and Vince, 2008). At the end of 2004, USCOP submitted to Congress its formal report on the marine policy, 'An Ocean Blueprint for the 21 Century'. and it was issued as an executive order by President Bush on December 17 of the same year; 'the *U.S. Ocean Action Plan*' (*USOAP*) was published to implement 'An Ocean Blueprint for the 21 Century' (OC, 2007).

The Australia development

In 1995, Prime Minister Keating of Australia declared that the federal government has been developing 'integrated ocean policy' to manage Australia's marine resources, which was led by the Prime Minister and the Cabinet jointly. After the new Prime Minister was elected in 1996, the Howard administration continued the development of marine policy and made it his environmental protection policy. The development responsibility was handed over to the Department of Education, Employment and Workplace Relations (DEST); an intergovernmental committee was established by DEST subsequently to assist the primary departments related to the maritime affair in making the preparation for the government. In 1997, Prime Minister Howard announced the development of marine policy and published the *Consultation Paper* for 'Australia's Oceans-New Horizons.' In the same year, Ministerial Advisory Group on Oceans Policy was established by the Department of the Environment and Heritage, which was formed by 18 members representing all major interest groups to provide stakeholder's opinions and issues to the Minister. In responding to the *Consultation*

Paper, the federal government requested Marine and Coastal Community Network to establish the Australian marine policy development community (Haward and Vince, 2008). Finally in 1998, Australia's Oceans Policy was deployed with the goal of coordinating marine activities to create an effective and efficient oceans management regime. The policy was the first attempt to administer an ecosystem-based ocean management in a holistic, integrated, and national fashion (Addison, 2005).

The Canada development

In 1986, Canadian Prime Minister Brian Mulroney requested the Minister of Department of Fisheries and Oceans (DFO) to review marine policy and focus on laws and regulations that were related to the coordination of marine policies and activities. It resulted in the announcement of an Oceans Strategy by the federal government in 1987. Under the assistance of Committee on Oceans and Coast of the National Advisory Board on Science and Technology, it started to develop and implement the ocean governance system. The Committee recommended to the Prime Minister that Canada should develop a strong marine policy to manage its estuaries, coasts, and oceans comprehensively through the implementation of the Oceans Strategy and the enactment of the *Oceans Act* (OA). The *Act* was enacted in 1996 following the Oceans Committee's recommendation, and was put into effect on January 31, 1997. The *Act* authorises DFO to develop and implement international ocean strategy and serves as the basis for managing the ecosystems of estuaries, coasts, and oceans under the Canadian water jurisdictions. At the same time, it requires the department to consult with the federal government and each level of government to develop an integrated management plan. It also stipulates the implementation principles of the plan. Canada's Oceans Strategy (COS) was completed in 2002 to activate the policy objectives and activities (Mageau and

VanderZwaag, 2005). Subsequently, the *Canada's Oceans Action Plan* was passed in 2005 to address the challenges encountered during the COS implementation.

The U.K. development

After the passing of the *UNCLOS*, UK started a series of marine policy related activities, but not an integration of marine affairs laws and regulations, i.e. its marine policy consists of marine policies from various departments and various legislations. In a long period of time (1978-1830) after 'industrial revolution,' sectoral policies were developed following their relevant legislations and reflected the actual development situation of the marine economy in 1950-1960 periods. In the early 90s of the 20th century, UK government published the report, '*the Strategic Plan for the Marine Science and Technology Development in the 90s*', and proposed 6 major national oceanic strategic objectives and a marine development plan. In 1995, UK government established Ocean Technology Forecast Committee. In 2002, UK government announced the Marine Stewardship Report and proposed a vision to keep the marine environment of oceans and seas clean, healthy, safe, productive, and biologically diverse. The *Marine and Coastal Access Bill* which received Royal Assent on 12 November 2009 (*Marine and Coastal Act*) provided the framework for managing the demands on the seas, improve of marine conservation, and more open access for the public to the English coast. On 10 March 2010, *Scotland's Marine (Scotland) Act* came into being marking a major turning point in safeguarding the future of Scottish seas and laying the foundations for a more simplified marine planning and licensing system. (Defra Website, 2010).

The Japan development

The Japanese government established 'Council for Marine Science and Technology'

in 1961 to serve as the advisory body for Prime Minister and to be responsible for the investigation and study of marine issues in the new and undeveloped domains. In 1968, the House of Representatives of Japan discussed development matters related to space and ocean in the regular sessions of ‘Special Committee for Measures on Reviving Science and Technology,’ which showed that Japan has been working toward an integrated management of marine development. In 1969, ‘Council for Marine Science and Technology’ published the third response concerning marine development. It stressed that Japan should promote the following five national plans: (1) an integrated basic survey for the continental shelf around Japan; (2) the investigation and study of marine environment and the management of marine intelligence; (3) the development of sea farming experimental field and the farming-fishery technology. (4) the technology development of remote control deep excavation equipment; and (5) low priority marine development and the development of common technologies. The response has also become the foundation of Japanese ocean development policy. In 1971, ‘Council for Marine Science and Technology’ was reorganised into ‘Council for Ocean Development’ and three responses were produced to address the marine policy issue. The first two responses were positioned as the primary bases for marine policy development; their main points include: (1) Overview; (2) About oceans: in particular, the expanded investigation and study within the 200 nautical mile Exclusive Economic Zone (EEZ) and the establishment of integrated survey, observation, and monitoring systems; (3) About the development and utilization of sea territories and the implementation of the integrated plan and management for environmental protection; (4) About the response to the new international marine order and the active promotion of international cooperation; and (5) An integrated promotion system for the preparation of the rule of law of marine development (Song and Tsai, 2007). In 1993, the Japanese government passed

'National Action Plan for Agenda 21' in responding to the requirement of Agenda 21. In 1998, the Cabinet passed *'the grand Design for the Land in the 21st Century,'* among which Part II Chapter 1 (National Land Conservation and Management) Section 4 (Conservation and utilisation of the ocean and coastal areas) emphasizes that *'In order to maintain the security of coastal areas, proceed with multiple uses, and create charming regions with good environment and self-reliance etc., the coastal areas will be declared as natural environment'*. Therefore, local public authorities will be in the dominant position to guide the integrated management planning of coastal areas. In 2000, Japanese government announced *'The Guideline for the Development of Integrated Coastal Zones Management Plan'* to serve as the basis for developing the integrated management of coastal areas by local public and private sectors. In 2002, the Council's Subdivision on Ocean Development submitted *'Japan's Ocean Policy in the Early 21st Century.'* This report emphasizes that a marine policy should balance between *'preservation, utilisation, and understanding.'* (Terashima and Hayashi, 2005) In 2005, the Ocean Policy Research Foundation submitted to the Chief Cabinet Secretary the policy recommendation of *'Ocean and Japan: the 21st century ocean policy recommendations.'* arguing the necessity and urgency of developing the outline of the ocean policy, the *Basic Ocean Law*, and the establishment and perfection of an integrated ocean management system. It also passed the *Basic Ocean Law* in the next year (Chu, 2008).

The China development

In 1984, the State Oceanic Administration of China submitted *'Research Report for marine development strategy of China'* and clearly delineated 12 basic policies for marine development such as marine land development, marine industry transformation, and emerging marine industrial development etc. In 1991, it

formulated ‘The basic policies and working outlines of China marine business for the 90s’ to define the focus of China marine business and its basic mission as an integrated response to *UNCLOS*. The ‘Work outline’ was the first integrated basic policy of dealing with marine affairs for more than 40 years since the establishment of China. Of course, the outline does not address the internationality aspect of marine policy nor does it make clear rules for aspects such as public participation. In 1996, China ratified *UNCLOS* and developed ‘China Ocean Agenda 21’, in the same year, which clarified the concept of integrated ocean management (Wang, 2008a). An integrated ocean management should originate from the overall interest of the maritime right, marine resources, and marine environment. of the country; through the development and implementation of principles, policies, laws and regulations, zoning, and planning etc. to safeguard the maritime rights of the nation and promote sustainable developments. In 1998, it published the white paper of ‘*the Development of China’s Marine Programs*’, which set the main goals of reasonable developing and utilizing marine resources, protecting and maintaining marine environment, developing marine science and technology education, and implementing integrated ocean management and international cooperation of marine affairs etc. It illustrated the high degree of importance that China government has placed on marine development and protection and reiterated the importance of sustainable marine developments. In 2008, it ratified ‘Outlines for National marine business development plan’ positioning the integrated management as the first principle and explicitly put forward the implementation of ecosystem-based management (Wang, 2008b).

In reviewing the national development of marine policy of six countries, it can be seen that the marine policy of each country all moves actively toward the basic direction of integrated ocean management and sustainable development. They all

begin to develop nation-wide integrated marine policies to coordinate marine developments and managements from various departments and emphasize the importance of ecosystem based marine management to further achieve the goal of balancing environment and development.

2.4 POLICY AND MANAGEMENT ISSUES

Although U.S. has made some improvements since the 1970s, many marine and coastal resources continue to suffer damage. As a result, better governance is requested; its main issues include: excessive nutrients, water and sediments, blooming algal, declining fisheries, loss of coastal habitats, and invasive alien species. The increasing demand on resources by marine users, natural coastal disasters, and the impact of climate changes etc. all magnify the challenges on coastal and marine resource management even more (Cicin-Sain, 2005). In order to remedy the current condition of lack of management system, Congress ratified and President Clinton signed '*the Ocean Act of 2000.*' The *Act* stipulates that USCOP shall assess the U.S. coasts and oceans and their management conditions and propose plans to establish coordinated and effective marine policies.

Issues in U.S.

The U.S. government allocated \$8.5 million to the USCOP so that it could complete its analysis and publish its findings. Under the decree of the *Ocean Act of 2000*, the Bush government published the *USOAP*, which is a report responding to USCOP. The action plan proposes several specific actions as mechanisms to further assess and handle proposals from USCOP. The *USOAP* recommended six areas to improve and support the management of oceans and Great Lakes: (1) leadership and coordination; (2) knowledge and understanding; (3) use and conservation; (4) coasts and their

watersheds; (5) marine transportation; and (6) international ocean policy and science.

The coastal management program has been implemented in the 34 coastal states and territories and has made significant progress in the protection of marine mammals and endangered species. In fisheries, 200 nautical miles of the waters have already been 'Americanized' and priority is given to U.S. fishermen. There are significant improvements made in the pollution control of point sources. The National Estuary program has begun in 28 estuaries. Moreover, it is also in progress in 13 marine sanctuaries and 26 national estuary research reserved areas. The Coral Reef Reserved area northeast of Hawaii Island covers 340,000 square kilometers. The offshore oil and gas project also allows the supply of energy under a record of safety.

However, there are obvious problems in U.S. ocean policy. Resources in many fisheries have begun to decrease. Except for the Gulf of Mexico, California, and Alaska, many offshore oil drilling activities have been suspended. The worst accident in recent time should be 'Deepwater Horizon Accident'. The Deepwater Horizon oil spill (also referred to as the BP oil spill) is an oil spill in the Gulf of Mexico which flowed for three months in 2010. The impact of the spill continues even after the well has been capped. It is the largest accidental marine oil spill in the history of the petroleum industry. The spill stemmed from a sea-floor oil gusher that resulted from the April 20, 2010 explosion of Deepwater Horizon, which drilled on the BP-operated Macondo Prospect. On July 15, 2010 the leak was stopped by capping the gushing wellhead, after it had released about 4,900,000 barrels (779,000 m³) of crude oil. It was estimated that 53,000 barrels per day (8,400 m³/d) were escaping from the well just before it was capped. On September 19, 2010 the relief well process was successfully completed, and the federal government declared the well 'effectively dead' (Houck, 2010; Guegel *et al.*, 2010).

Although the pollution control of point sources has been somewhat successful, there are still plentiful of difficulties facing the pollution management of non-point sources (such as agricultural and urban run-off). Therefore, they account for 70% of all the pollution. Although there are extensive alleged evidences substantiating the success of coastal management, measurable coastal indicators are still lacking, which render the development and growth of the political supporting bases for the program unsustainable. Although there have been some obvious planning in the development of U.S. estuaries and some programs have even started being implemented and executed, apparent conflicts have also developed between marine mammals and fisheries, which can not be resolved properly as well.

From Australia viewpoint

Australia has been a pioneer of management of MPAs since the 1970s and has taken resolute actions against marine pollution in the 1980s; concurrently, it has also been taking strong sanction measures against Illegal, Unregulated and Unreported fishing in the 1990s. Australia's marine and coastal policy in the 1980s and 1990s started to explore the effect of the relationship between governments to the development of marine policy. The public began to pay close attention to the damaged beaches and waterways, which have become a major theme for political discussion and resulted in increasing federal activism. Although Ocean Constitutional Settlement can be used to settle the jurisdiction issues between the federal and the state, the relationship in terms of marine and coastal issues between the two of them would become harder and harder to maintain in the 1990s. Meanwhile, some apparent federal actions have also been developed to administer marine environmental management, which include Ocean Rescue 2000 (OR 2000), intergovernmental environmental agreements, national ecological sustainable development strategies, and federal coastal policies etc.

(Haward and Vince, 2008).

The State of the Marine Environment Report in OR 2000 of the Department of the Arts, Sport, the Environment and Territories provides data needed by marine policy and confirms issues facing oceans and coasts, which include deterioration of water quality, loss of marine and coastal habitats, changes in ecosystems, un-sustainable use of marine and coastal resources, lack of marine science policy, lack of strategic planning on coastal and marine environment etc. (Kriwoken 1996; Williams 1996; Zann 1996). And, another programme of OR 2000, '*An Australian Marine Conservation Strategy*', also promotes formulation of a more comprehensive marine policy. Finally, OR 2000 also established National Marine and Coastal Community Network to allow a wider participation in marine policy (Wescott, 2000).

From Canada viewpoint

The drivers for enacting *Canada's Oceans Act* were: pressure due to the gradual increase of coastal and marine development, reduction in the number of species, the languishing of target species for international fishery, and emerging international maritime agenda. The *Act* was passed by Congress in 1996 and put into effect in 1997. The COS was published in 2002. In 1994, Canada took various actions to protect the marine biodiversity. The federal government has begun the building of National Marine Conservation Areas system and revised National Marine Conservation Areas Policy. In 1995, it proposed *National Marine Conservation Areas System Plan*. The intergovernmental biodiversity work group has also developed Canadian Biodiversity Strategy to accelerate the protection of marine natural areas (Haward and VanderZwaag, 1995).

The *Oceans Act* sets up a wide range of ocean management actions to conserve and protect Canada's oceans. These management actions include: (1) *National Marine Protected Areas Program*, which includes designating regions in accordance with the special protection causes specified in the *Oceans Act*; (2) Marine ecosystem health program, which provides technical support for the other programs and actions of the *Oceans Act*. This program includes the establishment of marine environmental quality objectives, standards, and guidelines etc., which might even have the effect of law (Mageau and VanderZwaag, 2005).

From UK viewpoint

The most urgent problem facing marine policy is the destruction of ecosystems, which is mainly caused by the conflicts of overfishing and intensive use of the water. Its main related issues include the necessity of preserving the representative systems of coastal and marine protected areas, which is related to the effective control of its offshore development system. The foundation of UK marine policy is rested on a series of departmental policies, which possess pretty solid legal bases, such as port, shipping, mining and energy exploration, fisheries, marine conservation, water quality, coastal protection, and flood control etc. The development of integrated policies related to multiple uses has emerged in the 1990s; especially in coastal management and the sea use management, thereafter, which is implemented through the concept of marine spatial planning.

From Japan viewpoint

The development of shorelines, loss of critical habitats, industrial facilities, ports, disaster prevention, and conflicts due to multi-use. all are driving forces for adopting special laws or regulations to improve the environment of gulf and semi-closed sea

area. At the same time, previous laws are amended for a wider range of applications; human health problems such as Minamata etc. has prompted governments to enact laws and regulations that regulate various marine and coastal issues. Japan did not have a national ocean governance system. Rather, it employed a series of policies from marine departments to govern its oceans, which included shipping, shipbuilding, fisheries, environment, science and technology, maritime security, and the development of energy and seabed mineral resources etc. (Terashima and Hayashi 2005). Even though Japan has built a higher level coordination mechanism such as marine policies, and marine planning etc., but because there was no one integrated functional department that was dedicated to the marine management affairs for a long period of time, resulting in loopholes such as too many authorities in charge of marine affairs, overlapping responsibilities, or conflicts etc., it took tremendous amount of time and energy to coordinate all the related ministries and agencies when problem occurred and as a result, the responses were slow and difficult to become effective. As the concern about marine resources, environment, and security within the globe became wider and wider and issues such as island dispute, oil and gas development, and maritime zoning etc. kept on emerging between Japan and its neighboring countries, all walks of life in Japan requested the government to change its existing multi-distributed marine management system and called for the establishment of a dedicated agency in charge of the marine management so that it could take initiative in the international maritime affairs and during marine disputes with neighboring countries.

In November, 2003, The Policy Affairs Research Council of Japan's Liberal Democratic Party established 'Maritime rights work group'. The work group released 'A nine point proposal to preserve maritime rights' on June 15th, 2004. The proposal

points out that Japan must develop an integrated marine strategy as soon as possible and decisively preserve maritime order to ensure its own maritime rights and interests. It suggested the government should establish a 'Cabinet meeting for related maritime rights and interests' led by the Prime Minister himself. It also suggests that Japan conducts marine resource survey on the Japanese side of the so called 'Central line' of China and Japan, implements integrated marine strategy, strengthens the readiness and monitoring mechanism of Coast Guard, and takes measures against Chinese oceanographic survey ships etc. Afterward, the work group was reorganised into the 'Special Committee for the Maritime Rights and Interests' in September of 2004 and in March, 2005, proposed to then Prime Minister, Junichiro Koizumi, 'Emergency Recommendations for the protection of maritime rights and interests in the Eastern China sea.' In order to consolidate domestic laws which preserve maritime rights and interests, the 'Special Committee for the Maritime Rights and Interests' drafted 'Draft of laws concerning the construction of marine Safety Zone Buildings' in December, 2005. It was submitted as Member-submitted bill to Diet for deliberation. In April, 2006, Hidenao Nakagawa, Chairman of Policy Affairs Research Council of the Liberal Democratic Party, forming alliance with 10 members of the National Diet from Liberal Democratic Party, New Komeito Party, and the Democratic Party, 15 marine experts, and 10 government officials from relevant ministries and agencies, established the 'Study group for the Basic Oceans Law' (Chaired by the former Defense Minister, Shigeru Ishiba), and, at the same time, reorganized the 'Special Committee for marine rights and interests' into 'Ocean Policy Committee'.

In the mean time, Japanese academic and economic circles have also proposed successively policy proposals and policies related to marine issues. On July 21st, 2005, the Liaison Committee of Japanese Symposium on marine scientific research

published 'the Necessity to Promote Marine Research Comprehensively-Recommendation for the Development of a Comprehensive Ocean Policy'. On July 22nd, 2005, The National Diet of Japan passed '*Comprehensive National Land Development Act*'. The *Act*, for the first time, will include the utilisation and protection of sea areas including EEZ and the continental shelf as targets for territory planning. On November 11th, 2005, Japanese Keidanren published a policy recommendation, titled 'Important Issues concerning the Promotion of Marine Development', and proposed 4 recommendations: 'Realistically enhance surveys for the continental shelf', 'Prevent and reduce natural disasters and marine pollution and damage', 'Developing marine resources', and 'Consolidating promotions for marine development system' etc.. It also advocated that 'Industry, Academia, and government' is the industry in the marine development field and academic and government should join forces to conduct marine education classes in elementary, middle and high schools in order to improve the understanding and caring of marine issues (Chu, 2008).

From china viewpoint

After 1980s, China, pushed by the rapid development of coastal economies due to reform and opening up, drove up the development and utilisation business of marine resources and space. At the same time, because the number of departments participated in the development has increased, the conflicts between departments becomes increasingly acute. Additionally, owing to the number of coastal industries depending on ocean or partially utilizing oceans have increased rapidly, a large number of environmental and resource issues have also accompanied those growth. Therefore, at the end of 1980s and in the middle of 1990s, China implemented two reforms on the marine management system to build an integrated marine management

system. This transformed the State Oceanic Administration from a business service department as its original nature into a functional department in charge of national maritime affairs: comprehensively managing sea areas under China's jurisdiction, implementing marine monitoring and surveillance, safeguarding China's maritime rights and interests, coordinating reasonable development and utilisation of marine resources, protecting the marine environment, organizing marine public business, and building and managing basic infrastructure (Lu and Ai, 2001). In 1979 to 1986, it launched a comprehensive survey for national coastal zones and marine resources. State Council gave definitive instruction: 'Survey needs to be combined with the legislation work of the coastal zones.' From 1989 to 1997, it launched a comprehensive survey for national island resources; from 1989 to 1995, launched the task of national marine functional zoning; from 1990 to 1994, launched the task of national marine development planning.

As the development and utilisation of oceans and coasts becomes increasingly diverse, the pressure on the environment and the conflicts between departments have become more and more serious. Traditional hierarchical management can not cope with the utilisation issues of marine and coastal policies. Therefore, all countries have been taking new actions to cope with them. Some actions have become well-known, such as U. S., Canada, and Japan who enacted special laws for oceans and developed. Australia also developed *Ocean Rescue 2000 Program* and *An Australian Marine Conservation Strategy Program* under Australia's Oceans Policy to actively safeguard its marine environment and resources. And, who recently, China has also been comprehensively managing its marine affairs through the adjustment of the responsibilities of the State Oceanic Administration. This is tends to its marine environment, just like UK government, through adopting a sea planning approach to

coordinate the utilisation of various departments and implements the protection of the marine ecosystem through the protection area mechanism.

It can be seen from the above analysis that all countries cope with the changes in sea use policy issues mostly from system and implementation aspects: through special ocean laws and the establishment of a dedicated coordination agency to carry out the task of marine management. The most important work item among them is marine spatial planning to coordinate and plan various marine utilisations. MPAs are used to safeguard ecosystem environment and the continuous use of resources.

2.5 ORGANISATION

Organisations in U.S.

U.S. Ocean Policy currently is comprised of 20 federal departments and commissions enforcing 40 federal marine-related laws and regulations. The authorities in charge of the management of marine-related affairs within the U.S. government are scattered amongst various departments and commissions at different levels. For instance, departments and independent agencies are under the Office of the President; in regards to federal departments, the Department of Agriculture is in charge of marine resource conservation, the NOAA of the Department of Commerce monitors oceanic meteorology and far-sea fisheries, Department of Defense is in charge of national marine-area safety care of the U.S. Navy, the Department of Energy looks after ocean-bottom oil and mining survey as well as retrieval, the U.S. Coast Guard is in charge of marine enforcement and maritime management on behalf of the Department of Homeland Security, Maritime Administration is responsible for the security matters pertaining to oceanic transportation management, Customs and Border Protection takes care of border affairs, Department of the Interior looks after marine parks,

mining management and ocean-bottom geographical survey, along with the Department of Justice, Department of Labor and Department of Transportation looking after their respective responsibilities (USCOP, 2004, Cicin-Sain and Knecht, 2000). However, there is yet to be a designated cabinet-level department in the U.S. government solely responsible for oceans and coast, or natural resources and the environment, neither is there any federal department or organisation in charge of the monitoring of marine and coastal issues. As of now, the monitoring of marine and coastal issues are scattered amongst at least 11 of all the 15 Departments in addition to 4 Independent Agencies and several Commissions.

All the said governmental Departments and Independent Agencies do not set ocean and coast as their core missions. However, several Administrations below cabinet-level organisations are in charge of long-term projects and short-term actions, but the central foci for these projects and actions do overlap with one another (Kuska, 2005), so in order to resolve such issues, the USCOP is sanctioned under the *Oceans Act of 2000*, comprised of 16 members assigned by the U.S. President, 8 of whom are nominated by the Senate Majority Leader, and 4 by the Speaker of the House of Representatives in order to ensure the inclusion of all expertise and stakeholders. As stipulated in the *Ocean Act of 2000*, the said Commission should assess and comment on existing and/or planned plans, actions, laws, regulations, resources and investments on coastal facilities, the relationship and activities amongst private sectors, local, state and federal governments, the changes needed in the areas of the law and overall system, as well as the coordination amongst all relevant federal agencies. Finally, the Executive Branch, namely the Office of the President, will be responsible for the drafting of the proposal in order to develop national ocean policy. In the meantime, USCOP suggests that National Ocean Council (NOC) be established under the Office

of the President in order to effectively monitor the added federal leadership and coordination. NOC is comprised of Secretaries of the Departments to coordinate, integrate, as well as patch up the loopholes and legitimise Federal Ocean Policy through the partnering relationship amongst the Departments, private sectors, the academia, the generally public and other NGOs. Finally, NOC will resolve inter-organisational conflicts, and establish the overhauling of the federal government in order to improve marine management. On the other hand, President's Council of Advisors on Ocean Policy will represent the official opinions presented by lower-level governments and the NGOs of the stakeholders (Cicin-Sain and Ehler, 2005).

Organisations in Australia

Australia does not have a designated governmental authority responsible for the establishment of marine and coastal management, and the responsibility of marine affairs respectively belongs to Department of Resources, Energy and Tourism, Department of Tourism, Federal Resource Assessment Commission, National Environmental Protection Commission, and Intergovernmental Commission on Sustainable Development of Ecology. In addition, coastal states are in charge of the management of marine areas within 3 nautical miles, some of which have even established governmental institutions pertaining to the management of coastlines; for example, Victoria has established the Management Commission for Coastal and Port Management, Western Australia has the Coastline Commission, and Tasmania has the Advisory Commission for the Sustainable Development of Ecology (Lu and Ai, 2001). The Ocean Policy of 1998 requested that some new administrative institutions be established for the purpose of policy implementation, including Oceans Board of Management, National Oceans Advisory Group, Oceans Policy Science Advisory Group (OPSAG), Planning and Advisory Committees, and Council of Australian

Governments to implement and coordinate specific projects under the ocean policy. Finally, high-level decisions must be made by the Minister of Department of the Environment, Water, Heritage and the Arts, under which the Marine Division is responsible for the development and execution of marine policy and marine planning, meanwhile providing support and suggestions to other groups and institutions concerning certain technical issues. Marine Division coordinates daily tasks of marine policy development. In some cases in which high-level decision-making is needed involving the entire government, the issues will then be presented in the Sustainable Environment Committee in the cabinet of the Australian government.

Organisations in Canada

The operation of the Canadian government is under a federal framework, and the primary departments in charge of the sea are: the DFO, Transport Canada, and the Department of National Defense. Other departments with interests in the sea and designated coastal areas are the Department of Natural Resources, Environment Canada, the Department of Foreign Affairs and International Trade, Industry Canada, the Canadian International Development Agency, and Public Safety Canada. Through the collaboration between provinces and territories in the management of coastal areas, between the regulators of other departments and industrial sectors, as well as the collaboration at the regional level between stakeholders and indigenous peoples, Canada attempts to implement integrated principles concerning the management of marine activities. Horizontal collaboration is achieved through the establishment of interdepartmental committees. In similar fashion, vertical integration is done through the unified arrangement between federal and provincial governments, an arrangement including legislative bodies and federal-provincial agreement. For instance, a case in point is the memorandum signed between Canada and British Columbia in September

of 2004 for the joint execution of marine strategies (Mageau and VanderZwaag, 2005).

Organisations in the UK

Though there are public departments, relevant enforcement agencies, NGOs, non-governmental consulting organisations and other institutions dealing with marine affairs, the Marine Management Organisation (MMO), the relatively new executive non-departmental public body established and given powers under the Marine and Coastal Access Act 2009, brings together for the first time key marine decision-making powers and delivery mechanisms. Primary marine-related departments at the governmental level in the UK are Department for Environment, Food and Rural Affairs (Defra), Department of Trade and Industry, Ministry of Defence, Department for Transport, Department for Culture, Media and Sport, Office of the Deputy Prime Minister, HM Customs and Excise. Currently, administrative responsibilities that have been released to lower levels remain focused on the environmental areas (Smith and Ball, 2005). However, the multifunctional Department of the Environment in the early days was incapable of resolving issues pertaining to marine and coastal environment (Ballinger, 1999). In order to effectively foster coordination amongst governmental departments, between the government and entrepreneurial sector, as well as between management and research institutions, the UK established the Liaison Committee on Marine Science and Technology in 1986 responsible for coordinating amongst government-sponsored marine technology activities. Also, a permanent joint committee on coastline issues was set up in the same year to express the concern over coastline-related issues, to foster the collaboration amongst the member units thereof and to reduce contradictions in development, meanwhile drafting regional and strategic coastline management plans.

Royal Property Management Committee is responsible for the use and management of marine areas. In 1994, a permanent forum on coastline management was set up in the UK comprised of members from nearly 70 institutions and groups relating to coastlines, with the purpose of fostering scientific management, sustainable use and methods of development coastlines. With the increasing deterioration of global climate, the British government gradually has come to realize the importance of marine environmental protection. So the MMO has been convened under the stipulations in the *Marine Bill*. This organisation funded by hundreds of governmental institutions, enterprises and NGOs will regularly conduct assessments on British territorial waters and surrounding marine areas.

The handling of issues relating to marine control and management in Japan is scattered amongst the ministries, including Ministry of Economy, Trade and Industry, Ministry of the Environment, Ministry of Agriculture, Forestry and Fisheries of Japan, Ministry of Land, Infrastructure, Transport (MLIT), Ministry of Education, Culture, Sports, Science and Technology, and Ministry of Foreign Affairs. Of the above, MLIT includes Japan Coast Guard and Japan Meteorology Agency established in 2001 during the overhauling of governmental infrastructure, in order to foster better monitoring and systematic use, the development and conservation of areas under national jurisdiction, hydrological surveys, marine and climatic observations, marine and maritime transport affairs, marine safety, the promotion of the use of ports and the sea, measures countering marine pollution, maritime traffic safety, coastal zone management, the task of sewage discharge, river, reservoir and land planning, as well as urban planning. Currently, a taskforce for inter-institutional communication on marine development is set up as the communication committee for issues relating to marine development, and the chairperson thereof is the deputy secretary general of the

cabinet; however, the said committee is incapable of effectively coordinate among relevant policies. Another institution set up in 2004 is the communication taskforce for inter-institutional continental shelf research and marine resources, and the chairperson thereof is also the deputy secretary general of the cabinet (Terashima and Hayashi, 2005).

In order to resolve the issue of coordination amongst governmental ministries and agencies, Japan establishes liaison meetings amongst ministries and agencies to uniformly draft and implement marine policy, including Liaison Meetings among Ministries and Agencies Relating to Marine Development, Okinoshima Implementation Operation Committee, Liaison Meeting amongst Ministries and Agencies Relating to the Preparation and Response to Pollution Events and Liaison Meeting amongst Ministries and Agencies Relating to Surveys on Continental Shelf, but the result still is not apparent (Song and Tsai, 2007). Therefore, a centralised institution Department of Integrated Marine Policy was established in 2007 headed by the Prime Minister of Japan, and Chief Secretary of the Cabinet and Minister of Land, Infrastructure and Transport as the deputies, and Minister of Land, Infrastructure and Transport also serves at the Minister at Large of Marine Policy responsible for the drafting of marine policy.

China's marine management took administrative management as the core before 1980s. The State Oceanic Administration was established in 1964, and took responsibility for investigation of marine resources and marine public service in the beginning. The marine system of classification management and local marine administrative organisations were been established in succession since 1980s. The governmental ministries connected to marine affairs are Ministry of Science and

Technology, Ministry of Finance, Ministry of Land and Resources, Ministry of Transport, Ministry of Water Resources, Ministry of Agriculture, Ministry of Environmental Protection, General Administration of Customs, and State Administration of Taxation. The marine affairs not belonging to the responsibility of ministerial party committee members or the scope of enforcement generally are of the responsibility of State Oceanic Administration (Chou, 2005). The scope of responsibility of State Oceanic Administration includes sea use management, marine environmental management, marine science and technology, marine international cooperation, the reduction and prevention of marine disasters as well as the preservation of marine rights, a total of 6 aspects. In order to strengthen marine-related monitoring and law enforcement, China Marine Surveillance General was established in 1999 in charge of the comprehensive law enforcement of all the marine areas under Chinese jurisdiction (Lu and Ai, 2001). The liaison amongst different marine-related departments in the central government is done in the State Department, and as institutional reform involves marine legislation, liaison meetings amongst relevant departments are held; when conflict arises due to disputes concerning scopes of responsibility, the Office of Central Organisation Committee Member is in charge of liaison and arbitration. However, Communist Party members, organisations and formal offices are established in the same-level units, so the Party system also has mechanisms conducting policy liaison. With regards to the system of local governmental ministries, the Party has negotiation mechanisms amongst the 4 Party Committee members. As far as the executive branch of the government, central governing ministries are related to local governments only in the aspect of business contacts and the provision of advice, with no subordinating relationship. With all the liaison mechanisms in place, sectionalism remains obvious concerning departmental interests and on the local, regional levels (Chou, 2005).

The responsibilities of marine affairs of most countries are scattered amongst their respective governmental departments, but as marine affairs become more multifaceted and all these departments make use of marine areas and resources in a competitive fashion, the issues of environmental and resource preservation also arise as a result. Thus, in order to liaison sea use and preserve marine ecology, cabinet-level interdepartmental committees are set up in some countries; for example, the Marine Council of the US, the Commission on Sustainable Development of Australia, the interdepartmental committee in Canada, the permanent committee on coastline issues in the UK, the communication taskforce on marine development in Japan; some US presidents even take up the burden in the drafting of marine policy in order to develop national ocean policy. As of 2007, the Prime Minister of Japan began serving as the head of the Department of Integrated Marine Policy to oversee the overall development of all marine-related ministries. The liaison between central and local governments is done through the arrangement of committees. In terms of enforcement, only Fisheries and Oceans Canada, the State Oceanic Administration of China and the UK MMO are dedicated institutions in charge of marine and coastal management, the type of governmental institutions are nonexistent in other countries, but instead, relevant departments and ministries are in charge of the said scope of responsibilities, such as U.S. NOAA, the Marine Division of the Department of the Environment, Water, Heritage and the Arts of Australia, and MLIT of Japan.

2.6 LEGISLATION

Increasing environmental concern (such as *Santa Barbara oil spill*): in 1969, the Stratton report of U.S. Ocean Policy combined with a proactive Congress resulted in the enactment of major ocean-related legislations and regulations in 1969 to the 1970s. The most important events included: the *Clean Water Bill of 1972*, the *Coastal Zone*

Management Act of 1972 (which launched the state coastal zone management), the *Marine Mammal Protection Act of 1972*, the *Marine Research, Conservation and Asylum Act of 1972*, the *Endangered Species Act of 1973*, the *Magnuson Fishery Conservation and Management Act of 1976*, the amendments for the *External Continental Shelf Lands Act of 1978*, etc. In order to address the issue of lack of marine management system, Congress ratified and President Clinton signed ‘the *Oceans Act of 2000*’, which took effect in 2001. The *Act* stipulates that the USCOP shall assess the U.S. coastal and marine condition and its management and propose plans to establish and coordinate effective marine policies (Cicin-Sain and Ehler, 2005). The government allocated \$8.5 million to the committee so that it could complete its analysis and publish its findings. At the same time, the Commission asked President to provide plans to Congress within 90 days to implement or respond to its proposal (Cicin-Sain and Ehler, 2005).

The decree of Australia’s marine and coastal management is established on the international laws and *Australia’s Constitution*. It protects Australia’s maritime rights and interests and lays the foundation for related laws and regulations which are enacted for the purpose of implementing various marine development and usage activities by the federal government. These laws include the *Convention on Biological Diversity*, *Fisheries Act*, *Offshore Minerals Act*, *Australian Oceans Act*, and constitutional resolutions for offshore issues etc. (Lu and Ai, 2001). In spite of the existence of a wide range of federal, state and regional laws, Australia’s marine legal system is still not quite complete (Rothwell, 1996). Also, the responses to marine issues from each state are not all consistent; for example, different legislative instruments are adopted in responding to international laws limiting pollution and dumping from ships on the sea. Although Australia Federal Government enacted

Australia's Oceans Policy in 1998 to solve marine issues and Australia Prime Minister signed the policy in the same year, but state and territorial governments did not agree to sign it. Therefore, the effect of the policy is limited to the federal government only. Australia's Oceans Policy did not pass the Legislature: it is merely a high level, 'general' policy and cannot replace existing policies or legislation. Rather it is designed with an idea of adding no additional management arrangement but only integrating and coordinating existing mechanisms. Therefore, ocean policy cannot replace or remove existing management measures. The policy must combine together the scope of existing plans to serve as the guidelines for marine users. Because there are no laws to support it, there are no direct enforcement activities related to the policy (Addison and Petrachenko, 2005).

Canada did not have a complete set of marine laws before the 1990s due to its political and historical background. Not until 1997 did *OA* pass that it committed to adopt an integrated approach to start and confirm the responsibility of the federal government to its oceans (Lu and Ai, 2001). *OA* includes: (1) Validate Canada's oceans and demand Canada Government to commit to the responsibility of marine conservation and management; (2) Provide DFO with authorisation for its special policies and programs to implement the Canadian way of protecting estuarine, coastal and marine ecosystems. It also stipulates in Section 29 that the Minister of Fisheries and Oceans shall lead and press for the development and implementation of marine strategy; and (3) the responsibility for starting *OA*. The strategy includes all integrated management plans that will impact estuaries, coastal waters, marine waters, and all the way to continental shelf. Published in 2002, COS was the result generated from joint discussion among public, Federal, state, and the Aboriginals. COS includes three policy objectives: (1) Understanding and Protecting the Marine Environment; (2)

Supporting Sustainable Economic Opportunities; and (3) International Leadership, which includes promoting effective governance and regulations in developing countries for sustainable marine resources management and supporting the capability-building for the UN marine advisory process (Mageau and VanderZwaag, 2005). Other than *OA*, Canadian laws related to oceans include decrees from each department and local decrees, which include the *Federal Water Act*, *Environmental Protection Act*, *Fisheries Act*, maritime law, and port business law etc.. Various law enforcement agencies enforce laws and implement managements actions according to these decrees.

UK does not rely on a comprehensive legislation to cover and regulate all the behaviour of development and use of marine resources; rather, it adopts a legal system, classified, meticulous, and cross-referenced, to limit development behaviour, which can be roughly divided into: (1) Maritime rights and interests involving 200 nautical mile EEZ; UK complies with EU's critical sea principle; (2) Industry regulation. There are about 240 plus institutions engaging in the development and use of marine resources in the entire UK and there are already 80-100 related decrees which have been promulgated by the Parliament; (3) Local decrees. In UK, the management authorities for various businesses and industries within each district and group are all authorised by the legislature and have a tendency to protect local interests and the interest of local organisations; and (4) Decrees and directives issued by agencies, such as *Marine Fishery Rules*, and *Marine Fish Law*. While the major laws and regulations to adjust sea use activities are the *Crown Estate Law of 1961*, the *Coastal protection Act of 1949*, the *Continental Petroleum Rules of 1964*, and the *Town and Country Planning Act of 1971* (Lu and Ai, 2001). The major marine environmental protection decrees include: the *Water Act of 1989* to prevent pollution of various waters and

water bodies, the *Pollution Prevention and Control Act of 1999* to prevent offshore facilities from polluting waters, and *Conservation (Natural Habitats) Law* (Chang, 2008), and the most important regulation recently is Council Regulation No 2371/2002, which was applied in 2002. Regulation 2371/2002 sets out the economic, environmental and social basis of the Common Fisheries Policy, the objective of which is to guarantee sustainable exploitation of living aquatic resources. The measures adopted under this Regulation are based on applying the precautionary principle and sound scientific advice. There are several ministries and departments related to marine and coastal issues in Japan, which are described in prior sections (please see Section 2.5) and there are various laws, which adopt a departmental or un-coordinated approach to managing marine and coastal issues. The recent actions taken aimed at vertical and horizontal integration as objectives started adopting government guidelines and special laws to implement them. Moreover, the central government and local governments, communities, scholars, and private and industrial stakeholders all work together to jointly develop and implement policies. Most actions have been concentrated in the coastal zones, but national ocean policy still needs to rely on administrative guidelines or guidelines from local governments or communities; there are no complete national legal frameworks to regulate the effective implementation of guidelines (Terashima and Hayashi, 2005) until the realization of the *Ocean Basic Law of 2007*. During the period, some special laws or regulations have been adopted, especially those focussing on improving the environment of special areas, such as gulf, and semi-enclosed seas etc. and periodic revision also makes the decrees of existing laws easier to comply. Japan's major laws related to marine and coastal issues in various domains are: *Legislation on Planning Comprehensive National Land Development Act*, *National Land Use Planning Act*, and *Natural Park Law*. Most of these decrees are basically aimed at issues from

various departments. Recently, there are some laws starting to focus on specific serious issues which require inter-departmental cooperation, including *the Law concerning the Special Measures for Regeneration of the Ariake and Yatsushiro Seas*, and *the Law concerning the Promotion of Nature Restoration* (Terashima and Hayashi, 2005). These two laws rely on the coordination and cooperation of MITI, Ministry of the Environment, Ministry of Agriculture, and Forestry and Fisheries of Japan. The ‘*Basic Ocean Law*’ and the ‘*Law to Establish Safety Zone around Marine Structures*’ passed in 2007. The purpose of developing the *Ocean Basic Law* is to realize the national policy objective of becoming a marine nation, to cooperate with other countries according to the relevant provisions of *UNCLOS* and the international treaty obligations which Japan bears, to peacefully and sustainably develop and use the ocean, to protect the marine environment, and to ensure maritime safety. It also stipulates basic administrative strategy in Section 17 to 28 and the establishment of ‘*Headquarters for Integrated Ocean Policy*’ and other matters in Sections 29-38.

The marine legal system of China consists of laws and regulations at various levels: ‘*Territorial Sea and Contiguous Zone*’ and ‘*EEZ and Continental Shelf*’ constitute the constitutional charter of China’s marine law; the three guidelines: the ownership of the waters established by ‘*Sea Use Management Directive*’, pay for the use, and functional zoning, provide the necessary legal means for the realisation of integrated ocean management; ‘*Marine Environmental Protection Law*’, ‘*Mineral Resources Law*’, ‘*Maritime Traffic Safety Law*’, ‘*Foreign-related Marine Scientific Research Regulations*’, and related laws and regulations, provide rules to follow for major developments and uses of marine activities such as marine resources development, marine environmental protection, maritime transport, and marine scientific research (CIMA, 2007).

Among the six countries, U.S. Canada, and Japan all have dedicated decrees for integrated ocean management to specify the responsibilities of marine management that the government should shoulder, to establish an effective and coordinated marine policy, and to implement related *ocean action plans*. This kind of explicit stipulation of government responsibilities compels these three governments to take actions proactively to manage marine issues comprehensively. And China also developed sea use management measures to establish the three guidelines of the ownership of the waters, pay for the use, and functional zoning to serve as the legal bases of realizing integrated ocean management for China. Although Australia developed an ocean policy, but it did not pass associated the Legislature, Therefore, it can only rely on existing laws and regulations from various departments to integrate and coordinate existing mechanisms to regulate various development activities, which makes the implementation of an integrated ocean management difficult. At the same time, it also leads to the situation of inconsistent responses to marine issues between states due to the lack of a consistent standard. UK has adopted a legal system, classified, meticulous, and cross-referenced, to limit development behaviour but has not had a unified decree until recent Acts such as the *Marine Coastal Act, 2009* and the *Marine (Scotland) Act, 2010*, both of which paved the way for a more integrated and comprehensive policy approach for marine development, protection and conservation. To summarise the above results, it can be seen that all countries have started to focus on the development of special laws for integrated ocean management and, at the same time, explicitly stipulate the government responsibilities for integrated ocean management in decrees. Only by doing so, can government departments to de completed develop integrated management proactively and prevent the conflict of resources and spaces arising from the departmentalism within various departments.

2.7 TECHNICAL MANAGEMENT AND IMPLEMENTATION

In order to restore marine and coastal resources, NOAA's Marine and Coastal Resource Office has formulated the 'coastal zone management planning', national marine conservation area project, river-outlet research and protection system, and national river-outlet project. Each year a federal funding of \$5.5 billion is spent on coastal planning, and each coastal state also contributes accordingly. As of now 29 states have received national funding and established coastal planning offices. In recent years, the U.S. coastal zone management planning is focused on coastal hazards, wetland protection, urban reservoir restoration, and non-point source pollution. These efforts help build inter-governmental collaborations on federal resources and settings while the states' voluntary participation and plans are coordinated. The U.S. National Marine Conservation Project is based on the '*Marine Protection, Research, and Conservation Act*' formulated in 1972. The purpose is to protect major marine areas and protect and restore their recreational, ecological, cultural, art, and research values. The federal government spends about \$14 million on the 14 conservation areas, and each state is required to match the funding on a 1:1 basis. In the river-outlet research and protection system, special river-outlet areas are reserved for research and monitoring and serve as long-term science education bases that provide decision-makers of coastal management with information. This project was enforced in 1972, and currently 19 states and Puerto Rico have 22 river-outlet conservation areas. NOAA is in charge of helping state governments manage the national river-outlet research and conservation areas. The National River-mouth Project was based on the *Clean Water Act* enforced in 1987 by the U.S. Environmental Protection Agency for the purpose of protecting river-outlets. Activities allowed inside the areas are also regulated. There are 11 areas being protected at current time in order to improve their surrounding and restore ecological

resources. To achieve the goals, a joint managerial organisation was established by the federal government, state, and local organisations, and protection and management plans were also formulated. An example is the San Francisco River-outlet Project (Lu and Ai, 2001).

Under the decree of the *Ocean Act of 2000*, the Bush government published the *USOAP*, which is a report responding to USCOP. The action plan proposes several specific actions as mechanisms to further assess and handle proposals from USCOP. The *USOAP* has 7 themes in the access to and protection of the sea, including: (1) improving fisheries, providing support for quota, allowing representatives from regional fishery unions, promoting better data-collection, using scientific guidance, and achieving international cooperation. (2) Protecting coral reefs. The U.S. government will promote conservation efforts, the protection of the conservation areas in Hawaii, and the research on deep-sea coral reefs. (3) The U.S. government will reduce mix catch and utilize better law enforcements to deal with the protection of marine mammal, shark, and sea turtle through international collaborations. (4) The U.S. government will propose regulations and guidelines regarding offshore cultivation. (5) *USOAP* demands improvements on the coordination in marine management zone (including MPA). (6) The U.S. government will support the development of offshore energy. (7) Protecting shipwrecks with national inheritance significance. In order to improve the coastal regions, the U.S. government has proposed many plans focusing on coordinating federal and state management, minimising impacts from agriculture, increasing and restoring wetlands, preventing and controlling foreign species, and reducing pollution caused by reduced flow and sedimentary airborne particles.

Recommendations for enforcement are mostly on improving collaboration (enforcement is done by different departments), training for law enforcers, information sharing, and field inspections. The more important recommendations are on MPA, reducing the rate of coastal development, protection against natural disasters, septic systems, the National Pollution and Emission Reduction System, non-point source pollution, measures for rainfall due to storms, marine security, ballast water treatment (foreign species), marine garbage, fisheries, marine mammal, public construction and technical development, and federal research grants (Cicin-Sain and Ehler, 2005). The U.S. Marine Management Information System is handled by the National Oceanographic Data Center of NOAA that deals with marine information generated from domestic and foreign marine activities.

The imbalance between the federal, state, and local government in Australia has led to many instable in Australia's marine and coastal management; in other words, 'the federal government has the money, the state government has the power, and the local government has all the problems'. Since the 1960s, problems such as shoreline erosion, pollution, and loss of habitats have been worsening, and the states have started formulating the coastal zone management plan since the 1970s. The federal government's attention on the ocean and coast peaked in the 1990s as policies such as the '*federal coastal area action plan*', 'OR 2000', '*comprehensive ocean plan*', and 'marine science and technology development'. The *federal coastal area action plan* includes the establishment of the marine monitoring system, the participation in the global marine observation system, and the founding of 'Coast Net' that publishes digital photo albums of Australia's coastlines.

In order to reinforce integrated ocean and coast management, the federal Australian

Government also implemented managerial efforts such as ocean zoning and MPAS (Lu and Ai, 2001). The goal of the national MPA system is to ‘manage the human activities that use or affect marine environment, protect the sea, access the sea in a controlled manner, and get prepared for understanding and enjoying the marine inheritance’. In the framework of the *Environment Protection and Biodiversity Conservation Act 1999* (the *EPBC Act*) that was a product of the new bioregional planning model proposed for marine planning, it says under section 176 of the *EPBC Act* that the Department of the Environment, Water, Heritage and the Arts must observe bioregional plans when making decisions relevant to the project in any way’. More studies are required regarding the correct implementations and observing the *new bioregional plan*. *Bioregional plans* give a complete ecological picture of each regional plan and identify the primary conservation values, features, and process in the extinction of a species. The *plans* set up goals, strategy, and measures for biodiversity conservation in each regional plan.

Bioregional plans summarise a series of the authority and actions by the Australia government regarding wildlife conservation, including the restoration of endangered species, reducing threats, strategy evaluation, MPA development, and fisheries assessment. The *plans* also include a baseline measurement of the ecological sustainability that is reported once every five years. Of the six regional plans the *South-east Regional Marine Plan* that was first implemented would end in May of 2004. The *Northern Regional Marine Plan* will soon be completed, and it is wished that by the end of 2005 the new bioregional planning model would be utilized. The *South-west Regional Marine Plan* began in early 2005 and fully utilized the new bioregional planning model. Each of these measures has its execution and abiding plans. Tasks implemented under the federal-level natural resource are often carried

out by law enforcement agencies and the military, including the Australian Federal Police, the Royal Australian Navy, Coastwatch and the Australian Customs Service (Addison and Petrachenko, 2005).

The implementation of the Australian Marine and Coastline Management Information System started in 1995. This system links up the Marine Organisation Leader/Federal Space Information Committee, Marine Information Team, experts' consultation teams, and New National Marine Information System. Through the Australian Global Marine Observation System, data collected by ships, satellites, and coastal stations are processed and compiled, and most of its users can use the National Marine Information System and Management Information System to understand the sea and its ecological status and in turn engage in the Australian marine and coastal management.

The Canadian government demands DFO and Environment Canada to use similar land planning and methods to create a sea use system and ask that the coastal zone and marine management strategy formulated now must anticipate for future resource-access conflicts and have plans. Projects currently underway are the '*Green Planning*', '*Ocean Dedicated Network Action Plan*', and some coastal zone management planning based on the local communities. The *Green Planning* is a comprehensive project formulated by Environment Canada. Its purpose is to facilitate protection of Canada's coastlines and waters, and targeted areas include the Fraser River watershed, Atlantic Bay and the outlet, and the Arctic region. The *Ocean Dedicated Network Action Plan* is formulated by the International Development and Research Center, with the goal of exploring and establishing a cross-domain knowledge network dedicated to Canada's oceans (Lu and Ai, 2001).

The *OA* sets up a wide range of ocean management actions to conserve and protect Canada's oceans. These management actions include: (1) *National Marine Protected Areas Program*, which includes designating regions in accordance with the special protection causes specified in the *OA*; (2) Marine ecosystem health program, which provides technical support for the other programs and actions of the *OA*. This *program* includes the establishment of marine environmental quality objectives, standards, and guidelines etc., which might even have the effect of law (Mageau and VanderZwaag, 2005). The COS was completed in 2002 and was one of the major demands in the *OA*. The COS initiates political goals and activities that support the policies and has received feedbacks and experiences from 30 experimental marine conservation area projects.

Canada's 'Policies and Managerial Structure of Canadian's River-outlets, Coastlines, and Coastal environment' document identify two types of comprehensive projects: *Large Ocean Management Areas (LOMAs)* and *Coastal Zone Management Plains*. *LOMAs* are primarily large-scaled ecological and economic development, whereas *Coastal Zone Management Plains* focuses on the local environment and economic issues, including eco-tourism and cultivation, in the provinces and autonomous regions. *LOMAs* are led by DFO and jointly implemented by other departments at different levels, aboriginals, and stakeholders. There are five key areas in the first phase of the *oceans action plan* where the targets regarding ecology and integrated management are confirmed. At the same time the plans that are taking effect or being implemented by the state or local governments become a part of *LOMAs*. The large-scale projects of top priority are: the *Eastern Scotia Shelf Integrated Management Project off Nova Scotia on Canada's Atlantic Coast*, the *Pacific North Coast Integrated Management Initiative in British Columbia and Beaufort Sea*

Integrated Management Initiative in the Arctic, the Placentia Bay-Grand Banks initiative off Newfoundland and the Gulf of St Lawrence Integrated Management Initiative.

Problems and challenges in implementing the integrated management action include: a lack of steady funding, seriousness of ecological issues being neglected, the abilities of participating stakeholders, and some regulators and industries holding the 'customers are always right' attitude. This key point is responded with COS and sponsorship, and the *Oceans Action Plan's* priority is currently leading to a more focused and result-oriented method. The *OA* that is being authorised rather than regulated demands collaborations and ability development. The *OA* does not have the power to providing the planning of coastal land or the regulative power to specify valid at projects. As of now, no states have passed its own integrated coast management regulation, but one federal agreement has been approved, and other agreements are being negotiated. When lacking legal regulations, the implementation of integrated management plans has to rely on the collaboration between regulators, interest groups, and stakeholders (Mageau and VanderZwaag, 2005).

Canada's *Bay of Fundy, the Gulf of Maine and Georges Bank (FMG) Project* is about the development of a sustainable coastal and marine management information system that gathers data through an online Geographic Information Systems (GIS). Afterwards, the Atlantic Earth Mathematics Joint Project utilizes *FMG* to develop the Distributed Environmental Information System in order to browse the original database. Atlantic Coastal Zone Information Steering Committee is a regional, inter-governmental Committee that facilitates coastal region and marine information management. To promote exchange of information and provide opportunities for

collaborations for activities such as coastal mapping, and two versions of an Atlantic database index have been formulated.

Since 1977 the UK has divided its coastlines into 44 zones and gradually established the coastal protection zone. When conducting coastal zoning, the UK first established standards for developmental and conservation areas in order to protect the coastlines and marine environments and resources. The UK government has been introducing new measures to protect marine eco-systems in recent years (Lu and Ai, 2001). On 1st May 2002, the UK government proposed the '*Complete Protection of UK Marine Biology Project*' to prepare better habitats for the 44,999 marine species living in UK waters. In 2003, as recommended by OSPAR Commission, the UK government also established an information network complete with marine science, status of development, and prospects in order to completely implement marine environmental protection (Chang, 2008).

In the 1980s, most European Union (EU) nations were not very enthusiastic about the 'Strategic Environmental Assessment' (SEA), except UK. Although in its official policies UK did not strictly enforce the SEA system, its government nonetheless was asked to make proper environmental considerations when formulating policies (e.g., consider whether an ecological environment could be damaged when formulating policies). The aspects involved include the central government's policies and local agencies' land-use projects. In UK, environmental assessment is divided into the national, regional, and local level. UK Defra also announced in 1991 the 'Policy Evaluation and Environment' and sent copies to all departments. 'Policy Evaluation and Environment' is a more systematic operation principle after the Environmental White Book was announced, and one of the recommendation included is the

implementation of SEA when any agency is formulating policies.

The UK government has legislated laws to enforce SEA; in 2004 the *Environmental Assessment of Plans and Programmes Regulations 2004* was passed, and Northern Ireland, Wales, and Scotland also formulated similar regulations. Also, in Scotland the *Environment Assessment Act 2005 of Scotland* was passed and replaced previous regulations. Besides the development projects passed before February 2006, all others must observe the new law.

In 2005, the authority of the UK government carrying out SEA formulated the '*A Practical Guide to the Strategic Environmental Assessment Directive*', whose content provides legal requirements and information on how to achieve the goals. It also provides developers with the needed information and provides guidance for projects that are not really regulated.

From the environmental perspective, the most urgent problem in marine policy is about the damages to the ecosystem, which are mainly caused by overfishing and conflicts over access-intensive waters. Most relevant problems include the conservation of the representative system of the coastal and marine protection zone as it is related to effective control over coastal waters. At the moment there is only a certain level of effective control by the agencies of administration and management. Therefore, in the next century or the more distant future, the development proposed by the Integrated Coastal Zone Management (ICZM) and the *Marine Bill* should provide information in order to effectively deal with these problems, and the most likely one is using marine spatial planning. One of the most important development recently is the '*Charting progress: an integrated assessment of the state of UK seas*'

published by Defra, which serves as an evidence basis for ecological management and the link between all the objectives (Smith and Ball, 2005). In 2010, Defra published Charting Progress 2 that is based on a robust, peer-reviewed evidence base and describes progress made since 2005. The report presents an updated and improved assessment of the state of the UK seas. Charting Progress 2 provides a solid foundation for policy-makers to make the strategic and far reaching decisions needed to meet our legislative obligations and to protect our marine resources (Defra, 2010).

The UK marine enforcement teams are quite diverse, including Her Majesty's Coastguard, Royal Navy, the Royal Life Boat Association, and other agencies. HM Coastguard is in charge of rescue at sea, protecting waters, ensuring order in swimming areas. The Royal Navy's duties include routine patrols, detecting smuggling, assist in marine rescue, and, as requested by Defra, inspecting marine fishing and protecting fishery areas. The Royal Life Boat Association is a private rescue organisation. Marine environmental protection and marine transport safety are conducted using chartered boats and aircrafts. The Marine Pollution Control Agency of the Ministry of Transportation handles accidental oil spills.

In the 1990s, UK successfully developed a marine fishery management information system utilizing observation, navigation, and communication satellites that reinforces the monitoring on marine fishing boats, and marine GIS was also introduced to provide information on the influences of changes in the marine environment on ecosystems and resources. The UK Coastline Management System utilizes dedicated information management strategies, including data base, GIS, equipment for analysis and sorting. Different models for coastline comprehensive management have been proposed, including the Environmental Coastline Management Model.

Since the 1970s, Japan has formulated a series of marine development planning projects. After the 1980s, Japan reinforced its national ocean management and formulated a national marine development project, including a 7-year coastal development project and an advanced marine development project. The goals of the 7-year project are to: (1) protect the citizens' lives and properties, ensure high-quality coastlines and protect against earthquakes and tsunamis, (2) create richer natural coastlines, create high-quality marine habitats, create artificial coastlines for seaweed cultivation, and promote environmental clean-up, and (3) create beautiful coastlines and establish coastal parks and streets. The total funding for this project is 1770 billion Japanese Yen. The advanced marine project is a national project developed based on the actual status of marine development. It includes the projects for marine bio-resources in the five seas, development of marine minerals, marine energy, marine space, coastline protection, comprehensive marine space utilisation, global environmental protection, marine research, general marine-related technologies, and international issues. Japan's marine law enforcement is handled solely by its Coast Guard. All of Japan's marine laws and regulations are implemented and supervised by the Coast Guard.

In recent years, Japan has been reinforcing its access to marine information, especially the Centre of Marine Data that covers all of Japan, Asia, and the Pacific Ocean. All sorts of information are fed to ocean-related organisations of Japan, and printed materials such as 'Japan Marine Information Center's Report', 'Report on Domestic Marine Investigations', and 'International Marine Information Exchange' are published. The Marine Intelligence Report Center was established with the support from some financial groups for the purpose of assisting Japan's marine information

centers. The first 5-year project is to study all the marine and coastal data in order to develop high-quality management methods and publish various types of data on the Northwest Pacific Ocean through online systems.

In the '*Marine Environmental Protection Act of People of Republic of China*' it has clearly stated that the State Oceanic Administration is in charge of Marine Functional Zoning in order to formulate marine development strategy, policy and planning, macro guidance to marine development, establish good marine order, optimize marine industrial structure and output, coordinate activities related to marine development, implement integrated management, protect the marine environment, ensure water-quality management models, establish a billing standard for paid-marine-access, and determine a sea use management mechanism that provides scientific data. Therefore, State Oceanic Administration worked with relevant agencies, coastal provinces, Autonomous regions, Municipalities, and counties to hold the National Marine Functional Zoning. Between 1989 and 1995, small-scale Marine Functional Zoning was established for the country and all the coastal provinces. In 1998 the larger-scale Marine Functional Zoning was formulated. The country, provinces, cities, and counties form four administrative systems serve as the basis for marine development and utilization (Lee and Chun, 2008). In this effort, 3,663 marine functional zones were formulated, which included 2,502 functional zones of development and utilisation, 530 functional zones of governance and protection, 221 natural preservation zones, 330 special functional zones, and 80 reserve functional zones.

Between 1991 and 1993, China conducted a national marine development planning, exercise and the Government authorized the State Oceanic Administration to work

with relevant agencies, coastal provinces, autonomous regions, municipalities, and counties to adjust marine industrial structures and development map, marine land restoration, and environmental protection in order to realise China's ocean policy. To implement sea use management, in 1997 the State Oceanic Administration also formulated an exemplary zone of sea use management for implementing sea use planning.

China has three enforcement teams: China Sea Surveillance, China Port Surveillance, and the Fishery Administration of China. China Sea Surveillance is affiliated to the State Oceanic Administration whose goal is to patrol and ensure the nation's sovereignty and engage in rescues and other law enforcement efforts. China Port Surveillance is managed by the Ministry of Transport, whose duty is to supervise and inspect boats, equipment onboard, personnel, and their certificates, deal with boat supervision and marine incidents, rescues, ensure passage and port safety, and deal with pollution relating to boats or other marine vessels. The Fishery Administration of China is under the Fisheries Agency of the Ministry of Agriculture, and its purpose is to enforce the *Fisheries Act*, protect the rights over marine fisheries resources, review and issue fisheries permits, manage fishing boats and their equipment's technical inspections, ensure wharf safety, and stay on top of fisheries waters and resources. Besides the above three agencies, there are also coast patrols and anti-smuggling teams that deal with illegal immigration and smuggling.

In order to implement the marine policy, the Government of six countries formulated ocean-related management plans to implementation, for example, the *USOAP*, *Canada's Oceans Action Plan*, etc.. According to the plans, the most important action is to solve inappropriate management measures among marine ecological protection

and marine governance through the MPAs plan, marine spatial planning, coastal management plan (Crowder and Osherenko, 2006).

The nations have different plans to implement their marine policy, but their main focus is the MPAs plan, marine spatial planning, coastal management plan, while an ecosystem-based ocean management is the trend in their managerial efforts. To conduct marine planning, the nations have variously started marine monitoring, using GIS to construct a marine and coastal information system. Besides utilizing marine spatial planning, UK also relies on SEA to prevent environmental impacts caused by the marine development policy. In the aspect of enforcement, it differs depending on each nation's situation.

2.8 HUMAN RESOURCES AND CAPACITY BUILDING

In order to effectively use and protect marine resources, the U.S. federal government invests a large amount of manpower and resources to promote scientific research; for example, the U.S. National Marine Fisheries Service set up 5 fishery science research centres in various areas with 2-8 institutes under each centre to form a marine fishery scientific research network. And in order to control and prevent oil spill pollution incidents, it invested \$188 million in 1996 to build a high-tech oil spill response system, which used computer models of oil spill routes and threatened natural resources etc. as references for decision making. At the same time, In order to protect the environment and resources in natural protection areas, it also set up 22 research centres to conduct research of natural resources and environment to keep track of and understand the major ecological factors and their changes. Moreover, U.S. also established the first stranded animal rehabilitation centre and the world largest environmental research centre in 1996 and 1997 respectively.

USCOP demanded to doubling of the research investment in 5 years so that the government could make decisions based on unbiased, credible, and timely information. USCOP recommended developing a national marine research strategy, improving public infrastructure, and supporting new technology, including integrated ocean observation systems and monitoring network. A National marine education office would be set up in the NOC to improve and coordinate informal, K-12, and higher education. USCOP recommended that proceeds earned from renting EEZ resources be used to finance the implementation of the report's recommendations. Offshore oil and gas exploration injects about 400 million US dollars to non-earmarked funds currently, which should be enough to fund the expenses needed to implement recommendations proposed by USCOP, about \$390 million. USCOP recommended that these and future proceeds earned from using EEZ be deposited into an ocean policy trust fund. This fund is not there yet currently. Funding for several important programs, such as the renewal of public water and sewer facilities, which requires the public and private sectors to invest about \$60 billion in 20 years is not included within the scope of this report (Cicin-Sain and Ehler, 2005).

Moreover, U.S. Sea Grant has developed a set of appropriate marine education programmes to improve citizen's marine knowledge level. The program consists of 30 planned networks from the U.S. Great Lakes and coastal states supporting the research, services, and education of the marine environment. It achieves the marine education goals through the education of institute, post doctoral research education, university education, scholarship, k-12 education, and free choice learning etc. (Moll and Oh, 2007). Some research programs have started being implemented to comply with the national science priority developed by the OPSAG of Australia. The *programme* objectives under the *National Science Work Program* are as follows: (1)

The establishment of the existing knowledge and making marine related data and information easily accessible; (2) Survey and depict Australia biological, geographic, oceanographic features to be included in various marine uses; (3) Include the most easily obtainable knowledge in the marine planning. The tasks of the *Marine Science Work Program* focus on 3 aspects: (1) The development of National marine biological areas, which will describe the broader biodiversity patterns and further support a structure of planning and management; (2) Providing biological and economical information to marine planning to help implementing and promoting national sea issue and its use assessment; (3) Encourage understanding and using marine-based and adaptation-based management in marine planning.

Under Australia's Oceans Policy, Australian government promises: (1) Develop long-term marine education policy and program (from kindergarten to 12 grades) for each education age group in Australia's State and Territory; (2) Continue to develop relevant teaching materials for use in schools and to promote technology, advanced education, and the cooperation between universities and professional organisations etc.; (3) Continue to provide excellent specifications for hands-on teaching materials to teachers and students.

Funding for the implementation of Australia's Oceans Policy is maintained through the constant support from the Department of the Environment, Water, Heritage and the Arts. In 2000, it established the National Oceanic Office in Hobart, Tasmania, to coordinate the implementation of ocean policy. AU\$4.1 million is used for building the office. The *South-east Regional Marine Plan* started at the end of 2000 and finished in 2004, which cost about AU\$15.36 million. The *Northern Regional Marine Plan* started in 2002 and was expected to adopt the new bioregional planning model at

the later year of 2005. The total expenditure has been AU\$6.19 million so far. The *South-west Regional Marine Plan* began in early 2005, but is still in the early stage of development; it has only spent AU\$0.3 million so far. In order to support marine planning, the *National Science Work Program* has been providing broader data since 2000; its funding spent on supporting various scientific researches on marine planning currently has been as high as AU\$13 million. In 2005-2006, Australian government has approved AU\$9.4 million to implement ocean policy and marine planning (Addison and Petrachenko, 2005).

Canada provides special training to domestic staff members through the new research projects on coastal zone and integrated ocean management in universities and provides university training in the area of coastal zone and marine management and capacity building activities to U.S. and oversea students and visiting scholars, such as the *Marine Affairs Plan of Dalhousie University*, and the newly established advanced degree program and the International Ocean Institute for ICZM of Memorial University of Newfoundland. UNCED and the summer training program for the *UNCLOS* attract a large number of medium to high level government officials and some personnel in private sector hoping to improve coastal zone and marine management capacity. Among them, *Atlantic Coast Action Plan* is dedicated to nurture the capacity for local management staff to handle issues related to coastal and marine management.

The COS emphasizes that decision-making must be based on complete scientific judgment and pay attention to the uncertainty of our knowledge base so that management actions can be adjusted based on the new scientific information available. Therefore, academia, international science organisations, and their sister institutions

in other governments should form a partnership to promote the development of tools that apply ecosystem-based methods to the consideration of marine issues. At the same time, they should also establish a rigorous review science advisory process to support marine administrators. In order to further develop the necessity of scientific understanding to support the implementation of Canada ocean management policy, marine management research network is also established to serve as the action step to link social sciences and human study council to the DFO. The promise to improve marine science and technology can be seen in *Canada's Oceans Action Plan*. Its objective is to enhance the sharing of information through the connection of network; through supporting the development of standards and the research and development of its objectives to promote innovation and new technologies; through conducting pilot experimental programs of large scale marine management zones to promote commercialisation.

There has been no new money injected to the implementation of the *OA* or the COS due to budget constraints since 1997 until the federal government approved *Canada's Oceans Action Plan* in 2005. Funding for implementing national marine management has reached target through the redistribution of DFO; expenditure for the programs of the six administrative regions of the DFO all came from these funding. From 1997, DFO has redistributed about \$100 million funding to finance the ocean strategy activities. But the *Oceans Action Plan* provides some new funding, about \$28 million for 2 years to related departments, and outlines a phased approach to implementation of the policy with the possibility of injecting some added funds on the 2nd phase (Mageau and VanderZwaag, 2005).

UK possesses large quantity of public facilities for marine research and education; particularly worth mentioning are the marine laboratories, which include fisheries and oceanography, the Armed Forces and Meteorological Office, 26 universities with teaching capability of ocean-related research, and professional marine consulting companies. Therefore, UK plays an important role in the international marine science planning and management. The Natural Environment Research Council (NERC) conducts research, survey, training, and knowledge transfer in environmental sciences. NERC's Strategy for Marine Science and Technology is one of the 7 departments related to the environmental sciences. The existing marine thematic programs involve successful partnership between NERC Centres/Surveys, universities, industry and other non-academic bodies. Establishing an ocean ethic is mainly the responsibility of the voluntary sector, such as the World Wildlife Fund (WWF), the Royal Society for the Protection of Birds, the Marine Conservation Society, the Whale and Dolphin Society, the National Trust, and wildlife trusts by conducting science, stakeholder meetings, demonstration projects, lobbying, and public outreach. The school system, if through the National Curriculum, cannot be designated as mainly marine-oriented. However, as is well-known, there still is substantial marine capacity in the higher education system. At present, the most important source of funding is HM Treasury. UK does not levy hypothecated taxation to be used as funding for marine policy projects; every year, it funds central administration and agency operation, enforcement, scientific research, and higher education (Smith and Ball, 2005).

After year on year increasing trend in Japanese higher education organisations performing marine education cases targeting children. Its background is because national universities are incorporated as independent administrative corporations in 2004; in addition, the third mission of professional research and higher education

demands them contributing to society, and the never-ending 'falling birth rate domestically', provokes a sense of crisis in universities to keep students passed the entrance exams. Academic organisations have also increased their promotion for marine education activities gradually. The science academic societies or engineering academic societies led by Japan marine academic society or Japan Ship Ocean Engineering academic Society have launched a marine education related research division to dedicate to the practicing activities. Business pushes more in the promotion of universal education, which might signal their attitude of achieving corporate social responsibility, but also show that there exists a problem of shortage of technical personnel due to the 'hollowing out of industry'. Moreover, marine education initiated continuously by Nonprofit Organisations, public facilities, region, or families or similar activities are very popular. In contrast, there are quite a few worried voices crying for the decline of marine education in the education scene of schools; there are merely 8% of marine related content in textbooks (Fukushima, 2007).

Since the founding of New China, over a long period of effort, until the end of 20th century, it has built 109 independent marine institutions with 13,500 professional technical personnel and about 30,000 in total if other related technical personnel are added. However, if 4 million marine social workers in China are used currently, the proportion of professional technical personnel in the marine industrial labor is less than 1%, which is far lower than the world marine level of a moderated developed country. The illiteracy rate in the maritime employees is as high as 20%; the average education level is only primary school; the overall quality is low. Furthermore, there is sign of losing marine human resources to other industries. In view of the above issues, in the '*Outlines for the National Maritime Development Plan*' passed in 2008,

in the marine technology and education, the focuses are placed on items: marine cutting-edge technologies, marine critical technologies, marine basic scientific research, marine technology innovation platform, technology for ocean revival platform, marine education, and general science etc. Marine knowledge is included into the national education system: launching basic marine education in primary and secondary schools, accelerating the marine vocational education, and nurturing marine occupation technical personnel to fulfill the vision of nurturing marine talents and raising the overall strength of marine technology.

The development of marine and coastal education and training should be aligned with academic ideas and practices (Smith, 2000), therefore, all six countries promote scientific research programs through national scientific research and academic organisations, and further nurture talents needed by the country. The USCOP demands the government to double research funding in 5 years and the National Marine Education Office is improving and coordinating informal, K-12, and higher education. The *US Sea Grant Program*, through the formation of 30 domestic planned networks, to support the research, services, and education of the marine environment and through the establishment of schools, including institute, university, scholarship system, and k-12 education etc. to achieve the objective of capacity building and enrich the national marine scientific research talents. Australia's government also promises to promote marine education under Australia's Oceans Policy and the government's implementation is maintained through the constant support from the Department of the Environment, Water, Heritage and the Arts. Currently, it is promoting the *Marine Bioregional plans* and developing the talents needed domestically through research at the same time. Canada is also using integrated ocean management plan to provide the university training of coastal zone and marine

management and capacity building activities to domestic workers, foreign students, and scholars, such as the *Marine Affairs Plan of Dalhousie University*. UK is also using the national scientific research organisations and schools to promote ocean-related training and education, e.g. the education and training of environmental science conducted by NERC. What is noteworthy is, just like U.S. and Japan, it combines NGOs, industries, and civilians to promote the work, e.g. WWF. And Japanese businesses are also worried about technical personnel shortages and outflow and push for corporate social responsibility. China uses Outlines for the *National Maritime Development Plan* to promote marine scientific research and includes marine knowledge in the national education system. It also actively promotes marine education and training. To summarise the above results, The nurturing of marine talents, including education and training, depends on joint promotion by government, research units, academic institutions, industries, NGOs, and the public to train enough talents that are needed for a marine country.

2.9 ASSESSMENT

All countries all face the problems that marine affairs are scattered amongst various departments, and lack special governmental authority for marine management so that the government cannot manage effectively and then adjust or add to set up the management organisation, and special governmental authority or cross-departmental co-ordination units and mechanism in marine management for integrated development effectively. U.S. set up USCOP and NOC for resolving inter-organisational conflicts, and established the overhauling of the federal government in order to improve marine management. Australia does not have a special management organisation, and the responsibility of marine affairs respectively belongs to different departments. Australia implemented and coordinated specific projects under the ocean policy

through new administrative institutions. Canada integrated the progress of management through the establishment of interdepartmental committees and the unified arrangement between the federal and provincial governments. UK established the Liaison Committee on Marine Science and Technology, and a permanent joint committee on coastline issues to express co-ordination between the governments and folk and draft management plans. Also, a permanent forum on coastline management was set up, and the most of recently, MMO has been created under the stipulations in *Marine Bill*. In order to resolve the questions of coordination amongst governmental ministries and agencies, Japan set up related communication taskforce, committees, and liaison meetings, but the result still is not apparent. Therefore, a Department of Comprehensive Marine Policy was established in 2007 for the centralised institution of marine policy. China not only established the State Oceanic Administration but also set up related co-ordination mechanisms to carry out marine management. Also, owing to they are restricted to departmental interests and sectionalism, marine management systems of the centralised institutions and comprehensive co-ordination has not been established at present.

In order to implement marine management effectively, it can be seen that all countries start focusing on the formulation of special laws for integrated ocean management that serves as the legal basis through Acts/regulations that have been formulated and establishing the framework that be abide by different levels to strengthen marine management and avoid conflicts. U.S. passed the *Ocean Act of 2000* to resolve the problems of lack of marine management system. Australia's marine legal system is still not quite complete, and the Legislature did not pass Oceans Policy so that the effect of the policy is limited to the federal government only. Canada not only passed *OA* but also Canadian laws related to oceans include decrees from each department

and local decrees which are the legal bases of management. UK adopts a legal system, classified, meticulous, and cross-reference to each others. In order to integrate and management effectively, the government is also actively formulating *Marine Bill* in recent years. Japan passed the *Basic Ocean Law* to achieve the objective of national marine policy. China developed sea use management measures to establish the ownership of the waters, pay for the use, and functional zoning to serve integrated ocean management.

In the aspect of technical management and implementation, these six countries all formulated marine management plans for implementation. In order to restore marine and coastal resources, a special managerial organisation was established by the federal government, state, and local organisations, and protection and management plans were also formulated in U.S. Also, the *USOAP* was published under the decree of the *Ocean Act of 2000*. In order to reinforce integrated marine and coastal management, Australian Government also drew related management plans, implemented managerial efforts such as ocean zoning and MPA, established the marine monitoring system to understand marine and coastal ecological situation, and offered marine information to proceed marine and coastal management. Canada set up ocean management actions in accordance with *OA* to integrated management, and developed online GIS system to set up coastal and marine management information system. UK conducted coastal zoning management to protect marine and coastal resources, and set up a coastal management information system at the same time to promote eco-system management. Japan formulated marine development planning and projects, and set up the Centre of Marine Data to strengthen marine management. China set up an exemplary zone of sea use management for implementing the National Marine Functional Zoning.

All six countries also pay attention to the nurturing of marine scientific talents. They nurture marine talents through national scientific research and academic organisations. U.S. not only increased research funding but also sets up a national marine education office. U.S. also promoted Sea Grant to increase marine professional talents. Australia promoted marine education under Australia's Oceans Policy, and invested a lot of funding in the implementation of the *National Science Work Program* to nurture talents needed. Canada provides special training and capacity building activities to domestic staff members, oversea students, and visiting scholars through the research projects on coastal zone and integrated ocean management. UK also nurtured marine talents through national research units, school education systems, and folk donation. Japan devoted to promote marine education by Academic organisations and business. China focused on the development of marine technology and education, and marine knowledge is included into the national education system to nurture marine technical talents.

While all six countries pay attention to the issues of integrated ocean management, they begin to face the important factor of formation of the issues, and the obstacle in the implementation and management, and then adopt comparative improvement measures to ensure marine environmental actions can achieve anticipative effects. They also expect to restore marine environmental resources for managing effectively through comprehensive management actions.

To synthesise above-mentioned, in order to carry out integrated ocean management effectively and toward sustainable development, all countries adopted new actions in the aspects of organisation, legislation, technical management and implementation, and human resources and capacity building to resolve a great deal of marine

management issues. In view of this, the thesis will assess specifically the effects of marine policy and marine management in Taiwan in accordance with themes.

2.10 Conclusion

With all nations' increasing sea use, problems such as conflicts over national sovereignty, destruction of environment and resources, and conflict of utilisation have also been on the rise. Therefore, gladly held the United Nations Conference on the Human Environment, the United Nations Conference on the Law of the Sea, the UNCED, and the WSSD have attempted to regulate each nation's sea use and ensure sustainable utilisation while ecosystems are preserved. To respond to Agenda 21 in the Convention on Biological Diversity, FCCC, the nations have started procedures such as the integration of the environment and development, the integration of sectors, and the integration of nation.

By reviewing the six nations' marine management systems, it is clear that each nation's marine policy is aimed at integrated marine management and sustainable development, and they all have started integrated marine management in order to meet the demands in the international conventions and action plans with the focus on an ecosystem-based ocean management. At the moment the nations face similar sea issues, including over-fishing, point source pollution, receding coastlines, oil spill pollution, the destruction of habitats, conflict of utilisation. To solve these problems of environment and resources, the nations have been adjusting their national ocean management system.

In the aspect of organisation, in order to coordinate sea use and protect the marine ecosystem, some nations have starting establishing cabinet-level, cross-departmental

commissions for the purpose of a race on sea use caused by each department's egocentrism. In the execution level, only Canada and China have dedicated marine agencies, while other nations leave these tasks to related agencies. The coordination between central and local management is also achieved by establishing coordination mechanisms; examples include Japan's Communication Conference, the U.S. coastal subsidies, Canada's federal and province joint arrangements, and UK coastal region management forums. These efforts push the local governments to complement the central government's marine policy and conduct marine and coastal management.

Responding to more and more management issues, U.S., Canada, China, and Japan have formulated regulations dedicated to comprehensive marine management that serves as the legal basis for the government on integrated ocean management. UK has approved several regulations, such as, The Marine and Coastal Access Act in 2009 and Marine (Scotland) Act in 2010, yet Australia only has the Ocean Policy rather than dedicated laws, resulting in different states having different reactions towards marine-related issues. This indicates that the nations have been focusing on formulating dedicated regulations for comprehensive marine management as it serves as the primary managerial basis that prevents different departments' resource and spatial conflicts.

The nations have different plans to materials the marine policy, but their main focus is the MPAs plan, marine spatial planning, coastal management plan, etc., while an ecosystem-based ocean management is the trend in their managerial efforts. To conduct marine planning, the nations have started marine monitoring, using GIS to construct a marine and coastal information system. Besides utilizing marine spatial planning, According to EU Directives, EIA and SEA are needed for plans and

programmes which are in the local development plan likely to have significant effects on the environment (Sheate et al., 2005). Therefore, the country can depend on EIA and SEA to prevent environmental impacts caused by the marine development policy.

In order to development enough marine and coastal talents, the nations have started working on marine science research, education and training, such as the U.S. USCOP demands the government to double the funding for research and education in the next 5 years, allowing marine science research units and schools to develop national marine talents. Besides national support, more and more data indicates the importance of spontaneous implementation of marine education by NGOs, industrial circles, and people, such as making marine education widely available through marine education activities or donations.

The above emerging topics utilize the regional approach to conduct marine policy, and of which Europe and North Atlantic Ocean are the key players, whereas regions and sub-region development are emerging roles surrounding the transfer of administration. Topic of secondary importance is the emerging partnership in the marine policy as it plays key roles in the expectations for the central government (i.e., the government takes full responsibility of marine policy, participating in the private and volunteer sectors (taking care of all the expenses), and in decision-making.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

The preceding chapter reviewed the literature on marine policy and environmental management at global and national level and identified issues relating to policy and management, organisation, legislation, technical management and capacity building. Particular attention is paid to fisheries, waste disposal and pollution, and marine environmental protection and conservation. The review of the literature demonstrated both the theoretical and practical interface between decision-making and institutional development in relation to marine policy and marine environmental management. Based on the previously defined research questions and data needed, this research will adopt a qualitative case study research design since the research aim is to study the relationship between marine policy and marine environmental management in Taiwan. The following sections will focus on the methodological issues involved in researching the conflicts that sometimes occur between sea users, NGOs and government policy, practice and management. This chapter describes research strategies and methods; the research design selected for this study (the case study approach); choice of research themes; management elements; management assessment; the data collection and management, which include a pilot study, questionnaire surveys and interviews; and the analysis of qualitative and quantitative data derived therefrom.

3.2 RESEARCH STRATEGY AND METHODS

A research strategy is '*a general orientation to the conducting of social research*' (Bryman, 2001) and takes into account a variety of considerations associated with the process of doing research. There are two dominant research strategies used in social

science research: deductive and inductive. Two research methods for conducting research are qualitative and quantitative approaches. The research strategies and methods are discussed below.

3.2.1 Research strategy

As previously indicated, there are two dominant research strategies used in social science research: namely: deductive and inductive strategies. The distinction between deductive and inductive strategies is often made in the context of theory and research. In deductive research it is essential that a conceptual and theoretical framework be developed before testing it through empirical observation for seeking general laws that apply to every situation (Gill and Johnson, 1991). The aim of deductive research is to seek general rules which apply to every situation. It begins from some knowledge base, usually a theory or hypothesis, and attempts to extend it by making a prediction, and then verifying that prediction by comparing it to empirical results. The outcome of the process is to confirm or reject the predicted theory. However, *'the actual experimental procedure and results have no intrinsic interest other than confirming or falsifying the set of principles which have been used to make that prediction'* (Palya, 2000). In contrast, inductive research aims to find explanations about what has been observed. The outcome of inductive research usually results in a theory. It *'begins from some observational or experimental result and attempts to integrate the finding(s) within some theoretical context'* (ibid). While deductive and inductive research methodologies have their advocates, they both have advantages and disadvantages for researchers.

The aim of this research is to study the relationship between marine policy and marine environmental management in Taiwan, paying particular attention to fisheries, waste

disposal and pollution, and marine environmental protection and conservation. Given the aims and objectives of this research, it cannot be easily defined as deductive in nature, nor easily defined as inductive. This is not unusual because ‘*at some points during the research process, it is likely that both types of inferences and methods will be used simultaneously*’ (Tashakkori and Teddlie, 1998: 25), has been reported in (Bryman, 2001; Kitchin and Tate, 2000). Some academics tend to distinguish deductive and inductive strategies by the methodologies they adopt (Trochim, 2001; Whipp, 1998). They suggest that, as outlined in Table 3.1, quantitative research tends to be more deductive, structured, logical, measured and broad, while qualitative research tends to be more inductive, intuitive, subjective, and in-depth. This research project will primarily adopt inductive strategies.

Table 3.1 A comparison of quantitative and qualitative research

Aspect of the Research	Quantitative	Qualitative
Principal orientation to the role of theory in relation to research	Deductive; testing of theory	Inductive; generation of theory
Relationship between researcher and subject	Distant: “ <i>the researcher is ideally an objective observer who neither participates in nor influences what is being studied</i> ” (Writing@CSU)	Close: “ <i>the researcher can learn the most by participating and/or being immersed in a research situation</i> ” (Writing@CSU)
Research strategy	Structured	Unstructured
Nature of data	Hard, reliable	Rich, deep

Source: Adapted by the author from Bryman (2001) and Writing@CSU (undated)

3.2.2 Research methods

As indicated earlier, there are two principal methods used for conducting research, namely: qualitative and quantitative. The distinction between qualitative and quantitative research methods is based on theoretical and epistemological differences. As Bell (1993: 63) points out, *‘the initial question is not ‘Which Methodology?’ but ‘What do I need to know and why?’* The central point is to consider the methodologies and methods appropriate for collecting valid and practical data to answer the research questions. Because the present research is investigating three sea use cases in a real-life setting, in order to answer the questions posed by the study, qualitative methodology is the most appropriate research method. Moreover, studies focusing on the relationship between marine policy and marine environmental management in Taiwan, including the institutional development, which pay particular attention to fisheries, waste disposal and pollution, marine environmental protection and conservation commonly use qualitative methodologies in the context of case studies. In contrast, quantified data are not able to explain the complexity of these phenomena (Bryman, 2001). As a consequence, this research will adopt an inductive strategy and qualitative methodology. The following section describes the integration of the case study approach with qualitative methodology as a research design.

3.3 RESEARCH DESIGN: CHOICE OF THEMES AND CASE STUDIES – FISHERIES, WASTE DISPOSAL AND POLLUTION, MARINE ENVIRONMENT PROTECTION AND CONSERVATION

The following sections will demonstrate the choice of themes and the appropriateness of the case study approach and choice of domains, as well as explain, justify and discuss the reasons that underpin this choice.

3.3.1 The choice of themes

The study investigated the relationship between marine policy and marine environmental management in Taiwan. The issue of the topic is *'also relates to whether anyone outside the researcher's own immediate institution or area would be interested in the topic'* (Creswell, 2003: 29). In the study the research can ask others for their opinion to the topic and look for the reactions from people in the related field (Creswell, 2003). Moreover, in qualitative research, *'the literature provides a useful backdrop for the problem or issue that has led to the need for the study'* (Creswell, 2003: 30). With this in mind, the information and data for the present study was taken from the Taiwan literature reviews (Chapters 4, 5, 6, and 7) and first time field work in Taiwan (Pilot study). In addition, the research's aim and objectives are addressed in Chapter One. Therefore, four themes were chosen in the study, namely: organisation and legislation, human resources, policy development, as well as technical management, implementation and enforcement. These themes also were used in the questionnaire survey and semi-structured interview, and are analysed in Chapter Eight.

3.3.2 The case study approach

Robson (1993: 52) defines the 'case study' as *'a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real life context using multiple sources of evidence'*. This is very important since this research focuses on real-life contexts, that is, fisheries, waste disposal and pollution, and marine environmental protection and conservation, and requires multiple sources of evidence to understand these scenarios. A later section will describe a whole range of qualitative methodologies which can be used to collect the required data. Yin (1994: 3) makes a similar claim that the *'case study allows an*

investigation to retain the holistic and meaningful characteristics of real-life events'. Moreover, the case study *'allows a particular issue to be studied in depth and from a variety of perspectives'* (Kitchin and Tate, 2000: 225).

Bryman (2001: 29) defines a research design as *'a framework for the data collection and analysis of data'*. It ensures that the study will be relevant to the research context and will utilise appropriate procedures (Churchill and Gilbert, 1991; Frankfort-Nachmias and Nachmias, 1992). According to Stake (1994: 242), a *'qualitative case study is characterised by the main researcher spending substantial time, on site, personally in contact with activities and operation of the case, reflecting on and revising meanings of what is going on'*. These characteristics are influential in undertaking the field investigation. First, the researcher has to spend substantial time in observing field phenomena in order to collect data. Second, the researcher has to be on site and personally in contact with the activities and operations of the case, which implies that, to a certain extent, the researcher will be involved in events and therefore the issue of positionality may arise. This issue will be discussed in a later section. Third, during the process of conducting the research, the researcher has to continually examine whether he is collecting meaningful and useful data, and, whether he has lost his position in the research.

The case study often *'employs a number of methods of data collection and analysis'* (Sarantakos, 1998: 191). Such flexibility enables the researcher to *'address a broader range of historical, attitudinal and observational issues, and to articulate perceived realities from various sources'* (Chen, 2002: 111). These advantages enrich the research in terms of data collection and analysis, which consequently results in a deeper understanding of the phenomenon under study. A qualitative case study is the

most appropriate research design to accomplish the aims and objectives of this study since the case study approach has often been used in previous studies that have investigated the scenario of a conflicting in order to find some resolution to the issues raised (Suman, 2001). This approach appears to be an appropriate method to develop comprehensive understanding of the relationship between marine policy and marine environmental management, to investigate in-depth the issues involved, and suggest solutions to the problems of fisheries, waste disposal and pollution, and marine environmental protection and conservation.

3.3.3 The choice of multiple cases

The previous section indicated that the research will adopt a research design that integrates the case study approach with qualitative methodology. This section will describe the research design for conducting the research.

‘A primary distinction in designing case studies is between single- and multiple-case designs’ (Yin, 1994: 38). The rationale for adopting a multiple-case design is because fisheries, waste disposal and pollution, and marine environmental protection and conservation present a ‘revelatory case’. A revelatory case exists *‘when an investigator has an opportunity to observe and analyse a phenomenon previously inaccessible to scientific investigation’* (Yin, 1994: 40). The six case studies presented in Suman (2001) highlighted a wide range of issues in coastal management; illustrated various types of conflict having diverse economic, environmental, and social implications; presented different institutional arrangements to address the issues; and offered a set of innovative strategies for the wise management of coastal areas, thereby demonstrating that when used to the maximum capabilities, the case study method helps to promote analysis to resolve issues, improve decision-making skills

under conditions of competing interests, and facilitate a coordinating approach between involved parties to address problems relating to fisheries, waste disposal and pollution, and marine environmental protection and conservation, thus justifying the adoption of a multiple-case research design in this study.

3.3.4 Selection of domains for in-depth study

In the research process, the researcher should have obtained a general understanding of the situation and the various conceptual backgrounds in order to assist him/her in preparing questions for the questionnaire and interview. To better understand the issues associated with marine affairs in Taiwan the researcher decided to adopt the focused interview '*to corroborate certain facts [he] already thought to have been established*' (Yin, 1994: 85). More beneficially, focused interviews would enable him to focus '*on a specific topic ... [and ...] maximise the potential of the study ... by allowing the discussion to go beyond the originally planned themes and topics, and thereby encourage respondents to discuss as many issues of the themes as possible*' (Sarantakos, 2001: 253). The researcher therefore decided to undertake focused interviews in the field in order to corroborate his thoughts about the situation and to identify issues pertinent to it which he may have overlooked.

Thirteen months into the research, personal circumstances afforded the researcher an opportunity to return to Taiwan, to develop contact with ocean-related scholars, governmental officials, staff in ocean-related organisations and non-governmental ocean-related organisations, and fishermen, and conduct initial interviews in order to better understand and examine the issues pertinent to the research topic. The researcher noted in his diary: "*I hope the investigation will help me to refine 'data collection plans with respect to both the content of the data and the procedure to be*

followed (Yin, 1994: 74). Between November 2004 and mid-February 2005 the researcher conducted interviews with 20 ocean-related scholars, 7 governmental officials and staffs in ocean-related organisations, 4 in ocean-related NGOs, and 3 fishermen”. Interview topics included the current marine situation and problems, the absence of marine policy and future directions. Data obtained were analysed according to the purposes of this research. The results (Table 3.2) helped the researcher to identify main issues and areas for further investigative purposes. The results are discussed in the following paragraphs and in Section 3.3.5.

Twenty-two interviewees thought the most important marine affairs issues to be marine environment protection and resources’ conservation in order to address the problems of pollution, jurisdiction, over fishing, uncontrolled marine development and marine crime (the destruction of marine resources), and to promote the sustainable utilisation of marine resources. Other important issues are marine policy enforcement, more education in marine affairs, the need to work closely with relevant international organisations, establish a unified administrative authority with sole responsibility for marine affairs and a more effective marine legal system, and encourage the development of tourism.

Fourteen interviewees thought it necessary to improve current implementation of marine policy and educate more students in marine affairs and actively train them in the management of such affairs. Current regulations are out-of-date and horizontal interaction and coordination is insufficient. Governmental departments should revise regulations according to the current situation and overlapping of responsibilities for marine affairs should be avoided to make the best use of existing personnel and avoid departmental conflicts. Some interviewees advocated more public participation in the

formulation of marine policy. In their view, the promotion of marine policy requires not only the enforcement of rules and regulations but also increased public awareness of environmental issues, research investigation by domestic specialists and scholars, and an integrated administrative system and administrative department with specific responsibility for marine affairs. Scholars and officials affirmed that a good marine policy is essential to a marine country in order to promote marine environment protection and resources' conservation. The government is failing to solve current problems due to an absence of coordination and communication between relevant organisations and units and involved parties. Public participation in the decision-making in the initial stages is also essential to avoid misunderstanding and conflict.

Table 3.2 The results of field survey in Taiwan

Domain		Issue	Frequency of mention
marine environment protection and resources' conservation	22	pollution	11
		over fishing	8
		marine development	7
		sustainable utilisation of marine resources	4
		marine crime (destruction of marine resources)	4
marine policy enforcement	14	marine crime (smuggling and stowaways)	7
		ship collision	5
		fishing beyond the mainland	2
		national security	1
		improve marine affairs education	14
strengthen professional training	7		
Support training overseas	4		
pay more attention to marine courses	1		
extend services	9	strengthen the disaster rescue system	8
		maintain marine security	2
		protect public benefits and rights	1

actively cooperate with relevant international organisation	8	international fishing cooperation	5
		international training	4
		international marine security cooperation	2
unified administrative authority	7	management system	5
		no horizontal link	4
		organisational responsibilities overlap or are not well coordinated	3
		division between central and local government policy	2
marine legal system	6	no effective legal system	5
		lags far behind international standards	2
tourism development	5	the increasing need of tourism	4
		development of fishing villages to improve fishermen's lives	3
		encourage the public become more aware of the ocean and the need to conserve its resources	2
jurisdiction	4	overlap of EEZ and continental shelf	3
		Disputed fishing rights near neighbouring countries	1
		fishing rights need further clarification	1

Note: interviewees could provide more than one answer with respect to each domain and issue

3.3.5 Selection of case studies

Methodologies in this study included a pilot study, a survey questionnaire, interviews, and a search of relevant documentation, e.g. legislation, governmental reports, and statistics. Based on the pilot study findings (please see Section 3.3.4), it was decided to focus on three domains: fisheries, waste disposal and pollution, and marine environmental protection and conservation. By analysing the effectiveness of the system for developing marine policy in these sea use cases, suggestions might be made for implementing a more effective governmental administrative system for enforcing marine policy in Taiwan.

This research's main proposition is that there is little interaction between marine policy and marine environmental management in Taiwan. The problem is not simply that an integrated environmental management system for marine affairs is lacking, since it is sometimes the case that there is unclear jurisdiction among related agencies, but strategic planning is also lacking and there is therefore the absence of a coherent and systematic approach to marine environmental management on the part of the Taiwanese government. Accordingly, there is the need to adopt an integrated marine environmental management system in order to facilitate effective interaction between marine policy and marine environmental management.

To identify fundamental problems and difficulties within the existing marine policy and marine environmental management system, three domains in Taiwan are selected for this research. Their backgrounds are presented below.

The selected domains, namely, fisheries, waste disposal and pollution, and marine environmental protection and conservation not only present revelatory cases which have not been investigated previously, but also provide an opportunity to analyse and demonstrate how confusion occurs within organisations and between involved parties. The research not only employs a multiple case study approach but also investigates each case at different levels of government (national, regional, provincial, and municipal) and confusion among different uses of the marine and coastal environment to understand contradictory perspectives on the events. That is the original intention and ultimate goal of the research. Moreover, the investigation of these cases will also address broader issues, both theoretically and practically. Theoretically, it will address issues associated with the marine policy/marine environmental management relationship, conflicts of uses, innovative strategies for wise management, and

methodological issues; and practically, it addresses perspectives on sustainable development, designation of protected areas and protected area management, policy-shaping, decision-making and policy-implementation.

3.4 MANAGEMENT ELEMENTS

Element is defined as *'a major component of the evaluation Framework defined by the aspect of management that is being assessed. The elements relate to the steps in a strategic planning and management cycle. Performance within each element is assessed by reference to a number of defined criteria'* (IUCN, 2006: xiii). The meaning of management has a number of different explanations, and it can mean the ability to deal with a situation or control that is a kind of power (Kay and Alder, 2005). Jr. Lynn thinks that public management means policy management, and policy goal and idea could be implemented through canvassing the public policy from the viewpoint of management (Son, 2007). Consequently, the thesis chooses management elements related to marine policy to discuss and analysis the relationships between marine policy and marine environmental management in Taiwan.

3.4.1 Government: administration, legal basis and human resources

In the marine topic, the role of government is doubly important in a developed country because of it has a dominant position with common property in the marine component of the coast at least (Kay and Alder, 2005). Kay and Alder (2005) also think the government can improve the management of coastal areas through encouragement, force or the utilisation of research and information. In addition, Gulick & Urwick think 'POSDCORB' (Planning, Organizing, Staffing, Directing, Coordinating, Reporting, and Budgeting) that reflects the classic view of administrative management. And, management of public affairs needs a set of the

organisational system of explicit policy and operation (Son, 2007). Therefore, the government plays an important role in the development of marine policy (Cui, 2009).

Because the government is the main body of marine activities, it is very important that the country sets up any organisational system in the course of carrying on marine management, especially on its organisational level, duty and responsibility, interaction, administrative command, coordinating mechanisms. In order to promote management efficiency, the government also can strengthen governmental leadership and policy interconnection, and implement the rational division of operation and organisation through adjustment and transformation of the government. The Law which formulated through the parliamentary or legislative process delegates the government has specific basis for implementation on the management structure. Kenchington proposed using the present permissible system or inter-agency to practice management. And, the decree also interprets specifically the definition of goal and domain (Chiau, 2006; Kay and Alder, 2005). Therefore, an Act or Law can be regarded as the foundation of management. It also can promote practice of the specific system on the management, such as enforcement, education, monitoring, etc., such as Chiau (2006) thinks the strategy of marine management in Canada need to establish a set of legal framework to support the implementation of marine management. In addition, owing to the government is the representative of public power, the formulation of policy and implementation all relate to specialty. And, the core of management lies in combining realistic resources effectively. The people are not only the essential factor of management but also the direct target of management. Therefore, the human resources will be the key to success or failure in the government governance (Chiang, 2003). Susan and Schuler (2000) emphasize that the human resources means how manage effectively for personnel in the organisation, and its purpose is to enable the staff,

enterprise and society can obtain its profit. And as for administrative structure, the human resources management regards the human resources as one of key elements in organisational operation. Mondy (1993) advocates the human resources management is the activity which performs the human resources through various technology and method for achieving organisational goal. Consequently, it is very important that the cultivation, division of labour and combining of the professional managerial talent in the concept of management (Hsu, 2003). If the government can make effective management for the human resources, the capacity and efficiency of government service would be promoted, and the goal of national construction would be realized (Tsai, 2008).

3.4.2 Policy development and issues

Politicians, administrators and managers always quote policy as the foundation for decision making. The policy is the plan which formulated by the government, institution, organisation or an individual for realizing the goal. It includes a series of organised action or activity undergo planning, and can be understood as political, management, financial, and administrative mechanisms arranged in order to reach explicit goals. Anderson *et al.* defined policy as '*purposive course of action followed by an actor. . .in dealing with problem*' (Kay and Alder, 2005: 111). Owing to policy has the quality of policy-making, and it is the decision which formulated under the reasonable discussion via the government or parliament, the policy and choice that adopted for solving the public problem in particular period usually have extensive and far-reaching influence or consequence. The public policy turns into the main means of government for administration, and puts its function mainly in Law, regulation, policy-making and action (Chen, 1998). Moreover, the public policy is formed in various topic fields. There are many different policy issues in each field. And, the

policy issue has its own specific policy problem which has dispute and need to be solved (Chang, 2005). Heath (1997) thought the policy issue has three formulation stages from public opinion to the development of public policy: public opinion formation, public policy formulation, and public policy implementation. Therefore, in order to make policy planning and implementation to be integrality, the government will choose the main policy issue to be the basis of department's development and administrative plan in the process of policy formulation and operation.

3.4.3 Management

Management comprises planning, organizing, staffing, leading or directing, and controlling an organisation or effort for the purpose of accomplishing a goal (Wikipedia Website, 2010). Public management is various strength which is the public departments taking government as the core and combining the society, and use the methods of politics, economic, management, and law to strengthen the administration ability of the government, improve government's performance as well as public service quality for realizing public welfare and public interests (Son, 2007). Therefore, in order to implement goal and idea of policy, it is necessary to analyse on relevant regulation and management system after understanding tentatively relevant present situation, countermeasure, system and structure for solving its contradictory or conflict problem (Chiau, 2006).

3.4.4 Assessment of management

Assessment is defined as '*the measurement or estimation of an aspect of management*' (IUCN, 2006: xiii), but applies to many other areas as well such as management effectiveness evaluation is defined as '*the assessment of how well the protected area is being managed – primarily the extent to which it is protecting values and achieving*

goals and objectives' (Hockings, *et al.*, 2006: vii). The World Commission on Protected Areas also developed an overall assessment framework for providing a consistent approach to assessing protected area management effectiveness (Ervin, 2003). Therefore, assessment can evaluate the process of management, and focus on different questions and information. In the aspect of marine affair, management of ocean and its resources have become the main issue in the international forum (Cui, 2009). In order to management effectiveness for improving efficacy and efficiency of the government and achieving the national goal, the thesis will adopt four management assessment tools to analyse the four main themes for understanding the relationships between marine policy and marine environmental management in Taiwan. They will be discussed in the Section 3.5.

In summary, in accordance with the thesis is to conduct a study of the relationships between marine policy and marine environmental management in Taiwan, and focused on the study in three domains and four research themes. Therefore, it is essential to understand the management elements so that the researcher can seek out the relationship between policy and management.

3.5 MANAGEMENT ASSESSMENT

The section provides an overview of the management assessment issues, factors, obstacles and improvement in the main themes of the thesis. Consistent with the general focus of the thesis, particular emphasis is placed on describing and analysing management tools to assist in dealing with the themes. The thesis chooses four management tools as the management assessment, namely issue, factor, obstacle and improvement.

3.5.1 Issues

Issue is defined by dictionary as '*an important question that is in dispute and must be settled*'. The investigation of issue can assist manager understand what problem is people concern, and what is the trend in the future. Therefore, it is important for manager to understand issue. It can help manager to understand the key point of administration for improving and promoting management. Issue may refer to issue management. Chase (1982) defined issue management as '*Issue management is the capacity to understand, mobilize, coordinate, and direct all strategic policy planning functions, and all public affairs/public relations skills, toward achievement of one objective: meaning participation in creation of public policy that affects personal and institutional destiny*'. Moreover, it is the global tradition that the discussion of issue which includes fact, value and policy (Heath and Palenchar, 2009). Therefore, the thesis chooses the issue as one of management assessment tool.

3.5.2 Factors

Factor is defined by dictionary as '*anything that contributes causally to a result*'. In order to realize the background of the issue, it is necessary to discuss the factor causing the issue. Moreover, existing factors also affect the ability to achieve the objectives and can assess the strengths and weaknesses of the management (Ervin, 2003). Therefore, in the process of management assessment, the research will reveal differences between the analyses result of the issues from diversity factors.

3.5.3 Obstacles

Obstacle is defined by dictionary as '*something immaterial that stands in the way and must be circumvented or surmounted*'. Adaptive management is essential considering situations and stakeholders' interests. In accordance with issues and factors, the thesis

will find out the key obstacles for management assessment. However, obstacles also vary on a case-by-case basis, depending on different situations. Therefore a thorough understanding of the underlying problems is essential for the development and implementation (Choo and Granek, 2009). In order to examine how the management effectiveness, key obstacles are included in the process of management assessment.

3.5.4 Improvement

Improvement is defined by dictionary as '*the act of improving something*'. In response to the key obstacles, it is essential that specific solutions are developed through policy maker or public participation because of most administrative behaviors are mostly mandatory, and relate to the people's rights and obligations (Tsai, 2008). Improvement in the management assessment is thought to a more holistic approach to address the obstacles. Therefore, successful management requires development of assessment approaches appropriate to address existing problems, and improvement becomes very important in the process of management assessment. In summary, issues, factors, obstacles and improvement are connected with together in the process of management assessment. The thesis will discuss the main themes through this process.

3.6 DATA COLLECTION AND MANAGEMENT

As indicated in the previous sections, this research employs a qualitative case study research design to understand organisational atmosphere, background, structure, marine policies as well as marine environmental management. However, to ensure the quality of the data collected, it is necessary to establish a 'protocol' to guide the investigator conducting the research (Yin, 1994). The establishment of such protocol and preparations for data collection are described in the next section.

3.6.1 Establishing the research protocol and preparing for data collection

Preparation is important for conducting any research because the researcher seeks to collect meaningful and valid data to answer the research questions. Without adequate preparation, the data collection stage might result in meaningless and useless data. According to Yin (1994), in order to ensure the quality of the data collected, a 'protocol', which contains the instruments, as well as procedures and general rules for using the instruments, should be established to increase the reliability of the research and guide the investigator undertaking the research. The four elements of the protocol established for this research were: an overview of the case study project, field procedures, case study questions, and a guide for the case study report (Yin, 1994). As well as the establishment of the protocol, attention was paid to the issue of trust in preparing for data collection. These two issues are, to a certain extent, relevant to and influence each other, and influential on the research in terms of the reliability and validity of the data collected, as well as the research ethics.

'The overview should cover background information about the project, the substantive issues being investigated, and relevant readings about the issues involved' (Yin, 1994: 66). The overview is not only a reminder to the researcher of what the research is about, but also a procedural element that can prepare involved people and groups for what is required in the research. The researcher provided background information on an A4 sheet of paper and outlined the purpose of the research, the issues involved, relevant readings, the respondents, and possible outcomes. Informed consent was based on this document.

Designing a field procedure is crucial in case study research because the field is full of unknowns and the researcher has therefore to comply with external conditions

rather than control the situation (Yin, 1994). Accordingly, the researcher has to be well-prepared to confront all possible situations. Further, the more information about the situations of the case, the earlier the researcher can contact potential respondents, informants and groups, and the more quickly a schedule for interviews and a timetable for observing specific events can be produced. One overwhelming advantage the researcher had in this research was being able to contact most respondents in the initial exploratory investigation. As a consequence, primary contact work was not a problem, and the field procedures and an interviewees schedule were therefore produced relatively quickly.

As regards case study questions, the researcher should consider respondents' capabilities to respond to them (Yin, 1994). The researcher should bear in mind the purpose of the research, the possibility of gaining responses to specific questions, the need to clarify potential sources of evidence, and select appropriate questions for collecting data. Yin (1994) also emphasises the importance of multiple sources of evidence to every question in order to enhance the reliability and validity of data collected. As a consequence, the researcher drew a relationship-map to identify the multiple sources of evidence to the research questions and therefore pose appropriate questions to each respondent.

Even though the outcome of this research will be presented in an academic manner, establishing a guide for the case study report '*will facilitate the collection of relevant data, in the appropriate format, and will reduce the possibility that a return visit to the case study site will be necessary*' (Yin, 1994: 74). The researcher therefore identified each piece of information collected from the field with the date and key features, asking: How was it relevant to the research? Why was it important to the

research? By doing so, the researcher believed time and cost would be saved in the later stages of organising and analysing data.

Thus, the protocol was established. Although the protocol did not deal with the issues of trust and positionality directly, these two issues were borne in mind when establishing the protocol, as well as in the subsequent stages of collecting and analysing data.

The trust building process is linked to the research ethics issue that is often referred to as informed consent. Yet, trust building is more than informed consent. Chacko (2004) argues that in order to gather valid information from the field, researchers have to equalise the power distribution between themselves and the researched by building and maintaining relationships, which results in trust. That is to say, the purpose of the trust building is to make a connection between the researcher and the researched in order to overcome the '*value-action-gap*' and consequently obtain valid data and information from the field. Blake (1999) uses the phrase '*value-action gap*' to signify in general terms the difference between what people say and what people do. Such a gap is also referred to as a '*response error*' and may be due to the misunderstanding of questions, internal pressure from the group to which respondents belong, external pressure from the researcher, or other kinds of bias (Parfitt, 1997). If respondents and informants distrust the researcher or misinterpret the purpose of the research, they might refuse to give evidence or may offer the responses they believe the researcher wants.

3.6.2 Data collection

Generally, the evidence is categorised as primary and secondary data. Primary data refer to data collected by the researcher, while secondary data refer to data generated by somebody else. Primary data are generated specifically from the research questions (Tull and Hawkins, 1993), while secondary data offer a comprehensive range of information which may be difficult to obtain from a single source, for example, governmental reports (Bryman, 2001). However, it has to be noted that both primary and secondary data have their limitations and the researcher has to consider these while considering methods for collecting data. To overcome the limitations of each type of data, the researcher decided to collect two types of primary data elicited from focused and in-depth interviews (Section 3.6.2.3.1), and one kind of secondary data, namely, that obtained from relevant documentation. The collection of secondary data from documentation is described below.

3.6.2.1 Data collection from documentation

The researcher's intention was to collect data from relevant documents in several areas in order to understand the historical aspects and present day situation of marine affairs in Taiwan as well as contemporary development of marine policy and control and management of the marine environment:

- (1) documentation relating to the historical and contemporary development of marine policy and the marine environment, particularly problems associated with marine affairs;
- (2) documentation relating to the historical and contemporary development of governmental authorities responsible for the enforcement of marine policy and legislation in Taiwan;

- (3) documentation relating to the historical and contemporary development of environmental movements and environmental NGOs in Taiwan; and
- (4) documentation relating to other influential development in relation to the issues under study.

Such documentation was anticipated to be helpful in understanding the relationship between marine policy and marine environmental management in Taiwan with respect to fisheries, waste disposal and pollution, and marine environmental protection and conservation. Such understanding would help the researcher to conduct the case studies in terms of gaining access to respondents/informants, as well as design the questions for interviewing purposes. As soon as the required documents were collected and reviewed, the process moved on to the second stage.

3.6.2.2 Questionnaire survey

Questionnaires were given to ocean-related people in order to obtain their views on current marine policy and marine environmental management in their working environment. This section contains four sub-sections, namely: questionnaire design, piloting of the questionnaire, questionnaire development, and analyses of quantitative data. The following will be discussed in detail.

3.6.2.2.1 Questionnaire design

A questionnaire is a form containing set of questions for gaining information from respondents (Malhotra, 1999). Lee *et al.* (1999) point to the questionnaire is one of main typical data collection techniques. De Vaus (1991) also states that a questionnaire is a general term which includes data collection in which people is asked to respond to the same set of questions in a pre-determined order. In addition,

Oppenheim (1992) indicates that questionnaire design cannot be taught from textbooks because of they can only hope to prevent some of the worst pitfalls and give practical. He also states that the information you done by yourself that will point the way out of difficulties. In this study, several authors state the reasons which the questionnaire is the most commonly used method of data collection. Therefore, in order to conduct my research successfully, the researcher adopted the questionnaire survey for obtaining secondary data.

According to the literature reviews and fist time field work in Taiwan, the main themes are identified, namely: organisation and legislation, human resources, policy development, as well as technical management, implementation and enforcement. Therefore, the purpose of the questionnaire is to investigate issues, factors, obstacles, and improvement in the areas of policy development, legal and administrative basis of policy, implementation and enforcement of policy, as well as capacity-building through education and training. A common set of items within each sub-category for all major areas, e.g. principles (e.g. sustainability), sea use based (the activities – fisheries, etc.), ecological/environmental, economic, social, political, legal, administrative, education and training, public awareness and so on (Table 3.3).

Table 3.3 Questionnaire’s themes and dimension of survey

Questionnaire’s Theme	Dimension			
Policy development	Issues	Factors	Factors	Improvements
Legal and administrative basis of policy	Issues	Factors	Factors	Improvements
Implementation and enforcement of policy	Issues	Factors	Factors	Improvements
Capacity-building through education and training	Issues	Factors	Factors	Improvements
Items within each sub-category for all major areas	<ol style="list-style-type: none"> 1. Principles (e.g. sustainability) 2. Sea use based (the activities – fisheries, etc.) 3. Ecological/environmental 4. Economic 5. Social 6. Political 7. Legal 8. Administrative 9. Education and training 10. Public awareness 			

In each questionnaire’s themes, there are four dimensions are included, namely: issues, factors, obstacle, and improvement. These are also the management assessment tools and had discussed in Section 3.5. After questionnaire questions formalisation and consultation with my supervisor Dr. Hance Smith, the researcher piloted the questionnaire. On the other hand, owing to differences in culture, the questionnaire used in this investigation was originally written in English and then translated into Chinese. After translation of the questionnaire into Chinese, the researcher also discussed the questionnaire detail with my former Master supervisor, Dr. Ching-Hsiewn Ou, who had been working in the field of marine affair for more than 20 years, and then modified any differences between the two versions for achieving a more accurate meaning in Chinese.

3.6.2.2.2 Piloting of the questionnaire

Poor questionnaire design may cause response bias, and it is essential to pilot the questionnaire. A good questionnaire refers to the pilot study because it is critical in achieving the optimum use of language and sequence of questions (Moser and Kalton, 1985). In the course of the pilot study, the researcher went back to Taiwan to pilot the questionnaire. The researcher chose fifteen ocean-related respondents, comprising scholars, government officers, fishermen, NGOs and research students. They offered to me their opinion and suggestion with regard to the questionnaire. The researcher discussed these with my former Master supervisor, Dr. Ching-Hsiewn Ou, and my supervisor Dr. Hance Smith by mail for modifying the questionnaire.

3.6.2.2.3 Questionnaire development

The researcher developed the questionnaire carefully with reference to the guidelines above. There are 22 questions in the questionnaire, which consist of respondent details and theme's questions. In order to elicit respondents' further comments, one open question was included at the end. Moreover, Hinkin (1995) points out that questionnaire length can affect responses. It is very important to consider the time factor. In my questionnaire, it was designed around 20-25 minutes to complete because of the previous pilot. Totally 300 ocean-related respondents were chosen, comprising officers of central government and local units, academic, private sector, and NGOs. Their professional field relate to fishery, marine environmental protection and conservation, marine enforcement, marine tourism, and other (Table 3.4). Owing to the researcher used to be the police officer in the Coast Guard Administration (CGA) and got the Master degree in Taiwan, the researcher knew many high level government officers, scholars, fishermen, and ocean-related friends. They introduced many respondents to me. The researcher gave them the questionnaire by face to face.

Owing to each group assembles in the same office/place, it save the researcher a lot time to collect it. The researcher conducted the administration of the questionnaire survey between 1st January, 2006 and 31st January, 2006. In the end of questionnaire survey, the researcher received 270 responses totally.

Table 3.4 The professional field and number of respondents

	fishery	marine environment protection and conservation	marine enforcement	sea utilisation	marine tourism	other
central government (58/60)	12/12	12/12	12/12	12/12	10/12	0
local unit (54/60)	12/12	12/12	12/12	10/12	8/12	0
academic (53/60)	11/12	11/12	10/12	11/12	10/12	0
private sector (52/60)	15/15	0	0	11/15	11/15	15/15 (resident of fishery port)
NGOs (53/60)	11/12	12/12	0	11/12	10/12	9/12 (marine culture and education)
total (270/300)	61/63	47/48	34/36	55/63	49/63	24/27

3.6.2.2.4 Analyses of quantitative data

As this study intends to understand several dimensions of marine policy and marine environmental management, various data analysis methods are employed to achieve the research objectives and questions. In order to support and establish semi-structure interview's question. The researcher used statistical tools, Microsoft Office Excel 2003 and Statistical Product and Service Solutions 14 (SPSS 14), for analysing questionnaire data. The findings for the questionnaire survey will be discussed in Section 4.6 and Chapter 8.

3.6.2.3 Interviews

In attitudinal research, the questionnaire survey may be effective, but the investigator may have indirect contact with respondents who may interpret his/her questions very differently from his /her intentions (Howard and Sharp, 1981). Moreover, owing to the questionnaire survey only can ask simple and straightforward questions and more complex questions might be too confusing for respondents, the questionnaire survey is limited (Lu, 2001). Owing to the study's underlying theory is too complex (Lee *et al.*, 1996), insufficiently developed (Loscocco, 1997), or narrowly interpreted (Rynes, Bretz and Gerhart, 1991), in-depth interviews may be combined with a questionnaire survey. Consequence, in order to obtain the greatest value of information, it is essential for doing a personal interview.

3.6.2.3.1 In-depth interviews

To obtain the data necessary to fulfill the research aims and objectives, the researcher conducted in-depth interviews with selected respondents since they have the advantages of providing first hand information and offering a considerable wealth of detail (Greenbaum, 1998). In many instances, the in-depth interview is used to

'explore multiple meanings of or perspectives on some actions, events, or settings' (Johnson, 2001: 104). This feature would be particularly useful to understand different organisations' perspectives on marine affairs issues. Johnson (2001: 105) also stated that the in-depth interview is the best approach where *'different individuals or groups involved in the same line of activity have complex, multiple perspectives on the same phenomenon'*. Individuals from fisheries, waste disposal and pollution, marine environmental protection and conservation sectors and from different institutions will have different perspectives due to their mission differences and differing involvement in issues. In-depth interviews are appropriate to elicit and identify differences in their perspectives. In terms of implementation, in-depth interviews were conducted with selected members involved in the establishment of the Marine Committee of the Executive Yuan, ocean-related politicians, governmental officials, administrative leaders, environmental NGOs, and academics. As regards in-depth interviews, the researcher used 'semi-structured' forms to provide the information necessary to answer the research questions. Questions posed sought to elicit respondents' attitudes towards the issues under investigation, their strategies to gain their goals, their relationships with and perspectives on others, and their achievements in terms of gaining control and managing marine policy and the marine environment. In order to obtain a clear understanding of the multiple interpretations of and perspectives on the administration system of the Ministry of Marine Affairs, it was considered appropriate to combine in-depth interviewing with other research methods. Conducting in-depth interviews requires skill and experience to control the situation and obtain relevant, detailed information from respondents/informants. Moreover, the researcher must not express his own opinions or feelings on the issue under study or offer suggestions for responses (Johnson, 2001).

3.6.2.3.2 Interviews with marine affairs personnel

The researcher decided to use the face-to-face interview technique to interview ocean-related scholars, governmental officials or staffs of ocean-related organisations, non-governmental organisations, and fishermen. The number of interviewed ocean-related people was expected to be over thirty. Questionnaire questions would concentrate on the relationship and interactions between marine policy and marine environmental management, problems and misunderstanding within marine affairs organisations, and institutional development. These questions would corroborate the fact that problems and misunderstandings exist in the context of control and management of marine policy and marine environment, as well as provide more information on the situation. Each interview was not expected to exceed an hour, and all interviews digitally recorded and transcribed. Because the advantages of focused interviews are based on interviewees' openness and freedom to speak, the researcher has to cautiously 'guide' respondents rather than allow them to provide irrelevant information (Sarantakos, 2001). Moreover, in focused interviews, the researcher must not lead respondents nor give hints towards proposed answers (Yin, 1994); nor must the researcher restrict respondents (Sarantakos, 2001).

The researcher hoped that data generated at this stage would lay the foundation for the next stage. The data would be examined for corroboration of the researcher's thoughts on the situation, respondent's ability to answer the research questions, and identification of questions and issues raised by respondents. The researcher might be confronted with difficulties in continuing the research at this stage, and might have to reconsider the research aims, objectives, and questions, and make adjustments where necessary. The achievements at this stage would guide the researcher towards the next stage.

3.7 DATA ANALYSIS

The following outlines methods employed to analyse the data obtained from the case studies, relevant documentation, questionnaire survey, and interviews.

Yin (2003) called for a general analytic strategy to analyse case study evidence. He argues that *'the strategy will help [the researcher] to treat the evidence fairly, produce compelling analytic conclusions, and rule out alternative interpretations. The strategy also will help [the researcher] to use tools and make manipulations more effectively and efficiently'* (Yin, 2003: 111). This research utilised the strategy of relying on theoretical propositions because the original objectives and design of the case study were based on propositions which, in turn, produced a set of research questions stemming from a review of the literature to produce new propositions (Yin, 2003). The research accordingly employed a 'Framework' as a method of data analysis, developed in the context of conducting applied qualitative research by a unit based within the National Centre for Social Research (formerly named Social and Community Planning Research) (Ritchie and Spencer, 1994). A 'Framework' *'involves a systematic process of sifting, charting and sorting material according to key issues and themes'* (Ritchie and Spencer, 1994: 177). This would be particularly useful for this research because of the nature of the qualitative materials obtained from the field. Moreover, its strength is that *'by following a well-defined procedure, it is possible to reconsider and rework ideas precisely because the analytical process has been documented and is therefore accessible'* (Ritchie and Spencer, 1994: 177). Such a systematic procedure to analyse data also enhances the quality of the analysis. There are five key stages to qualitative data analysis involved in the 'Framework': familiarisation; identifying a thematic framework; indexing; charting; and mapping and interpretation. Each is discussed in turn below.

Stage 1. Familiarisation

The main purpose of this stage is for the researcher to become familiar with the data collected. This can be done through reading documents and transcripts, and listening to interview records. Although these processes are often time-consuming, they are essential, particularly in the situation where data collection is performed by a team. Moreover, if time is limited, the researcher has to select specific materials according to different categories. However, in this research, time was not a problem; firstly, because the researcher would collect the data by himself, and, secondly, time constraints were not a problem since the researcher could vary his schedule. Through familiarisation, the researcher obtained a comprehensive overview of the data.

Stage 2. Identifying a thematic framework

‘During the familiarisation stage, the [researcher] is ... beginning the process of abstraction and conceptualisation’ (Ritchie and Spencer, 1994: 179). Here the researcher takes notes and records responses to research questions, and jots down recurrent themes and issues important to respondents. Using these notes, the researcher is able to *‘identify the key issues, concepts and themes according to which the data can be examined and referenced’* (Ritchie and Spencer, 1994: 179). Such sifting and sorting of data results in classifying issues according to their sources and their degree of essentiality and significance to the research. However, the researcher has to be cautious and careful in judging issues in terms of their essentiality and significance to the research – in some cases, failure in judgment results in failures in the research.

Stage 3. Indexing

“*Indexing* refers to the process whereby the thematic framework is systematically applied to the data in its textual form” (Ritchie and Spencer, 1994: 180). Indexing is mainly applied to transcriptions of interviews. Implementing ‘indexing’ requires the researcher to review all data and annotate according to the thematic framework. Accordingly, the researcher ‘*must infer and decide on meaning, both as it stands and in the context of the interview as a whole, and must record the appropriate indexing reference*’ (Ritchie and Spencer, 1994: 182). However, such work is highly subjective and may lead to different interpretations of data. Nevertheless, ‘*by adopting a system of annotating the textual data, the process [will be] made visible and accessible to others*’ (Ritchie and Spencer, 1994: 182), which means others will be able to follow the researcher’s intention of organising data and test his approach. The researcher will also have an opportunity to check out the approach.

Stage 4. Charting

This is a stage in which the data is categorised and presented. Charting refers to the process of lifting data from their original context and rearranging them according to the appropriate thematic reference (Ritchie and Spencer, 1994). The researcher adopts a thematic approach to lay out the charts. ‘*Charts are [therefore] drawn up for each key subject area, and entries made for several respondents on each chart*’ (Ritchie and Spencer, 1994: 183). The passages contained in the charts have to be studied and abstractly presented, with references to the original context.

Stage 5. Mapping and Interpretation

In this stage, the researcher ‘*review[s] the charts and research notes; compare[s] and contrast[s] the perceptions, accounts, or experiences; search[es] for patterns and*

connections and seek[s] explanations for these internally within the data' (Ritchie and Spencer, 1994: 186). Ritchie and Spencer (1994) identified several key objectives and features of qualitative analysis, namely: defining concepts; mapping the range and nature of phenomena; creating typologies; finding associations; providing explanations; and developing strategies. These are not the whole range of the objectives and features of qualitative analysis. Due to the flexibility of the 'Framework', the researcher can use other qualitative data analysis methods, provided they accord with the data available and research questions asked. Accordingly, the researcher will determine the choice of data analysis methods as soon as the data have been collected.

3.8 CONCLUSION

The first section of this chapter delivered a brief discussion of the mainstream ideologies that are used as research principles, which is a qualitative case study research design. This chapter also presents various themes connected with the empirical approach adopted for this study. These themes include research strategy and methods, research design, management elements and assessment, data collection and management, and data analysis.

In this study, the researcher adopted inductive strategies and qualitative methodology as the research design. Four themes and three research domains were chosen from the literature reviews and field work in Taiwan. These also related to my questionnaire survey and semi-structure interview. According to the research themes and domains for investigating the relation between marine policy and marine environmental management in Taiwan, the researcher discussed management elements through the field of public policy and public management. Then, the researcher identified issues,

factors, obstacles, and improvements as the management assessment tools for justifying the research themes. The more details will discuss in Chapter 8. The researcher used questionnaire survey and qualitative research (in-depth interviews) for complementary methods of data collection and management. Finally, the research accordingly employed a framework as a method of data analysis. There are five key stages involved in the 'Framework': familiarisation; identifying a thematic framework; indexing; charting; and mapping and interpretation.

The data collected from the questionnaire surveys and semi-structure interview will be analysed and discussed to answer the research questions from Chapters 4 to 8.

There are several limitations in this research.

(1) Limitation of interviewees

According to personal experience and the topic of this research, all interviewees in this research are chosen from Taiwan.

(2) Limitation of research methods

According to the feature of the research, this research tried to adopt qualitative research method to obtain relative data

(3) Limitation of research target

The aim of this research is to conduct a study of relationships between marina policy and marine environment management. Therefore, the research targets were focus on public sector and some other organisation better than private companies.

CHAPTER 4

TAIWAN MARINE POLICY AND ENVIRONMENTAL MANAGEMENT

4.1 INTRODUCTION

Taiwan is a densely populated island with little flat land. Due to the scarcity and high value of available land, the marine environment appears to offer potential sites to meet the various needs of future development and to attract both public and private developers. However, the marine environment in Taiwan has not been well planned and used, which has resulted in several problems, such as loss of the natural coastline, destruction of natural habitats, and a decline in marine biodiversity. The marine environment in Taiwan is under heavy pressure from rapid development and incompatible uses, thus Taiwan's government has devoted considerable effort to improving marine environmental management. However, several problems remain to be resolved. This chapter describes the background to and evolution of marine policy and marine environmental management in Taiwan. Ocean-related organisations, legislation, human resources, and technical management and sustainable development are also reviewed to understand the existing circumstances in the country. The performance of marine policy and marine environmental management in Taiwan and related problems are analysed via a questionnaire to identify the main issues, facts, obstacles, and improvements.

4.2 DEVELOPMENT OF SEA USES

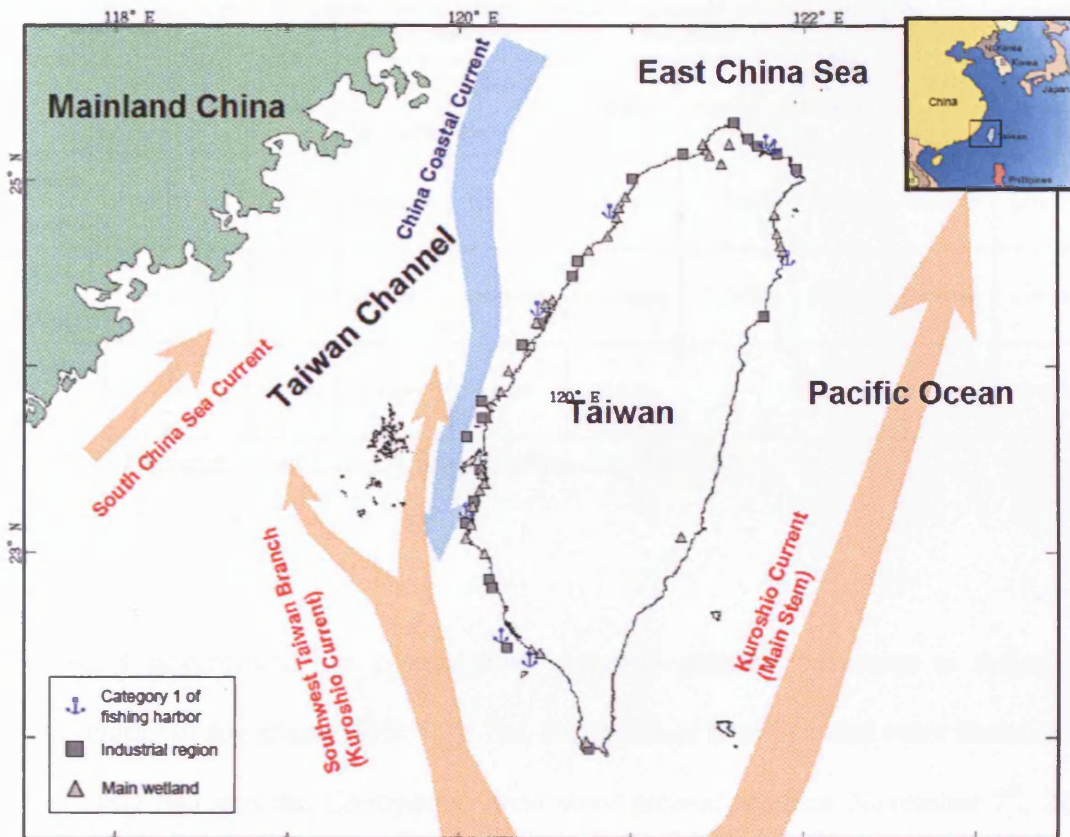
Most of the administrative jurisdictions of Taiwan have coastal and marine dimensions that encompass tremendous geographical and environmental diversity, and support substantial social and economic wealth. Just like other advanced industrial countries, Taiwan is also facing the problem of exploitation of its marine areas, and pollution by waste and waste water. The marine environment around

Taiwan is getting worse (Chiau, 1998). Taiwan's situation with regard to its marine geography and maritime claims, and sea uses are discussed in the following sections.

4.2.1 Marine geography and maritime claims

Taiwan is an island surrounded by sea: the Pacific Ocean to the east, the East China Sea to the North, the Taiwan Strait which separates Taiwan and China, and the South China Sea to the south-west of the island (Figure 4.1). Taiwan is located between 119° and 124° longitude in the east and between 21° and 25° latitude in the north (Table 4.1). Areas under the government of Taiwan's jurisdiction include the main island of Taiwan and the smaller islands of Penghu, Kinmen, Mtsu and Pratas Islands, the Itu Aba Island of the Spratly Islands, and coastal islands of Taiwan. Taiwan's coastline is 1,139.2 kilometres in length or 1,566.3 kilometres if including the coastline of remote islands. It's total land area is 35,879.3 square kilometres, or 36,006.1 square kilometres if including the land area of remote islands (Table 4.2).

Figure 4.1 The geography of Taiwan's coast



Source: Researcher's own work

Table 4.1 Taiwan's geographic location

Locality	Longitude		Latitude	
	Aspect	Apex	Aspect	Apex
Taiwan	Eastern Point	124° 34' 09"	Southern Point	21° 45' 18"
District	Western Point	119° 18' 03"	Northern Point	25° 56' 21"
Taiwan	Eastern Point	121° 59' 15"	Southern Point	21° 53' 50"
Proper	Western Point	120° 01' 00"	Northern Point	25° 18' 20"
Penghu	Eastern Point	119° 42' 54"	Southern Point	23° 09' 40"
Islands	Western Point	119° 18' 03"	Northern Point	23° 45' 41"

Source: Department of Land Administration, Ministry of the Interior (MOI) (2004)

Note: At flood tide

Table 4.2 Area and length of Taiwan's coastline

Locality	Number of Islands			Area (square kilometres)					Length of Coast (kilometres)		
	Total	Taiwan Proper	Offshore Islands	Total		Taiwan Proper		Offshore Islands	Total	Taiwan Proper	Offshore Islands
				Include Reclamation	Exclude Reclamation	Origin	Reclamation				
Taiwan District	87	2	85	36,006.1794	35,967.3310	35,829.9034	38,8484	137.4276	1,566.3389	1,253.7574	312.5816
Taiwan Proper	23	1	22	35,879.3153	35,840.4669	35,765.6646	38,8484	74.8023	1,239.575]6	1,139.2483	100.3273
Penghu Islands	64	1	63	126.8641	126.8461	64.2388	-	62.6253	326.7634	114.5091	212.2544

Source: Department of Land Administration, MOI (2004)

Note: At flood tide.

Taiwan's government has promulgated several legislative measures to define the sovereignty of sea areas (Table 4.3). The first batch of baselines and outer limits of the Territorial Sea and the Contiguous Zone were promulgated on November 7th, 2003 (Figure 4.2) including those of Taiwan and affiliated islands (delimited by a combination of 18 straight baselines and 4 normal baselines), the Pratas Islands (Dongsha) (delimited by a combination of 2 straight baselines and 2 normal baselines), and the Macclesfield Bank (Chungsha) (delimited by a normal baseline). The Diaoyutai Islands (delimited by a normal baseline) are also within the scope of the first batch of promulgated baselines. As for the Spratly Islands, their baselines have been announced in written words. The baselines of the Paracel Islands (Hsisha), Kinmen and Machu have not been promulgated (RDEC, 2006). There is no marine space wider than 400nm between Taiwan and neighbouring countries (e.g. China, Japan, and Vietnam). Accordingly, Taiwan's government has to negotiate with neighbouring countries about the delimitation of EEZ. Delimitation of sea area is always an international issue. It is impossible to solve problems of delimitation by

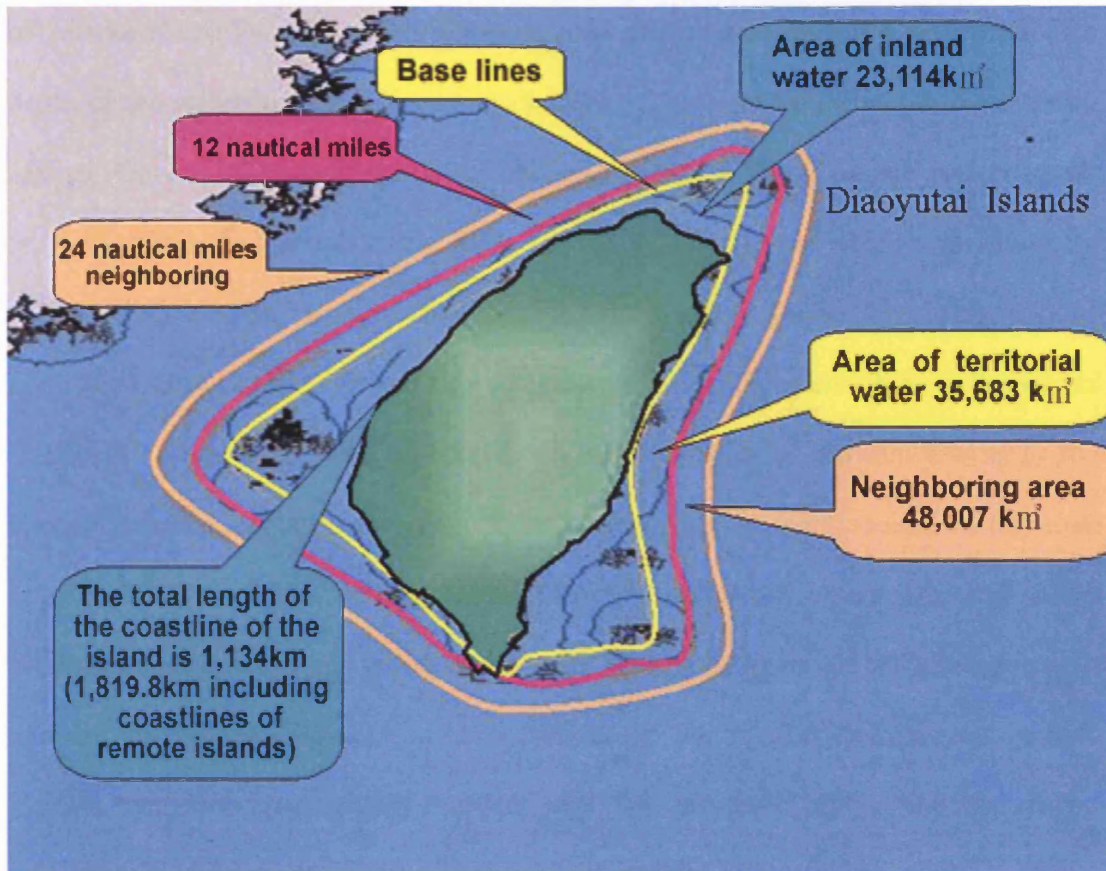
domestic laws alone. Taiwan depends on international laws to ensure validity of delimitation with neighbouring countries. However, it is difficult to solve the problem of delimitation with China because of the difficult political situation which exists between Taiwan and this neighbouring country.

Table 4.3 Legislative measures for defining sovereignty of sea areas

Type	Date	Limits	Source	Notes
Archipelagic, straight baselines, and historic claims	Jan 1998		<i>Law on the Territorial Sea and the Contiguous Zone of the Republic of China</i>	Establishes straight baseline claims.
Territorial Sea	Oct 1979	12 nm	Presidential Decree	
	Jan 1998	12 nm	<i>Law on the Territorial Sea and the Contiguous Zone of the Republic of China</i>	Notice required for foreign military or government vessels prior to passage through the territorial seas.
Contiguous Zone	Jan 1998	24 nm	<i>Law on the Territorial Sea and the Contiguous Zone of the Republic of China</i>	
Continental Shelf	Oct 1970			Became party to the 1958 Convention on the continental Shelf (with reservation relating to role of islets in determining natural prolongation)
	Jul 1974			Enforcement Regulations for Petroleum Offshore Areas
	Jan 1998		<i>Law on the Exclusive Economic Zone and the Continental Shelf of the Republic of China</i>	Limited to 350nm from the baseline or 100nm from the 2,500 metre isobath
EEZ/Fishing Zone	Oct 1979	200 nm	Presidential Decree	EEZ: 'such jurisdictions the exercise of which is recognised by international law.'
	Jan 1998	200 nm	<i>Law on the Exclusive Economic Zone and the Continental Shelf of the Republic of China</i>	EEZ
	1999	12 nm		Fisheries Zone

Source: Adapted by the author from Asia-Pacific Economic Cooperation (2004)

Figure 4.2 The baseline and outer limits of the Territorial Sea and the Contiguous Zone



Source: Adapted by the researcher from Coast Guard Administration website (CGA, 2004a)

4.2.2 Sea uses

Geographically, Taiwan is an island, and there are, in total, 85 offshore islands within the district of Taiwan. Territorial sea under the jurisdictional administration of Taiwan's government is approximately 170,000 square kilometres, 4.72 times the size of Taiwan's land area (RDEC, 2006). The existence and development of the territorial area rely on the ocean because of the wide Continental Shelf, complex ocean environment, diverse coastal terrain and ecological system (Hu, 1997; RDEC, 2006). Taiwan is located between the tropics and subtropics. To the west of Taiwan is a

Continental Shelf, whose average depth is 60 metres. Along the western coast are beaches, sand dunes, lagoons, estuaries, wetlands and extensive tidelands. To the east of Taiwan is the Pacific Ocean, whose seabed and ocean trench are very deep. The depth of the water from the coast to a distance of six nautical miles can reach 3,000 metres. Gravel beaches, rocks, bays and cliffs can be found on the eastern coast (RDEC, 2006). To the east of the island is the Pacific Ocean, which contains many different fish species. The Kuroshio Current passes eastern Taiwan, and brings a lot of fish. The China Coastal Current flows southward from Mainland China in the winter (Figure 4.1). There are several upwellings on both sides of Taiwan. Owing to the clement climate and special marine environment, natural reefs abound in the area, making it an excellent fishing environment. Consequently, there are over 2,000 economic fish species and bio-species make up one-tenth of global bio-species. In addition to fishery resources, other activities in the marine environment include marine transportation, marine tourism, and the extraction of marine living and non-living resources.

Currently, the population of Taiwan is more than 23 million people. With an area of only 36,000 square kilometres and more than two-thirds of the island covered by rugged mountains, the population density of Taiwan was 632 people per square kilometre in 2005, the population in the coastal zone was 4.4 million (MOI, 2005). Due to the scarcity and high value of available land, the coastal zone offers potential sites to meet various development needs and has attracted the interest of both public and private developers (Chiau, 2006). The building of jetties along the coast has resulted in the loss of 50% of the natural coastline, and tideland reclamation and construction projects in the coastal zone have also destroyed the habitats of many coastal species. In addition, the extraction of marine resources has proceeded

unabated and without restriction, and overfishing has led to a substantial decline in fishery resources. Waste and pollutants are discharged or discarded in the sea, contributing to pollution of the marine environment. At the same time, various marine recreational and leisure activities are disturbing and destroying marine species and their habitats (NCSD, 2007).

Although Taiwan's wetlands are widely distributed and vary in their type and location, most are located in the south-western part of the island along the coastline. The 16 main wetlands cover altogether 11,896 hectares. If seacoast areas or filled lakes are also included, the acreage of wetlands in Taiwan is 65,000. Wetlands are, however, affected by warm water emission from desalination plants, the dumping of garbage, waste accumulation, industrial pollution, seacoast development. According to an investigation carried out in 1983 by the Environment Protection Bureau of Taiwan, of the 294 landfill sites used for dumping garbage, 178 were wetlands, comprising 60% of total landfill sites. In recent years, the government has developed many seacoast wetlands, including the Hsinchu Hisangsan seacoast wetlands, to create the Changhua Coastal Industrial Area, Mailiaoli Island Industrial Area, Sanding Island Transportation Centre, Qigubin South Industrial Area, and Tainan Science and Technology Industrial Area, such that the ecological system of wetlands along the sea is facing serious threats (Chiau, 2000).

Further, areas to the north and south of Taiwan as well as close to Phenhu, Liugiu, Lu Tao, and Lan Yu Islands provide habitats for more than 300 types of coral and 1200 types of fish. However, due to pollution, warm water emission from desalination plants and climate change in recent years, many corals have stopped growing or even died. As a result of the destruction of wetlands and coral reefs, there has been a sharp

decline in fishery resources along the coastline.

The marine environment in Taiwan is under heavy pressure from rapid development and diverse uses, thus the central government has begun to devote much time and effort to improving marine environmental management practice. However, problems still remain: for example, there is no agency specifically established to oversee marine environmental management practice, *the Coastal Act* has as yet not been promulgated, an integrated management practice mechanism and fully qualified management personnel are lacking, and information pertaining to the marine environment is limited. In order to balance environmental protection and socio-economic development needs, there is an urgent need to strengthen marine environmental management practice in Taiwan.

4.3 EVOLUTION OF MARINE POLICY AND ENVIRONMENTAL MANAGEMENT

Evolution of marine environmental management in Taiwan has changed from marine control (restricting access to the coast) and marine use (highlighting land development but ignoring marine development), to marine protection (coastal protection) (The Marine Affairs Promotion Committee, 2004b). In order to manage the marine environment well, it is necessary to understand how marine policy and marine environmental management practice have evolved from their inception to the present day, and to identify those obstacles which hinder their further development in Taiwan.

4.3.1 Evolution

The people of Taiwan had restricted access to coastal areas in the *Martial Law* Period (1949-1987). During this period, central government managed and planned the coastal

zone and local government played little or no role in this. Tideland reclamation and industrial development were the main issues of concern at this time. However, towards the end of the period (1983-1987), protection of the marine environment became an increasingly important issue, and several protected areas were established and the Executive Yuan drew up *Environmental Protection Policy Guidelines* in 1987. The *Wildlife Conservation Act* was subsequently promulgated and *the Coastal Act* (in draft form) was drawn up in 1989.

Accompanying growing awakening of the need to protect the marine environment in the latter period of *Martial Law* imposition was increasing recognition of the importance of effective marine environmental management. Several large industrial parks and extensive developments had been planned in the coastal zone between 1990 and 1993, for example, the Changhua Coastal Industrial Park. In the wake of coastal development came pollution and destruction of the coastal zone, for example, pollution at Chungkung estuary.

In order to protect the marine environment and due to growing international recognition of the importance of conserving marine resources, several important *Acts*, regulations and plans were promulgated or drawn up, for example, *the Environmental Impact Assessment Act*, *the Coast Guard Act*, *the Marine Pollution Control Act (MPCA)*, *the Natural Environmental Programme for Protecting the Coastal Zone*, and *Marine Environment Pollution Cleanup and Disposal Regulations* (The Control Yuan, 2004). The CGA was established to enforce protection of the marine environment in 2000 and the Government Reorganisation Committee advocated establishing the Ministry of Marine Affairs to address marine management in 2002 (Table 4.4) (Chiau, 2005).

Table 4.4 Timeline of key marine policy and marine environmental management events in Taiwan

Year	Important events
1956	<ul style="list-style-type: none"> ■ The former Taiwan Provincial Government published the <i>Regulation of Coastal Reclaimed Land in Taiwan Province</i>.
1958	<ul style="list-style-type: none"> ■ The <i>Convention on the Territorial Sea and Contiguous Zone Law</i> was ratified. ■ The <i>Convention on the High Sea</i> was ratified.
1963	<ul style="list-style-type: none"> ■ The former Taiwan Provincial Government took over the <i>Commission for Planning and Development of Tideland Reclamation</i>.
1965	<ul style="list-style-type: none"> ■ The former Taiwan Provincial Government combined the <i>Commission for Planning and Development of Coastal Reclaimed Land</i> and the <i>Commission for Planning and Development of Eastern Taiwan</i> into the <i>Commission for Development of Land Resources in Taiwan</i>.
1970	<ul style="list-style-type: none"> ■ The Ministry of Economic Affairs strove to establish <i>Anping Industry Park</i>. ■ The Oceanic Oil and Mineral Resources Search and Exploitation Regulation was promulgated.
1976	<ul style="list-style-type: none"> ■ The former Taiwan Provincial Government deactivated the <i>Commission for Development of Land Resources in Taiwan</i>. The exploitation of tidal lands came under the administration of the former Provincial Water Resources Agency. The Steering Group of Tidal Lands Exploitation was established and the Taiwan Tidal Lands Exploitation Regulation was stipulated.
1983	<ul style="list-style-type: none"> ■ The Executive Yuan published the <i>Regulation of Development and Management of Tideland Reclamation</i>. ■ The Taipei City Government decided to establish the <i>Guandu Natural Protected Area</i> to protect mangroves.
1984	<ul style="list-style-type: none"> ■ <i>Kenting National Park</i> was established. ■ The Executive Yuan ratified and implemented the <i>Natural Protection Plan of the Coastal Zone in Taiwan</i>. ■ The <i>Northeast Coast National Scenic Area Administration</i> was established. ■ The Executive Yuan published the <i>Taiwan Natural Environment Protection Solution</i>.
1987	<ul style="list-style-type: none"> ■ <i>Martial law</i> ended and the people of Taiwan had open access to coastal zones. ■ The Executive Yuan drew up the <i>Environmental Protection Policy Guidelines</i>. ■ The Executive Yuan ratified the second part of the <i>Natural Protection Plan of the Coastal Zone in Taiwan</i>. ■ Heavy metal pollution resulting from burning waste wires in the Erhjen estuary of South Taiwan destroyed all cultured oyster fields.
1988	<ul style="list-style-type: none"> ■ The <i>East Coast National Scenic Area Administration</i> was established.
1989	<ul style="list-style-type: none"> ■ The Council for Economic Planning and Development completed the <i>Study on Coastal Land in Taiwan</i>. ■ The <i>Wildlife Conservation Act</i> was promulgated.
1990	<ul style="list-style-type: none"> ■ The Ministry of the Interior drew up the <i>Coastal Law</i> (draft). ■ The Government of Kaohsiung carried out the 1st phase of the South Star Plan.
1991	<ul style="list-style-type: none"> ■ The Ministry of Economic Affairs strove to establish <i>Chang Hua Coastal Industry Park</i>.
1992	<ul style="list-style-type: none"> ■ The former provincial government promoted the Taiwan Tidal Lands Exploitation Promotion Plan. ■ The former provincial government prepared the Tidal Lands Exploitation Plan for Hsian-shan, Hsinchu.
1993	<ul style="list-style-type: none"> ■ The New Urban Development Plan of Danshuei was carried out by the Construction and Planning Administration, Ministry of the Interior.
1994	<ul style="list-style-type: none"> ■ Wushipi Coastal Nature Reserve and Kenting Uplifted Coral Reef Nature Reserve were established by the Council of Agriculture, Executive Yuan. ■ The Ministry of the Interior drew up the 2nd version of the <i>Coastal Law</i> (draft). ■ Pollution at Chungkung estuary ■ The <i>Environmental Impact Evaluation Act</i> was published.

1995	<ul style="list-style-type: none"> ■ The Ministry of the Interior published <i>Research on the Bylaws of the Coastal Law</i>.
1996	<ul style="list-style-type: none"> ■ The Directorate General of Highways, MOTC, constructed the 11th Road which affected the coastal landscape and resulted in dispute.
1997	<ul style="list-style-type: none"> ■ The Executive Yuan delivered the <i>Coastal Law</i> (draft) to the Legislative Yuan.
1998	<ul style="list-style-type: none"> ■ The Legislative Yuan passed the <i>Territorial Sea and Contiguous Zone Law of the Republic of China</i> and the <i>Exclusive Economic Zone and Continental Shelf Law of the Republic of China</i>. ■ The Executive Yuan published the <i>National Environmental Protection Plan</i>. ■ Regulation for foreign vessels passing through the territorial sea of ROC was promulgated.
1999	<ul style="list-style-type: none"> ■ <i>Regulations for sea wall management in Taiwan Province</i> was published by the former Taiwan Provincial Government. ■ The Ministry of the Interior drew up the <i>Coastal Management Plan in the Taiwan Area</i> (draft).
2000	<ul style="list-style-type: none"> ■ The Legislative Yuan passed the <i>Coast Guard Act</i>. ■ The Executive Yuan reviewed the <i>Coastal Law</i> (draft) revised version and delivered it to the Legislative Yuan. ■ The Coast Guard Administration, Executive Yuan, was established. ■ The Executive Yuan published the <i>Isolated Islands Construction Act</i>. ■ The <i>Marine Pollution Control Act</i> was promulgated. ■ Regulation for constructing, using, altering and dismantling artificial island facilities and structures in the Exclusive Economic Zones or Continental Shelves of the ROC was released. ■ The <i>Regulation Governing Permission to Undertake Marine Scientific Research in Exclusive Economic Zones and the Continental Shelf of the Republic of China</i> was published. ■ Regulations for Coordination & Liaison between the Coast Guard Administration, Executive Yuan and Police and Fire Departments were published. ■ <i>Guidelines for the National Sustainable Development Strategy of Taiwan, ROC</i> was passed.
2001	<ul style="list-style-type: none"> ■ The <i>Marine White Book</i> was published by the Research, Development, and Evaluation Commission, Executive Yuan. ■ The <i>Amorgos oil spill accident</i> occurred. ■ The Environmental Protection Administration published the <i>Standard for Marine Environmental Classification and Quality</i>. ■ The <i>Procedure for Coordination & Liaison between the Coast Guard Administration, Executive Yuan and Ministry of Transportation and Communications</i> was published. ■ <i>Regulations for Coordination & Liaison between the Coast Guard Administration, Executive Yuan and Ministry of National Defence</i> were published. ■ The <i>Procedure for Coordination & Liaison between the Coast Guard Administration, Executive Yuan and Ministry of Finance</i> was published. ■ The <i>Procedure for Coordination & Liaison between the Coast Guard Administration, Executive Yuan and Environmental Protection Organisations</i> was published.
2002	<ul style="list-style-type: none"> ■ The Commission to Reorganise Government (Government Reform Commission, Office of the President) passed the reorganisation programme to the Executive Yuan, which suggested the Ministry of Marine Affairs should be established. ■ The Ministry of the Interior implemented the <i>Natural Protection Plan of the Coastal Zone in Taiwan</i>. ■ The Executive Yuan again reviewed the <i>Coastal ACT</i> (draft) revised version which was subsequently published. ■ Formulated the <i>Procedure of Coordination & Liaison between Coast Guard Administration and Council of Agriculture</i> was formulated. ■ The <i>Marine Environment Pollution Cleanup and Disposal Regulations</i> were published. ■ The <i>Management Plan for Coastal Reclaimed Land in Industrial Parks</i> was published. ■ The <i>Cultural Heritage Preservation Act</i> was published. ■ The <i>Environmental Basic Act</i> was published.

2003	<ul style="list-style-type: none"> ■ The <i>Act for the Establishment and Management of Free Ports</i> was established.
2004	<ul style="list-style-type: none"> ■ The Marine Affairs Promotion Committee was established. ■ <i>National Oceans Policy Guidelines</i> were passed.
2005	<ul style="list-style-type: none"> ■ The <i>National Land Recovery Strategies and Action Plan</i> was promulgated.
2006	<ul style="list-style-type: none"> ■ The <i>Ocean Policy White Paper</i> was published. ■ <i>Integrated Development Strategies for Sustainable Coastal Development</i> were promulgated. ■ The <i>National Land Recovery Strategies and Action Plan</i> was revised.

Source: Researcher's own work

Marine policies have been substantially developed in recent years. *Guidelines for the National Sustainable Development Strategy of Taiwan* and the *Marine White Book* were drawn up in 2001. Their goals are: (1) to develop coastal zone management practice; (2) to plan the use of the whole coastal zone; (3) to draw up plans to protect and conserve the coastal zone; (4) to set up an institution with responsibility for issuing permits to develop the coastal zone; (5) to establish the GIS and a system for monitoring the coastal zone environment; (6) to emphasise the importance of mitigating disaster and environmental impact; and (7) to encourage public participation and develop public awareness by introducing educational programmes focusing on sustainable development in the marine environment (NCSD, 2001a; RDEC, 2006). The Marine Affairs Promotion Committee approved the *National Oceans Policy Guidelines* in 2004 and established six groups to improve marine environmental management practice and oversee the following: marine strategy, safety of the marine area, scientific research of the sea, marine industries, marine culture, and marine resources (The Marine Affairs Promotion Committee, 2004a and 2004b). The Construction and Planning Agency of the MOI promulgated *Integrated Development Strategies for Sustainable Coastal Development* to respond to the delay in *the Coastal Act's* enactment; to prevent further loss of the natural coastline; to reduce coastal engineering installations and their negative impact on the environment; to promote sustainable coastal zone development; and to restore the coastline's

original landscape. Further, to achieve sustainable coastal zone development, development strategies have focused on fishing ports, the coastal road, jetties, marine tourism, tideland reclamation, and coastline investigations. An annual budget of \$NT 3.2 billion¹ has been assigned for a five year period.

The Executive Yuan has promulgated a *Plan for Sustainable Development on the Coastline*, which contains main guiding principles for all public sector tiers when proposing and assessing land use of all kinds in the coastal area in order to preserve the coastal ecosystem, reduce damage to the natural environment, and promote ecological restoration. The *Plan* also clearly defines the characteristics of two types of coastline: natural and artificial. There is a short-term strategy: ‘zero damage to the natural coastline’, and a long-term strategy: ‘sustainable coastline action’. Moreover, the *Plan* is in accordance with *the National Land Recovery Strategies and Action Plan* promulgated by the Executive Yuan in 2006. Intended aims are to actively restore the ecological environment of the coastal zone, halt serious stratum sinking areas, promote sustainable development of natural resources, effectively manage the coastline, address the problem of subsidence, protect the natural environment of offshore islands, reduce the occurrence of natural disasters, limit the damage caused by natural disasters, and reduce the damage to human life and property.

Due to Taiwan’s geography, traditional lifestyle, and historic factors, the marine affairs of Taiwan were initially related to fisheries. The marine administrative system in Taiwan can be divided into four periods, which have been influenced by the historic background at that time:

¹ 50 New Taiwan dollars = 1 pound in sterling

(1) Period of fishery administration as top priority (1895 -1986)

During this period, the marine administrative system of Taiwan was focused on the exploitation and utilisation of fishery resources and was driven by fishery economics. Fishery administration included preparation of fishery policies, rules, production and technical blueprints; planning and directing aquaculture, far sea fisheries and offshore fisheries; planning and supervision of fishing ports, aquatic products industry, piscatorial pollution and cooperation; guidelines for the fishing population; the marketing of aquatic products; fisheries' popularisation; and education of and benefits for fishermen. This period can be further divided into two phases:

(1.1) Fishery administration under Japanese governance (1895 - 1944)

After the occupation of Taiwan by Japan in 1895, there was a fishery-related department in charge of Taiwan's fisheries industry. During this period, the main marine policy focus was fishery administration. At the same time, responsibilities for marine policy administration were spread among several related units through horizontal work division.

(1.2) Fishery administration under the governance of Taiwan (1945 - 1986)

After the Japanese Colonial Administration handed over the full governing authority of Taiwan to the Kuomintang Military Administration in 1945, a fishery administration system was developed on the basis of what the Japanese had formerly established. It was further improved according to global trends and social variances. During this period, responsibilities of the fishery administration system were assigned to agriculture administration units under the Executive Yuan, with unilateral top-down vertical integration. Although responsibilities were spread around several units and authority was divided horizontally, fishery administration was still at the core of

marine affairs.

(2) Period of protection of the environment as top priority (1987 - 2000)

During this period, awareness of the importance of protecting the environment began to grow and increase. For this reason, the Environmental Protection Administration (EPA) was established under the Executive Yuan in 1987. Further, Article 4 of the *MPCA* published on November 1, 2000, stated that the competent authority referred to in this *Act* means the EPA, at the central government level, the municipal government in special municipalities and the county or city government in counties or cities. During this period, Taiwan's government began to pay increasing attention to the marine environment and ecosystem protection as well as fishery administration. However, operations relating to marine affairs were still spread among different departments during this time.

(3) Period of marine enforcement as top priority (2000 - 2001)

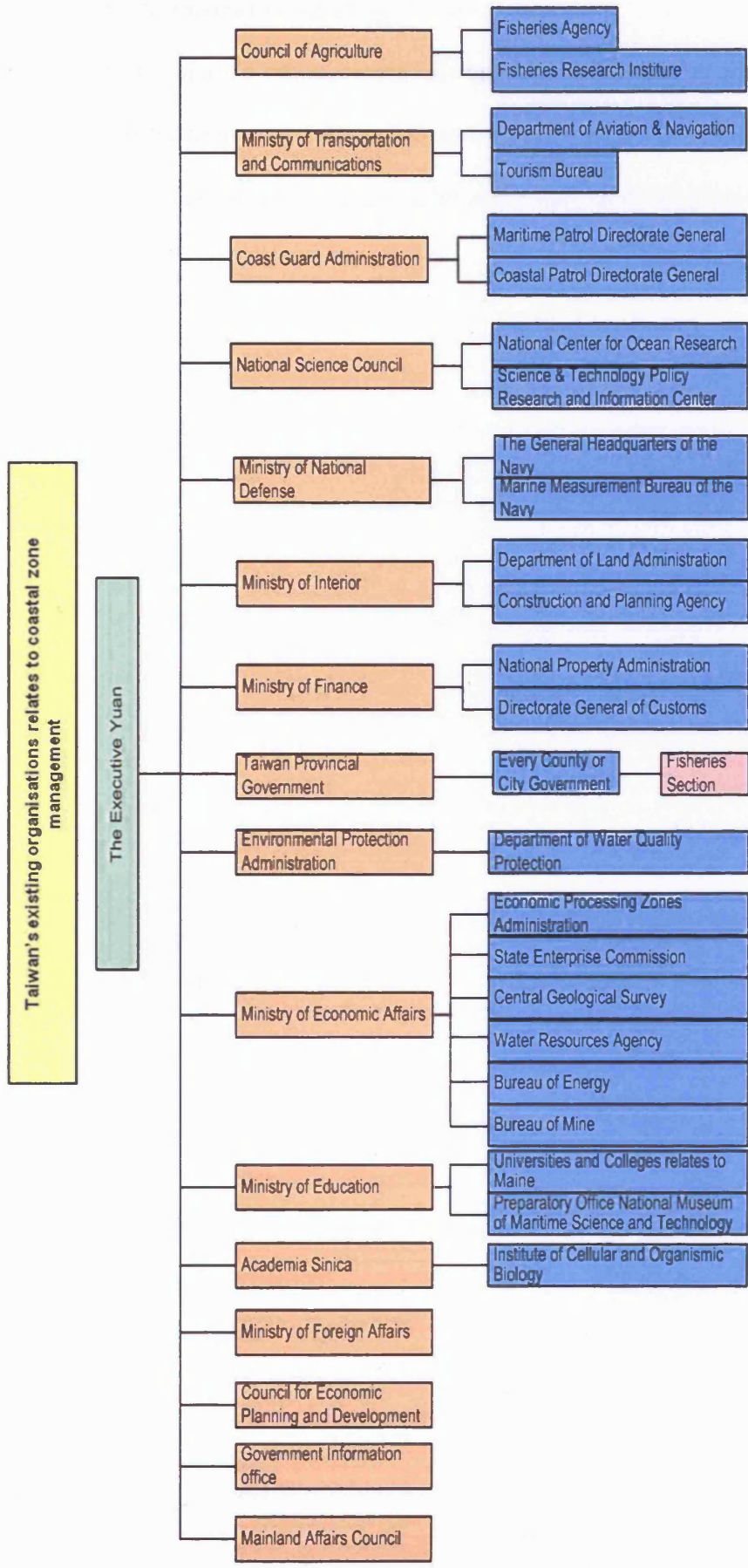
The coastal defence of Taiwan was at this time in the charge of the MOI, Ministry of National Defence (MND), and Ministry of Finance (MOF). However, conflicts arose as a result of responsibilities being assigned to the different administrative authorities. To improve this situation, the National Security Committee proposed the foundation of the Coast Guard Special Unit on March 18, 1999. After lengthy discussions in the Executive Yuan, a committee was set up to begin planning of the integration of marine affairs relating to this unit. On January 28, 2000, the CGA was formally established under the jurisdiction of the Coast Guard Headquarters of the MND. The CGA consisting of maritime policemen and military corps and coast guard personnel from the Directorate General of Customs under the MOF was founded to cover coast guarding and marine enforcement on the sea and to protect national and public

security. During this period, marine policy related affairs were still spread among different departments. Only the marine affairs administration system paid attention to marine law enforcement.

(4) Period of discussion relating to the establishment of one organisation responsible for marine affairs (2002 - present)

Responsibilities for marine affairs are dispersed among a number of central government agencies (Figure 4.3). In recent years, several marine matters, for example, the negotiation of gill net utilisation in the North Pacific with the US and incidents such as smuggling, illegal immigration, and piracy, have attracted the public's attention.

Figure 4.3 Taiwan's existing organisations relating to marine affairs



Source: Researcher's own work

4.3.2 Present administrative and legal basis

With regard to the marine management system, responsibilities for marine affairs in Taiwan are distributed among different ocean-related organisations. Each organisation manages marine affairs according to its rights and responsibilities (Table 4.5).

Table 4.5 Existing organisations and their rights and responsibilities for marine affairs

Organisations	Rights and Responsibilities for marine affairs
1. Council of Agriculture (1) Fisheries Agency (2) Forestry Department	(1) in charge of the protection and administration of fisheries' resources, guarding and picketing of fisheries, dissension management, foreign affairs in oceanic fisheries, and assisting in pollution prevention (2) is responsible for wild life protection
2. Coast Guard Administration (1) Maritime Patrol Directorate General (2) Coastal Patrol Directorate General	(1) (2) are responsible for policing the sea area and coast, protecting the utilisation of resources, ensuring national security
3. Environmental Protection Administration	is responsible for overall environmental management and marine pollution prevention.
4. Ministry of Transportation and Communications (1) Department of Navigation and Aviation (2) Tourism Bureau	(1) in charge of policy making with regard to marine transport and ports, development and administration of marine transport, development and administration of ports, promoting and executing international co-operation between marine transport and ports, administration of inoffensive foreign watercraft passing through the territorial sea of Taiwan, marine disaster rescue, administration of foreign watercraft anchoring within the territory of Taiwan, inspection and administration of dangers (2) is responsible for coastal tourism administration
5. Ministry of the Interior (1) Department of Land Administration (2) Construction and Planning Agency	(1) in charge of maritime delimitation, layout and reconnaissance of baselines and outer borders, construction and administration of a national maritime information database, layout of benthos cables and pipes, and issuing and censoring of maritime maps (2) in charge of planning coastal environment protection and coastal administration, legislation of maritime laws, administration of exploitation of tidal flats
6. Ministry of National Defence (1) The Navy General Headquarters (2) Navy Bureau of Oceanographic Survey	(1) is responsible for naval supremacy policy making and directing related manoeuvres (2) is responsible for depth reconnaissance of the sea area around Taiwan, hydrological information collection and producing maritime maps
7. Ministry of Finance (1) Directorate General of Customs (2) National Property Administration	(1) in charge of customs and suppressing smuggling (2) in charge of non-public state coastal land and hiring
8. Ministry of Economic Affairs (1) Department of Mines (2) State Enterprise Commission (3) Water Resources Agency (4) Energy Commission (5) Central Geological Survey (6) Economic Processing Zone Administration	(1) in charge of exploitation of maritime sandstone and mineral products (2) in charge of investigation and exploitation of oil, natural gas and other marine resources (3) is responsible for desalting seawater, disaster prevention, coastal stratum sinking prevention, hydrological monitoring of the coastal sea (4) in charge of exploitation, utilisation and administration of non-biologic marine resources (5) in charge of the geological investigation of Taiwan and surrounding sea area, investigation of marine geology and resources (6) is responsible for setup of storage and transport zones
9. Ministry of Foreign Affairs Department of Treaty and Legal Affairs	is responsible for negotiations with neighbouring countries regarding overlapping sea areas
10. Ministry of Education	in charge of education of marine staff and marine technology
11. Mainland Affairs Council	in charge of coordinating affairs relating to Mainland China in government units
12. Council for Economic Planning and Development	is responsible at the level of the Executive Yuan for policymaking, coordination of economic planning and the work of Ministries, and is in charge of research on and resolution of marine problems.
13. National Science Council	is responsible for promoting basic marine research
14. Council for Cultural Affairs	is responsible for marine cultural relics preservation and cultural popularisation
15. Government Information Office	in charge of disseminating information relating to marine policies and their implementation

Source: Research's own work

Agencies in charge of the management of natural resources, for example, the Council of Agriculture (COA), which includes the Forestry Bureau and the Fisheries Agency (FA), which are in charge of forestry and fishery resources, respectively, should bear in mind their accountability for resources.

With regard to wetlands, the Taiwan Province Water Conservancy Bureau embarked on the '*Sea Wall Construction Programme*' in 1976. In 1997, the artificial jetties extended to 498km. Since then, its length has increased to 557km, almost half the length of Taiwan's coastline. The establishment of fish farms, industrial areas, new cities and ports has contributed to wetlands' destruction, indicating that an ecosystem approach and long-term perspective are missing from coastal management practice.

As regards sustainable development, the most important agency is the National Council for Sustainable Development (NCSDD). This Council was established in 1997 in order to strengthen the environmental ecosystem, and promote social justice and economic development. Its chairman has been the Prime Minister since 2002. Council membership is made up of one-third government officers, one-third scholars, and one-third members of the public. The Council includes nine working groups, namely: Sustainable Vision; Water and Land Resources; Technology and Industries; Biodiversity; Life and Production; International Environmental Protection; Healthy Risks; Sustainable Education; and Climate Change and the Kyoto Protocol Response Taskforce. The Director of the groups is the Minister or Director on the Council (NCSDD, 2001b). In 2000, the NCSDD drew up Taiwan's Agenda 21 to provide the basis for sustainable strategies. Subsequently, an *Action Plan* for the period 2002 to 2010 coordinated by the Executive Yuan was drawn up to implement sustainable

development from 2002 onwards. The year 2003 was the first year of sustainable development in Taiwan (NCSD, 2002).

The Council will carry out 264 work projects to promote sustainable development in Taiwan. For example, the mission of the International Environmental Protection working group is to protect marine resources and the coastal zone. This group will help Taiwan to participate in or join international conventions and organisations related to the conservation and protection of marine resources and the coastal zone. In addition, this group has been formed to draw up the final draft of *the Coastal Act* and other functional Acts, and revise *the Fisheries Act* and its related Acts. The Biodiversity working group's mission is to investigate trouble spots in the coastal zone, perfect the protected area system, and assist recovery of fisheries' resources. The Water and Land Resources working group follows the ecosystem approach in its mission to manage river basins and conserve coastal and marine resources. The MOI is the agency primarily responsible for coast and sea conservation and management. Its responsibilities include overseeing investigation of the total length of the coast, establishment of conservation indicators, examination of existing programmes, drawing up specific conservation and management strategies, usage of ecological engineering methods in coastal and sea engineering practice, and discussion of the relationships between related Acts. The COA, the EPA, and the Ministry of Economic Affairs (MOEA) are support agencies.

Implementation of *the Action Plan for Sustainable Development* for the period 2002 to 2010 has been outstanding in many respects. For example, in 2003, the Sustainable Development Indicator System was established in Taiwan. It serves as the basis for

regular assessment of the sustainability of national development in Taiwan and possesses the dual functions of policy evaluation and policy guidance for all relevant decision-making processes. Given the increasing importance of the ocean, marine affairs include fisheries, mines, transportation, tourism, and exploitation of resources, eco-system protection, environmental protection, and exploitation and administration of the coast. The original single-function administration system does not therefore meet today's modern requirements. A system is needed with enhanced interior coordination, but the government has not established such a setup for marine affairs at present. Most units which have rights and responsibilities for marine affairs are on the fringe of government activity. Neither do these units pay sufficient attention to marine affairs, have an adequate budget to effectively implement marine policy, or their directors have sufficient knowledge about such affairs. Therefore, government is unable to implement a holistic national marine policy and no effective action can be taken on the ocean. Many have expressed the opinion that a unit specialising in marine affairs should be setup. It is contended that this new unit specialising in marine affairs should be given the responsibility of, amongst others, formulating marine policy and rules for marine traffic around the island known as the 'blue highway'. The new unit should cover all areas relating to the sea. Moreover, its responsibilities should include promoting and enhancing the coordination of related units, reducing conflicts, decreasing the overlapping of responsibilities, and merging the power of administration, research and technology. The goal should be to prepare, plan and execute unified marine affairs work. To achieve this goal, there is a need to promote cooperation between related departments and coordinate central and local authorities' activities.

In response to the problems that have occurred in the oceans, Taiwan is actively undertaking several measures for better management of marine areas. In *the Constitution*, Article 10 relates directly to marine environmental management, and 22 Acts and 2 draft Acts also directly relate to marine environmental management, for example, the *Fisheries Act*, the *MPCA*, and the *Environmental Impact Assessment Act* (Table 4.6).

Table 4.6 Acts related to marine environmental management

Act	Date Enacted
Fisheries Act	11/11/29
Pilotage Act	28/09/45
The Land Act	30/06/30
National Property Act	27/01/80
Tourism Development Act	30/07/69
National Park Act	13/06/72
Regional Planning Act	31/01/74
Water Pollution Control Act	11/07/74
Waste Disposal Act	26/07/74
Commercial Harbor Act	02/05/80
Cultural Heritage Preservation Act	26/05/82
National Security Act	01/07/87
Wildlife Conservation Act	23/06/89
Tideland Reclamation Development Management Act	30/04/93
Water Conservancy Act	27/05/94
Coastal Act (draft)	17/02/00
Environmental Impact Assessment Act	30/12/94
National Land Integrated Development Act (draft)	06/03/02
Law on the Territorial Sea and the Contiguous Zone of the Republic of China	21/01/98
Law on the Exclusive Economic Zone and Continental Shelf of the Republic of China	21/01/98
Marine Pollution Control Act	01/11/00
The Coast Guard Act	26/01/00
Basic Environmental Act	11/12/02

Article 17 of the *Fisheries Act* requires the FA under the COA to produce a comprehensive plan for exclusive fishing right zones which, at the same time, considers the public's interests, such as navigation, water conservancy, and environmental protection. According to Article 2 of the *MPCA*, the intertidal zone, internal waters, Territorial Seas, Contiguous Zones, EEZ, and waters superjacent to the continental shelf under the jurisdiction of Taiwan should be considered holistically

to prevent marine pollution.

The Medium Range Policy Implementation Plan aims to establish high quality fishing grounds and marine ecosystem conservation areas, promote the cultivation of diverse marine resources, introduce measures to reduce fishing vessels, reward fishing off, maintain offshore and coastal fisheries' resources, as well as promote sustainable development of fisheries. Articles 7 and 11 of the *Permission Management Regulation of the Construction of Artificial Fishing Reefs or Fisheries Facilities* state that construction of artificial fishing reefs or other fishery facilities should not negatively impact on the marine ecosystem. If this should happen, the reefs and facilities should be removed. Before 2006, the government decided to delimit 5% offshore sea areas to accord with the request of the 'Biodiversity convention' and move towards a target of delimiting 20% offshore sea areas.

The Environmental Protection Policy Guidelines aim to protect the natural environment and maintain the delicate ecosystem for next generation sustainable use, thus newly formulated policies and legislation should adhere to marine environment protection. For example, Article 1 of the *MPCA* and Articles 1, 3, 18 and 20 of the *Basic Environmental Act (BEA)* emphasise the need for government to protect the marine environment, maintain ecosystems, protect biodiversity and wildlife, and promote the sustainable use of marine resources. Moreover, the EPA also encourages local governments to create local government environmental protection plans. The *BEA* was promulgated in 2002 to provide the legal basics for these plans to protect the natural ecosystem and water quality.

The National Environmental Protection Programme outlines basic environmental protection practice and emphasises the importance of taking into account the long-term perspective when drawing up implementation plan objectives. This programme seeks to address existing criticism(s) (if any), set objectives to improve integration of environmental protection and development needs, and accommodate differences in district and practice. Consideration of difference not only requires a comprehensive plan of existing development within the county and city, but also integration of future development aims and objectives to ensure the same environmental quality for natural resources and artificial constructions. It is important that priority is given to environmental improvement. Accordingly, *the National Environmental Protection Programme* was established to put in to practice Article 10 of the Constitution: ‘development of economic and scientific techniques in harmony with environmental and ecosystem protection management practice for 13 years’. The *Programme* provides basic guidelines for organisations or relevant government departments at all levels to facilitate environmental protection management practice nationwide.

In order to ensure beaches are cleaned and to keep them free from hazardous wastes or other pollutants, the EPA has introduced ‘*the Clean Beach Maintenance Environment Plan in Coastal Areas*’, which requires local governments and related units to mobilise all walks of life to clean beaches. Article 7 of the *BEA* states that the central authority should help local government implement sound environmental protection practice. In addition, Article 29 indicates that the NCSA should be comprised of one-third each government representatives, academics and experts, and civic groups, and be responsible for relevant national sustainable development

strategies and policies.

The New Agriculture Programme Towards the 21st Century emphasises adaptive management. Fishing effort has been reduced due to the decline in fisheries' resources. This *programme* thus aims to protect and restore the habitats of fisheries' resources, cultivate them and promote cage aquaculture. Articles 37 and 44 of the *Fisheries Act* adopt adaptive approach principles in management practice according to the status of fisheries' resources, fisheries' industries and international fisheries' agreements. Article 9 of the *MPCA* requires government at different levels to monitor the marine environment and then adjust management measures according to monitoring results. Article 25 of the *BEA* also states that the standard for environmental quality and management measures should be set according to social demands and technological level.

In the aspect of marine pollution, article 8 of the *MPCA* indicates that the central authority may, in accordance with marine environment categories, marine environment quality standards, and the characteristics of the marine environment, delineate marine control zones, determine marine environment control standards, issue official announcements, and implement coastal zone plans and pollution control measures after determining control standards. Moreover, Articles 7 and 25 of the *BEA* state that local governments, in light of the needs of natural and social conditions within the local jurisdiction, may draft autonomous laws, regulations and environmental protection plans. The vision of Taiwan, as depicted in *the Environmental White Paper* published in 2006, is that of an island with blue skies, green land, green mountains and clean water, protected and conserved by the public to

create a sustainable homeland. This *Paper* focuses on the prevention of pollution, the recycling of resources, and public involvement in the protection of the environment. Articles 5 and 11 of the *BEA* indicate that the public should actively participate in environmental protection and help government implement pollution control measures.

Article 20 of the *BEA* states that government entities at all levels should actively adopt various measures to protect the marine and coastal environment. Such measures should include enforcing the polluter pays principle, the establishment of an environmental monitoring system, policy benefit analysis, incentive measures, environmental impact assessment, and a development permission system. *Environmental Protection Policy Guidelines* uphold the polluter pays principle and outline measures to prevent marine pollution and promote restoration of the environment. Further, they encourage government entities at all levels to involve stakeholders in environmental protection policy decisions.

4.4 MAJOR POLICY ISSUES

Since marine policy and marine environmental management has been in existence for several years, it is time to review performance issues and problems. This section describes institutional, legislative, human resources, as well as technical management and sustainable development of marine policy and marine environmental management in Taiwan to ascertain the progress of such management practices.

4.4.1 Institutional

Marine management organisation is based on separate management objectives (Figure 4.3). However, with increasing diversity in marine environment use, integrated marine

environmental management becomes essential. In order to deal with emerging problems, many scholars and experts have urged the government to establish a Ministry of Marine Affairs (Chiau, 2005), whose responsibilities should include management of a national marine environment database; oversight of the installation of cables under the sea bed; protection of the natural environment of the coastal area; management and development of the coastal zone, including tideland reclamation, marine living and non-living resources, fisheries' production and development, and ports and navigation; observation and reportage of marine activities and pollution; technology development; resolution of marine affairs disputes; and marine policy consultation (The Executive Yuan, 2002). Unfortunately, due to political infighting, the Ministry has not yet been established. Opposition parties supported the establishment of 14 separate Ministries or Commissions to oversee different aspects of marine affairs, and the central government decided to establish the Marine Affairs Committee instead of a Ministry of Marine Affairs.

According to the above discussion, the administrative responsibilities of the government agencies are likely to be overlapped or insufficient because accountability is scattered among the agencies (Table 4.5). Due to the lack of a unified, integrated, and dedicated agency, marine resources have been misused and the quality of the marine environment has been deteriorating (EPA, 2003). The Executive Yuan has already included setting up the Ministry of Marine Affairs in its agenda, but prior to its realisation, what is missing at this stage is a cross-departmental integration mechanism since marine affairs has a complicated and multi-dimensional nature. The current dispersed-type of system could result in a blurring, over-generalised administrative accountability of marine affairs, which makes cross-departmental

administrative coordination and government resources integration difficult to attain.

4.4.2 Legislative

Sectoral development plans for the industrial, energy-generating, and fisheries' sectors are important constituents of the land use plan system for economic development in Taiwan. However, each sector follows its own objectives and there is little or no integrated and coordinated development with other sectors. In addition, there is inadequate legislation to protect the marine environment from uncontrolled development as a result of ambiguous development policy, neglect of the environmental planning concept, and many different coastal engineering plans (Chiau, 1992). It is therefore important to draw up legislation specifically regulating management of the marine environment.

At present, there exists *the Coastal Act* in draft form to overcome existing insufficiencies in coastal management practice; to integrate coastal zone management policy in order to reduce conflict between different parties' activities in coastal zone areas; to strengthen the authority of existing land management organisations and the management function of local government; and to ensure coastal zone regulations and coordination and consultation mechanisms complement each other. The Executive Yuan assigned responsibility for drawing up *the Coastal Act* in draft form to the Construction and Planning Agency of the MOI. The first draft was drawn up in 1994.

There are, however, several problems with *the Coastal Act* draft. According to the MOI (1995), these problems include: (1) the failure to define the meaning of land; (2) the failure to define land usage; (3) the failure to identify the organisation with

responsibility for enforcing *the Act*; *the Act's* failure to assign funding for a coastal research database; (5) the imbalance between development and coastal environment protection needs; (6) *the Act* does not apply in privatised coastal zone areas; and (7) inadequate funding provision for coastal management practice (Chiau, 1998; Hwang, 2004). Further, according to *the Coastal Act* draft, fisheries planning should be tied in with coastal zone planning, coastal protection planning, and coastal shelter planning. For *the Coastal Act* to be effective, representatives from the organisation established to enforce the *Act* need to be given the authority to restrict fisheries' activities when considered necessary to prevent overfishing and conserve fisheries' resources, and to ban illegal and dangerous activities of fisheries (MOI, 1995).

In addition, there is no specific law for coastal management, the coastal territory planning system remains unclear, and each authority has its own administrative provision. In other words, the coastal management has neither comprehensive vision nor planning. That is why conflicts between marine conservation and development within the same coastline occur often, and that can be disadvantageous for sustainable development (The Control Yuan, 2004).

4.4.3 Human resources

In the past, ocean science research was ignored in Taiwan. Indeed, it had decreased from 0.59% of total scientific research in 1989 to 0.52% in 1991 (The Control Yuan, 2004), despite the fact that main industries at that time were fisheries and shipping (LSPRC, 2005). The level of ocean science research was also much lower than in other countries. However, in the past decade, awareness of the importance of educational programmes in marine environmental management practice has grown in

Taiwan. Main organisations providing training in marine environmental management are the National Taiwan Ocean University and the National Sun Yat-Sen University. However, the number of teachers involved and the funding level are low. There is therefore a need for the government, which describes Taiwan as an 'oceanic nation', to implement more educational programmes to promote and improve marine environmental management practice.

In addition, the *Proposal for the Development of Marine Affairs and Policies (PDMAP)* has been established to maintain 250 patrol teams (5,000 members) along the nation's rivers, and hold related publicity activities, meetings, forums, educational courses as well as provide training for tackling river pollution. Primary school teachers are expected to attend classes on marine bio-diversity in order to promote the conservation of fisheries' resources, the marine eco-system, and management and protection of bio-diversity. The COA sponsors activities to promote bio-diversity and has initiated 40 detailed plans under the multi-partnership of biology plan.

The FA also holds educational courses and conferences, and propagates the concept of sustainability of resources by holding educational courses on the domestic economy and fisheries affairs in fishing villages. The *PDMAP* also proposes to build several clean oil vessels and to develop facilities for promoting awareness of effective techniques for marine salvage, rescue, and pollution control, as well as send people on recognised education and training courses to deal with marine oil pollution. The government has also established four research institutes focusing on marine affairs in Taiwan and provides scholarships for studying abroad. Job openings for public servants in the marine field, and a database and think tank related to marine legislation

and policies have also been established by the *PDMAP*.

The EPA has offered \$NT9077 to fishing communities to hold marine related activities and participate in environmental discussion as well as supervision. Owing to the lack of budget to implement the *Land Subsidence Prevention programme*, environmental awareness is weak, and enforcement officers in the local government have insufficient human resources to enforce legislation effectively.

The *MPCA* has conducted research on pollution control since 1994 to provide information to relevant domestic organisations and businesses with regard to construction activity, recreational areas, industrial areas, local community needs, and agricultural resources. Although the EPA introduced a plan to protect the environment in 1993, serious pollution of the river section has decreased only slightly in the past ten years, sewer construction has been intermittent, and the emission of sanitary sewage has therefore remained uncontrolled. These are main causes of the pollution of reservoirs (EPA, 2007).

The *Medium Range Policy Implementation Plan* also promotes biodiversity, awareness of the natural landscape through educational and academic training as well as partnership between government and stakeholders. To promote the work of international and domestic conservation organisations, participation in relevant activities is encouraged. For the purpose of adjusting the fisheries' structure, the competent authority may establish a fisheries' advisory committee, consisting of experts, scholars, fisheries' associations, and officials from relevant government agencies. The fisheries' advisory committee should be organised, function, and

operate in accordance with regulations prescribed by the central competent authority.

In order to allow for variation in water body and quality over time, the EPA should produce an overall plan to sample and monitor monthly and quarterly the water quality of local rivers, sea areas, offshore recreation sea areas, reservoirs, and ground water sources in Taiwan and the adjacent islands of Kinmen, Matsu and Penghu. Implementation of water quality monitoring should include taking samples monthly from 87 rivers, 19 coastal sea areas, and 58 reservoirs, seasonally from 43 regional groundwater stations, and between June and September every year from 10 recreational sea areas. To-date, more than 41,000 samples have been collected. All monitoring data has been put on the EPA website for people to access and use.

Because human and industrial activities continues to impact on the environment and such impact brings changes to the environment, new environmental problems will continue to emerge. Thus, education programmes related to the environment need to be ongoing and adapted to suit individual requirements and not limited to school education. Such programmes should provide continuous, lifelong learning based on up-to-date scientific knowledge and technological development.

In order to encourage people to participate in water quality monitoring and then maintain it, the EPA held the first national monitoring day in October, 2003. In total, 82 schools and 3 groups from the private sector participated in this event, comprising 1,460 students/members of the public and 175 teachers. A website was set up to disseminate the results of the activity day, which was connected to water quality websites in other parts of the world in order to increase awareness of and interest in

domestic environmental protection activity.

Marine education in Taiwan has never been emphasised because the general state policy of Taiwan for a long time has been focused on the land and neglected the sea (MOE, 2007). As a result, the levels of marine literacy related courses in the country are below the average, and locations and activities for marine experiences are significantly insufficient. As indicated by the Control Yuan in 2004, some major issues regarding the nation's marine education are: a failure of cultivating industry required talents because of confused and overlapped goals at different levels of marine education and talent development; poor resource allocation due to the lack of investment in marine education; poor course quality and proportion of marine education in elementary, junior high, and senior high schools; lack of marine research oriented institutions; short of budget for marine technological development; and poor job market for students graduating from schools (The Control Yuan, 2004). Therefore, establishing an effective talent development policy is the most important task at this very moment.

4.4.4 Technical management and sustainable development

Tools such as GIS, EIA, Monitoring, MPA, etc. have been applied extensively, for example, the EPA is based on ecological construction, and has already established 71 facilities to improve water quality to-date. They can deal with more than 488 tonnes of water every day, and reduce the Biochemical Oxygen Demand (BOD) pollution about 9,000 kilograms. The *Towards Environmental Protection Sustainability Action Plan* has led to the implementation of 22 projects. There are also eight coastal zone management projects, addressing river water quality improvement. Water quality

monitoring results of rivers are shown by the River Pollution Index. This index showed that pollution of the river section extended to 459.2 kilometres in 2003 (15.8% of the whole river network) but had dropped to 180.5 kilometres in 2006 (6.2% of the entire river network) (NCSO, 2007). The EPA has also set up a water quality improvement website that can be accessed to see the quality of water in those facilities already in place. Meanwhile, the Construction and Planning Agency has set up a regional planning GIS and database for promoting coordinative management in coastal areas.

The *Sustainable Development Action Plan* sets a 5% marine sea area of 12 nautical miles away from the coast as a MPA, and delimits the coastal conservation axis. It has also set up a biodiversity information exchange mechanism which integrates the databases of many related organisations, and an information management system to monitor bio-diversity data. The government is setting up MPAs, but, like the conservation areas of fisheries' resources, it is difficult to protect and monitor them because of lack of manpower and finance.

The COA has promoted the launch of artificial fish reefs, the releasing of fish seeds, and areas to conserve fisheries' resources over a long period of time. In accordance with the fisheries' development programmes, 1,350,000 steres of artificial fish reefs have been launched to improve the environment of fishing grounds, and 69,210,000 fish seeds have been released to-date. Further, the MOI is resolved to bring 75 national important wetlands into the coastal protection areas programme as part of the plan to monitor national utilisation and land utilisation at the same time, and monitor the natural coastline continuously.

The Academic Sinica (AS) established the Global Biodiversity Information Facility Committee in 2008 to provide a communication platform across organisations and integrate bio-diversity information and promote integration. The EPA in Taiwan is also actively planning to liaise with an international environmental partner. In order to restore fisheries' resources, the FA has been given a budget of \$NT170,000,000 to buy back 37 coastal and offshore fishing vessels as well as 301 fishing rafts, a budget of \$NT109,450,000 to reward 7756 vessels for voluntary fishing closure, and \$NT3,350,000 to reward 27 vessels fishing for larval fish for observing fishing closures during 2007-2009. This plan is still in process, therefore, its effect has yet to be determined.

The Water Resources Agency in the MOEA has established a stratum sinkage database. According to recent data, stratum sinkage in Ilan, Taoyan, Kaoshiung, and Pingtung has ceased in the past 7 years, and has eased to between 3.8 and 2.9 centimetres in Chiayi, Tainan, in recent years. Of particular note, stratum sinkage in Changwa has eased from 17.6 to 8.4 centimetres over time. In addition, the percentage ratio of fresh water fish production to seawater fish production has adjusted from 45: 55 to 40: 60 (COA, 2000). Fish farm area has decreased from 53,641 hectares in 1981 to 44,338 hectares in 1999. The extraction of underground water decreased from 24 hundred million cubic metres to 11.6 hundred million cubic metres in the same period (Hu, 2002). There is sometimes conflict between people and government when the latter seeks to enforce the closure of illegal wells. People often violently resist such enforcement such that the local government does not have a strong will to implement it, hence, it is difficult for official personnel to actively enforce the closure of illegal wells. In addition, environmental pollution causes water quality degradation and

depletion of uncontaminated groundwater sources. Substitute water sources are developed with difficulty so that people are forced to depend on illegal wells for crop irrigation, etc. The government has established a groundwater database in Taiwan and an integrated information system.

Importantly, the government should encourage environmental protection groups to participate in the decision-making process concerning the environment. To promote their participation, the government should offer sufficient funds for environmental protection groups to invite people and the media to forums, debates, or meetings held by government so that bilateral communication can be established. At present, there are only five occasions when the public can participate in the decision-making process relating to the environment: EIA, public meeting, location survey, debate on the location survey, and a review of the environmental impact estimation report, participants are usually limited to government representatives and scholars. People from the local community seldom join in the decision-making procedure. This indicates it is not easy for local residents to obtain information about any proposed development in its initial stages, which can lead to confrontation or deadlock between concerned parties or lack of environmental protection because of lack of communication (Wang, 2001).

In order to establish a safe and sustainable environment, protect people's livelihood and maintain the safety of sea areas, the government has initiated several research studies. These include a study on climate and environmental change; development of a model to forecast marine disasters in Taiwan; development of a long-term monitoring system of the sea-bed; an investigation and study on the enhancement of

marine organism genes and species as well as a method to sustainably utilize marine organism resources; development of a numeral model and simulation system of sea areas around Taiwan; establishment of a technique for monitoring the marine ecosystem, and a method for appraising the monitoring, forecasting and estimating of Taiwan's marine environment and ecosystem variations. Other research includes the development of a robot submarine and sensor technique; development of a dynamic forecast model of the situation in the sea; and a float, search, traction and salvage technique for identifying sea water and underground water capacity.

Finally, Strategic Environmental Assessment (SEA) has existed since 2000 to estimate environmental impact in accordance with the government's policy. However, only five assessments have been carried out to-date (Wang, 2007). Such assessment has not been applied to marine affairs, so still needs to be developed in the future.

Even though the government has established various relevant policies, programs and measures for comprehensive development for marine environmental protection, marine environmental resources, the situation appears to be deteriorating. The crux of the problem is therefore still unclear and needs more investigation.

4.5 CONSTRUCTING THE QUESTIONNAIRE

Many problems that currently exist in the major policy issues of Taiwan have been detected from reviewing the evolution of marine policy and marine environmental management in Taiwan. For the institution part, the problems which are the decentralized administrative authority, incapability of carrying out concrete implementing actions, and political influence. For the legislative part, ocean-related

act/regulations are not sound, the policies are vague, and the concept of environmental planning has been neglected. For the human resources part, there has been a shortage in talents and funding for marine management, and a lack of marine environmental awareness among the law-enforcement personnel. For technical management and sustainable development, the technical tools for marine conservation and environmental protection cannot be implemented effectively, and there are constraints on the mechanisms of public participation (please see Sections 4.2 - 4.4).

The quality of policy can be evaluated only through administrative practices, and therefore, discussion on the construct of a questionnaire began at management elements such as government, policy development and issues, management, and assessment of managements (please see Section 3.4). According to the description from Sections 4.3 and 4.4, in this section the following management tools - issue, factor, obstacle, improvement - were used to evaluate government's organisation and legislation, human resources, policy development, and technical management, implementation and enforcement (please see Section 3.5), and the result was used as a basis for designing the questionnaire. This questionnaire encompasses questions related to topics related to principles, sea uses, ecological/environmental issues, administration, education and training, and so on (Section 4.6). For the question design, the questionnaire has six sections. The first section are respondent details including name of the organisation, type of respondent, position held, date of completion, contact telephone, and e-mail. The second section is about the legal and administrative basis of policy. The third section is on capacity-building in education and training. The fourth section is on policy development. The fifth section is on implementation and enforcement. The last section is related to any additional ideas,

views or comments that may be attached to the questionnaire, and would be greatly appreciated. In addition, for an issue-related question such as Question 2.1, the question was phrased as ‘What are your main issues of concern with regard to the existing legal and administrative system basis of policy?’ Also, the options for this question were designed based on the literature review on Taiwanese marine policy and environmental management of this chapter. These main reasons are: government lacks a marine comprehensive management organisation (administrative), ocean-related act/regulations are not sound (legal), the marine enforcement is ineffective (legal), and politics influence the development of ocean and legislation (political). The main purpose is to gain an insight from those marine-related issues concerned by the interviewees. Other questions were also designed based on this principle (Appendix 1).

Questions regarding issues and obstacles were created to have a multiple answer format, and the options were designed to be selected in preferential order. The purpose is to obtain the interviewees’ order of preference for the options. For questions regarding factors, they were presented in a multiple answer format. The purpose is to select factors giving rise to the issues. Questions on improvements were designed in a Likert scale format. The purpose is to evaluate the interviewees’ satisfaction on the improvements provided by the author. Last, results from analysing the questionnaire were presented in the section 4.6.

4.6 ANALYSIS OF QUESTIONNAIRE

This section describes the results of the questionnaire surveys undertaken to investigate and understand problems associated with marine policy implementation in

Taiwan in order to suggest a framework for efficient management.

4.6.1 Introduction

Data concerning marine policy and marine environmental management in terms of policy development, the legal and administrative basis of policy, implementation and enforcement of policy, as well as capacity-building through education and training was obtained. The purpose of the questionnaire was to investigate issues, factors, obstacles, and improvements within these areas. All items (Table 4.7) were first modified from the literature review relating to Taiwan, then refashioned through questionnaire piloting and revision by the author's supervisor and Dr Ou, an ocean-related scholar in Taiwan, where necessary. The following presentation of data analysis not only provides a broader picture of marine policy and marine environmental management in Taiwan but also forms the basis for discussion in later sections.

Table 4.7 Common set of items within each sub-category

Areas	sub-category	Items
Policy development	1. Issues and (priorities) 2. Factors 3. Obstacles 4. Improvements	<ul style="list-style-type: none"> ● Principles (e.g. sustainability) ● Sea use (activities – fisheries, etc.) ● Ecological/environmental ● Economic ● Social ● Political ● Legal ● Administrative ● Education and training ● Public awareness
Legal and administrative basis of policy		
Implementation and enforcement of policy		
Capacity-building through education and training		

There were in total 270 respondents to the questionnaire survey (Table 3.4). Figures 4.4 and 4.5 show the numbers of respondents and the organisational types to which they belonged. Questionnaire findings are discussed below.

Figure 4.4 Respondent numbers and organisational types to which they belonged

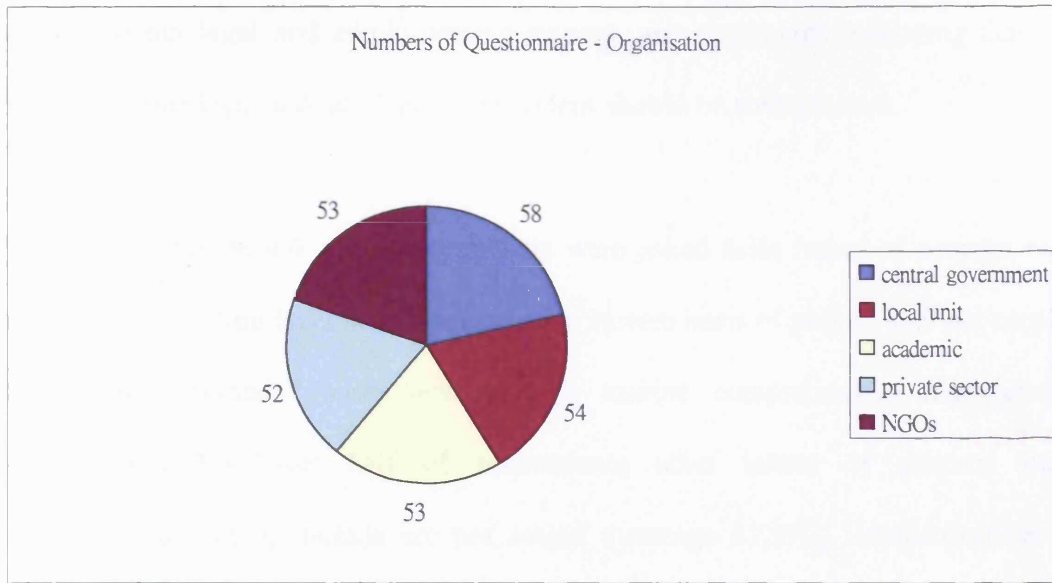
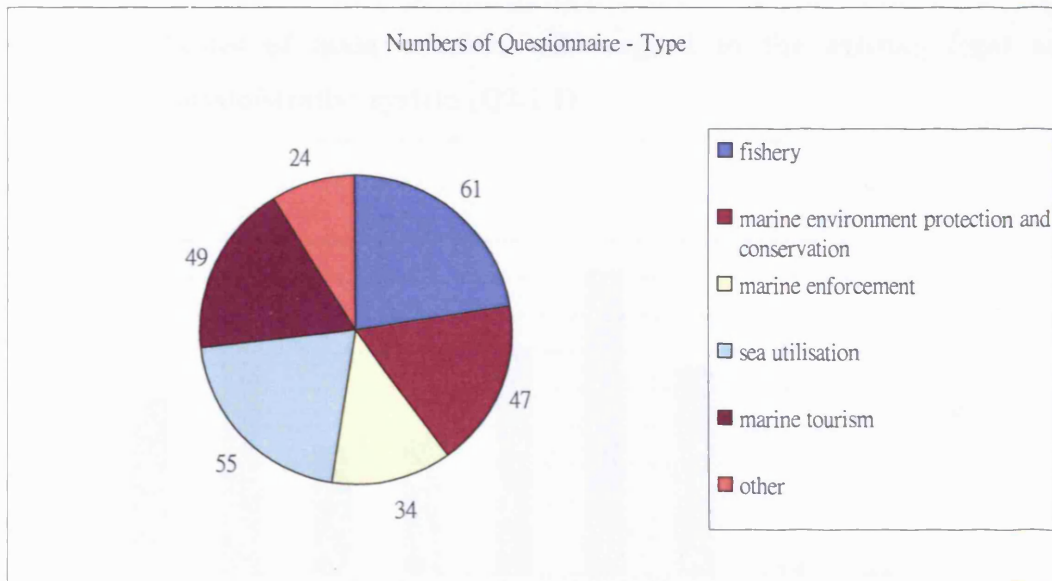


Figure 4.5: Respondent numbers and organisational types to which they belonged



4.6.2 Administrative, legal and human resources

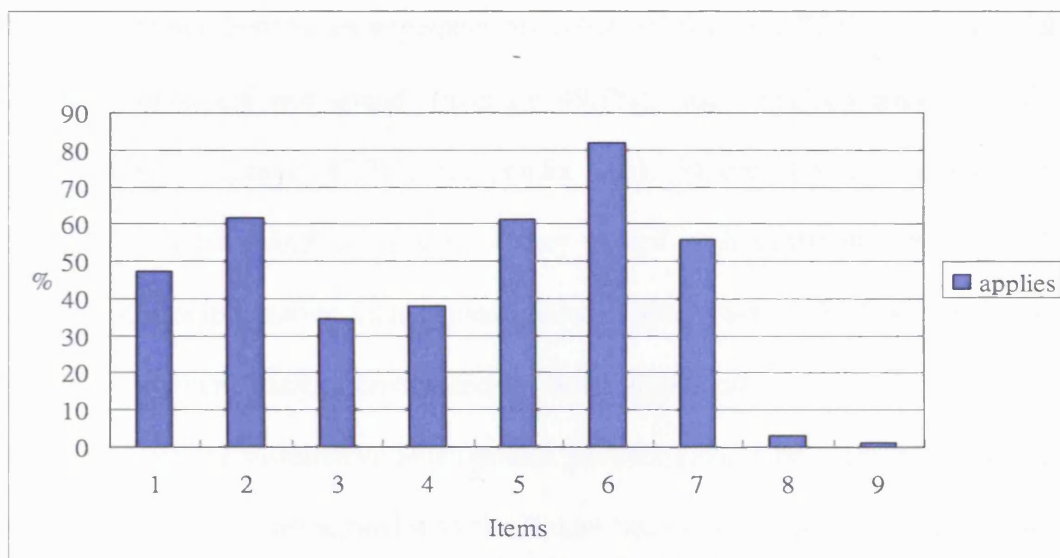
4.6.2.1 Administrative and legal basis

This section discusses the legal and administrative basis of policy, including main issues of concern with regard to the existing legal and administrative system basis of

policy, statements with regard to marine management, difficulties that apply, in relation to the legal and administrative system, and statements indicating that the existing marine legal and administrative system should be strengthened.

As shown in Figure 4.6, when respondents were asked main issues of concern with regard to the existing legal and administrative system basis of policy, 81.9 per cent of respondents reported ‘government lacks a marine comprehensive management organisation’. For over half of respondents other issues of concern were ‘ocean-related Act/regulations are not sound’ (average 61.5%), ‘ineffectiveness of marine enforcement’ (average 61.1%), and ‘legislators lack the marine perspective’ (average 55.9%) (Appendix 2.1).

Figure 4.6 Issues of main concern with regard to the existing legal and administrative system (Q2.1.1)



1. politics influence the development of ocean and legislation
2. ocean-related Act/regulations are not sound
3. communication and co-ordination cross ministries/agencies
4. communication and co-ordination between central and local government
5. ineffectiveness of marine enforcement
6. government lacks a marine comprehensive management organisation
7. legislators lack the marine perspective

- 8. other
- 9. don't know/no opinion

Figure 4.7 The top three issues of main concern with regard to the existing legal and administrative system basis of policy (Q2.1.2)

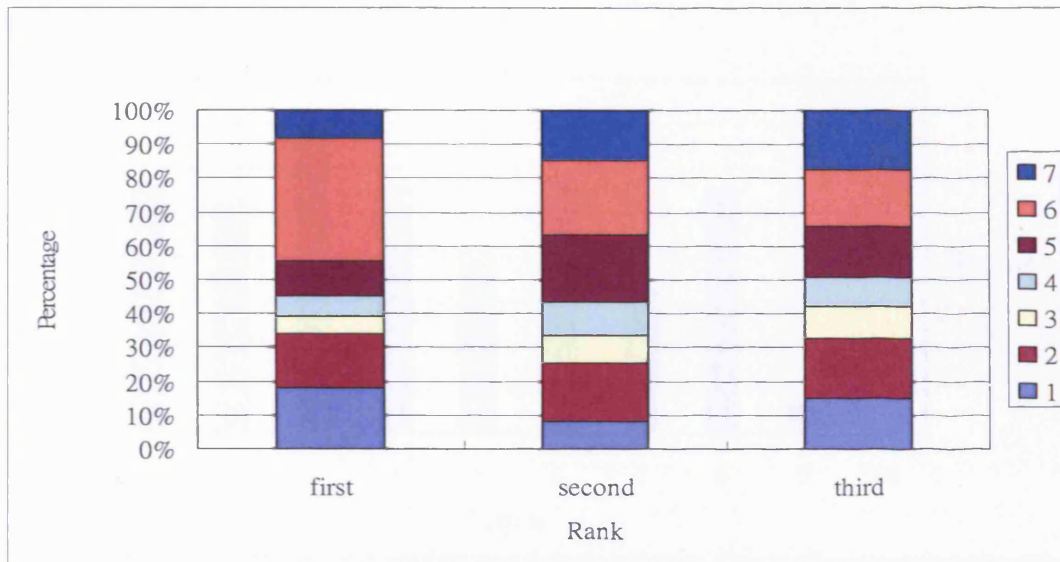
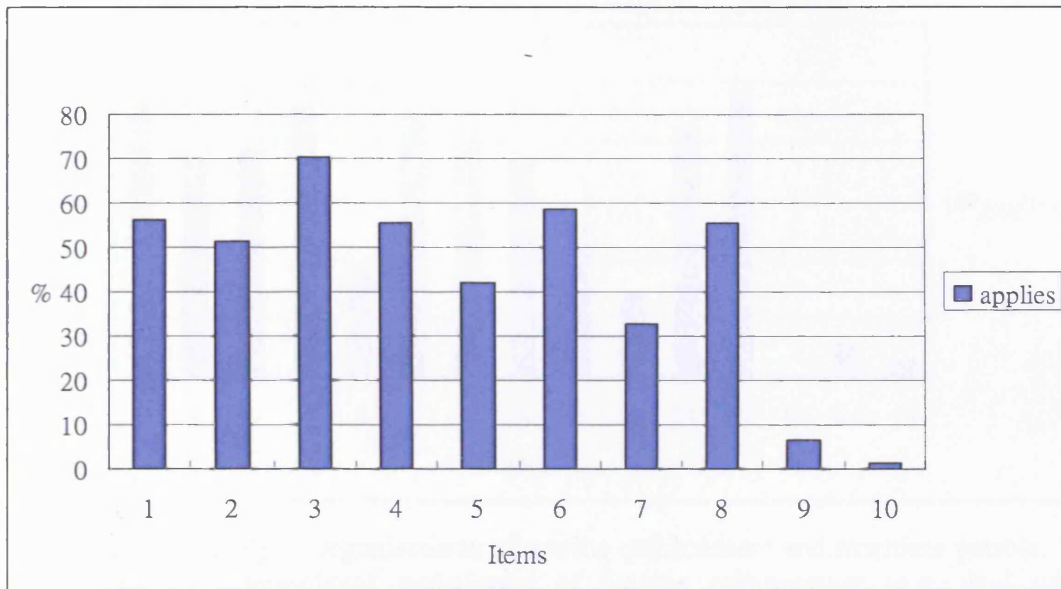


Figure 4.7 shows the top three issues of main concern. They were: ‘government lacks a marine comprehensive management organisation’ (average 72.6%), ‘ocean-related Act/regulations are not sound’ (average 49.3%), and ‘ineffectiveness of marine enforcement’ (average 43.7%) (Appendix 2.2). Figure 4.8 shows that when respondents were asked to indicate if they agreed with statements with regard to factors influencing marine management, almost three-quarters (70.4 per cent) agreed with the statement ‘lack of environmental development principles in the legal system (e.g. principles of sustainable development, polluter pays, precautionary, etc.)’. More than half of respondents agreed with the factors ‘lack of political will’ (average 58.5%, except the private sector), ‘economic is the priority’ (average 56.3%, except the private sector and NGOs), ‘a special organisation has not been established’ (average 55.6%, except the private sector and NGOs), ‘fishermen/other sea users don’t want to co-operation’ (average 55.6%), and ‘differences in implementation exist between

central policymaking and local execution' (average 51.5%) (Appendix 2.3).

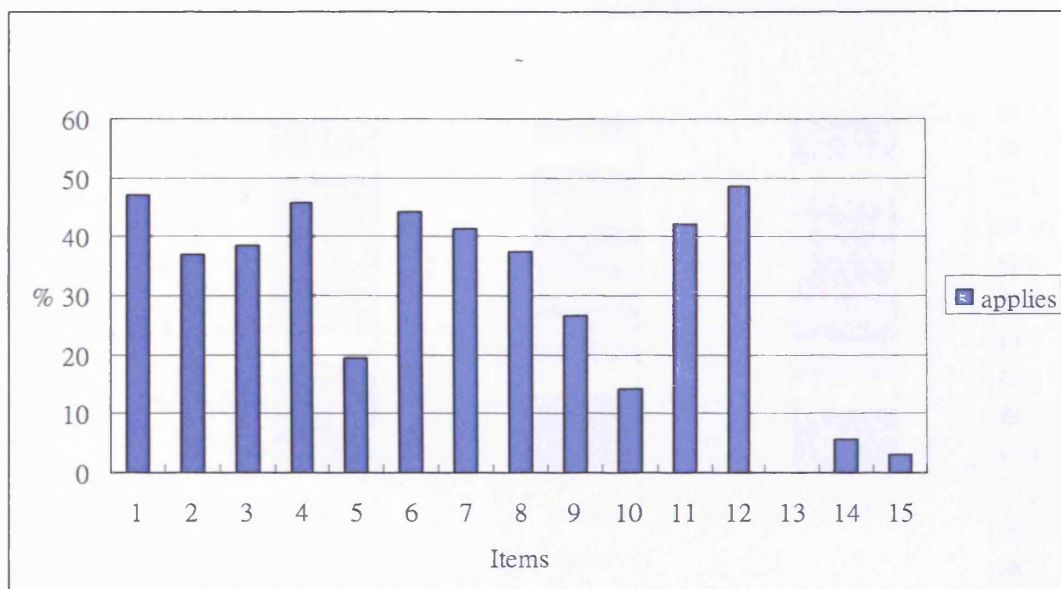
Figure 4.8 Statements with regard to marine management (Q2.2)



1. economic is the priority
2. differences in implementation exist between central policymaking and local execution
3. lack of environmental development principles in the legal system (e.g. principles of sustainable development, polluter pays, precautionary, etc.)
4. a special organisation has not been established
5. lack of marine management budget
6. lack of political will
7. low penalty of law
8. fishermen/other sea users don't want to co-operation
9. other
10. don't know/no opinion

As indicated in Figure 4.9, when respondents were asked what difficulties apply in relation to the legal and administrative system, 48.5 per cent reported 'political factors affect the effectiveness of management', 47.0 per cent reported 'lack of ability of organisations of marine enforcement and maritime patrols', and 45.9 per cent reported 'the same region is administered by multiple units would have questions of departmental egoism'. (Appendix 2.4).

Figure 4.9 Difficulties which apply in relation to the legal and administrative system (Q2.3.1)



1. lack of ability of organisations of marine enforcement and maritime patrols
2. lack of international experience of marine enforcement (e.g. deal with international fishery disputes, enforce a ban of piracy)
3. lack of complementary measure for sea use in the legal system
4. the same region is administered by multiple units would have questions of departmental egoism
5. *the coastal Act* has to enact as soon as possible
6. political personages do not care marine legislation
7. government connive marine environment destruction due to developmental benefits
8. fishermen/other sea users lack law knowledge
9. lack of budget for marine enforcement (e.g. lack of far sea patrol vessels)
10. the legislative system does not pay attention to the management of sea area so much
11. lack of sound system of marine enforcement
12. political factors affect the effectiveness of management
13. no difficulties
14. other
15. don't know/no opinion

Figure 4.10 The top three difficulties that apply in relation to the legal and administrative system (Q2.3.2)

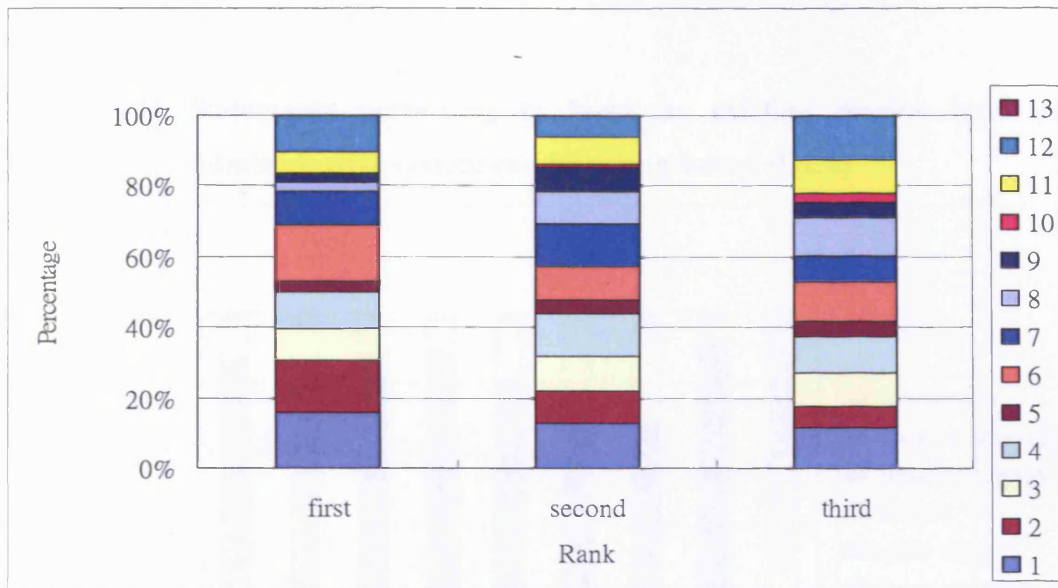
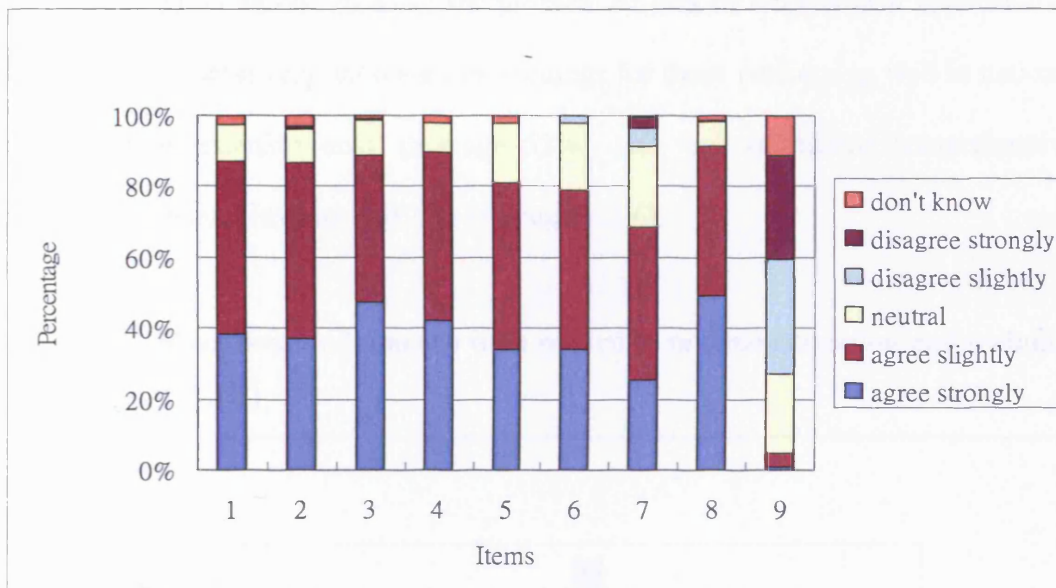


Figure 4.10 shows the top three difficulties that apply in relation to the legal and administrative system, namely: ‘lack of ability of organisations of marine enforcement and maritime patrols’ (average 36.7%), ‘political personages do not care marine legislation’ (average 33.7%), and ‘the same region is administered by multiple units would have questions of departmental egoism’ (average 30.4%) (Appendix 2.5).

Figure 4.11 shows that when respondents were asked to what extent they agreed with statements pertaining to how the existing marine legal and administrative system can be strengthened, 90 per cent of respondents agreed with the statement ‘establish a comprehensive management organisation or mechanism’, 88.5 per cent of respondents agreed with the statement ‘strengthen marine enforcement and maritime patrol system (e.g. increase enforcement budget and personnel, enhance coordination with CGA, enhance to enforce a ban of illegal fishing, etc.)’, and 88.2 per cent of respondents agreed with the statement ‘enact a sound bill (e.g. *the Coastal Act*)’. Only 4% of

respondents concurred that the existing marine legal and administrative system does not need changing.

Figure 4.11 Statements pertaining to how the existing marine legal and administrative system can be strengthened (Q2.4)



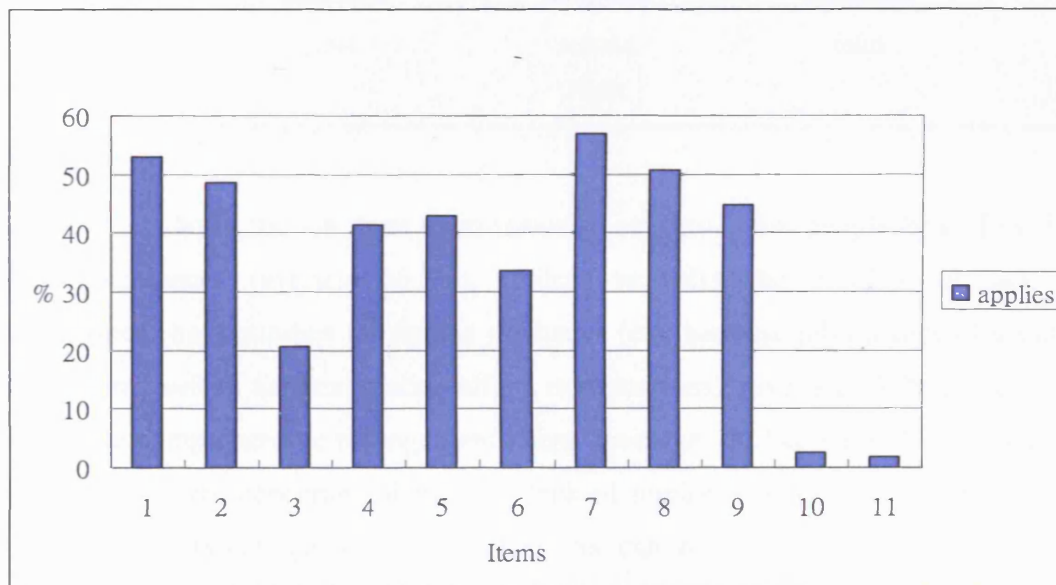
1. modification of existing marine legislation (e.g. increase principle of sustainable development)
2. establish the Ministry of Marine Affairs
3. strengthen marine enforcement and maritime patrol system (e.g. increase enforcement budget and personnel, enhance coordination with the Coast Guard Administration, enhance to enforce a ban of illegal fishing, etc.)
4. enact a sound bill (e.g. *the Coastal Act*)
5. increase marine budget
6. establish the Marine Affairs Committee
7. increase penalties of for breaking the law
8. establish a comprehensive management organisation or mechanism
9. no change is needed

4.6.2.2 Human resources

This section also focuses on capacity-building in education and training including main issues of concern with regard to marine education and training, most effective ways to educate sea users, main obstacles to promoting marine education and training, as well as statement for improving marine education and training.

Figure 4.12 shows that when respondents were asked their main issues of concern with regard to marine education and training, 57 per cent reported ‘people lack of marine accomplishments’. More than 50 per cent of respondents were also concerned about the need to ‘failure to solve the problem of lack of employment opportunities for marine graduates (e.g. increase job openings for those performing well in national marine affairs examinations)’ (average 53%), and ‘ack of marine comprehensive management talent’ (average 50.7%) (Appendix 2.6).

Figure 4.12 Main issues of concern with regard to marine education and training (Q3.1.1)



1. failure to solve the problem of lack of employment opportunities for marine graduates (e.g. increase job openings for those performing well in national marine affairs examinations)
2. government does not devote sufficient resources to the development of marine education
3. lack of marine teachers and equipments in ocean university/college
4. the cultivation of high level talents in specialty fields concerning the ocean, marine policies and laws, and comprehensive management
5. insufficient investment of marine education
6. lack of marine education and training
7. people lack of marine accomplishments
8. lack of marine comprehensive management talent

- 9. fewer and fewer people want to devote themselves to marine industries
- 10. other
- 11. don't know/opinion

Figure 4.13 The top three main issues of concern with regard to marine education and training (Q3.1.2)

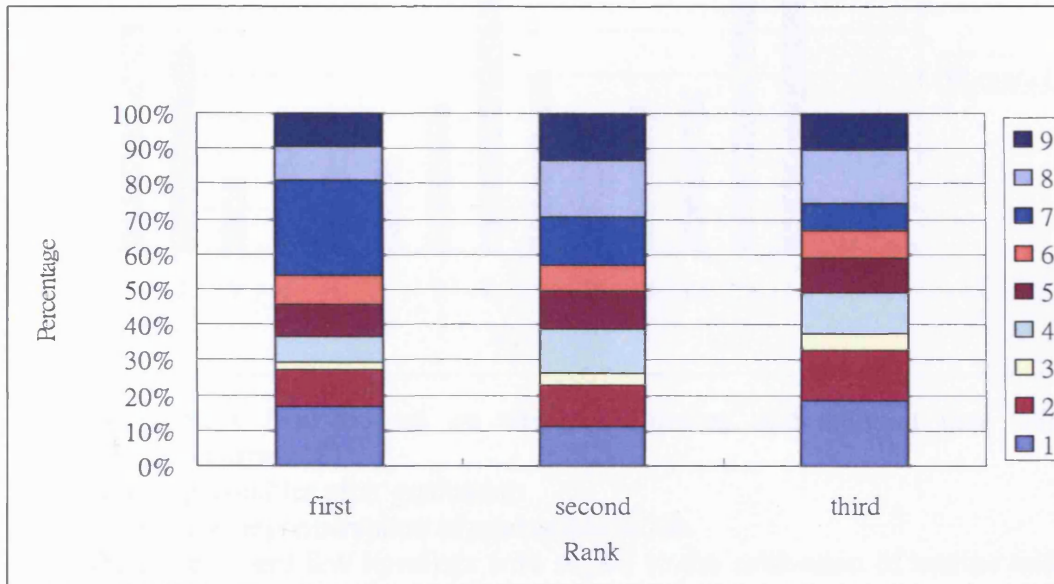
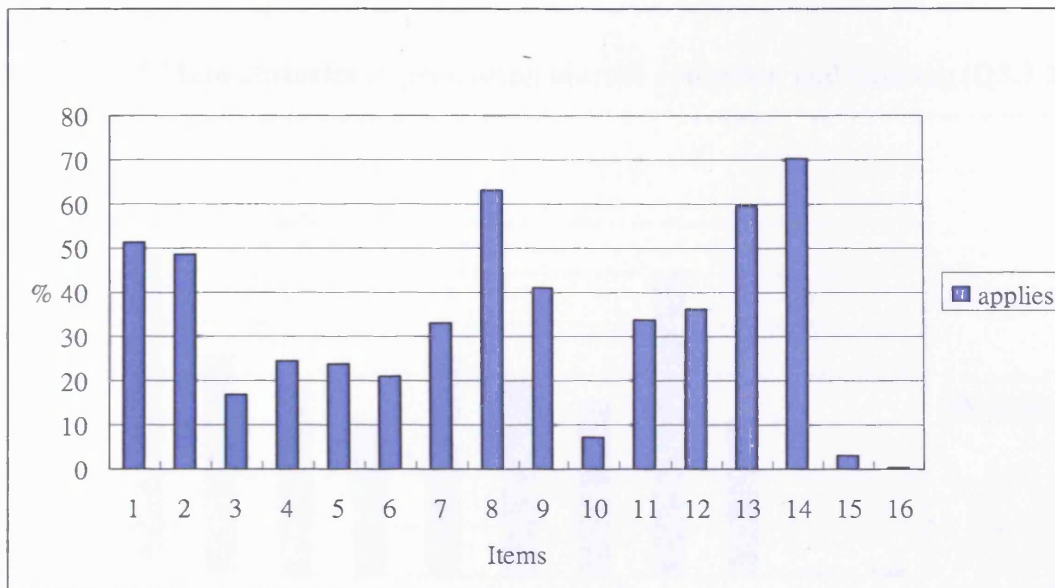


Figure 4.13 shows the top three main issues of concern were ‘people lack of marine accomplishments’ (average 46.3%), ‘failure to solve the problem of lack of employment opportunities for marine graduates (e.g. increase job openings for those performing well in national marine affairs examinations)’ (average 43.3%), and ‘lack of marine comprehensive management talent’ (average 38.1%). Only 9.6 per cent of respondents were concerned about this ‘lack of marine teachers and equipments in ocean university/college’ (Appendix 2.7). As can be seen in Figure 4.14, when respondents were asked what extent they agreed with the importance of statements for marine education and training, 70.4 per cent responded “the notion of ‘focusing on the land and despising the sea’”. More than 50 per cent of respondents also indicated ‘people seldom commune with ocean’ (average 63%), ‘lack of TV advertisements and programmes’ (average 59.6%), and ‘government focuses less on marine education and training than other education aspects’ (average 51.5%) (Appendix 2.8).

Figure 4.14 Importance of statements for marine education and training (Q3.2)

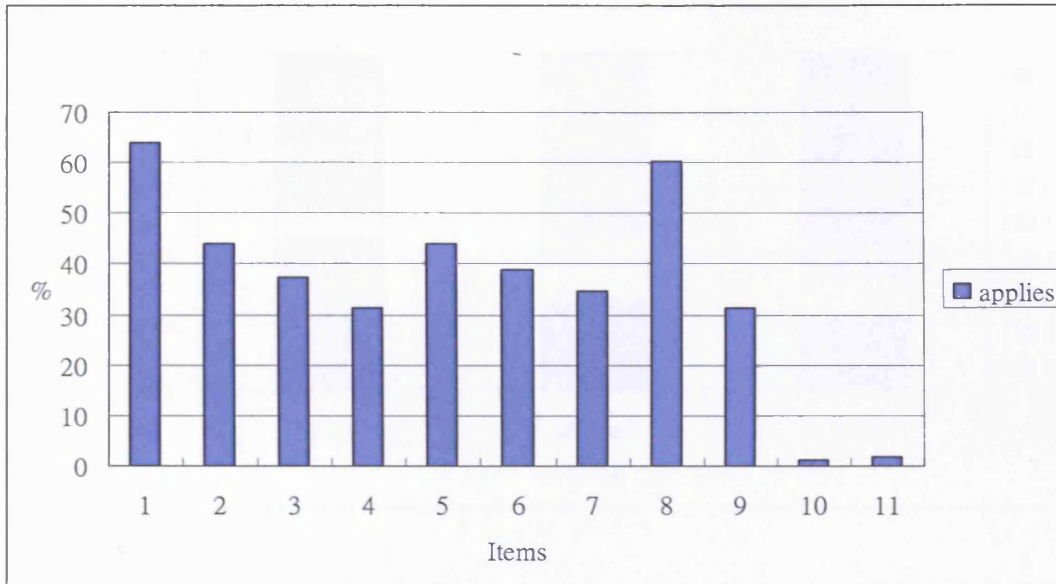


1. government focuses less on marine education and training than other education aspects
2. lack opportunities after graduation
3. ineffective implementation of marine education
4. there were very few openings with regard to the cultivation of marine talent for government-funded marine scholarship
5. threatened by a gap in manpower
6. both the traditional and emerging school departments have no idea what types of personnel are truly required by the industries
7. lack marine experience activities in the school education
8. people seldom commune with ocean
9. government already proclaim focus on it but doesn't carry out it
10. ineffective implementation of marine on-job training
11. the common education for all levels of schools offered very limited courses for cultivating maritime culture among the students
12. unsuitable resource distribution on marine education
13. lack of TV advertisements and programmes
14. the notion of 'focusing on the land and despising the sea'
15. other
16. don't know/no opinion

As indicated in Figure 4.15, when respondents were asked what they perceived to be main obstacles to promoting marine education and training, 64.1 per cent of respondents reported "education policy lay particular stress on 'consider the sea from the thought of land'", more than 50 per cent stated 'type of cultivation of marine talent and supply and demand of industry in the drop of quality and quantity' (average 60.4%), and 44.1 per cent of respondents reported 'lack of integrated institutions of marine research (e.g. academic research institutions of marine affairs)' (Appendix

2.9).

Figure 4.15 Main obstacles to promoting marine education and training (Q3.3.1)



1. education policy lay particular stress on 'consider the sea from the thought of land'
2. lack of ability of cultivation of marine affairs management talent
3. lack of sound system of marine education and training
4. lack of public interest
5. lack of integrated institutions of marine research (e.g. academic research institutions of marine affairs)
6. lack of a budget for marine education and training
7. jobs have low remuneration compared to other sectors
8. type of cultivation of marine talent and supply and demand of industry in the drop of quality and quantity
9. lack of ocean-related talent (e.g. lack of marine scientific talent and teacher)
10. other
11. don't know/no opinion

Figure 4.16 The top three main obstacles to promoting marine education and training (Q3.3.2)

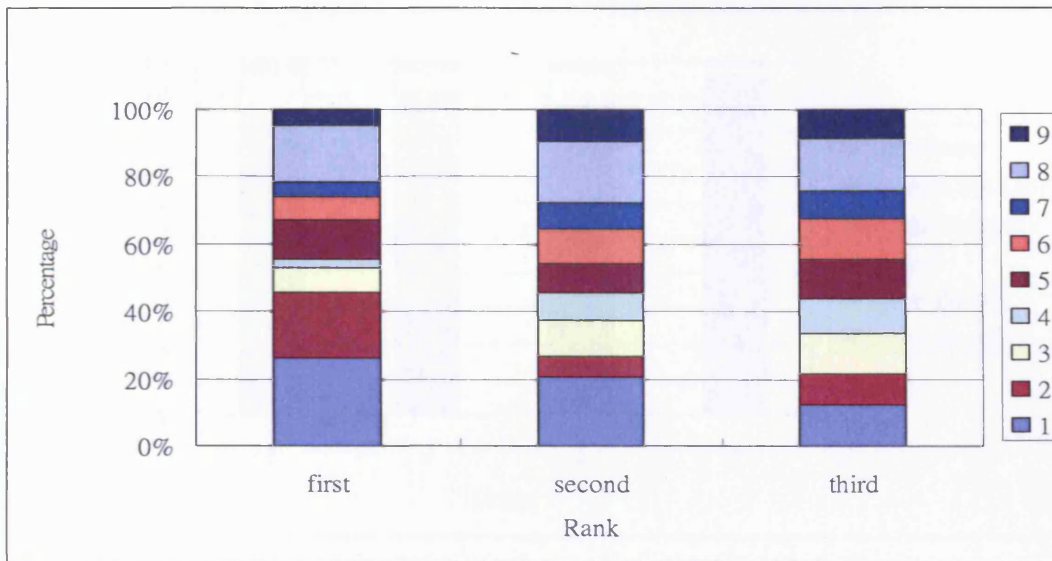
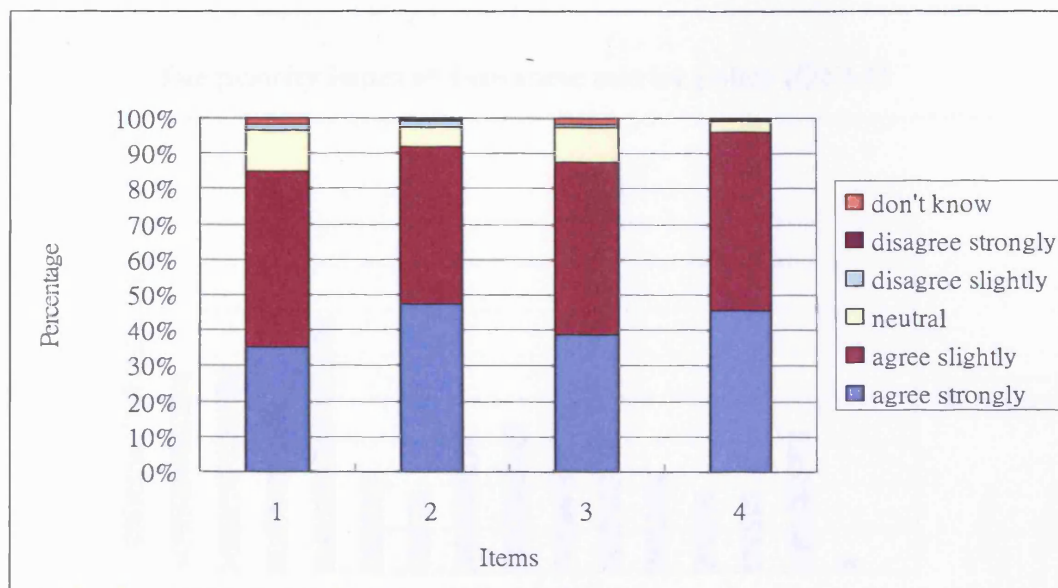


Figure 4.16 shows the top three main obstacles to promoting marine education and training are “education policy lay particular stress on ‘consider the sea from the thought of land’” (average 54.1%), ‘type of cultivation of marine talent and supply and demand of industry in the drop of quality and quantity’ (average 45.9%), and ‘lack of ability of cultivation of marine affairs management talent’ (average 31.9%) (Appendix 2.10).

As indicated in Figure 4.17, when respondents were asked if they agreed with the statements for improving marine education and training, more than 90 per cent of respondents agreed with the statement ‘promote the basic education of marine knowledge and strengthen marine courses and teaching materials in schools’ (average 94.8%), ‘enhance fishermen’s/other sea users’ education and training (e.g. in terms of legislation, marine environmental protection)’ (average 91.1%), and ‘strengthen manpower and financial resources of marine affairs management in education and training’ (average 86.2%).

Figure 4.17 Statements with respect to marine education and training (Q3.4)



1. increase budget for marine education and training
2. enhance fishermen's/other sea users' education and training (e.g. in terms of legislation, marine environmental protection)
3. strengthen manpower and financial resources of marine affairs management in education and training
4. promote the basic education of marine knowledge and strengthen marine courses and teaching materials in schools

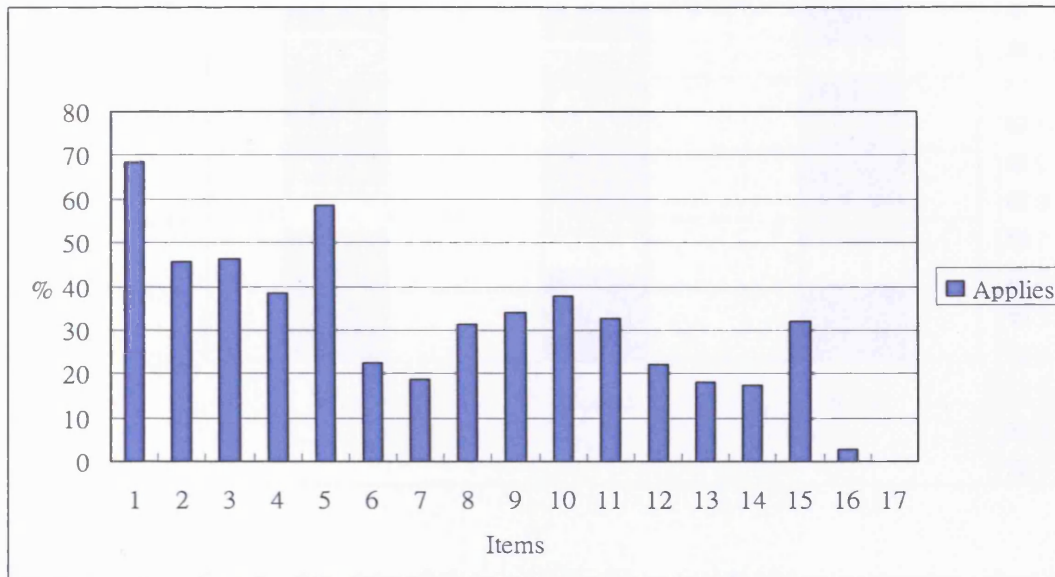
4.6.3 Policy development

This section discusses policy development, including priority issues of Taiwanese marine policy, which factors should be considered when the government is formulating marine policy, main obstacles to managing the marine environment, and respondents' agreement with statements with regard to what the government should focus on in the development of marine policy.

As shown in Figure 4.18, when respondents were asked what should be the priority issues of Taiwan's marine policy, 68.5 per cent of respondents reported 'marine resources declines continuously', 58.5 per cent considered 'ineffectiveness of marine environmental protection', and 46.3 per cent considered 'lack of marine comprehensive management' to be important. Few people were concerned about the issue of 'few courses of marine education and training' (average 17.4%) (Appendix

2.11).

Figure 4.18 The priority issues of Taiwanese marine policy (Q4.1.1)



1. marine resources declines continuously
2. ineffective implementation of marine conservation
3. lack of marine comprehensive management
4. ineffective implementation of fisheries management
5. ineffectiveness of marine environmental protection
6. lack of the ability of marine enforcement and maritime patrol
7. less scientific research of the sea
8. ocean-related Act/regulation
9. ineffective implementation of marine pollution
10. ineffective implementation of coastal zone management
11. marine tourism development influence marine ecology
12. lack of the equipment of marine disaster rescue system
13. marine culture education has not been popularized
14. few courses of marine education and training
15. overlap of marine jurisdiction (e.g. overlap of EEZ and continental shelf)
16. other
17. don't know/no opinion

Figure 4.19 The top three priority issues of Taiwanese marine policy (Q4.1.2)

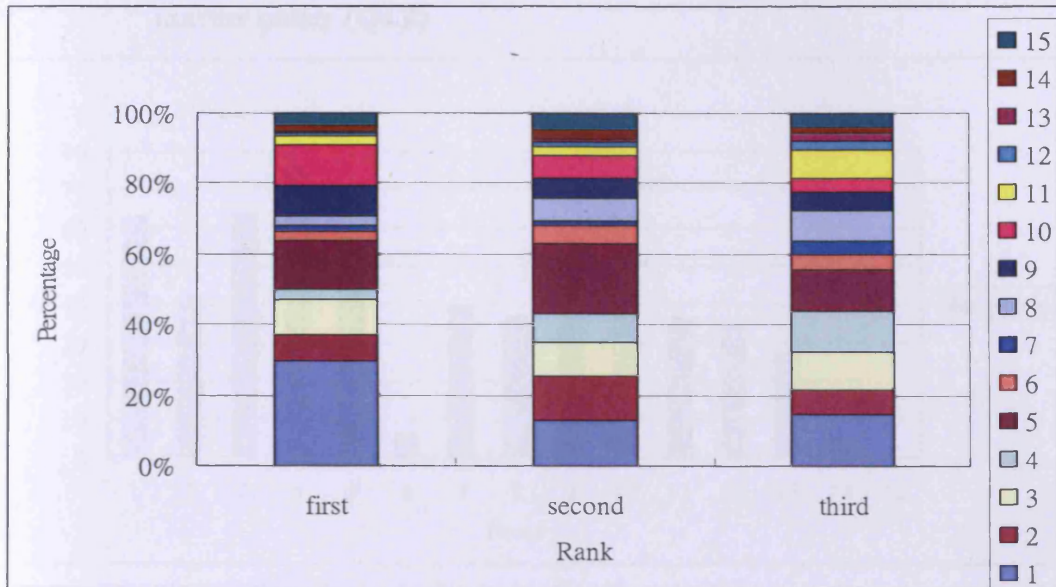
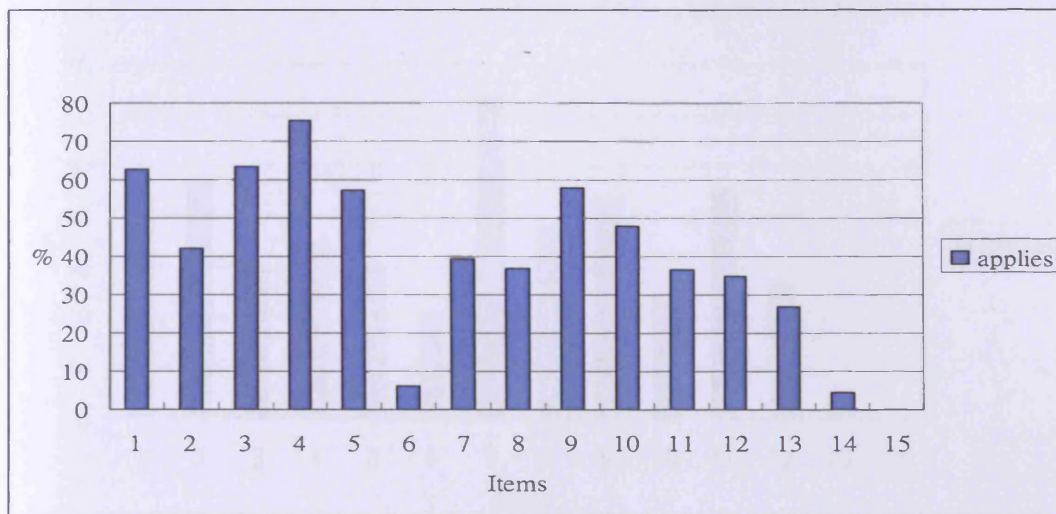


Figure 4.19 shows the top three priority issues: ‘marine resources declines continuously’ (average 56.3%), ‘ineffectiveness of marine environmental protection’ (average 44.8%), and ‘lack of marine comprehensive management’ (average 29.6%) (Appendix 2.12).

As can be seen in Figure 4.20, when respondents were asked which factors should be considered when the government is formulating marine policy, 75.6 per cent of respondents reported ‘pay attention to sustainable utilisation of marine resource’, almost two-thirds specified ‘pay attention to marine environment protection’ (average 63.3%), and over half said ‘following the international development trend of marine policy and management’ (average 62.6%), ‘pay attention to marine comprehensive management’ (average 58.1%), and ‘pay attention to conservation of marine biology resource’ (average 57.4%) (Appendix 2.13).

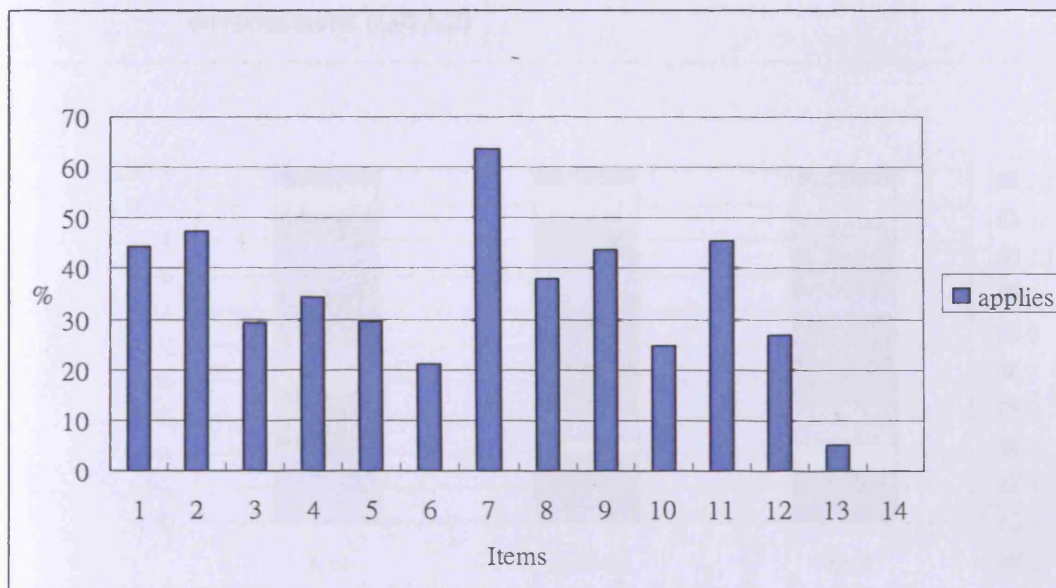
Figure 4.20 Factors which should be considered when government is formulating marine policy (Q4.2)



1. following the international development trend of marine policy and management
2. pay attention to co-ordination of government departments/agencies
3. pay attention to marine environment protection
4. pay attention to sustainable utilisation of marine resource
5. pay attention to conservation of marine biology resource
6. pay attention to marine tourism development
7. pay attention to co-ordination between central and local government
8. pay attention to the sound of marine legislation
9. pay attention to marine comprehensive management
10. pay attention to fisheries management
11. pay attention to the implementation of the system of marine policy and management
12. pay attention to marine scientific research
13. take account of ocean user's opinion in order to avoid conflict (public participance)
14. other
15. don't know/no opinion

As indicated in Figure 4.21, when respondents were asked what are the main obstacles to managing the marine environment, more than half of respondents viewed 'lack of policy of marine comprehensive management' (average 63.7%) as the main obstacle to management of the marine environment. In addition, 47.4 per cent of respondents reported 'lack concept of sustainable development in government' and 45.6 per cent considered 'government has not promulgated explicit marine protection plan' (Appendix 2.14).

Figure 4.21 Main obstacles to management of the marine environment (Q4.3.1)



1. politics influence
2. lack concept of sustainable development in government
3. lack of the co-ordination system among ocean-related agencies
4. lack of sound ocean-related Act/regulation (e.g. lack of specific Act of coastal management)
5. over-reliance on economic priorities
6. lack of the interaction between central government and local government
7. lack of policy of marine comprehensive management
8. lack of marine budget (e.g. developmental budget of scientific research of the sea is lower than other scientific research)
9. users lack awareness of environment protection of marine ecosystem
10. government does not pay attention to the development of marine policy
11. government has not promulgated explicit marine protection plan
12. the international status is weak
13. other
14. don't know/no opinion

Figure 4.22 The top three main obstacles to management of the marine environment (Q4.3.2)

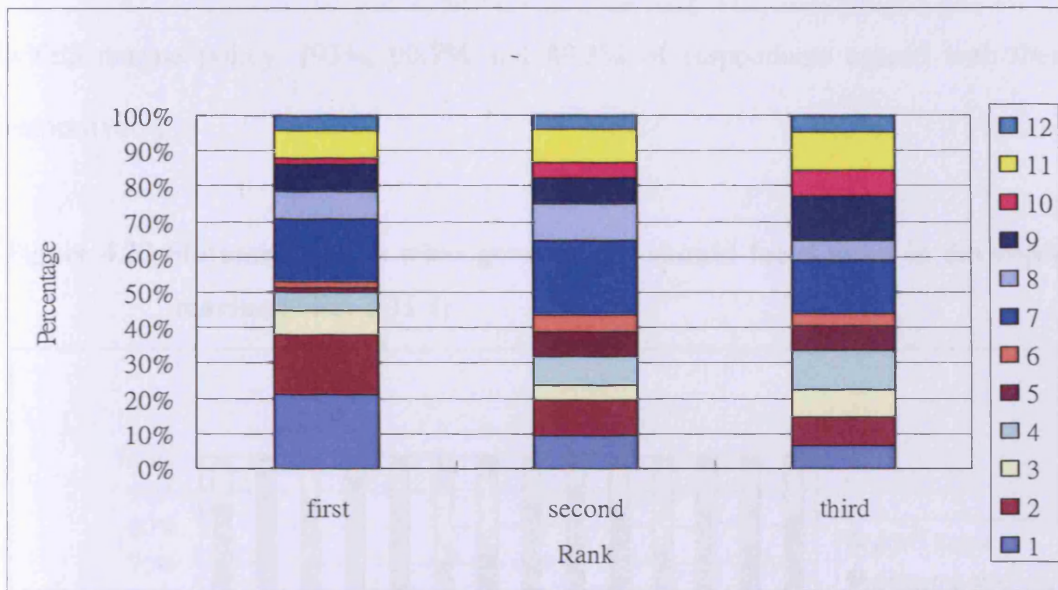
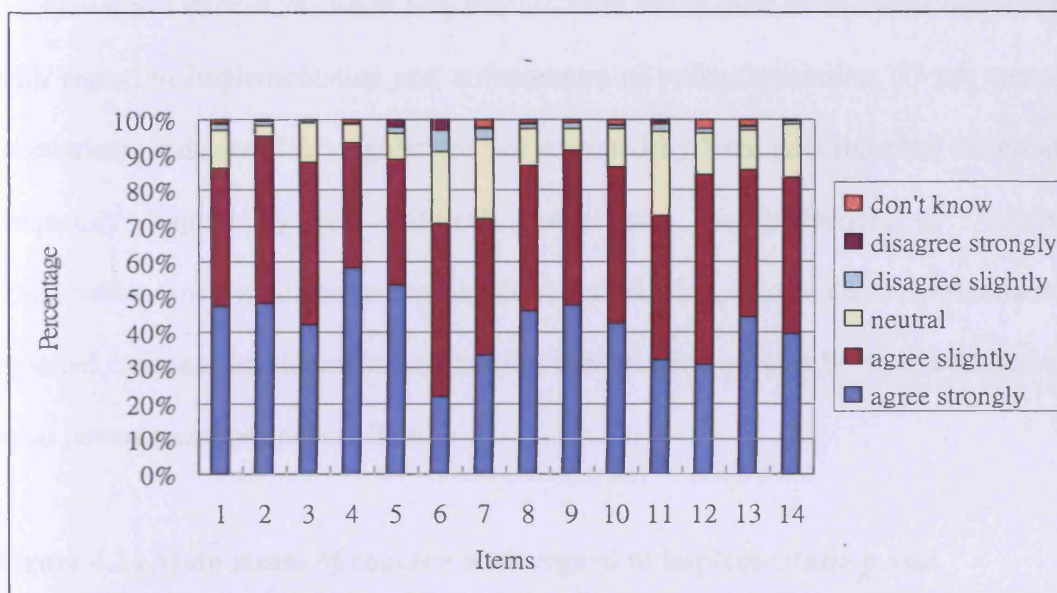


Figure 4.22 shows the top three main obstacles to management of the marine environment, are ‘lack of policy of marine comprehensive management’ (average 52.2%), ‘politics influence’ (average 35.6%), and ‘lack concept of sustainable development in government’ (average 34.1%). Only 9.3 per cent of respondents viewed ‘lack of the interaction between central government and local government’ as the main obstacle to effectively managing the marine environment and even fewer (1.7 per cent) from central government thought this obstacle existed (Appendix 2.15).

Figure 4.23 shows that when respondents were asked to what extent they agreed with statements relating to what the government should focus upon when developing marine policy, more than 50 per cent of respondents agreed strongly that its focus should be to ‘enhance marine environment protection’ and to ‘enhance conservation of marine biology resources’. In fact, respondents thought all statements should be adopted when the government focuses upon the development of marine policy,

especially 'enhance marine comprehensive management', 'enhance marine environment protection', and 'implement the concept of sustainable development within marine policy' (93%, 90.7% and 89.3% of respondents agreed with these, respectively).

Figure 4.23 Statements as to what government should focus upon in developing marine policy (Q4.4)



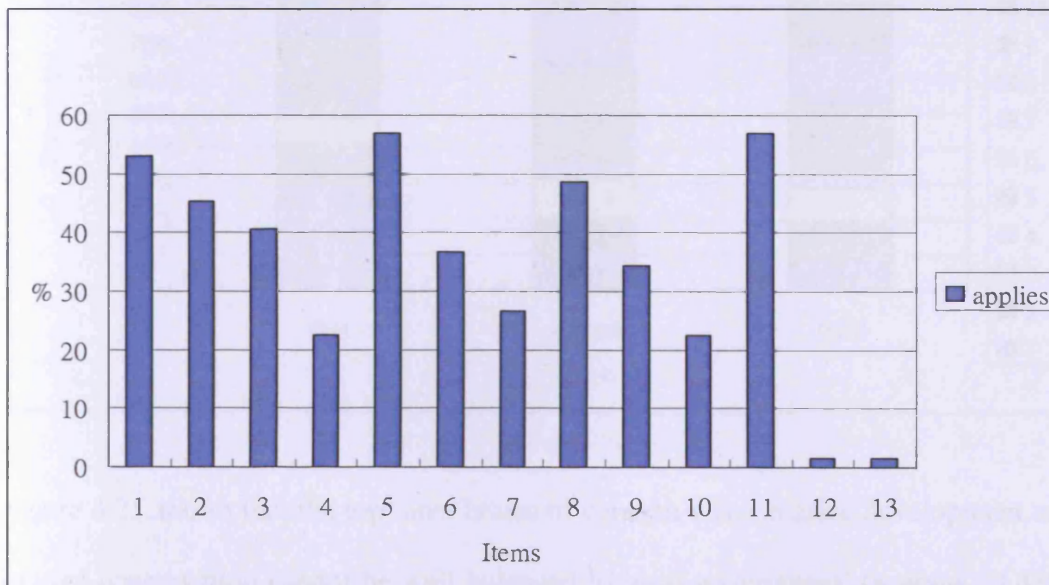
1. promote international position (e.g. participate in international marine organisations or fishery organisations)
2. enhance marine comprehensive management
3. enhance integrated management of coastal zone
4. enhance marine environment protection
5. enhance conservation of marine biology resources
6. enhance marine industrial development (e.g. marine tourism)
7. increase marine budget
8. enhance marine enforcement and maritime patrol (e.g. increase manpower and equipment, and strict enforcement of legislation)
9. implement the concept of sustainable development within marine policy
10. sound administrative management system (e.g. integrated co-ordination system of government departments/agencies)
11. enhance the interaction between central government and local government
12. enhance scientific research of the sea and monitoring
13. enhance marine education and training
14. enhance co-ordination of ocean-related government departments/agencies

4.6.4 Implementation and enforcement

This section focuses on issues of main concern regarding implementation and enforcement of policy/legislation. The importance of statements for the effective implementation of a sound marine policy and identification of obstacles so as to strengthen existing implementation and enforcement of policy is discussed.

As shown in Figure 4.24, when respondents were asked their main issues of concern with regard to implementation and enforcement of policy/legislation, 57 per cent of respondents indicated ‘the regulations are executed by local governments, which are frequently limited by real political power’ and ‘ineffectiveness of marine conservation and environmental protection’. In addition, 53 per cent of respondents reported ‘marine development and marine conservation cannot be well balanced in local government’ (Appendix 2.16).

Figure 4.24 Main issues of concern with regard to implementation and enforcement of policy/legislation (Q5.1.1)



1. marine development and marine conservation cannot be well balanced in local government
2. lack of public awareness lead to obstruction of implementation
3. the assignment and usage of resources and law enforcement are not planned and executed with full co-ordination between central and local government
4. regulations that are executed by local governments, since they are frequently limited by outlay
5. the regulations are executed by local governments, which are frequently limited by real political power
6. lack of awareness by national level policy decision-makers of the impact of their decisions at local management level
7. decision-makers in marine affairs are not aware of the impact of national decisions at the local level
8. managers lack the concept of sustainability
9. regulations that are executed by local governments, since they are frequently limited by human resources
10. lack of effort/commitment between implementation and enforcement personnel
11. ineffectiveness of marine conservation and environmental protection
12. other
13. don't know/no opinion

Figure 4.25 The top three issues of concern with regard to implementation and enforcement of policy/legislation (Q5.1.2)

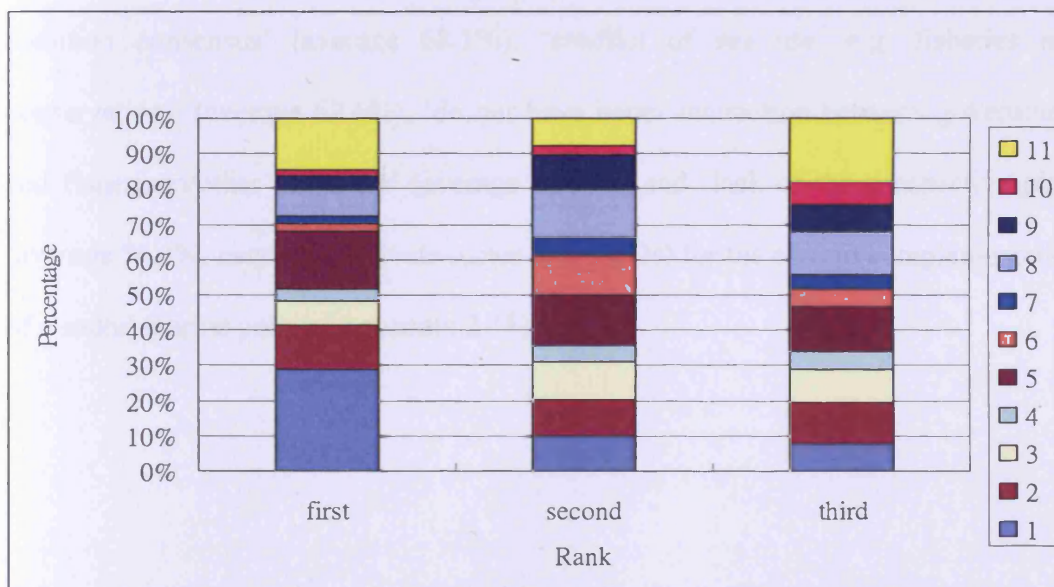
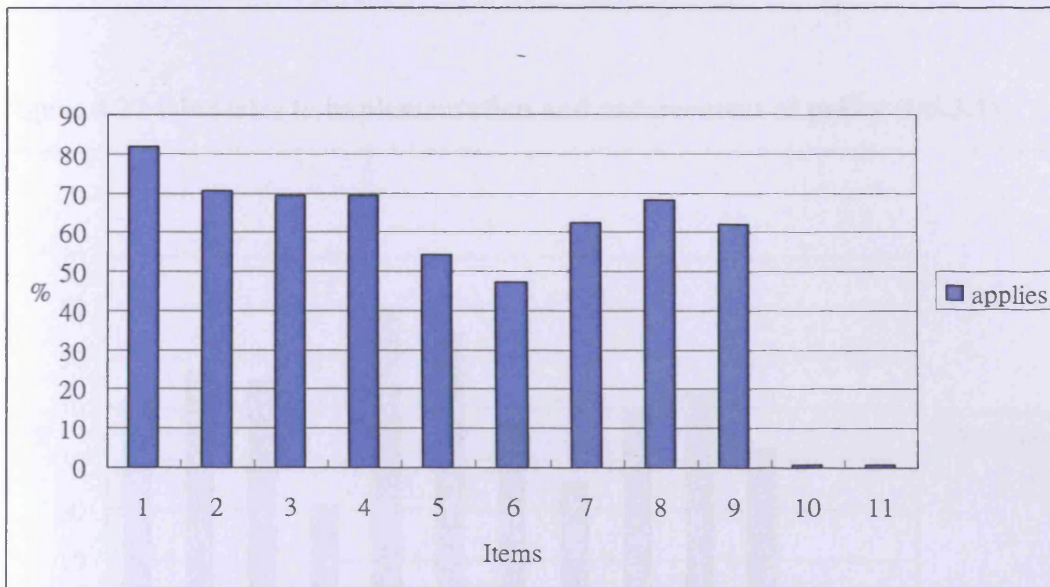


Figure 4.25 shows that the top three issues of concern were ‘marine development and marine conservation cannot be well balanced in local government’ (average 44.4%), ‘the regulations are executed by local governments, which are frequently limited by

real political power' (average 40.7%), and 'ineffectiveness of marine conservation and environmental protection' (average 38.1%) (Appendix 2.17).

As can be seen in Figure 4.26, when respondents were asked to what extent they agreed with the importance of statements for implementation and enforcement of policy/legislation, 81.9 per cent of respondents agreed with the importance of 'people lack understanding of the concept of marine environment protection and marine resource conservation'. Over two-thirds agreed with the importance of 'political influence (e.g. political benefits, to lobby illegally, voting consideration)' (average 70.7%), 'managers lack of concept of marine comprehensive management' (average 69.6%), and 'coastal environment worsens caused various environmental problems' (average 69.3%). Over half of respondents agreed with the importance of the statements, 'most people do not understand the ocean so that it is unable to reach common consensus' (average 68.1%), 'conflict of sea use (e.g. fisheries and conservation)' (average 62.6%), 'do not have better interaction between government and fishermen/other sea users' (average 61.9%), and 'lack of the prospective plan' (average 54.4%, except the private sector and NGOs) for the effective implementation of a sound marine policy (Appendix 2.18).

Figure 4.26 Importance of statements for implementation and enforcement of policy/legislation (Q5.2)

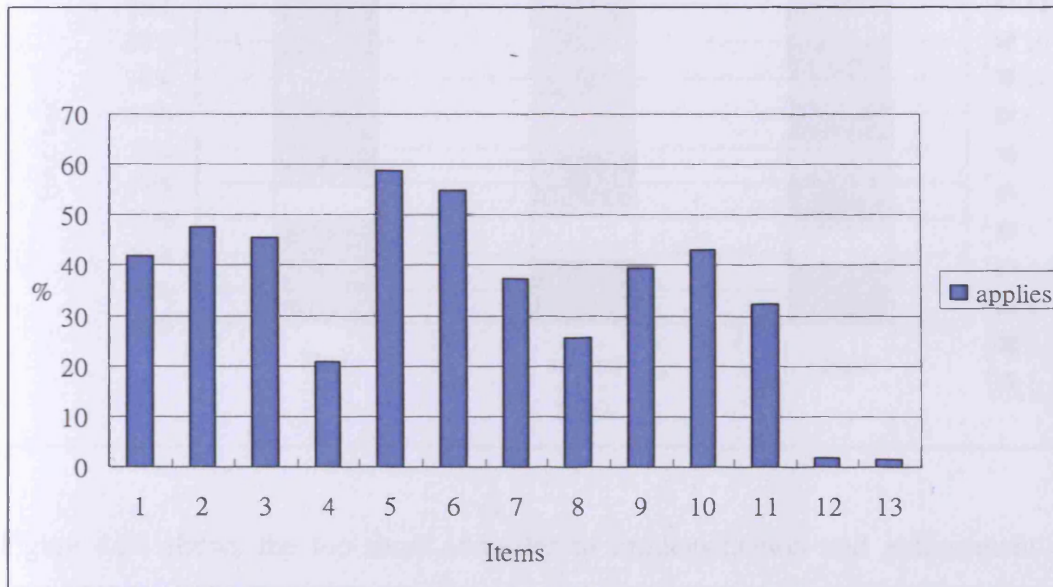


1. people lack understanding of the concept of marine environment protection and marine resource conservation
2. political influence (e.g. political benefits, to lobby illegally, voting consideration)
3. coastal environment worsens caused various environmental problems
4. managers lack of concept of marine comprehensive management
5. lack of the prospective plan
6. enforcer's professional knowledge is insufficient lead to influence the efficiency of enforcement
7. conflict of sea use (e.g. fisheries and conservation)
8. most people do not understand the ocean so that it is unable to reach common consensus
9. do not have better interaction between government and fishermen/other sea users
10. other
11. don't know/no opinion

As indicated in Figure 4.27, when respondents were asked to indicate their agreement with statements citing obstacles to the implementation and enforcement of policy, more than half agreed with the statement 'lack of co-ordination mechanism of marine comprehensive management' (average 58.9%, except the private sector) and 'technical tools of marine conservation and environmental protection can not implement effectiveness (e.g. SEA and MPA)' (average 54.8%). In addition, 47.8 per

cent of respondents reported ‘the absence of unified administration authority in marine enforcement’ (Appendix 2.19).

Figure 4.27 Obstacles to implementation and enforcement of policy (Q5.3.1)



1. lack of sound ocean-related information and science database (e.g. marine environmental database, database of fishery management, etc.)
2. the absence of unified administration authority in marine enforcement
3. economic development is the priority (e.g. government connives in marine environment destruction due to developmental benefits)
4. lack of marine budget
5. lack of co-ordination mechanism of marine comprehensive management
6. technical tools of marine conservation and environmental protection can not implement effectiveness (e.g. SEA and MPA)
7. lack of education and professional training of marine enforcement personnel (e.g. lack of marine management talent)
8. the departmental egoism among management organisation lead to influence the effectiveness of management
9. lack of a sound ocean-related Act/regulations
10. illegal sea use (e.g. illegal fishing, pollution of marine resources)
11. ocean users' attitude
12. other
13. don't know/no opinion

Figure 4.28 The top three obstacles to implementation and enforcement of policy (5.3.2)

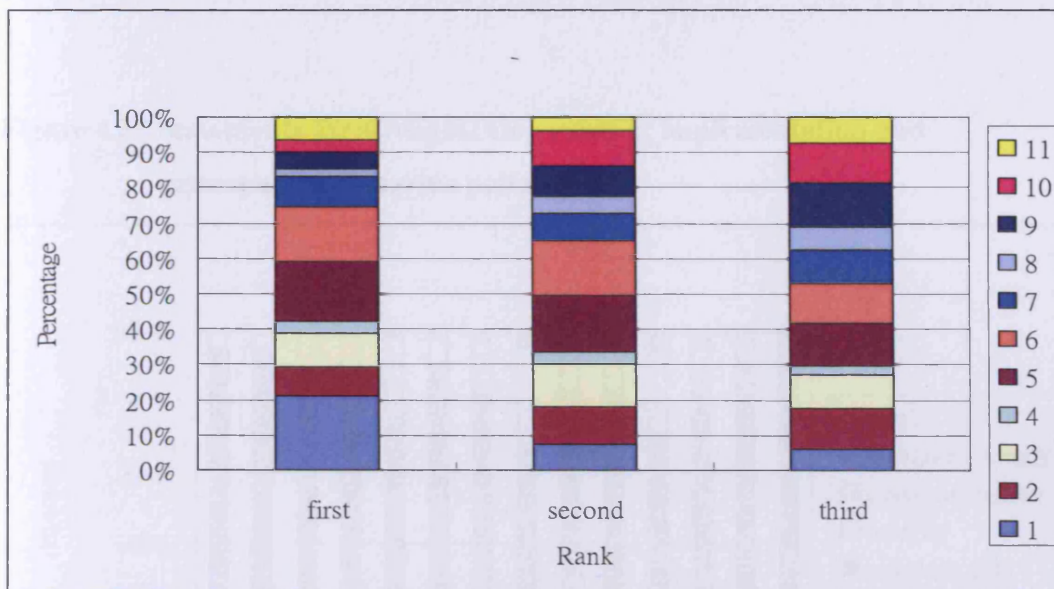
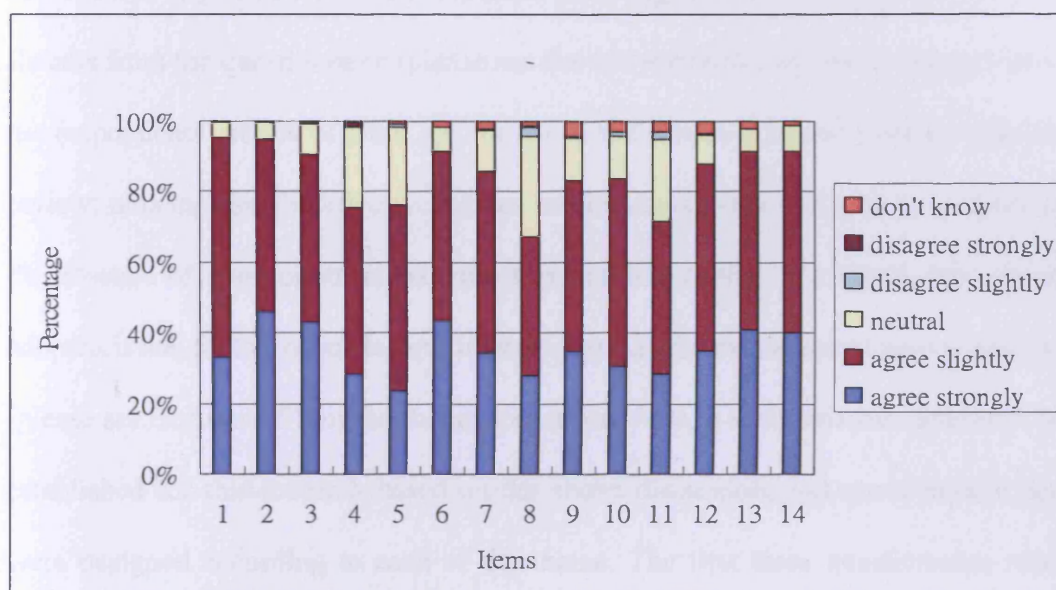


Figure 4.28 shows the top three obstacles to implementation and enforcement of policy, are ‘lack of co-ordination mechanism of marine comprehensive management’ (average 42.6%), ‘technical tools of marine conservation and environmental protection can not implement effectiveness (e.g. SEA and MPA)’ (average 40.4%), and ‘lack of sound ocean-related information and science database (e.g. marine environmental database, database of fishery management, etc.)’ (average 32.6%). Only 8.9 per cent of respondents viewed ‘lack of marine budget’ as an obstacle to implementation and enforcement of policy (Appendix 2.20).

Figure 4.29 shows that when respondents were asked if they agreed with the importance of certain statements for strengthening existing implementation and enforcement of marine policy, more than 90 per cent agreed with the statement ‘enhance mechanism of public participation’ (93.7%), ‘promote SEA and MPA actively’ (93.4%), ‘enhance co-ordination between ocean-related

departments/agencies' (90.3%), 'establish a sound ocean-related Act/regulations' (90%), and 'enhance ocean-related education and advertisements' (90%).

Figure 4.29 Statements for strengthening existing implementation and enforcement of marine policy (Q5.4)



1. enhance mechanism of public participation
2. promote SEA and MPA actively
3. keep a balance between marine development and marine resources conservation
4. establish an environmental monitoring system in order to avoid environmental destruction
5. reduce the ocean-related conflict between government and people
6. establish a sound ocean-related Act/regulations
7. implement relevant management tools (e.g. MPA, SEA)
8. increase manpower and equipment of marine enforcement
9. strengthen the marine science base (e.g. more research)
10. better provision of information/data to users
11. increase the marine budget
12. the law enforcement departments/agencies have to implement and administer by law
13. enhance ocean-related education and advertisements
14. enhance co-ordination between ocean-related departments/agencies
15. other

4.7 DISCUSSION: MAIN THEMES

Presently, numerous problems exist in Taiwanese marine policy and environmental management: a neglected marine management by the government, incomprehensive ocean-related act/regulations, a decentralised authority, political influence, and a lack of concrete implementation and systemic planning (please see Sections 4.2 - 4.4). Results from the questionnaire (please see Section 4.6) revealed that for certain issues, the respondents' points of view are similar to the results obtained from the literature review; nonetheless, the effectiveness on marine management cannot be evaluated in the absence of appropriate management assessment tools. As a result, this research adopted issue, factor, obstacle, and improvement as the management assessment tools (please see Section 3.5) for the theme discussion. Also, a semi-structure interview was established for this research based on the above discussion, and questionnaire items were designed according to each of the theme. The first three questionnaire results were selected as the focus of the questions. The purpose is to carry out an in-depth interview with academics from industry, government, education, and private organisations in order to gain a better understanding on the overall association. Questions for the interview were divided into six sections as follows: The first section are the interviewee's details including name of organisation, type of respondent, position held, date of completion, contact telephone, and e-mail. The second section is about organisation and legislation. The third section is on human resources. The fourth section is on policy development. The fifth section is on technical management, implementation and enforcement. The last section is related to any additional ideas, views or comments may be attached to the questionnaire, and would be greatly appreciated. In addition, for an issue-related question such as Question 2.1, the question was phrased as 'So far as your profession concern, could you please describe

briefly the cause the issues of organisation and legislation in terms of Government lacks a marine comprehensive management organisation, ocean-related Act/regulations are not sound, and ineffectiveness of marine enforcement?'. For an issue-related question such as Question 2.2, the question was phrased as 'According to the questionnaires results, in your opinion, the relevant factors of organisation and legislation lead to the issues whether are lack of environmental development principles in the legal system (e.g. principles of sustainable development, polluter pays, precautionary, etc.), lack of political will, and economic is the priority?' and two sub-question which are 'If yes, what is the interrelation with issues?' and 'If no, could you please describe briefly?' The main purpose is to gain an insight from those marine-related issues concerned by the interviewees. Other questions were also designed based on this principle (Appendix 3).

4.8 CONCLUSION

Concerning the current Taiwanese marine policy and environmental management, some relevant findings on sea uses are a continuous decline in marine resources, putting economic as the priority, and a lack of understanding of marine environment protection and marine resource conservation among people. For the part of evolution of marine policy and environmental management, the major findings are a lack of policy for marine comprehensive management, a lack of concept for a sustainable development in government, and a lack of explicit marine protection plan promulgated by government. In terms of the major policy issues, some of the key findings are a lack of marine comprehensive management organisation from government, poor ocean-related act/regulations, and an ineffective marine enforcement (please see Sections 4.2 - 4.4). Thereafter, the questionnaire can be used

to gain more insight on various management elements from organisation and legislation, human resources, policy development, technical management, and implementation and enforcement. These results can be integrated into the semi-structure interview, and according to the perspectives from industry, government, education, and private organisations as well as with the use of management assessment tools, the author can carry out an in-depth investigation on the sources (please see Section 4.7) to provide a reference for this research.

Furthermore, to be cautious and objective, important themes related to fisheries, waste disposal and pollution, and marine conservation are combined and discussed in Chapters 5, 6, and 7, respectively. Finally, Taiwanese marine policy and environmental management are comprehensively discussed in Chapter 8 to attain the purpose of this research.

CHAPTER 5

FISHERIES

5.1 INTRODUCTION

In order to research the fundamental problems and difficulties within the existing marine policy and marine environmental management system in Taiwan, fisheries is selected for the research (please see Section 3.3.5). The fishing industry is one of the most important primary industries in Taiwan. Taiwan's fisheries is divided into far sea fisheries, offshore fisheries, coastal fisheries, and aquaculture. As far sea fisheries exist in the High Sea and the EEZ of other countries and aquaculture fisheries is mostly inland culture, this Chapter will focus on offshore and coastal fisheries only.

The COA is the highest fisheries policy-making body in Taiwan. Under it comes the FA, the highest fisheries administrative agency in the country. Additionally, the COA has continued with the revision of the *Forestry Act*, *Wildlife Conservation Act*, *Cultural Heritage Preservation Act*, and related *Conservation Acts/regulations* to establish effective management regulations for nature conservation. However, as fisheries policy focused on development prior to 1974 only, it has resulted in the rapid decline of offshore and coastal fishery resources in recent years. In order to manage resources efficiently and effectively, the FA has already adjusted the industrial structure of offshore and coastal fisheries in accordance with the objectives of sustainable operations, and its vision is to establish sustainable and safe public fisheries of high quality. To understand the development and sustenance needs of Taiwan's fisheries, it is necessary to view fisheries management as the axis which other considerations revolve in any development or planning policy. Therefore, this chapter will discuss the situation of fisheries with regard to its development, governance, policy and management, as well as the technical, implementation and

enforcement aspects, followed by an overview of the management assessment.

5.2 DEVELOPMENT

Owing to the rapid decline of fishery resources, the Taiwanese government implemented a series of measures in fisheries management. This section reviews the evolution of fisheries in Taiwan including its development and structure.

5.2.1 Development

Fishing catch greatly reduced after the Japanese Colonial Administration handed over the full governing authority of Taiwan to the Kuomintang Military Administration in 1945. Total production was only 16,000 tonnes in 1946 because of the influence of World War II (COA, 1991). Thereafter, the government's main priority was to restore offshore and coastal fisheries in Taiwan. Offshore and coastal fisheries were restored rapidly through cooperation between the public and the government. The production of offshore and coastal fisheries was 21,458 tonnes and 26,048 tonnes, respectively, in 1950, an amount which exceeded the heyday in the Japanese Colonial Period (Chen and Wang, 1993).

In 1951, the government set up the 'Taiwan Fishery Increased Production Committee', cancelled the policy of limiting vessel building, and encouraged people to build fishing craft. From 1953 onwards, the government implemented an *Economic Development Plan* in six stages to encourage fishermen to increase production, especially with respect to offshore and coastal fisheries. The government hoped that the *Plan* would attract a large number of people devoting themselves to offshore and coastal fisheries with a limited budget (Lee, 2007). By the end of the second stage of the *Economic Development Plan* in 1960, the number of people employed in Taiwan's fisheries, the number of small-scale fishing craft, and the production of fisheries had

increased rapidly. By that time, fisheries were primarily limited to offshore and coastal fisheries. During the third stage of the *Economic Development Plan* (1961-1964), the government encouraged people to build larger fishing craft. The number of fishing craft using the bull trawl and the smaller sized otter trawl in Taiwan was 400 and 1,400, respectively, in 1964. Their combined number represented one-third of the total fishing fleet at that time. A major turning point in the development of Taiwan's fisheries was the gradual turning to far sea fisheries (COA, 1991). However, as most trawlers operated in the Taiwan Straits this led to the frequency of operations in the area becoming very high. In addition, many fishing craft disregarded the rule of law and operated in prohibited fishing areas. This led to overfishing and fisheries' resources reaching the point of exhaustion.

In 1967, for the first time, the government implemented measures towards limiting vessel building in order to maintain offshore and coastal fisheries' resources, and veer fishing craft towards harvesting far sea fisheries. The government began to implement the launching of various types of artificial fish reefs and the releasing of fish seeds in 1974 and 1978, respectively, subsidised local governments' building of small-scale vessels for the patrol of fisheries in 1980 and then implemented the patrol and protection of fisheries in 1982. Since 1986, the government has also implemented the *Plan of Assessment in Conservation Area of Coastal Fisheries Resources* which was under the *Programme of Improvement of Agricultural Structure and Increase farmers' Incomes* in order to restore and sustain Taiwan's aquatic resources (Hsieh, 2001). The Executive Yuan subsequently ratified the *Fisheries Development Programme* in 1990 and introduced the *Plan* to conserve and sustainably deploy and utilise coastal fisheries' resources as an important measure for promoting conservation of coastal areas in Taiwan.

In 1991, the production of offshore and coastal fisheries had decreased to 266,945 tonnes and 41,231 tonnes, respectively, and there were wild fluctuations in the price of fish. These facts pointed to a crisis in the operations of offshore and coastal fisheries. The government therefore introduced the 'Policy of Zero Increase' and focused on restructuring the structure of fisheries (COA, 1991). In order to downsize and adjust activities in offshore and coastal fisheries in Taiwan, the government implemented a *Plan* to reduce fleet size between 1991-1995 and also limit all-round vessel building in 1992. The government subsequently implemented further fleet size reduction in 2000 and fishing closures in 2002 to reduce fishing effort.

In more recent years, government policy with regard to offshore and coastal fisheries has focused on further measures to reduce fleet size, limit vessel building, and maintain fish stocks. The government's main existing offshore and coastal fisheries' policies are as follows:

- (1) *Plans to facilitate orderly fish productions in the 12-mile territorial waters will be re-assessed and an appropriate management mechanism will be established to extend the activities of coastal fisheries and to intensify the management of sea areas. Diversification of fisheries will be promoted to achieve effective utilisation of fishery resources within the territorial sea of Taiwan.*
- (2) *There will be plans to promote the multiple functions of fishing ports. The infrastructures at various ports will be improved by installing appropriate environmental protection facilities, thereby upgrading their overall features.*
- (3) *In line with the growing fondness of the public for recreational activities as well as the trend towards developing in recreational fishery, infrastructures at various ports will be improved while maintaining their scenic features. Fishermen will be*

encouraged to change their original operation to recreational fishery, in order to relieve the pressure on fishery resources and to ensure their sustainable utilisation. (FA, 2008a).

5.2.2 Structure

Taiwan is an island surrounded by sea, with little flat land and densely populated. There are several ocean currents around the island, namely, the China Coastal Current, the South China Sea Current, and the Kuroshio Current. The many rivers in Taiwan and Mainland China that flow into the sea surrounding Taiwan and the Continental Shelf of the East China Sea provide an excellent basis for Taiwan developing offshore and coastal fisheries. The scope of operation of Taiwan's offshore and coastal fisheries extends to three oceans, the Atlantic Ocean, India Ocean, and Pacific Ocean, and is the reason for Taiwan being one of the top six far sea fisheries in the world. The catch of tuna and squid are the second and third highest in the world, respectively. From Table 5.1, in Taiwan, the marine fisheries and aquaculture fisheries were provide 648.9 thousand ton aquatic product for domestic consumption. Overall, the fish protein provides more than 18% of animal protein for nation in Taiwan (FA, 2007).

Table 5.1 The production and utilisation of marine fisheries and aquaculture in**Taiwan**

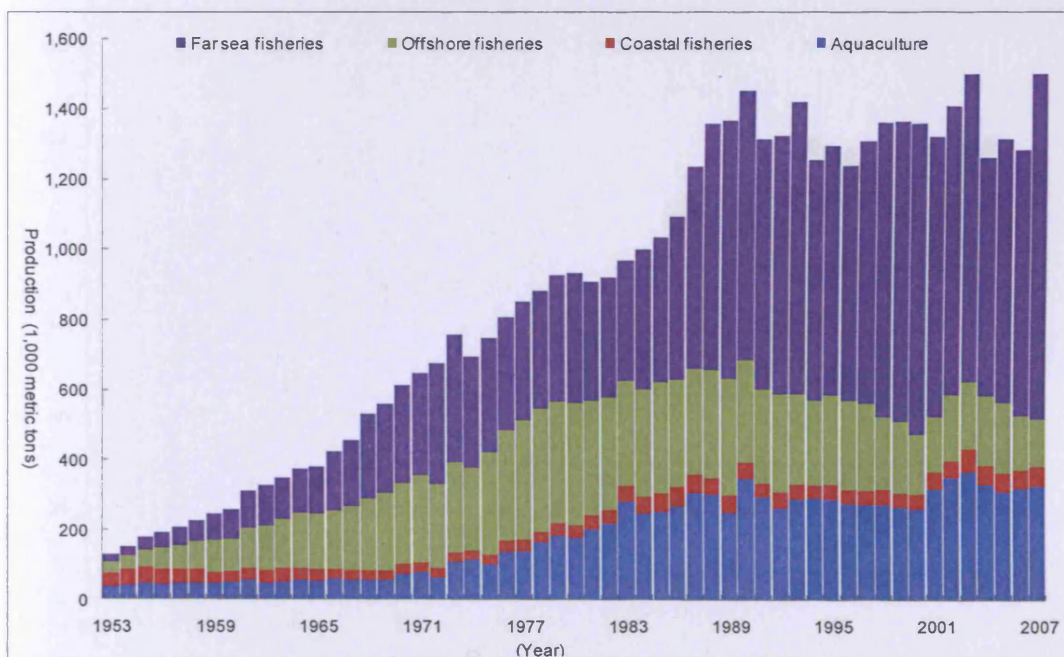
Production (tons)	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Inland										
Capture	0.04	0.05	0.0557	0.060	0.060	0.047	0.025	0.02	0.01	0.024
Aquaculture	22.91	23.91	22.8117	28.60	31.79	33.03	28.90	27.23	26.41	28.99
Total	22.96	23.97	22.86	28.66	31.85	33.08	28.92	27.25	26.43	29.02
Marine										
Far sea fisheries	83.91	85.46	88.68	79.56	82.35	87.76	70.68	75.21	75.78	98.45
Offshore fisheries	20.97	20.56	16.95	15.98	18.59	19.34	19.77	20.16	15.48	13.54
Coastal fisheries	4.36	3.9911	4.4016	4.9559	4.96	6.37	5.629	5.2956	5.4381	5.428
Coastal aquaculture	2.60	2.40	2.83	2.71	2.90	3.47	3.74	3.49	3.46	3.51
Total	111.86	112.43	112.87	103.21	108.82	116.96	99.82	104.17	100.17	120.93
Total capture	109.30	110.08	110.10	100.57	105.98	113.54	96.11	100.70	96.73	117.45
Total aquaculture	25.52	26.31	25.6399	31.31	34.70	36.51	32.64	30.73	29.88	32.51
Total fisheries production	134.82	136.40	135.74	131.87	140.67	150.04	128.75	131.42	126.60	149.95
Utilization										
Consumption	85.82	95.97	88.98	78.97	80.82	89.91	69.97	67.64	64.89	
Non-food	7.43	6.72	6.86	6.73	7.28	7.53	7.17	6.84	5.12	
Export	52.99	45.87	53.89	57.01	66.16	64.79	63.64	71.94	70.71	
Import	14.35	15.63	17.98	14.97	17.73	16.81	17.28	17.22	14.93	
Population	21.77	21.95	21.035	22.28	22.40	22.49	22.58	22.65	22.74	
Food supply	39.41	43.72	40.22	35.45	36.08	39.97	30.99	29.86	28.54	

Source: Researcher's own work

In 2007, the overall production of Taiwan's fisheries was 1,499,500, made up of 290,200 tonnes from inland fisheries and 1,209,300 tonnes from marine fisheries. In the case of inland fisheries, aquaculture contributed 290,000 tonnes to the total 290,200 tonnes, while in the case of marine fisheries, it was far sea fisheries which contributed 984,500 tonnes to the total 1,209,300 tonnes. Offshore and coastal

fisheries' production was 189,700 tonnes and marine culture contribution was 35,100 tonnes. Comparing 1985 and 2007 figures, it can be seen that the production of Taiwan's fisheries had increased from 1,035,300 tonnes to 1,499,500 tonnes. This increase was mainly due to the fact that production of far sea fisheries had increased from 413,700 tonnes in 1985 to 984,500 tonnes in 2007. The production of aquaculture fisheries had increased slightly, from 250,700 tonnes in 1985 to 325,100 tonnes in 2007. However, in the case of offshore fisheries, there was a downward trend in production, from 316,000 tonnes in 1985 to 135,500 tonnes in 2007 (Figure 5.1).

Figure 5.1 The overall production of Taiwan's fisheries by years (1953 - 2007)

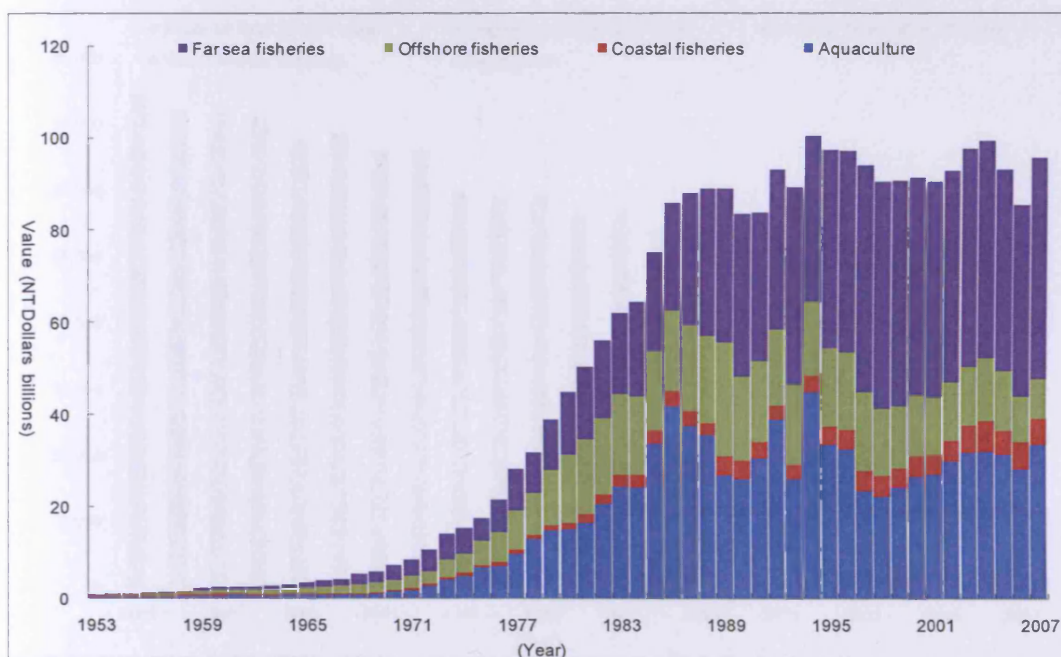


Source: Researcher's own work

In 2007, the value of Taiwan fisheries was \$NT 94.66 billion, \$NT 27.8 billion higher than the \$NT 66.89 billion in 1985. Of this total value in 2007, far sea fisheries contributed the highest value, \$NT 47.81 billion, followed by aquaculture fisheries

valued at \$NT 32.87 billion and offshore and coastal fisheries valued at \$NT 8.74 billion and \$NT 5.57 billion, respectively. The value of far sea fisheries had increased from \$NT 21.52 billion in 1985 to \$NT 49.04 billion in 1997, but had decreased slightly thereafter. The value of aquaculture fisheries had been \$NT 36.51 billion in 1995, its highest value, but had decreased rapidly to \$NT 23.78 billion in 1999, and then increased slowly thereafter. The offshore fishery value of \$NT 24.66 billion in 1989 had been its highest value, but this value had subsequently decreased to \$NT 8.74 billion in 2007. In the case of coastal fisheries, its value had increased year by year from \$NT 2.85 billion in 1985 to \$NT 5.50 billion in 2007 (Figure 5.2).

Figure 5.2 The value of Taiwan fisheries by years (1953 - 2007)

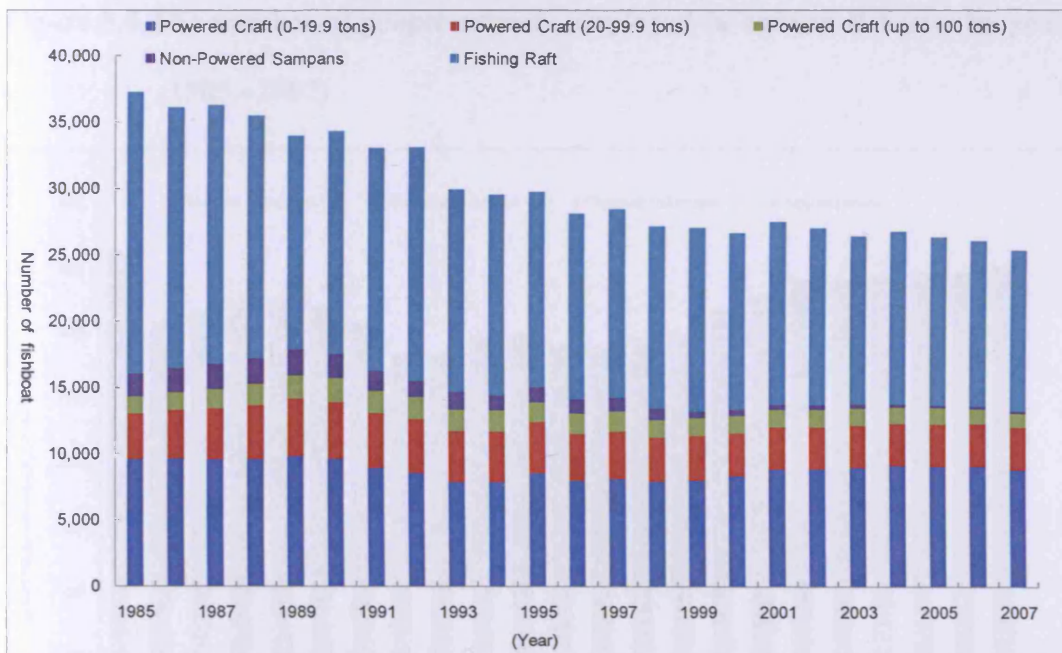


Source: Researcher's own work

In 2007, the number of fishing craft was 25,340, less than the 37,270 boats of 1985. Powered fishing craft was the most common boat type, amounting to 13,030 boats, followed by non-mechanised fishing craft (including non-mechanised sampans and

non-mechanised rafts) amounting to 12,120. The number of powered fishing craft above 100 tonnage was 1,040, in contrast to only 198 non-mechanised sampans. All types of fishing craft showed a decreasing trend. The number of powered fishing craft, which had amounted to 15,900 in 1989, had decreased to 12,570 boats in 1998. The number of non-mechanised fishing craft, which had amounted to 21,210 in 1985, had decreased to 12,120 by 2007. Similarly, the number of non-mechanised sampans which had been 1,990 in 1989 had decreased to 198 in 2007. Likewise, the number of powered fishing craft over 100 tonnage which had stood at 1,790 in 1990 had decreased to 1,040 in 2007 (Figure 5.3).

Figure 5.3 The number of fishing craft of Taiwan fisheries by years (1985 - 2007)

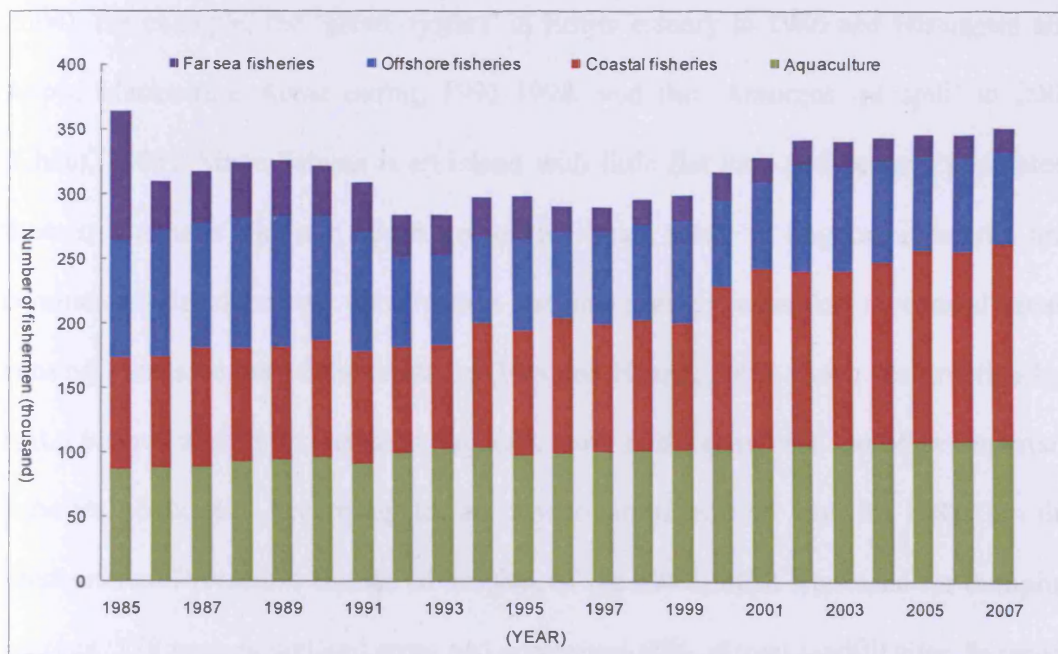


Source: Researcher's own work

The number of people actively employed in Taiwan fisheries has decreased in the past 15 to 30 years. In 2007, the number of people employed in Taiwan fisheries was 342,900, less than the 363,700 in 1985. The number of people employed in coastal

fisheries was the highest, amounting to 148,900, followed by 99,700 in aquaculture fisheries, 69,700 in offshore fisheries, and 17,400 in far sea fisheries, the lowest number. From the changes within the past decade it is clear that the number of people employed in far sea fisheries and offshore fisheries has come down year by year, from 99,700 persons and 90,800 persons in 1985 to 17,400 persons and 60,800 persons, respectively, in 2007. However, the number of persons employed in coastal fisheries and aquaculture fisheries has increased gradually, from 86,600 persons and 86,500 persons in 1985 to 113,000 persons and 99,700 persons respectively, in 2007 (Figure 5.4). Thus, the number of people employed in far sea fisheries has decreased substantially.

Figure 5.4 The number of people actively employed in Taiwan fisheries by years (1985 - 2007)



Source: Researcher's own work

In the past two decades, Taiwan's fisheries have suffered the negative consequences

of overfishing, mixed catch, habitat destruction, pollution, and the traditional fishing ground of far sea fisheries delimited to a 200 nautical mile EEZ. This had forced fishing craft of far sea fisheries to operate in offshore and coastal fisheries with the result that fishing effort in offshore and coastal fisheries has increased but the catch of each boat has decreased year on year (Hsu and Huang, 2006). Since 1981, the average catch of each boat has been less than half of that in 1964 (Hu et al., 2001). Moreover, owing to a decrease in catch of large fish species, the component of the catch has become smaller and younger in age. Thus, offshore and coastal fisheries' resources have been gradually depleted (Lee and Liou, 2006).

The pollution of the marine environment surrounding Taiwan has also become more serious. The most serious pollution problems have been due to river pollution and industrial waste, heavy metals and oil spills, entering the sea (The Control Yuan, 2004); for example, the 'green oysters' in Erhjin estuary in 1986 and Hisangsan and Anpin Mariculture Areas during 1991-1998, and the 'Amorgos oil spill' in 2001 (Chiau, 2005). Since Taiwan is an island with little flat land and densely populated, there is a serious shortage of land resources. As a result of ongoing industrial and commercial development, construction has increasingly extended to coastal areas, causing excessive use of the coastline (Hsu and Huang, 2006). Such construction has had a serious impact on wetlands, lagoons, coral reefs, estuaries, and other important fisheries' habitats. According to an investigation carried out in 1983 by the Environment Protection Bureau of Taiwan, of the 294 landfill sites used for dumping garbage, 178 were in wetland areas and comprised 60% of total landfill sites. In recent, the government has allowed development in many seacoast wetlands so that wetlands are facing a serious threat (Chiau, 2000). In addition, owing to more artificial jetties being built, the natural coastline has been rapidly disappearing in recent years so that,

currently, industrial areas cover almost one-third of the length of Taiwan's coastline (Tsai, 2004; Chiang, 2004).

Taiwan's fisheries have also suffered the negative consequences of overfishing, mixed catch, habitat destruction, and pollution, over two decades, resulting in the catch of offshore and coastal fisheries declining from 408,200 tonnes in 1980 to 257,200 tonnes in 2003. The catch has reduced by 58.71% and around 2,600 fish species have also declined in number in the past 15 to 30 years (Shao *et al.*, 2003). The aforementioned decline in catch and fish species demonstrates the importance of discussing the management of offshore and coastal fisheries in Taiwan. As far sea fisheries exist in the High Sea and the EEZ of other countries and aquaculture fisheries are mostly inland culture, this chapter will focus on offshore and coastal fisheries only.

The production of offshore fisheries has decreased gradually, from 292,400 tonnes in 1990, the highest amount, to 135,000 tonnes in 2007. Drag net, purse seine for mackerel, torch light net, and tuna long line contributed the highest tonnage in offshore fisheries in 2007. The overall decrease in production was due to drag net contribution decreasing from 125,300 tonnes in 1991 to 41,400 tonnes in 2007, and that of purse seine mackerel decreasing from 81,000 tonnes in 1997 to 13,500 tonnes in 2007. In the case of coastal fisheries, the variation in production is cyclical. It always fluctuates between 40,000 tonnes and 70,000 tonnes. The highest production was 63,700 tonnes in 2003, and the lowest was 39,900 tonnes in 1999. Gill net, set net, torch light net, and pole and lines boote contributed the highest production tonnage in coastal fisheries in 2007, that is, 54,300 tonnes. The value of offshore fisheries has decreased gradually, from \$NT 18.23 billion in 1990, the highest value, to \$NT 8.74

billion in 2007, of which drag net, purse seine for mackerel, torch light net, tuna long line, and misc. fish long line contributed the highest production value in offshore fisheries in 2007. Drag net and purse seine for mackerel have seen the highest drop in production value. Drag net production value decreased from \$NT 9.11 billion in 1991, the highest value, to \$NT 3.08 billion in 2007. The purse seine for mackerel production value decreased from \$NT 2.88 billion in 1997 to \$NT 274 million in 2006. Variations in the production value of torch light net, tuna long line and misc. fish long line are less dramatic, as is the variation in the production value of coastal fisheries, which was more than \$NT 5.00 billion after 2003.

The species of fish found in fish catch in offshore and coastal fisheries may be divided into five types: mackerel, horse mackerel, crustacean, mollusk, and others, although the main catch is mackerel. The production of horse mackerel was less than that of mackerel between 1998-2003. It was far more than that of mackerel prior to 1997. Mackerel production has decreased gradually since 1997. Its production has become less than that of crustaceans since 2004 and less than that of mollusks since 2006. The component of the catch seems to show a gradual trend towards species of low nutrition.

The number of people employed in offshore fisheries has decreased gradually, from 97,220 persons in 1990 to 71,280 persons in 2007. The number of full time persons has decreased the most, from 86,220 persons to 60,830 persons, compared to a slight decrease in the number of part-time persons, from 10,970 persons in 1990 to 8,830 persons in 2007. However, the total number of people employed in coastal fisheries has increased, from 90,760 persons in 1990 to 152,350 persons in 2007. This is because the number of full-time persons has increased, from 47,720 in 1990 to

113,020 in 2007. In contrast, the number of part-time persons has decreased slightly, from 43,040 persons in 1990 to 35,570 persons in 2007.

The number of fishing craft for offshore fisheries has decreased gradually, from 4,305 boats in 1990 to 3,218 boats in 2007. The number of fishing craft for miscellaneous long line fishing has also decreased, from 1,205 boats in 1990 to 563 boats in 2007. Fishing craft, using a gill net and torch light net have also decreased in number, from 410 boats and 232 boats, respectively, in 1990, to 58 boats and 56 boats in 2007, respectively. The number of fishing craft for coastal fisheries has displayed a similar trend, decreasing from 32,540 boats in 1990 to 21,084 boats in 2007. The number of fishing craft using a torch light net has decreased the most, from 2,489 boats in 1990 to 1,281 boats in 2007. Fishing craft using a troll line have also decreased in number, from 340 boats in 1990 to 25 boats in 2007. However, the number of fishing craft using a long line has decreased from 3,229 boats in 1990 to 2,966 boats in 2007. The number of fishing craft using a pole and lines boote and gill net has increased the most from 677 boats and 1,252 boats, respectively, in 1990 to 1,765 boats and 1,616 boats, respectively, in 2007.

5.3 GOVERNMENT

Regarding fishery affairs of those municipalities under the direct supervision of the central government and prefectural governments, the Fisheries Section or Fisheries and Livestock Section are usually formed under the supervision of the Agriculture Bureau or the Reconstruction Bureau. The Taiwanese Provincial Fishermens' Association (PFA) and 39 district fishermen associations have also been established. District Fishermens' Associations are organisations formed by ordinary fishermen under the *Fishermen's Association Act* of 1929. There are other fishery organisations

at national and district levels, formed in accordance with their specific functions (Ou *et al.*, 2004). In addition, the CGA is in charge of enforcement relating to fisheries.

5.3.1 Administration

5.3.1.1 Fisheries' Administration

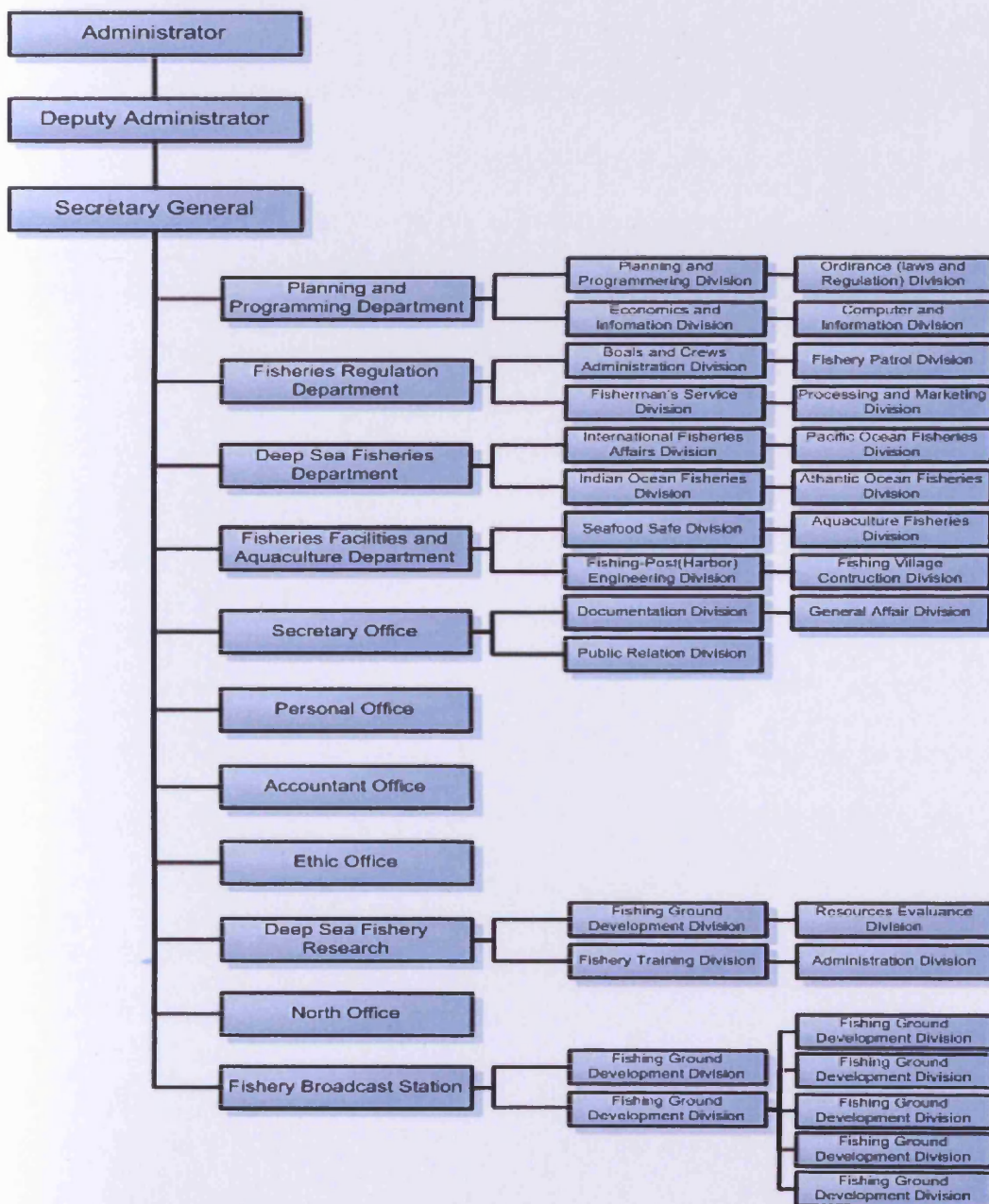
Taiwan's fisheries' administration is divided into central and province/city and local fisheries' administrations in accordance with Article 108 of the *Constitution*, the *Fisheries Act*, and the *Enforcement Rules of the Fisheries Act*.

5.3.1.1.1 Central fisheries' administration

The FA is responsible for fisheries' administrative affairs in Taiwan, and promoting every fisheries policy (Figure 5.5). The FA was established by upgrading the Department of Fisheries in the COA. In accordance with the *Organisational Act of the Fisheries Agency, Council of Agriculture, Executive Yuan*, there are an administrator, two deputy administrators and a secretary general, the planning and programming department, the fisheries' regulation department, the far sea fisheries department, and the fisheries facilities and aquaculture department. The FA is responsible for policy, foreign affairs, far sea fisheries beyond the EEZ of Taiwan and overseeing subordinate fisheries' administrative organisations. The Far Sea Fisheries Research and Development centre set up in the Agency is responsible for research into and development of fisheries resources, their investigation and estimation, as well as training of fisheries' staff and disseminating information to those in the field and the general public. The Southern office of the FA was established in Kaohsiung City in 2000, in the form of a task force. However, in order to deal with changes in the domestic and international fisheries environment, the daily multifarious affairs of fisheries administration, the need for fisheries products and to balance development in

the north and south of Taiwan, the South office was renamed the People's Service Centre in 2007 and a Taipei office was established in the north of the island. There are five divisions of the Agency which are responsible for coordinating affairs between other ministries/councils, fisheries services in counties in the north and south of the island, and enforcement of the government's fisheries policies.

Figure 5.5 The administrative structure of Fisheries Agency



Source: Adapted and revised by the researcher from the Fisheries Agency website (FA,
2009)

5.3.1.1.2 Local fisheries' administration

The provincial/municipal government and the county/city government are responsible for local fisheries' administration. The Fisheries Department was established under the Construction Bureau in the Kaohsiung City Government, and subsequently became the Harbour Bureau of Kaohsiung City Government in 2003. The Bureau was renamed the Marine Bureau of Kaohsiung City Government in 2004. There are five divisions of the Bureau which are responsible for managing offshore fisheries, enforcing the fisheries policies of the Central Government and overseeing subordinate fisheries administrative organisations. At the county/city government level, the Fisheries Division/Fisheries and Pasturage/Fisheries Management Centre was set up under the Agriculture Bureau of the Economic Development/Construction Bureau. It is responsible for managing coastal fisheries and aquaculture fisheries, and the affairs of the higher fisheries administration authorities (FA, 2008a).

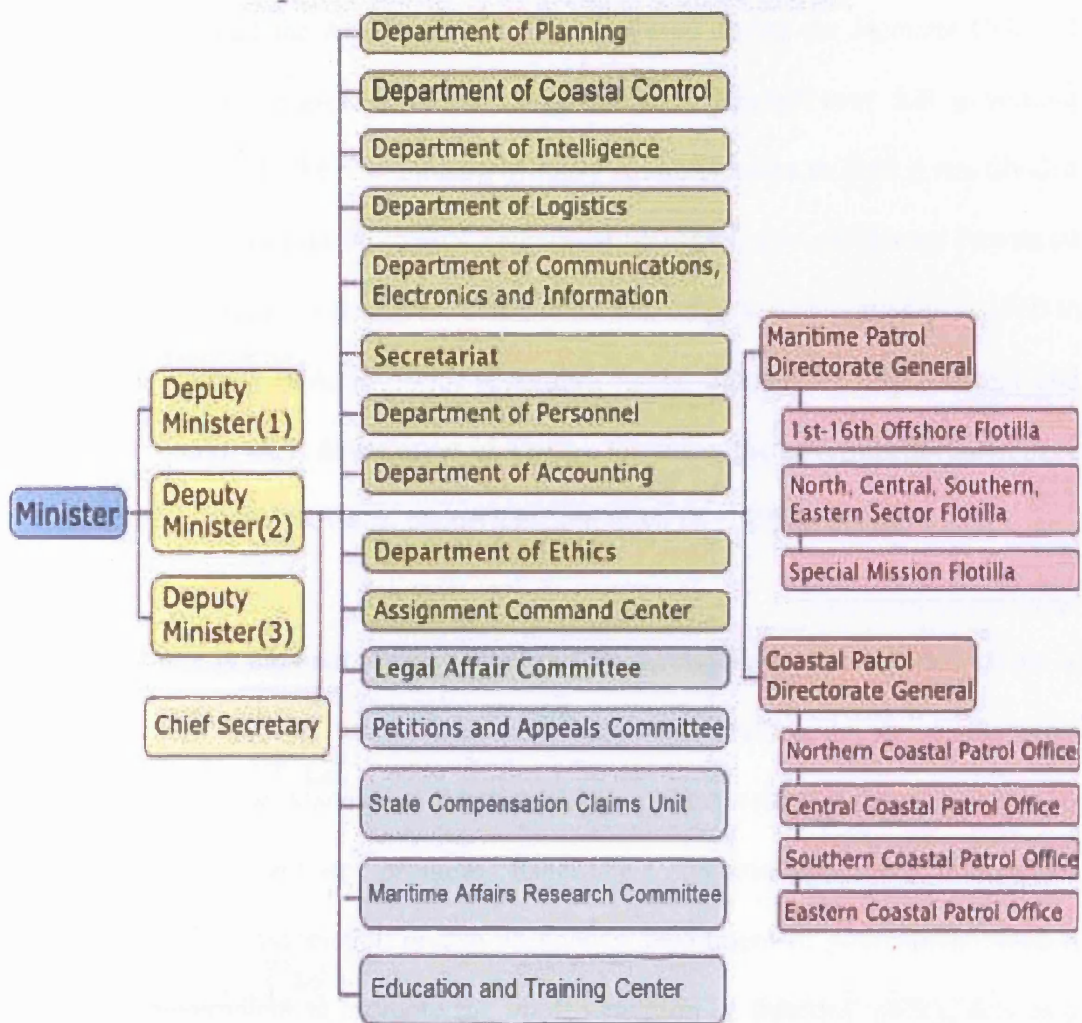
5.3.1.2 Coast Guard Administration

After the government declared the ending of *martial law* in 1987, patrolling and guarding the sea areas and coasts were carried out by ocean-related agencies/departments of the Ministry of National Defence, the MOI, and the MOF. However, because marine affairs functions were being shared between ocean-related agencies/departments, their performance was not good. In order to unify marine affairs relating to the sea and coastal areas, and protect the sea areas and coastal regions, the government decided to establish special patrols to guard them, and promote their protection and the sustainable utilisation of resources in them.

The government promulgated five Acts relating to coast guard activities on January 26, 2000, namely, They are *the Coast Guard Act*, *the Coast Guard Administration Act*

of the Executive Yuan, the Maritime Patrol Act of the Directorate General of the Executive Yuan, the Coastal Patrol Act of the Directorate General of the Executive Yuan and the Each District Coastal Patrol Office Act of the Coastal Patrol Directorate General of the Executive Yuan. At the same time, the government combined the duties of soldiers of the Coastal Command of the MND, policemen of the Maritime Police Bureau of the MOI, Customs officers of the MOF, and civil servants in other related agencies/departments to establish the CGA of the Executive Yuan on January 28, 2000. The CGA is in charge of enforcing execution of *the Coast Guard Act*, and the Maritime Patrol Directorate General and the Coastal Patrol Directorate General are under its supervision (Figure 5.6). Enforcement related to fisheries includes patrol and protection of fisheries, preservation of fisheries' resources, protection of the marine environment, and security and inspection of fishing ports.

Figure 5.6 The administrative structure of Coast Guard Administration



Source: Adapted by the researcher from Coast Guard Administration website (CGA, 2009a)

Therefore, in view of it being responsible for enforcement of the *Coast Guard Act* and each of the five aforementioned *Acts* relating to coast guard activities, the CGA plays an essential role in enforcing policies relating to fisheries' management in Taiwan (Huang, 2002).

5.3.1.3 Non-government organisations

The Fishermen's Association is the main NGO responsible for Taiwan's fisheries. It was formerly called the Aquatic Products Association during the Japanese Colonial Period. After the Japanese Colonial Administration handed over full governing authority of Taiwan to the Kuomintang Military Administration in 1945 it was divided into the Union of Taiwan Provincial Fishermen and the Union of Taiwan Provincial Fisheries' Production Cooperatives. Later, these two unions were combined in 1950 to become the Taiwan PFA. In 1955, according to the Scheme of Improvement and Implementation of each Association of Taiwan Province, the government reorganized this association at the province, county/city and town level (PFA, 2008).

Currently, there is the main Taiwan PFA and 39 district Fishermen's Associations in Taiwan (Figure 5.7) in accordance with legislation relating to the Fishermen's Association Act. The Association functions like a public welfare corporation since its primary purposes are to promote fishermen's income, improve fishermen's development. The Association is also an agency/department of government since it assists the government to promote the implementation of fisheries' policy, acts as a bridge between fishermen and government, and provides guidance and assistance in the management of fisheries and their operations. It runs a Health Club for fishermen and also aims to improve and promote the domestic economy, facilitate the safety of navigation, oversee loans to fisheries, respond to disasters, rescue fishing vessels and fishermen, improve fishermen's lives, ensure fishing vessels are insured, and pay attention to other related matters.

Figure 5.7 The distribution structure of different level Fishermen's Associations in Taiwan



Source: Adapted and revised by the researcher from the Fisheries Agency website (FA, 2008b)

At present, there are only around 200 staff in the FA and only one 275 tonnage patrol vessel and a few small-scale coastal patrol vessels to protect fishing craft. Taipei county government, Yiland county government, Penghu county government, and

Keelung city government are responsible for enforcing fisheries' resources conservation in wide sea areas (Huang, 2002). Comprehensive enforcement is a difficult task since there is at present only one officer in the fisheries division of each local government authority who manages fisheries' resources' conservation areas. The budget necessary for comprehensive enforcement is also limited; for example, only \$NT50,000 (including fish restoration) in Yilan county. Basically, current manpower and finances are insufficient for local governments to manage fisheries' resources conservation areas, thus the effective management of conservation areas exists on paper only (Ou *et al.*, 2004).

The Fishermen's Association in each district is both a semi-official organisation and an enforcement mechanism authorized to expel fishing craft from other districts within the three-mile exclusive fishing right area. However, there is no management measure for the Fishermen's Association to manage fishermen who have joined the local Fishermen's Association. Therefore, the Fishermen's Association has adopted a *laissez-faire* style of management and not developed an effective management system like the common management system of the Japanese Fishermen's Association (Lai, 2006).

5.3.2 Legislation

Presently, the main fisheries laws in Taiwan include the *Fisheries Act*, the *Fishermen's Association Act*, and the *Fishing Port Act*. The purpose of the *Fishermen's Association Act* is to stipulate the duty, organisation, and operation of the Fishermen's Association. The purpose of the *Fishing Port Act* is to stipulate the planning, construction, operation, management, and maintenance of fishing ports. However, the *Fisheries Act* is the main core of fisheries law as it stipulates management of fisheries' actions,

permission criteria for fisheries' operation, classification of fishery types, as well as utilization and maintenance of fisheries' resources (Wang, 2007). The measures established for managing fisheries' resources in the sea areas surrounding Taiwan are as follow (Chiang, 2006):

- (1) A permission system: Any person who wishes to operate a fishery or fisheries in public waters or non-public waters adjacent thereto must obtain approval and be in receipt of a fishing licence issued by the competent authority prior to the operation (*Fisheries Act* Article 6)
- (2) Restriction of the total number and tonnage of fishing vessels, operating areas, operating period, and other fishery related matters (*Fisheries Act* Article 37)
- (3) Restriction or prohibition of the use of fishing gear and fishing methods (*Fisheries Act* Article 44)
- (4) Restriction or prohibition of fishing areas and fishing periods (*Fisheries Act* Article 44)
- (5) Restriction or prohibition of the catching, harvesting, or processing of aquatic animals and plants (*Fisheries Act* Article 44)
- (6) The establishment of conservation areas for the propagation of aquatic animals and plants (*Fisheries Act* Article 45)

From the above *Fisheries Act* Articles, it can be seen that management of fisheries' resources in Taiwan presently adopts two approaches, namely, fishing effort management and technical management or input control management. The fishing effort management approach includes a permission system, as well as restriction on the use of fishing gear, fishing methods, and fishing vessels. The technical management approach focuses on fishing area, fishing period, and the establishment of conservation zones. Although this management measure is simpler and easier to

implement than the other approach, and has a lower administrative budget, as a management mechanism it is less effective since it controls input scope but does not restrict the fishing effort of fishing vessels, therefore cannot achieve effective management of all aspects of fisheries.

Under the *Fisheries Act*, there are in total 17 Regulations and Directions which, to name a few, include the *Enforcement Rules of the Fisheries*, the *Regulation of Registry of Fishing Rights*, *Recreational Fishery Regulations on the Management of the Crew of Fishing Vessels*, *Regulations on the Permission for the Export of Fishing Vessels* and *Regulations for Squid Jigging Vessels Operating in the Southwest Atlantic Ocean*. The regulations and directions under the *Fisheries Act* apply to each fishery domain; therefore provide indispensable criteria for managing fisheries at present.

Although Taiwan's fisheries related acts are comprehensive, and there is the *Wildlife Conservation Act*, there is no relevant provision in these Acts for aquatic animals. Article 47 of the *Fisheries Act* also stipulates that the central competent authority shall draft regulations for conserving and managing aquatic resources but these regulations have not been drafted yet so there is no legislation in force relating to the conservation and management of aquatic resources. Therefore, in order to conserve and manage all aquatic resources effectively, the relevant provision should be formulated as soon as possible.

5.3.3 Human resources

5.3.3.1 Marine education

The government has introduced education about marine affairs in vocational high

schools in order to produce a basic level of knowledge about the marine environment. At the moment, the marine education system in Taiwan includes vocational high school, college/university, and research institute.

5.3.3.1.1 Marine education in the vocational high school

According to statistical data published by the Ministry of Education (MOE) in 2006, there are nine schools which have set up courses related to maritime affairs: the National Suao Marine and Fishery Vocational High School, the National Keelung Maritime Vocational High School, the National Tainan Senior Marine and Fishery Vocational School, the National Tung Kang Marine and Fisheries Vocational High School, the National Penghu Marine and Fishery Vocational High School, the National Lu Kang Senior High School, the National Matsu Senior High School, National Kinmen Agricultural and Industrial Vocational Senior High School, and the National Cheng Kung Commerce and Fishery Vocational High School. Main departments in these vocational high schools are Aquatic Products, Navigation Management, Marine Engineering, Fisheries, and Shipping. The number of students in all departments has increased gradually year by year, excluding the departments of Aquatic Products and Fisheries. Student vacancies in the latter departments are higher than in other departments. Moreover, the number of students entering all departments in high schools is generally higher than the number of student placements (MOE, 2007). From Tables 5.2 and 5.3, the number of students related to marine education in the vocational high school and the enrolment gap are revealed.

Table 5.2 The number of students related to marine education in the vocational high school

Number	Year						Total
	2001	2002	2003	2004	2005	2006	
No. of maritime division	2,890	2,410	2,149	2,075	1,810	1,965	13,299
No. of aquatic production division	2,092	1,694	1,412	1,238	1,457	1,538	9,431
No. of non maritime and aquatic production division	1,611	1,974	2,252	2,381	2,916	3,087	14,221
Total	6,593	6,078	5,813	5,694	6,183	6,590	36,951

Source: Adapted by the author from Ministry of Education (2007)

Table 5.3 Marine fisheries vocational school enrollment gap

Item		Year						Total
		2001	2002	2003	2004	2005	2006	
Maritime division	Recruit students	874	870	801	762	614	610	4,531
	Vacancy students	167	98	122	89	97	82	655
Aquatic production division	Recruit students	563	348	437	343	498	547	2,736
	Vacancy students	104	90	95	78	72	63	502
Non maritime and aquatic production division	Recruit students	774	989	984	1,139	1,219	2,232	7,337
	Vacancy students	150	133	178	215	179	207	1,062

Source: Adapted by the author from Ministry of Education (2007)

5.3.3.1.2 Marine education in college/university

Marine education in college/university in Taiwan is to be found at the National Taiwan Ocean University, National Kaohsiung Marine University, National Penghu University, and Taipei College of Maritime Technology. Other colleges/universities have established departments of maritime affairs in Taiwan. These include the National Taiwan University, National Cheng Kung University, National Sun Yan-sen University, National Central University, the R.O.C Naval Academy, and the National Taiwan Normal University. All of them offer ocean-related studies for a Bachelor degree, Master degree, and Ph.D. In 2005, the number of graduates from these colleges/universities was 3,980, 1.18% of all graduates in all colleges/universities in Taiwan. However, only 20% of graduates in marine affairs devoted themselves to maritime affairs.

In recent years, the National Kaohsiung Marine University has set up specialist courses related to the fisheries industries in order to produce talented individuals to work in set-net fisheries.

5.3.3.1.3 Marine education policy in Taiwan

The United Nations Convention on the Law of the Sea was implemented in 1994 by the United Nations. This convention emphasises the importance of the knowledge and qualifications of human resources in the marine industry. In recent years, many countries such as Australia, U.S., Japan, and EU have promulgated sequentially a *Marine White Paper* for promoting development of the marine economy, society, and culture. The initial *Marine White Paper* to be promulgated by Taiwan's the government was in 2001, and declared Taiwan to be an ocean country, as well as indicated that Taiwan's future development should expand towards the ocean in order

to develop 'the Blue Territory'. The government promulgated the '*National Oceans Policy Guidelines*' in 2004, and renewed the *Ocean Policy White Paper* in 2006 in order to promote marine development generally.

Main problems relating to marine education in Taiwan include:

- (1) In the aspect of marine activities: people are influenced by the thought culture of the land in which they live, and the government strictly controlled people's access to the coast for activities for a long period. As a consequence, people seldom participate in marine activities.
- (2) In the aspect of marine education policy: education policy focuses primarily on the land, few courses focus on marine activity and places of marine activity. Further, the circumambulatory nature of a career in the marine environment does not encourage students to study marine affairs.
- (3) In the aspect of a gap between talent and industry requirement: there is a gap between the number and cultivation of qualified individuals interested in marine affairs and industry demand and requirements. The performance of academic research does not meet the maritime industry's requirements, and the development of maritime affairs as a discipline in vocational high schools faces a predicament (Gao, 2008).

In order to solve the above problems, the government drafted a policy entitled 'the main direction of the administration of education in the next four years' in 2004 and marine education was added to the implementation programme. According to the *National Oceans Policy Guidelines* and the *Ocean Policy White Paper*, the very existence and development of Taiwan depends on the oceans and seas. As a result, the government introduced a policy in 2006 to cultivate excellence in marine education to

promote marine development. It subsequently promulgated the *Ocean Education Policy White Paper* in 2007 to support the objective and strategy of further developing national marine education by building on the existing foundation of marine education. In addition, the outline of courses in primary and high schools was renewed and promulgated in 2008, and will be carried out in 2011. The government expects Taiwan to achieve the objectives of an ocean country, that is, to cultivate individuals who are knowledgeable about and interested in marine affairs, promote the marine industry, and upgrade the competitiveness of the national marine industry.

5.3.3.2 Training of fishermen

The Far Sea Fisheries Research and Development Centre is the unit responsible for training those on board fishing craft and fishermen in Taiwan. It is in charge of the training of sailors aboard fishing craft in basic safety procedures, fisheries' operations, and marine engineering and techniques. Such training also includes the navigation of fishing craft, telecommunication, and other professional knowledge related to fisheries. The centre has held 1,686 training courses which have been attended by 67,213 persons between 1998 and 2008. In addition, training in basic safety procedures for those seeking to survive on the sea provided by the seven vocational high schools of Suao, Keelung Tainan, Tung Kang, Penghu, Lu Kang, and Cheng Kung Vocational High School focuses on fire control on board fishing craft, first aid, use of lifeboats, and prevention of accidents. The seven vocational high schools hold courses for the training of cadre and sailors on board fishing operating in offshore and coastal fisheries. Such courses are readily accessible to local fishermen (FA, 2008a).

While national income has increased year by year, and it is easy to find a job on land, a fisherman's income is less than that of a labourer on dry land. In addition, the

working environment on a fishing craft is hazardous and fraught with risk. Therefore, people are less willing to work on fishing craft (Yu, 2001). There were around 29,000 crew members employed on fishing craft in 2006, of which around 24,000 were Chinese and 5,000 were foreigners. There were 4,500 fishing craft involved in offshore and coastal operations of between 10 and 100 tonnages. About 60% of crews relied on Chinese crewmen, suggesting a lack of Taiwanese cadres (Chiang, 2006; Hu *et al.*, 2001). Further, the average age of 47.5% and 26.3% of operators in offshore and coastal fisheries was 50-59 years of age and 40-49 years of age, respectively. Over half of purse-seine operators in mackerel fisheries (57.1%) were over 60 years of age, pointing to a very serious problem of aging fishermen.

5.4 FISHERIES POLICY AND MANAGEMENT

The government has been addressing the problem of gradual depletion of resources in offshore and coastal fisheries since 1970. The government began to implement the measures of launching artificial fish reefs and releasing fish seeds in 1974 and 1978, respectively. Up until 2007, 61,000 artificial fish reefs had been launched and 67,000,000 fish seeds had been released. In order to try to restore offshore and coastal fisheries' resources in Taiwan, the government implemented the *Policy of All-Round Limiting of Vessel Building* in 1989, and the policies of fleet size reduction and fishing closures in 1991 and 2003, respectively. Up until the end of 2007, there had been a reduction of 485 fishing craft and 613 non-mechanised fishing craft, and 35,374 cases of approved fishing closures (FA, 2008a). The first period of fleet size reduction (1991-1995) was mainly in view of old and inefficient fishing craft, which operated with difficulty. The government subsequently introduced the *Plan of Fleet Size Reduction of Old and Deteriorating Fishing Craft over a Five Year Period*. The *Vessel Buyback Plan* is still in process to reduce the fishing effort of offshore and

coastal fisheries as well as reduce pressure on fishing grounds. As regards the *Fishing Closures Policy*, most applicants applying for the reward for voluntarily observing fishing closures are mainly fishermen with small-scale fishing craft and therefore operate on a small scale, or fishermen of fishing craft of aquaculture fisheries who are unconcerned about fishing effort. This suggests that the policies' effectiveness for reducing fishing effort is limited (Chen, 2008).

As regards the marine environmental quality and natural habitats, the water quality of sea areas and heavy metal content along the coast have remained relatively unchanged in the past decade. According to a comprehensive examination of rivers, over 25% of the 50 main rivers in Taiwan are in a situation of middle and heavy pollution (Dai, 2008), but owing to the government actively promoting a *River Pollution Improvement Plan*, 71 facilities to improve water quality have been established so far. They can deal with more than 488,000 tones of water every day, and reduce BOD pollution by about 9,000 kilograms (Liu, 2008). Thus, the pollution of rivers and the ocean has improved gradually.

With regard to the ratio of natural coastline length to total coastline length, the index has decreased gradually year by year. In the past decade, natural coastline length has decreased by almost half in Chiayi county, Changhwa county, Yunlin county, Taichung county, and Hsingchu city (Liu, 2008). Although the government has established conservation areas to protect the important habitats of offshore and coastal fisheries' resources, their effectiveness is limited due to poor management.

In addition, because the government has not carried out a comprehensive survey of, or research on offshore and coastal fisheries resources, and focused only on certain

marine species for several years, it is unable to set the Total Allowable Catch (TAC) for output management in accordance with main economic species in Taiwan besides the sakura shrimp. Moreover, owing to the fact that fishermen are not required to declare their income, it is difficult to assess their actual income. In addition, given that fish products can be sold over-the-counter, it is difficult to estimate accurately the production and value of fisheries, which causes great problems in fisheries' management. However, based on the composition of unit fishing effort and main catch, offshore and coastal fisheries' resources would appear to be decreasing. This fact indicates that current policies and measures to restore such resources need to be enhanced.

5.5 TECHNICAL MANAGEMENT, IMPLEMENTATION AND ENFORCEMENT

5.5.1 Permission system

According to the *Fisheries Act*, Taiwan's fisheries are divided into the fishing right fishery, recognised fishery, and recreational fishery. The fishing right fishery is divided into the set-net fishery right fishery, sectional fishery right fishery, and exclusive fishery right fishery. The government has different fishery management systems depending on the type of fishery. In the case of coastal fisheries, the fishing right system is adopted for those fisheries whose operating waters are within 3 nautical miles of the coast, while the fishery permission system is adopted for those fisheries operating in waters between 3 and 12 nautical miles from the coast. The fishery permission system is also adopted for offshore fisheries which operate in waters beyond 12 nautical miles from the coast and far sea fisheries which operate in waters beyond the 200 nautical mile EEZ of Taiwan (Chiang, 2004).

If a fishing right fishery is operating in waters within the local government area, the

county/city government issues set-net fishery and sectional fishery rights only in the case of a recognised fishery and recreational fishery using fishing boats with gross tonnage less than 100 tonnes, the operator needs to apply for permission to operate to the municipal and county/city government. If an exclusive fishing right fishery is operating in waters within a province, a set-net fishery and sectional fishery are operating within waters the extent of at least two counties/cities, and a fishing right fishery is operating in waters covering at least two provinces/municipalities, the central competent authority is responsible for the management of their activities.

The government had issued in total 42 exclusive fishing right licences between 1994 and 2004, when all licences expired. As a result, exclusive fishing right holders can no longer carry out their activities. However, if these fishing right holders were to put in place a *Business Plan* approved by the government they might once again be granted licences. Such *Business Plan* should avoid overlap of utilisation of sea areas (Ou *et al.*, 2004; Chiang, 2006).

The government has adopted the fishery permission system to control fishing effort, limited vessel building to control the number of vessels so as to avoid the building of new vessels in order to control gross tonnage. It has twice implemented ‘fleet size reduction, in 1991 and 2001 (Shao, 2004). The government also implemented all-round control in 1989 and 2004 over coral fisheries, torch light fisheries, and other fishery types contributing to the heavy destruction of fisheries’ resources and no longer issued new fishery licences (Huang, 2006; COA, 2008). At the same time, the government restricted the number of part-time fishing vessels for fishing for larval fish and anchovy of tonnage less than 20 tonnes, and delimited the fishing areas and fishing period for operating to the end of 2008. Trawlers fishing part-time for larval

fish and anchovy were allowed to operate until the end of 2007 (Lee and Shieh, 2007). According to an investigation carried out by the county/city government, up until the end of 2008, there were only three boats licensed to undertake part-time coral fishing, however, there were also ninety-six boats operating in coral fisheries illegally.

5.5.2 Restriction or prohibition of the use of fishing gear, fishing methods, fishing area, and fishing period

Article 44 of the *Fisheries Act* stipulates that for the purposes of resources' management and fisheries' structure adjustment, the competent authority may promulgate the restriction or prohibition of the use of fishing gear, fishing methods, fishing area, and fishing period in order to maintain fisheries' resources such as prohibit trawlers whose tonnage is less than 50 tonnes from operating within 3 nautical miles from the coast, prohibit trawlers whose tonnage is more than 50 tonnes from operating within 12 nautical miles from the coast, prohibit vessels for fishing for larval fish and anchovy from operating within 500 metres from the coast during the three month period from 1st June to 15th September in each year. Moreover, there has been all-round prohibition since 2008 of fishing for whitefish flying fish roe between 16th May and 15th July, and prohibition of fishing for sakura shrimp between 1st June and 31st October in each year. According to the stipulation in the '*Compliance and Caution Note of Part-time Coral Fishery*', one boat in each year is limited to 120 kilograms of exports and five fishing areas, and fishing craft in operation are asked to install a Vessel Monitoring System and fill in a fishing logbook. However, whether these measures have proven effective or been effectively introduced still needs to be observed.

Article 48 of the *Fisheries Act* also stipulates that aquatic animals and plants shall not

be caught or harvested by the use of poisons, explosives or other forms of dynamite, electricity or narcotics unless their capture or harvest is for experimental and research purposes and permission to capture/harvest them has been obtained from the central/municipal competent authority.

With regard to the above management measures, the most effective have been those relating to management of the sakura shrimp fishery since they have resulted in the highest catch recorded due to prohibition of fishing during the oviposition period, which has been implemented strictly to achieve the objective of reasonable utilisation of resources. In addition, all fishing craft of the sakura shrimp fishery join the production and marketing team, and all assist in regulating operations (Chen et al., 2000). On the other hand, the other management measures still need to be improved. For example, trawling near the coast occurs frequently (United Daily News, 2006), its restriction therefore still needs to be enforced (Lai, 2006). Although the coral fishery has been reopened due to the influence of politics, there are no regulations with regard to fishing gear and fishing methods, nor restrictions on the size, altitude, and amount of the coral catch. Arguably, an eco-disaster is near at hand (Huang, 2008). After coral fishing craft were allowed to operate again, the government reviewed the operating of trawlers within 3 nautical miles of the coast and decided to relax all-round prohibition of the activities. However, this decision will undoubtedly lead to draining of the pond to get all the fish and also obstruct the development of conservation (United Daily News, 2006).

Moreover, some fishermen cannot accept the concept of conservation and lack knowledge of laws so that the illegal activities of fishing using poisons, explosives, and electricity as well as trawling against regulations continue without let up (Lai,

2006). In addition, owing to those involved resorting to every conceivable means to evade enforcement and limited administrators for enforcement of laws, fishing by the use of poisons, explosives, and electricity still occurs frequently. Illegal fishing by the use of poisons occurs in coastal waters and the tidal flats of Yunlin, Chiayi, Pingtung, Taitung, and Penghu. Illegal fishing by the use of electricity occurs in the coastal and offshore waters of Yiland, Keelung, Chiayi, and Penghu; and illegal fishing by the use of explosives occurs in the waters of Yiland, Keelung, Pingtung, Penghu, and Mastu. Owing to the difficulty of enforcing a ban on these illegal fishing activities and the very low penalties imposed by the courts on those who are caught flouting the law, such fishing activities will continue without let up (Wu, 2007).

5.5.3 Restriction or prohibition of the catching, harvesting, or processing of aquatic animals and plants

Article 44 of the *Fisheries Act* stipulates that the catching, harvesting or processing of aquatic animals and plants should be restricted or prohibited. Major measures at the moment by the government to achieve this are total control of catch quantity and size. For example, the sakura shrimp fishery in Tungkung has set the TAC at 1,500 tonnes (Wu, 2001). The government also established a ‘notification system for whale shark catch’ in 2001, and laid down the allowable total quantity of whale shark catch in 2002 as 80. This number has gradually decreased year by year do that it is prohibited to fish for whale shark all-year-round since 2008 (Hong, 2008; Zhuang *et al.*, 2007). The period for fishing for whitefish flying fish roe was established as between 16th May and 15th July in 2008 and TAC is 300 tonnes. Each fishing craft should obey the regulation regarding the catch for each boat, which has been approved by the county/city government of the locality in which operations are conducted and fill in the fishing logbook accurately. However, many fishing craft from Mainland China

operate in the sea areas adjacent to Taiwan so that the quantity of whitefish flying fish roe caught is difficult to estimate and sustainability of such resources is difficult to achieve. The government should therefore seek cooperation from Mainland China in order to be able to more effectively manage the cross-strait fishery (Chen, 2007). The upper limit of allowable catch of larval fish and anchovy was 3,200 tonnes in 2006. This amount has gradually decreased year by year, so that fishing for larval fish and anchovy will be prohibited all-year-round in 2009 (Lee and Shieh, 2007).

Each county/city government has also formulated local regulations to conserve fisheries' resources, such as size limits and limitations on the catch of fish species. The Penghu county/city government, for example, has introduced regulations pertaining to seven types of fish, including red porgy and black seabream. A fish whose body length is less than 9 centimetres cannot be caught, sold or owned. However, owing to the lack of administration in Penghu government to enforce the regulations, such illegal catch is prevented with difficulty.

5.5.4 Conservation measures for the propagation of aquatic animals and plants

Various types of artificial fish reef have been launched by the government since 1974. In 2007 there were 88 zones for artificial fish reefs and 69 locations in reef protection zones established in the coastal waters surrounding Taiwan. There are 13 locations of warship reefs and 15 locations of artificial fish reefs, where 61,000 artificial fish reefs were placed and 59,370,000 fish seeds were released during 1998 to 2007 in order to increase fisheries' resources (FA, 2008a). In addition, fisheries' resources conservation zones have been established since 1978 along the coast of Taiwan in accordance with the declared aims of the *Fisheries Act*, and are managed by the county/city government. Twenty-six fisheries' resources conservation zones had been

established by 2008.

Major methods employed by the government to restore fisheries' resources are the 'release of fish seeds' and 'artificial fish reefs'. The former is still in the research and development stages of tracing and estimation, the latter is as much praised as blamed. Their purpose is the cultivation of resources to improve the quantity and quality of fish stock, but many still dispute the effectiveness of the methods (Shao, 2008). Although Taiwan has 26 fisheries' resources conservation zones, the function of resources conservation cannot be developed effectively because enforcement and operations management cannot be practised completely (Wu, 2003). In addition, all methods are managed by the county/city government, but according to existing administrators, the financial ability of the county/city government is insufficient for implementation so that management of fisheries' resources conservation zones exists on paper only (Ou *et al.*, 2004).

5.5.5 Patrol and protection of fisheries

In order to achieve sustainable utilisation of fisheries resources in offshore and coastal waters, the government has not only implemented a system of replacing vessels/tonnages before building new vessels to control the increase in fishing craft, but also introduced the measure of vessel buyback to reduce fishing effort, and the measure of fishing closures to restore fisheries' resources. The effectiveness of these strategies is dependent on the patrol and protection of fisheries to prevent the illegal catching, harvesting and processing of aquatic animals and plants. According to Article 54 of the *Fisheries Act*, the competent authority shall dispatch patrol fleets to perform the duties of salvage, patrol, and fishery protection for the purposes of assuring fishery security and maintaining law and order in fishing areas. Accordingly,

the COA, Executive Yuan, established standard ‘operational procedures for the protection of fisheries by the government’ in 2004.

The government implements the restriction or prohibition of the use of fishing gear, fishing methods, fishing area, and fishing period by the competent authorities at different levels in accordance with Article 44 of the *Fisheries Act* by combining the patrol and protection of fishing craft by ‘Yu-jian No. 2’ FA, ‘Yi-an No.6’ of Yilan county government, ‘Peng-xing’ of Penghu county government, and ‘Jing-hai No. 2’ of Keelung city government, which together form a ‘working group’ to combat illegal fishing in each county/city. In addition, according to the *Coast Guard Act* and *Regulation of the Relationship between Taiwan Residents and Mainland China Residents*, the CGA not only seeks to ensue that fishing craft from Mainland China do not operate in the restricted waters and prohibited waters of Taiwan, but also to assist the competent fisheries authorities in implementing the matter of maintaining fisheries’ resources, and handing over cases where Taiwan fishing craft have violated the *Fisheries Act* to the competent fisheries authorities to deal with and impose discipline (FA, 2007).

Owing to fishermen’s insufficient awareness of marine laws and regulations, it is difficult to eradicate illegal fishing by the use of electricity, poisons, and explosives, as well as the catching of marine life in conservation areas. According to the CGA, the number of cases of illegal fishing by the use of electricity, poisons, and explosives was 296 in 2002. Because of the destruction of the ecological environment and illegal fishing operations by fishermen, fish size is small and the number of large size fish in offshore and coastal fisheries has gradually declined. It is difficult to achieve the desired aim to restore fisheries’ resources due to such ongoing destruction and illegal

fishing operations (Hsu and Huang, 2006).

According to CGA statistics relating to cases of smuggling of agricultural and fishery products and other goods, the quantity of smuggled aquatic products was 5,498 metric tones in 2007, the highest quantity to date.

More than 70% of aquatic products in the market, for example, small squids, white pomfret, oyster, and Canadian sergeant fish are smuggled into the country from China. The average selling price is less than between 10% - 50% of domestic aquatic products (Yang, 2007). Thus, the profits of domestic fishermen have decreased sharply. On the other hand, because smuggled aquatic products have not been examined by relevant units those who eat them may be exposed to harmful bacteria or toxins.

5.6 ASSESSMENT OF MANAGEMENT

This section provides an overview of the management assessment in the fisheries sector for understanding the foundational problems with regard to marine policy and marine environmental management in Taiwan (please see Section 3.5).

Since 1951, several policies and plans have been introduced. These include the establishment of the Taiwan Fishery Production Improvement Committee, in the Taiwan Province in 1951 and the *Economic Development Plan* from 1953 to 1964. From the above sections analysis, it can be seen that while the government has been expending effort to restore the resources of offshore and coastal fisheries for several years, due to external environmental changes, especially the disappearance of natural habitats which are necessary for the protecting and restoring of fisheries' resources,

fisheries' resources have been depleted gradually. Therefore, relevant organisations need to strengthen continually implementation of fleet size reduction and fishing closure policies, the launching of artificial fish reefs and the releasing of fish seeds, and coordinate implementation activities to actively promote the *Sustainable Coast Action Plan*. In addition, partnerships need to be established to improve the management mechanism of fisheries' resources' conservation areas and to ensure fishing is prohibited in designated areas in Fushan. The communities of Fushan and Bailanlu should work together with Taitung Fishermen's Association, National Taitung University, the CGA, and Marine Friends Societies to effectively manage conservation areas.

While the number of people actively employed in coastal fisheries has increased over time, the problems of aging and dependence on fishermen who come from China have also increased. This suggests that in the future the number of people actively employed in fisheries will likely decrease given also that the ratio of fishermen's average income to landlubbers' income has decreased gradually, leading to people's general reluctance to work on fishing craft. Nevertheless, because of developments in technology, the number of injuries to fishermen, as well as the number of accidents occurring during operational procedures, has decreased year by year. This shows there is an increasing awareness of the need for a safe environment for fisheries' operations. The FA is implementing at present the *Plan for the Third Period of Guidance and Assistance for Encouraging People to Work on Fishing Craft* to increase the number of people actively employed in fisheries. The aim is also to cultivate marine management talent by means of an increase in the number of training courses established for fisheries' staff. A set-net fisheries course has been established by Kaoshing National University, and other courses have been established in vocational

high schools for those operating in set-net fisheries to cultivate management talent for set-net fisheries.

The number of cases of illegal fishing operations varies from year to year, but the annual number of cases has been more than 100 since 2002. The main duties of the CGA are controlling illegal entry to Taiwan and preventing smuggling activities so it does not pay much attention to enforcing penalties for illegal fishing activities. A fisheries administrative organisation is therefore needed which should be responsible for enforcing the ban on illegal fishing operations in the future such as that which presently exists in Japan. To ban illegal fishing operations, the government should consider whether to adopt the example of Japan which has set up fisheries' oversight officials or to introduce supervisors to carry out investigative work of the catch in the sea and the coast (Hsia, 2006).

The quantity of smuggled aquatic products has increased substantially over the years, to 5,498 metric tonnes in 2007, the highest quantity to date. This shows the problem of the smuggling of aquatic products is becoming increasingly serious. Such activity not only reduces the price of domestic aquatic products, which, in turn, decreases fishermen's profits from operations and the number of operators in aquaculture fisheries, but also puts people's health at risk and increases the social cost of medical treatment because of lack of examination of smuggled aquatic products for harmful substances, such as toxins, by relevant units.

The number of patrol vessels protecting fishing craft in fisheries and the FA budget remain unchanged or have declined in substance in Taiwan. There are insufficient patrol vessels protecting fishing craft in fisheries and only a few local governments

have implemented procedures to enforce sea laws at present so measures to manage fisheries' resources' conservation areas, limit fish catch size, and launch artificial fish reefs cannot be fully implemented, which results in fisheries' resources suffering serious destruction. Given that current manpower, equipment and finances are insufficient, local governments can ask central government for subsidies to provide patrol vessels to protect fishing craft under the *Fisheries Act*. In addition, governments can adopt the example of Japan which rents boats to patrol and protect fisheries in order to save manpower, equipment, and finances in the future. Meanwhile, the government should formulate the *Regulation for conserving and managing aquatic resources* as soon as possible as the basis for banning illegal fishing operations for effective conservation and management of Taiwan's aquatic resources.

In summary, though the FA has made considerable efforts to restore fisheries resources and sustain fisheries development, the involvement of stakeholders, the long-term perspective objectives, and consideration of local issues and needs have not been considered in its coastal management policies. As a result, the government has not been able to identify local issues and develop applicable management measures. Management objectives would also not be achievable without considering the sectoral long-term objectives.

5.7 CONCLUSION

The government began to introduce measures to limit vessel building, launch artificial fish reefs, release fish seeds, and conserve fisheries' resources in the 1970s in order to halt the decline of offshore and coastal fisheries' resources. The government has also implemented fleet size reduction and fishing closure policies in recent years in order

to try to restore Taiwan's fisheries' resources. However, owing to fisheries' policies being affected by political wrangling such as coral reef fisheries, and lack of manpower and finances, management measures cannot be implemented effectively. The government needs therefore to continuously strengthen implementation of fleet size reduction and fishing closure policies and measures to manage fisheries' resources. In addition, the government should consider establishing partnerships between those units responsible for managing areas to conserve fisheries' resources, and combine the launching of artificial fish reefs and the releasing of fish seeds to produce a composite benefit.

However, since enforcement manpower, equipment, and finances are insufficient, many measures to manage fisheries' resources cannot be implemented effectively, leading to a continued decline in fisheries' resources, and destruction of habitats. Fortunately, under the provisions of the *Fisheries Act*, central government can provide subsidies to local governments for building patrol vessels to protect fishing craft. At the same time, the government should consider the establishment of fisheries' oversight officials or supervisors, and the system of renting boats in Japan for enhancing the enforcement of marine policies in conservation areas. Most of the expenditure for management of offshore and coastal fisheries is focused on the maintenance of fishing ports, fishing closures, the launching of artificial fish reefs, the releasing of fish seeds, and vessel buyback. However, given the temporal and spatial variations that exist, the government should consider allocating an additional budget for the management and maintenance of fisheries' resources in conservation areas, and the enforcement of marine policies and legislation.

CHAPTER 6

WASTE DISPOSAL AND POLLUTION

6.1 INTRODUCTION

In order to research the fundamental problems and difficulties within the existing marine policy and marine environmental management system in Taiwan, waste disposal and pollution is one the areas selected for the research (please see Section 3.3.5). Taiwan's economic development depends hugely on its marine environment. In order to follow the 'Blue Revolution', i.e. create a pollution-free marine environment, Taiwan's government has expended considerable efforts to prevent marine pollution, to conserve the natural coastline, to manage marine resources sustainability, and to promote the restoration of marine life. The EPA delineates Marine Control Zones, sets marine environmental control standards, and formulates zones based on enforcement plans and pollution control measures. In addition, the *MPCA* is the foundation of control in marine pollution. However, pollution of the marine environment still remains a serious problem in Taiwan. Such pollution arises from land-based sources in industrial and urban areas and the weak response to oil spills from the oil and shipping industries. This Chapter will focus on the ocean-related waste disposal and pollution.

6.2 DEVELOPMENT AND SOURCES

6.2.1 Land

Taiwan is a place in the world that has an extremely dense coastal population with approximately 32 metres of coastline per square kilometre. Due to its special geographical environment, Taiwan owns an abundant bio-resource meaning that the economic activity of its people is closely connected with the marine environment. The narrow landscape, dense population, urbanisation and industrialisation of Taiwan

result in massive discharge of point source pollution such as urban sewage, industrial wastewater, animal husbandry wastewater, as well as non-point source pollution such as agricultural recycled water or surface erosion that carries large amounts of pollutants into rivers which subsequently flow into oceans causing the water increasingly deteriorated quality of ocean water. However, as Yuen-Che Lee (the Chancellor of the AS) described ‘Taiwan as a violent nation’, the manner with which Taiwan treats the marine environment is heartbreaking (Yang, 2002).

Taiwan has a total of 129 rivers, with 21 primary rivers, 29 secondary rivers and 79 regular rivers. According to the scheduled monitoring activity on the water quality of primary and secondary rivers conducted by environmental protection authorities between 2001 and 2007, the conditions of pollution regarding the rivers in Taiwan are shown in Table 6.1.

Table 6.1 Statistics regarding the conditions of pollution of rivers in Taiwan between 2001 and 2007

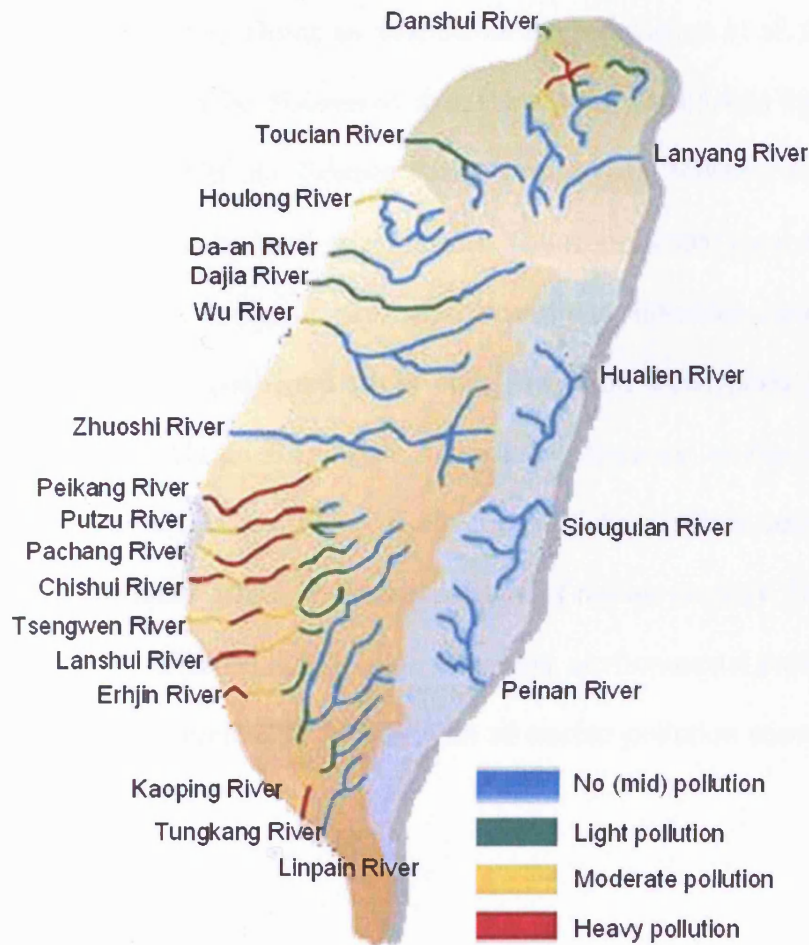
Year	Length of river	No (mild) pollution		Light pollution		Moderate pollution		Heavy pollution	
		Length	%	Length	%	Length	%	Length	%
2001	2,934.0	1,808.9	61.7	287.6	9.8	451.3	15.4	386.2	13.2
2002	2,904.2	1,812.6	62.4	349.7	12.0	335.4	11.5	4.6.5	14.0
2003	2,904.2	1,726.2	59.4	389.9	13.4	328.9	11.3	459.2	15.8
2004	2,904.2	1860.1	64.0	284.8	9.8	537.4	18.5	222.0	7.6
2005	2,904.2	1,864.9	64.2	287.8	9.9	572.5	19.7	179.1	6.2
2006	2,933.9	1,922.7	65.5	263.3	9.0	573.2	19.5	174.7	6.0
2007	2,933.9	1,811.7	61.8	233.2	7.9	692.7	23.6	196.3	6.7

Source: Adapted by the researcher from Environment Protection Administration website (EPA, 2009a) and the *Environmental White paper* in 2008 (EPA, 2009b).

In addition, according to the Report on the State of the Nation by the Directorate General of Budget, Accounting and Statistics of the Executive Yuan, the pollution to the rivers in Taiwan is on the increasing trend by at least 1.1% per annum (Zhong, 2007). The conditions in southern Taiwan are especially alarming, in that 8 out of 10 primary rivers are heavily polluted (Figure 6.1) (EPA, 2004), and the polluted river sections concentrate mostly in densely populated areas downstream. EPA states that the sources of pollution for domestic rivers can be grouped into 3 categories, namely, industrial wastewater, urban sewage, as well as wastewater of agriculture and animal husbandry, occupying 54%, 25% and 21% of the total amount of pollution in Taiwan,

respectively (EPA,2004). Probing into the cause, rivers in Taiwan suffer varying degrees of pollution because of the narrow landscape and dense pollution, and the urbanisation and industrialisation due to overconcentration of people that result in massive amounts of pollutants brought by industrial wastewater, urban sewage, wastewater of agriculture and animal husbandry discharged into rivers. Such large volume of wastewater exceeds the capacity of rivers, so that in general, rivers in Taiwan all suffer varying degrees of pollution. Approximately one third of the river sections suffer varying degrees of pollution, in that mid-and downstream of rivers is more severely polluted, and upstream, less (EPA, 2009b). The following is a discussion on the 3 major sources of pollution in relation to the rivers in Taiwan.

Figure 6.1 Degrees of pollution pertaining to the rivers in Taiwan

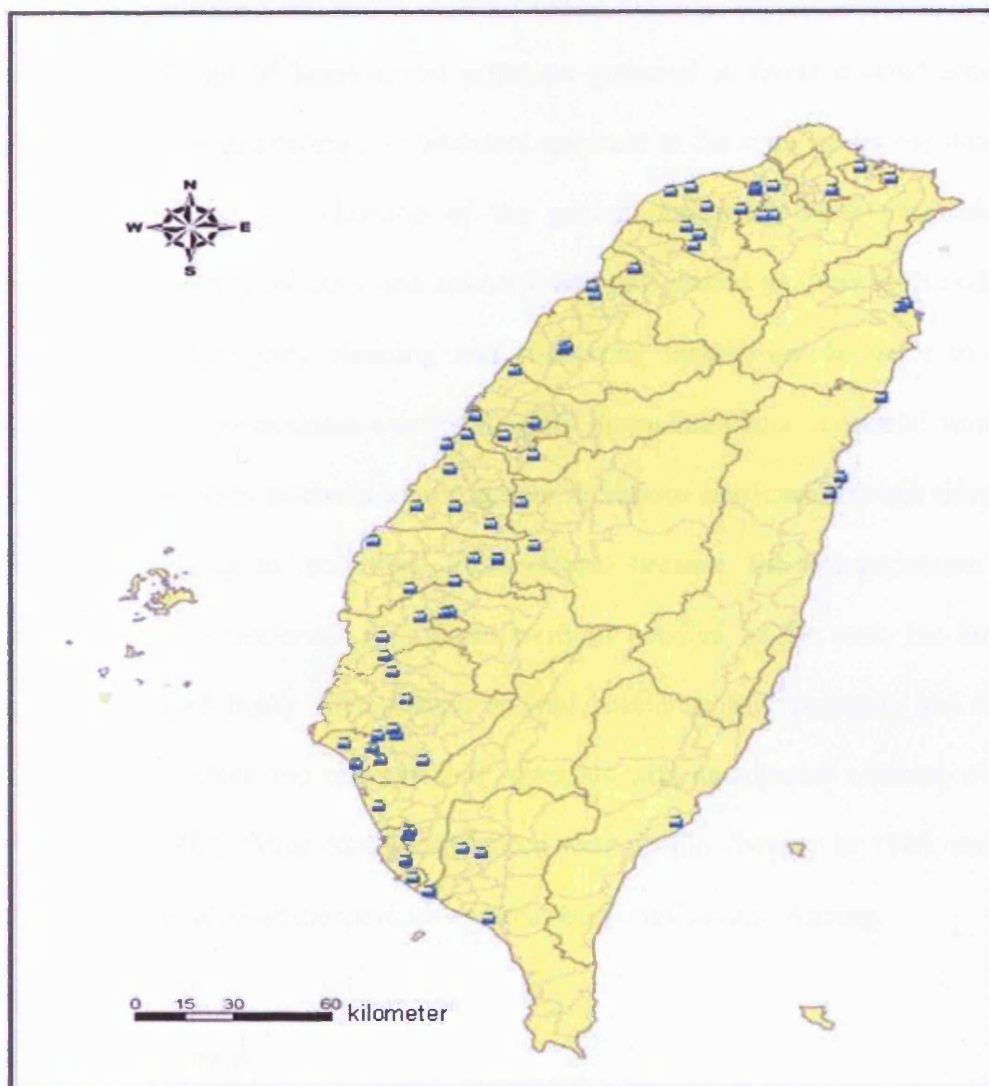


Source: Adapted and revised by the researcher from the Environment Protection Administration website (EPA, 2004)

6.2.1.1 Industrial wastewater

The industrial development in Taiwan in the 1980's has brought astounding economic achievements, but also led to the ever-increasing issue of severe environmental pollution (Lu, 2007). Doing an analysis on the jurisdiction of all the industrial zones in Taiwan, it can be discovered that some were established by National Science Council (NSC) (Hsinchu Science Park), some by the Ministry of Economic Affairs (MEA) and others by local governments. The result is that there are industrial zones all throughout Taiwan, in particular, waterfront industrial zones, offshore island industrial zones, specialized zones built from land reclamation, seashore industrial zones, *et al.* (Figure 6.2); their immediate adjacency to the ocean destroys the diversity and the extravagance of life forms of the seashore ecology that indirectly result in the predicament of the preservation of marine ecology. Despite the extended governmental effort on industrial development, environmental protection is deemed as secondary; the accelerated deterioration of marine pollution seems an obvious trend (Zhong, 2007).

Figure 6.2 The distribution of industrial zones in Taiwan



Source: Adapted and revised by the researcher from the Taichung Girl High School website (Taichung, 2009)

With the fostering of economic development, the total number of factories in operation at the end of 2005 is 77,851, an increase of 82.9% comparing with 42,575 factories in 1982. The waste gas, wastewater and wastes all cause severe pollution to the environment, so it can be said that industrial wastewater is the primary source of water pollution in Taiwan (EPA, 2009b); the strength of wastewater discharged by

each industry and the kinds of pollutants vary due to different industrial sectors, manufacturing methods and habits of water usage, causing massive volumes of toxic materials and issues of heavy-metal pollution gathered at rivers downstream and marine areas close to estuaries. In addition, pursuant to the regulations stipulated in *Waste Disposal Act*, the cleaning of the general industrial waste produced by industries, commerce, fisheries and animal husbandry should be done independently or handled by third-party cleaning and processing institutions. In order to save operating cost, some business owners illegally dump hazardous industrial waste to depopulated seashores or rivers letting it flow to various seashores through tides and river water leading to pollution. Furthermore, because the categorization and recycling of waste materials in Taiwan were ill handled in the past, the landfill leachate contained heavy metals such as lead, cadmium and mercury, and hence polluting rivers, lakes and underground water, as well as adjacent offshore marine areas (Yang, 2002). Some famous instances were Erhjin Estuary in 1986, and the ‘green oyster’ incident at the mariculture areas of Siangshan and Anping.

6.2.1.2 Urban sewage

Nearly 60% of the BOD of the waste water and sewage comes from urban sewage because the low connection ratio of underground sewage systems, the consequence of which being that most urban sewage is discharged without proper processing that constitutes one of the major sources of river pollution (EPA, 2009b). Till the end of 2006, according to the data from the Construction and Planning Agency (CPA) (CPA, 2009), the prevalence rate of sewage system construction in Taipei is 79.70%, 45.09% in Kaohsiung City, and the prevalence rate in Taiwan is 4.09%; the procedure and monitoring of animal husbandry wastewater and industrial wastewater lack stringent control and monitoring mechanisms resulting in severe conditions of illegal discharge

and forgery. Relevant laws and regulations focus more on regulating conventional and toxic materials with antiquated control standards, so there exists no adequate assurance to warrant the cleanliness of river water flowing into the ocean (Yang, 2002). On another front, the government made ‘incineration first, landfill second’ the focus of garbage processing as of 1991, and the 127 landfills throughout Taiwan have come to saturation in the last decades. Although there are 24 incinerator plants nationwide handling the garbage issue, the landfills of some townships and villages are located next to riverbanks without appropriate processing that result in landfill leachate causing pollution to the water quality of rivers. The volume of pollution for landfill leachate is 0.32g to 3.2g per person per day, approximately 5% of the volume of pollution of urban sewage, but landfills are of point source pollution with very concentrated volume of pollution discharge, so rivers are inevitably polluted if such discharge is not properly processed. The sewage coming from landfills generally contains a high concentration of organic materials with high turbidity and chromaticity, also causing pollution to water source (EPA, 2009b, The Control Yuan, 2004).

In addition, there are 4 marine discharge pipes in Taiwan that discharge urban sewage or industrial wastewater directly to the ocean after preliminary processing, so that some marine areas are polluted due to the accumulation of pollution volumes (The Control Yuan, 2004).

6.2.1.3 Wastewater of agriculture and animal husbandry

Chemical fertilizers such as nitrogenous and phosphate fertilizers are widely used in agriculture in Taiwan recently, but rivers will be polluted if they are not fully absorbed by plants and the leftovers are discharged into water. In addition, pesticides

and herbicides also constitute sources of water pollution, because the direct application thereof or the filtration, flow of surface water of the applied areas will cause pollution of surface or underground water sources. The toxicity of pesticides will pose threats to fish and other water-based organisms.

EPA states that the pollution from animal husbandry wastewater is one of the primary sources for water pollution in the country, mostly coming from pig farms; the total number of pigs in the country as of the end of 2007 is 6.64 million. Swine wastewater has been regarded as one of the 3 major causes of pollution to rivers. With the effort made in more than a decade, not only the wastewater from pig farms is reduced, wastewater processing installations are also in place, so that the environmental impact posed by swine wastewater is far lower than before and it is no longer a major source of pollution to domestic rivers (EPA, 2009b).

6.2.2 Marine

As an island nation, Taiwan began its industrial development in the 1960's, but due to its lack in petrochemical energy sources, the crude oil needed by oil-refining and petrochemical industries inevitably had to be imported from oil producing regions. Thus, maritime transport activities were flourishing. Taiwan Strait and Pacific coastline along eastern Taiwanese seaboard are marine regions via which merchandise is shipped to Mainland China, Japan and Korea, and hence the blooming maritime traffic (Figure 6.3), as well as the frequent reports of stranded ships, or even collision and sinking that cause pollution to seaboards. In addition, the ports in the country are not equipped with installations receiving waste oil, wastewater and wasted materials, such that the waste oil, wastewater and wasted materials of ships are discharged,

disposed at random that result in the consequential pollution to ports. There have been numerous ship-related oil-spill incidents in the last decade (Table 6.2).

Figure 6.3 The maritime transport routes near Taiwan



Source: Adapted by the researcher from 'The marine pollution and protection' (Yang, 2002)

Table 6.2 Ship-related pollution incidents of the last decade

Date	Case	Location
15/07/2006	The turnover of Indonesian registered 'DEWIBUNYU' chemical freighter	51 nautical miles at high sea off of Keelung
10/10/2005	Korean registered freighter 'SAMHO BROTHER' sunk out of collision	N25.01, E120.50 (approximately 10 nautical miles at high sea off of Sinjhu)
18/07/2005	Stranded sand and gravel ship 'Yungchang' registered in Anping, Tainan resulting in oil leakage	N22.45, E120.14 (0.3 nautical miles off of the seaboard of Erkeng, Mitou Township, Kaohsiung County)
11/07/2005	Mongolian registered freighter 'Lucky city' discharging waste oil at the marine area near Green Island	Marine area 13 nautical miles southwest of Green Island
30/06/2005	Turnover of cruise ship 'Royal Pacific' at the Port of Kaohsiung resulting in oil spill	Turnover at Dock 54 of Port of Kaohsiung
18/02/2005	Oil leakage of Suau registered 'Hemancheng' at port	In front of the dock of Suau Labor Union
21/10/2004	Oil overflow of oil storage tank(s) at Kingmen Power Plant	Oil spill discovered at the seaboard near Tashan Power Plant at Kingmen
15/07/2004	Oil leakage of China Petroleum Corp (CPC). 'Hsuanyuen II'	Suspected oil leakage at CPC operational platform
15/06/2004	Turnover and sinking of oil spill processing platform 'Hsiehchin VI'	Turnover and sinking of oil spill processing platform 'Hsiehchin VI' in the fishing port at Linhai New Village of Kaohsiung
18/03/2004	Stranded freighter, Panamanian registered 'Shuentung'	3.5 nautical miles northwest of Port of Keelung; water entering cabins
28/02/2004	Oil leakage from the oil transport pipes of China Petroleum Corp.	0.5 nautical mile at high sea off of Linkou Fossil Fuel Power Plant
01/14/2001	Oil leakage of Greek registered 'Amorgos'	Stranded and leaking oil near the marine area of Eluanbi

Source: Researcher's own compilation from multiple sources

The passage and promulgation of *MPCA* in November of year 2000 provides the legal basis for the execution of marine pollution control. However, the most severe incident of marine pollution in the last 2 decades, the 'Amorgos oil spill', occurred 2 months after the release of the *Act*. Although *MPCA* had already been passed in the country,

yet no response mechanisms could be initiated in time since relevant subsidiary laws and emergency response plans regarding oil spills had not been authorised. With the location of the incident being at marine areas close to Lungkeng Preservation Area that is very sensitive to ecological conditions, sectors in the country began deeming marine area oil spilling incidents as crucial, to reflect on the implications thereof and speed up the legislation of the accompanying measures to the *MPCA*. Various governmental authorities also hosted emergency response drills to cope with oil spills that marked the beginning of drastically reducing the probability of marine-area oil spilling incidents and consequential pollution. The aforementioned incident signifies a milestone regarding the task of marine pollution control in the country. In the context of sources of marine pollution, the scope of discussion in the chapter shall be limited to the pollution pertaining to the leakage of oil-related and chemical products for the reason that the major sources of marine pollution at Taiwan marine areas are oil-related and chemical products.

6.3 GOVERNMENT

6.3.1 Administration

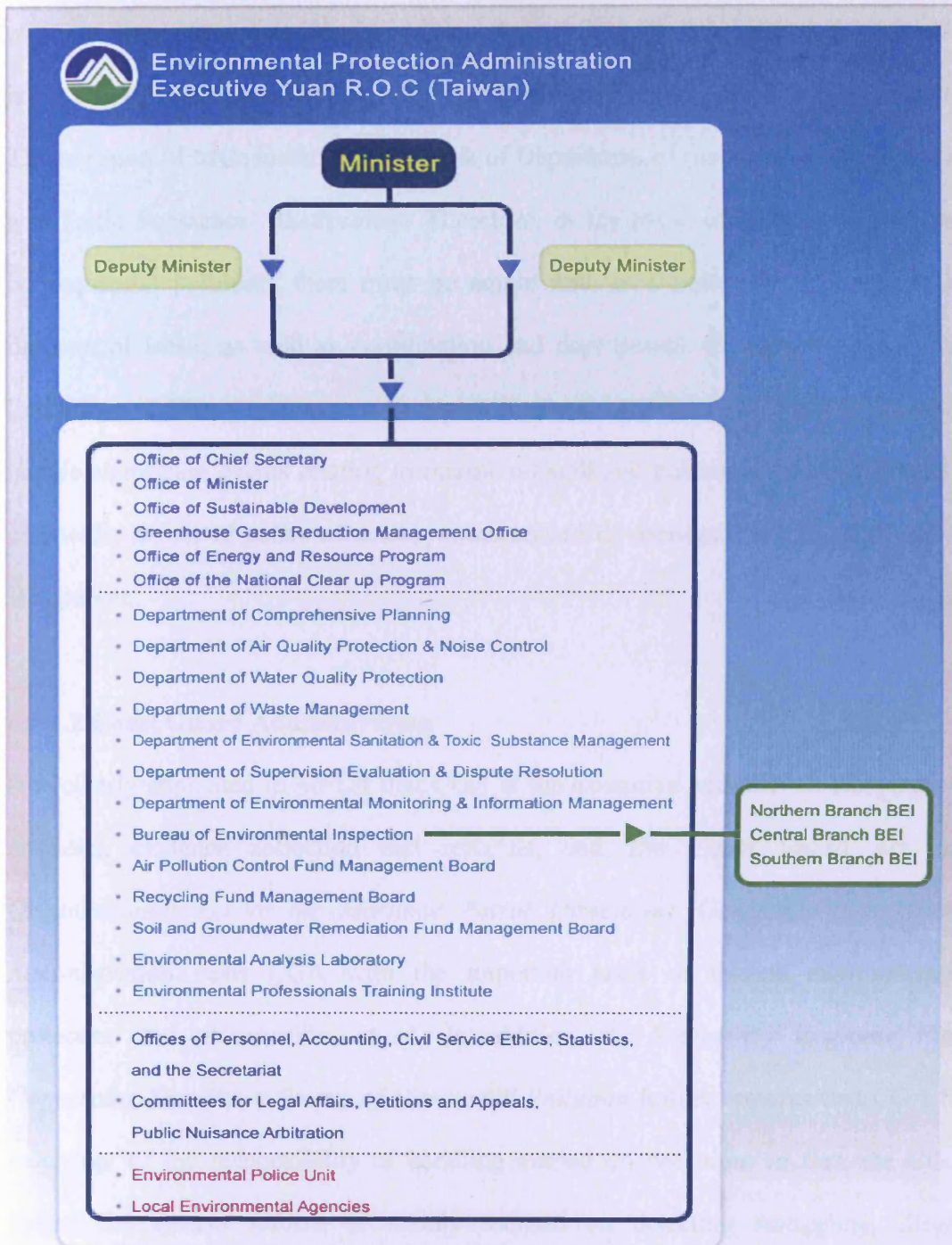
6.3.1.1 Environmental Protection Administration

EPA was established in the country in 1987 as the centralised authority in the Central Government in charge of environmental protection. This was in view of the rising demands on environmental quality from the citizens. *The Organisational Act of the Environmental Protection Administration, Executive Yuan* stipulates that EPA is in charge of the administrative affairs pertaining to nationwide environmental protection with the responsibilities of providing instructions and monitoring, under which one director and two deputy directors are installed, and the following departments are established, namely Department of Comprehensive Planning, Department of Air Quality Protection and Noise Control, Department of Water Quality Protection,

Department of Waste Management, Department of Environmental Sanitation and Toxic Substance Management, Department of Supervision Evaluation and Dispute Resolution, and Department of Environmental Monitoring and Information Management. The business office directly linked with the affairs of the protecting the marine environment and pollution control is Department of Water Quality Protection (Figure 6.4).

Figure 6.4 Organisational Structure of Environmental Protection

Administration



Source: Adapted by the researcher from the Environment Protection Administration website (EPA, 2009c)

Although Department of Water Quality Protection is primarily responsible for the task of marine pollution control, Department of Waste Management is in charge of the task of controlling waste materials. In addition, the monitoring of the marine environment is the task of Department of Environmental Monitoring and Information Management. The transport of toxic materials is the task of Department of Environmental Sanitation and Toxic Substance Management. Therefore, in the event of marine oil spill and consequential pollution, there must be ample time as a buffer for the purpose of division of labor, as well as coordination and deployment. In addition, due to the limitations of EPA on its executive capabilities and insufficient equipment, it cannot handle significant events relating to marine oil spill and pollution, so the importance of interdepartmental policy measures, communication, coordination and collaboration is apparent.

6.3.1.2 Coast Guard Administration

It is clearly stipulated in *MPCA* that CGA is the executive authority of carrying out citations, evidence collection and referrals, and *The Coast Guard Act* and *Organisational Act of the Maritime Patrol Directorate General, Coast Guard Administration* vests CGA with the important tasks of marine environmental protection and preservation, *et al.*. In addition, *the Emergency Response Plan Concerning Significant Events of Marine Oil Pollution* further requires that CGA be in charge of the responsibility of handling marine oil pollution. In fact, the CGA before the system reform of mainly focused on detecting smuggling, illegal emigration and criminal investigation, *et al.*. With the addition of legal responsibilities, it is necessary to gradually strengthen the professional training of personnel, purchase more response handling equipment of pollution control and the plan for more large oil removal boats with regards to the execution of marine

pollution control for the purpose of effective implementation of organisational mission and objectives.

6.3.1.3 Council of Agriculture

Organisational Act of the Fisheries Agency, Council of Agriculture, Executive Yuan clearly stipulates that COA is responsible for fishery science as well as the research and planning on the control of fishery related hazards. Therefore, FA should be in charge of the execution of damage assessment of fishery resources and ecological evaluation in the context of events relating to marine environmental pollution. In addition, laws such as Article 17 of *the Fisheries Act, Pollution Control Guidelines Regarding the Safety of Oil Barge Refueling within the Premises of Fishing Ports and Emergency Response Plan Concerning Significant Events of Marine Oil Pollution* clearly vest COA with the authority of governing the sunk boats, materials, floating materials or pollutants within the premise of a fishing port, and the need to handle the task of emergency response concerning any oil spill and pollution with a fishing port. Whereas, current COA organisation, equipment and manpower do not have the law enforcement capacity of citing port-area pollution and handling oil pollution in a fishing port.

6.3.1.4 Ministry of Transportation and Communications

Pursuant to the regulation in Article 35-1 of *the Commercial Port Act*, ‘*Ministry of Transportation and Communications (MOTC) shall consult relevant governmental authorities pertaining to the establishment of limitations to the discharge of hazardous materials by ships, operating manuals of oil freighters, ships’ records of oil stock and receiving equipment of wastewater onboard ships such that pollution to seawater by ships may be prevented*’, as well as administrative rules concerning the

handling of oil spill and pollution events within the premise of a commercial port. MOTC is also vested in *Emergency Response Plan Concerning Significant Events of Marine Oil Pollution* with the authority on any oil spill and pollution within the premise of a commercial port. So, the responsibilities of regarding the control of marine pollution are mostly stipulated in relevant laws, with a very small part relating to in-port pollution handling.

In regards to the regulations on ship-related pollution, *Commercial Port Act* primarily regulates all the ships accessing international or local commercial ports. There are no criminal penalties involved except for administrative penalties, so it can only actively request authorized agents of ships to perform the task of cleaning oil spill and pollution. The task of oil spill and pollution for the ports is vested to the Port Section of the Port Affairs Division, yet only the Section chief and a clerk are in charge, in practice, lacking the professional staff and equipment needed for the operation of detection, so the collection of evidence is difficult (especially at night time) leading to the inability to issue citations or penalties pursuant to the laws (Ceng, 1998). As of now, organisation and manpower as well as the response equipment for the task of environmental protection of the port authorities under MOTC in charge of the cleaning of in-port, land-based and marine oil spill and pollution are only capable of cleaning small-scale in-port oil pollution events. Immediate support from China Petroleum Corp. Ltd., locally stationed military units or civilian businesses must be called upon for the response handling and operational support for large-scale oil spill and pollution events.

6.3.1.5 Ministry of National Defense

According to Article 5 of *MPCA*, MND is the executive authority providing assistance in the response operations to marine oil spill and pollution, and is not vested in *Emergency Response Plan Concerning Significant Events of Marine Oil Pollution* with the authority to handle oil spill and pollution taking at any location at sea although MND is a member of the emergency response team. Therefore, MND should be defined merely as the law enforcement authority pertaining to marine environmental protection, and its role in the handling of oil pollution should be limited only to an assisting one.

6.3.1.6 Environmental Protection Bureau of local government

Environmental Protection Bureaus were gradually set up in county and city governments between 1988 and 1991 to strengthen the grassroots executive capability on the task of environmental protection. Pursuant to *MPCA*, special municipality governments, county (city) governments are local governing authorities; the jurisdiction before the MOI divided marine administrative districts was 3 nautical miles from the shore, and demarcation rules of perpendicularity and equidistance were adopted to draw up the judicial borders amongst special municipalities, counties and cities (EPA, 2002). At any rate, the primary mission was to focus on land-based environmental protection, and the capacity of marine pollution control was apparently lacking. For instance, Section Two of the Environmental Protection Bureaus of Taipei and Kaohsiung Cities are in charge of the control of water pollution, as well as affairs relating to the management of toxic chemical materials. Section Three of the Environmental Protection Bureaus of county and city governments are in charge of affairs relating to water pollution, heat pollution, soil pollution, management of water quality and management on the hygiene of drinking water. However, although the

governing authorities of local governments are named primary authorities for the task of marine pollution control, no response handling equipment is available for any control of oil pollution.

6.3.2 Legislation

The legal system of the past in the country has been ‘focusing on the land and despising the sea’, and put less emphasis on the management of marine areas. As of 1998, however, *Law on the Territorial Sea and the Contiguous Zone of the Republic of China* and *Law on the Exclusive Economic Zone and Continental Shelf of the Republic of China* were legislated marking the beginning to deem the sea of more value. *MPCA* opened up a new page in the protection of the marine environment.

Current laws in Taiwan relating to marine pollution are: *Water Pollution Control Act*, *Waste Disposal Act*, *Commercial Port Act* and *MPCA*, amongst which *Water Pollution Control Act* and *Waste Disposal Act* primarily focus on water pollution to ensure the cleanliness of water resource and the reduction of land-based sources pollution. *Commercial Port Act* and *MPCA* focus on the discharge of oil by ships in order to control marine pollution and protect the marine environment.

Regarding the control of land-based sources pollution, *Water Pollution Control Act* was legislated and enacted by the government in 2002 that incorporated preventive measures such a quota control system, self-initiated wastewater testing and reporting system, polluters’ user-fee system, permit system for pollution sources and certification system by designated officials, with the expectation that this *Act* will become the basis of execution to reduce land-based sources pollution. In addition,

Articles 15 and 16 of *MPCA* also contains regulations for the prevention of land-based pollution sources:

Article 15: *Public or private premises that fail to receive the permission of the central competent authority may not discharge wastewater or sewage into the sea or the following areas adjacent to the sea.*

- (1) Nature reserves or ecological conservation areas*
- (2) Ecological protection areas, significant scenic areas or recreation areas of national parks*
- (3) Wildlife preserves*
- (4) Aquaculture resource conservation areas*
- (5) Other areas the central competent authority has officially announced as in need of special protection*

Article 16: *Public or private premises shall promptly adopt measures to prevent, eliminate or mitigate pollution and shall promptly notify competent authorities at all levels and industry competent authorities when serious marine pollution occurs, or when there is concern of serious pollution occurring, due to marine discharge pipes, marine discharge points, or waste piling or disposal sites.*

In the circumstance in the foregoing paragraph, the local competent authority shall first adopt necessary response measures and, when necessary, the central competent authority may directly adopt handling measures; the public or private premises at issue shall bear responsibility for all expenses generated by response and handling measures.

Although *Water Pollution Control Act*, since its release to date, has achieved the legislative purpose of regulating the implementation of underground sewage systems and wastewater processing facilities of businesses, yet in response to the transition of the environment and effective improvement of river pollution at the current stage, the collaboration of *Water Pollution Control Act* with other relevant laws is needed to ensure the clean water quality of rivers. For instance, the *Act* lacks explicit regulations concerning non-point source pollution, and non-point source pollution is very severe because of the complexity relating to the current use of land within source water preservation areas, causing the difficulty of conducting work (Chen, 2004). Concerning *Waste Disposal Act*, relevant subsidiary laws pertaining to the issue of garbage disposal were legislated by EPA based on the amendments to some articles in *Waste Disposal Act* as of 1997, in order to implement the recycling and reuse of resources and prevent landfill leachate from polluting rivers, with the expectation to achieve the objective of 'zero-waste garbage'. However, there are no stringent regulations in the current legal system regarding the reduction of sources; only limited results are achieved through the collaborative measures of all the departments, for instance, to promote clean manufacturing process to strengthen the control on reduced sources (Chen and Guo, 2005).

Commercial Port Act was not legislated exclusively for the control of marine pollution, but therein are explicit regulations regarding the penalties for the discharge of waste oil by ships (ship owners, captains or persons in charge will be fined from NT\$60,000 to NT\$600,000) (Chiau, 2000). *MPCA* was officially enacted in 2000 expanding the scope of marine pollution from pollution caused by ports and ships to the entire area of the exclusive economic zone of the country, as well as all pollution sources leading to marine pollution. It was at this juncture that the country has a legal

basis exclusively for the control of marine pollution and exclusive authorities of management and law enforcement: EPA and CGA.

As a whole, *MPCA* has overall regulations on the relevant vested authorities, personnel, equipment, procedures and training pertaining to the prevention, management, response, responsibility and execution of marine pollution control. According to *MPCA* regulations, environmental protection units have no authority to board ships and execute port state control, and port authorities are primary executive units; environmental protection units rarely execute the task of auditing marine pollution due to equipment and personnel limitations; the main task is disciplinary actions of suspected violations of *MPCA* referred by CGA, MND or port authorities. So, there is no exclusive authority fully responsible for the oceans in terms of marine pollution control.

6.3.3 Human resources

6.3.3.1 Education and training

Education on the marine environment is one of the most fundamental methods in marine environmental management. Aside from the education provided by relevant marine colleges and universities presented in the Section 5.3.3, there are no colleges, universities in the country that offer academic departments dedicated to the control and management of marine pollution. Therefore, there is a general deficiency amongst the citizens of the country concerning the knowledge of marine pollution. In order to increase understanding on the oceans amongst the citizens of the country, the government, as of 2004, promulgated a series of tasks on marine education (Please see Section 5.3.3).

6.3.3.2 Education and training of the government

6.3.3.2.1 Professional education and training on environmental protection

The training of environmental protection personnel is pursuant to foundational laws of environmental protection in collaboration with *the Mid-term Policy Implementation Plan of EPA for 2005-2008* and *Government Programme for Tailored Learning*, in that the Environmental Professionals Training Institute of EPA designs various trainings in the environmental protection profession and certification training, in order to enhance the professional skills of the environmental protection personnel such as those of environmental protection authorities, governing authorities of target businesses, business institutions and environmental protection volunteers, *et al.*, in order to assist the government and businesses to care for the various tasks of pollution control and management.

Training courses include environmental protection policies, laws, professional skill and administrative management. Participants of the trainings include personnel of different levels of environmental protection agencies, personnel of governing authorities for target businesses, operation personnel of environmental protection businesses, environmental protection volunteers, patrol team members of communities and rivers and environmental protection alternative military service. A total of 184 classes were held, using 2007 as an illustration.

6.3.3.2.2 Education and training regarding oil spill pollution

The event of 'Amorgos' oil leakage caused severe damage to natural landscapes and bio-resources. EPA of the Executive Yuan promulgated *Emergency Response Plan Concerning Significant Events of Marine Oil Pollution* pursuant to Article 10 of *MPCA*. It is regulated therein the *Plan* that in the suspicious or actual emergency

event of significant marine oil pollution, immediate integration of resources of different levels of governments, business-sector groups and social groups according to the report and response systems of the *Plan* is needed in order to obtain pollution processing equipment and professionals so that safe, immediate, effective and coordinated response operations can be achieved.

(1) Coast Guard Administration

In order to strengthen the professional capability of marine pollution control, personnel is sent to domestic and international trainings in addition to the promulgation of emergency response plans, planning on the utilisation of pollution control equipment and the publication of operating manuals on pollution control. Also, marine oil removal equipment is acquired through transfers from EPA and purchase, and annual emergency response drills are carried out in collaboration with county (city) governments to improve on the prevention and response capabilities regarding marine pollution events (CGA, 2004b).

(2) Environmental Protection Administration

As of 2001, EPA began purchasing and enriching emergency equipment for marine pollution control, including oil booms, oil absorbing cotton and oil skimmers. All the equipment was then distributed to 27 marine patrol units, 10 fishing ports, 23 environmental protection authorities and 1 national park according to varying risks of marine pollution.

Between 2001 and 2004, 2,001 persons have completed professional training on marine pollution control domestically, 112 internationally. Half of the aforementioned trainees were CGA employees; those who were sent to EPA sponsored training

sessions on marine pollution have no employment relationship with EPA, so training instructors are not able to demand trainees' learning attitude; some of the trainees were reaching the end of their military service leading to ineffective implementation of education and waste of resources. In addition, Coastal and Maritime Patrol Directorates General have separate personnel training and study centers hosting respective education and training courses, thus causing the scattering and waste of resources (Gu, 2006).

The governing authority of emergency response to oil spills of the country is EPA, and maritime execution authority is CGA. According to all the marine pollution control affairs and existing personnel organisation, there exist an excessive number of involved missions and amount of regular business affairs, meanwhile also lacking professionals with maritime background. By contrast, the major items of execution for CGA are maintaining maritime traffic control, maritime rescues, emergency medical care for marine disasters, fishery patrol and the maintenance of fishery resources, as well as affairs pertaining to the protection and conservation of the marine environment. The lack of security concerns is due to the absence of clearly defined organisational missions and frequent rotation of local coast guard patrol personnel, as well as the use of vessels that are mainly for maritime law enforcement and rescue but not particularly fit for the use of emergency response to oil spills (Gu, 2006).

Since the EPA enactment of *MPCA*, one of the most important tasks focusing on the emergency response to marine pollution is offering domestic and international trainings to executive personnel of relevant authorities of emergency response to marine pollution; initial results can be seen through the hosting of trainings for more than 2,000 people as of today. However, local governments still lack the capacity of

Level 1 emergency response to oil pollution, so it is necessary to conduct an examination into the current procedure of event processing concerning the emergency response to marine pollution (Gu, 2006).

6.4 POLICY DEVELOPMENT

The dramatic economic and industrial progress in Taiwan for the past three decades, combining with the accelerated growth in population, cause the gradual depletion of natural resources, the increase in pollutants, the deterioration of environmental quality as well as nonstop self-help events. In addition, marine pollution control has never been highly regarded in Taiwan, in that the protection of marine environment has historically received little attention in the country, as has environmental protection (Zhong, 2007). It was not until the establishment of EPA in 1987 that a series of environmental policies was drafted (Table 6.3) and strategies concerning marine pollution control and river management.

Table 6.3 Details of environmental policies

Year	Name of policy	Principles	Strategy	Tools/Technologies/Measures
1987	the Environmental Protection Policy Guidelines	<ol style="list-style-type: none"> 1.Polluters' use-fee system 2.Participation of interested parties 		<ol style="list-style-type: none"> 1.Polluters pay the charges 2.Awarding and measures of assistance 3.Environmental evaluation system 4.Efficacy analysis on policies
1998	the National Environmental Protection Plan	<ol style="list-style-type: none"> 1.Sustainable development 2.Development in economy and technologies must take into account environmental and ecological protection 3.Participation of public, private and civilian sectors 4.International participation 	<p>Protection of water quality:</p> <ol style="list-style-type: none"> 1.Increase in pollution-source control and discharge reduction 2.Promotion of a permit system on the discharge 3.Promotion of control strategies in connection with economic incentives 4.Implementation of quota control on certain river sections and river basins 5.Objective set to holistic control on river basins, planning on the sustainable use of water resource 6.Objective set to reaching water quality standards to ensure the safety of drinking water 7.Strengthening of underground water control 	<p>1.Control tools:</p> <p>The objective of such tools is to directly impact on the environmental performance of polluters, through the establishment and execution of clearly defined objectives, standards and techniques for polluters to comply with relevant laws and regulations. Polluters must comply with all relevant laws and regulations without hesitation, or face judicial and administrative penalties.</p> <p>Four important tasks are included in the aforementioned tools:</p> <ol style="list-style-type: none"> (1)The establishment of standards relating to quality and discharge (2)The issuance of discharge permits (3)Monitoring on the sources of pollution for compliance of regulations (4)Appropriate penalties on pollution sources violating

			<p>8. Increase on the prevalence rate of quality drinking water to ensure the safety relating to drinking water</p>	<p>regulations</p> <p>2. Economic tools for environmental protection</p> <p>Economic tools are different from orders for controlling purposes in that they provide businesses or polluters a certain degree of flexibility to choose the most beneficial means to reach certain environmental objectives.</p> <p>Theoretically, economic tools provide incentives for increased cost effectiveness.</p> <p>Economic tools for environmental protection include: (1) Fee charging/taxation (2) Security deposit (3) Permits and quotas that can be traded (4) Financial incentives (5) Corporate responsibility (6) Miscellaneous: including public investments, environmental protection labelling, <i>et al.</i></p> <p>3. Social tools</p> <p>The behaviours of target groups can be impacted by social tools that play an important role in governmental encouragement and personal responsibility regarding environmental protection; commonly seen measures are the provision of information, opportunities for communication and monitoring, as well as promotion and education.</p>
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2000	the Administration and Management Programme of River Basins and Oceans of Taiwan			<p>1.Promotion on the pollution management and control on 13 designated rivers</p> <p>2.Reinforcement of regulations pertaining to marine pollution control</p> <p>3.Establishment of an emergency response system</p>
2005	Maintenance and improvement plan on the water quality of rivers and oceans			Improvement on the water quality of river body; cleaning of garbage on the river surface in conjunction with pollution auditing and control; increase in education, promotion and civilian participation in river patrol; the use of existing sewage processing plants to process river water and household wastewater; <i>et al.</i>
2006	Environmental White Paper	<p>1.Participation of interested parties</p> <p>2.Partnering relationship</p> <p>3.Coexistence with natural processes</p>	<p>1.Increase on the control of public hazards;</p> <p>2.Establishment of resource recycling;</p> <p>3.Expansion of civilian participation;</p> <p>4.Protection on environmental resources;</p> <p>5.Betterment on quality of life;</p> <p>6.Pursuit of sustainable development;</p>	
2007	The Action Plan Towards Environmental Protection Sustainability in Taiwan	The strengthening of partnering relationship amongst regional governments, fostering of cooperation amongst communities		The Action Plan Towards Sustainable Environmental Protection in Taiwan focusing its objectives on the desired results, with a total of 22 projects

Source: Researcher's own work

The opening words in *the Environmental Protection Policy Guidelines* unveiled and by the government on October 2nd, 1987 clearly state that '*the environment is a national resource on which the life and survival of the citizenry depend, the quality thereof being intricately connected with national and societal development. In order to better the environmental quality and foster the wellbeing of the citizenry, the Environmental Protection Policy Guidelines was thus established*'. These words clearly point out that at the present stage, the national environmental protection policies were to better the environmental quality and foster the wellbeing of the citizenry. The objective also clearly points out that importance of the protection of the natural environment, maintenance of ecological balance for the sustainable use for generations to come, pursuit of citizens' health, the safety and comfort of the environmental quality, maintenance of citizens' existence and the prevention of our living environment from the damage of public hazards. Article 7 in Chapter 2 concerning strategies also clearly states '*to promote the education and propaganda of environmental education, speed up the training of relevant staff and develop science and technologies of environmental protection*'. Articles 3 and 4 in Chapter 3 emphasize on '*how to protect natural, societal and humanistic resources for reasonable and effective utilisation*'; Article 9 especially emphasizes on '*strengthening environmental education, as well as research and development*'. From the aforementioned, environmental education is the bedrock for the task of environmental protection; there is no bettering of environmental quality without healthy environmental education.

The citizens of the country now have increased demands on environmental quality accompanying with the rise of personal income. In order to effectively improve environmental quality, EPA, as an extension to *the Environmental Protection Policy*

Guidelines, finished promulgating *the National Environmental Protection Plan* as the foundation of short-, medium- and long-term implementation of environmental protection measures of the country, as well as the implementation of the articles within *the Constitutional Amendments* regarding the unveiling of ‘*the development of economic and scientific development should take into account the protection to the environment and ecology*’. Also, as of 1999, EPA began encouraging and assisting local governments to promulgate *County (Municipal) Environmental Protection Plan* as a means to comprehensively implement the task of environmental protection; these county (municipal) plans on environmental protection were complete at the end of 2002. In addition, the release and implementation of *Basic Environmental Act* provides the legal basis for the aforementioned national and local plans of environmental protection, so that the strategy and construction of relevant laws on environmental protection are becoming more comprehensive.

The *Plan* is the top-level plan of the country in regards to the task of environmental protection as well as an important milestone for the task of environmental protection; in collaboration with *the Comprehensive Developmental Plan for State-Owned Land* in 2000, the year 2001 was set as the duration in order to achieve the following objectives:

1. *The prevention of public hazards, fostering of citizenry health; the cultivation of the environment of tranquillity and essence, bettering the quality of living environment.*
2. *The protection of environmental resources, pursuit of sustainable development.*
3. *The active participation to the international affairs pertaining to environmental protection, collaboration to execute the global task of sustainable development.*

In order to achieve the said objectives in the *Plan*, EPA used order and management tools, environmental and economic tools, as well as societal tools as executive mechanisms based on the degree of governmental control, and proposed 8 strategies (Table 6.3) in the context of protection of water quality. Initial efficacy had been achieved as of the start of execution till now with the active promotion from relevant governmental departments and local governments. The achieved percentage regarding the water quality of rivers slightly fell behind, and the probable cause was that despite strict citations by environmental protection authorities on industrial wastewater and animal husbandry wastewater as well as the compliance with environmental protection laws by businesses, the prevalence rate of underground sewage systems remained low resulting in severe pollution to the water quality of rivers by urban sewage (EPA, 2009b).

In order to progressively manage river basins, EPA continued to advance the pollution control of rivers based on *the Administration and Management Programme of River Basins and Oceans of Taiwan* approved by the Executive Yuan in 2000. Subsequently, EPA revised the Programme per approval of the Executive Yuan in 2001 in order to accelerate the improvement on the pollution to rivers and comprehensively carry out the task of protecting water quality; in the revised Programme, in addition to the expansion of the task regarding the content of marine pollution control, 13 designated rivers were selected, and 585 billion NT Dollars, 895 billion NT Dollars were poured in 2001 and 2003, respectively for the execution of the prioritized task regarding the pollution control on river basins. The execution of the Programme was good and was completed in 2004. In the area of pollution control of rivers, initial results were achieved, in that the achievement rate of dissolved oxygen for Puzi River rose from 52% in 2001 to 84% in 2004; the achievement rate

for the categorized water quality standards of water body of ammonia and nitrogen rose from 2% in 2001 to 18.3% in 2004; the length percentage of the severely polluted river sections of Nankan River were reduced from 92% in 2001 to 31% in 2004; the iron content in Tienpao River was reduced from 25mg/L to 3mg/L, and the water quality of other rivers continued being improved (EPA, 2007a). Regarding the control of marine pollution, a total of 17 relevant laws and subsidiary laws were promulgated regarding the comprehensive establishment of control laws of marine pollution and an emergency response system, and the initial implementation of the response equipment for the emergency response plan on significant marine oil pollution. As well, as of 2002, approximately 6,000 times of water quality monitoring were conducted and completed annually in Taiwan, Penhu, Kingmen and Matzu, including the following 5 categories of body of water: rivers, marine areas, marine areas near onshore leisure resorts, reservoirs and underground water (Lu, 2007).

In view of the extraordinary results of *the Administration and Management Programme of River Basins and Oceans of Taiwan*, therefore, the government initiated *the Maintenance Plan of Water Quality of Rivers and Oceans* in 2005 for the continued collaboration with the holistic environmental protection task of river basins as well as assurance to the sustained development and utilisation of environmental ecology, with a total of 5.65 million NT Dollars. The *Plan* sought to improve 20 river sections with mild to medium pollution and to improve the quality of seawater. Thus, the cleaning of pollutants was undertaken as a means to the improvement of environmental quality of river basins by focusing on the severely polluted areas along the riverbanks mid- and downstream of river basins, in order to prevent the filthy view along riverbanks from taking place, and the pollutants from being washed by storms

into rivers to pollute the water source. Initial results of improvement were achieved as of 2007 (Lu, 2007). The results were as follows:

1. The total length of severely polluted river sections nationwide was reduced from 222km (7.64%) in 2004 to 177.9km (6.13%) in 2005.
2. The largest range of improvement for the severely polluted river basins nationwide between 2004 and 2005 was along Erjen River, Nankan River and Putzi River, all of which were included in the designated river sections for management in the Maintenance Plan of Water Quality of Rivers and Oceans, with at least 40% reduction in severely polluted river sections.
3. The monitoring results from water quality monitoring stations for 13 designated rivers under management between 2004 and 2005 revealed that the percentage of medium pollution was reduced to mild or no (slight) pollution; the total number of monitoring stations were 18.

The Environmental White Paper published by the government in 2006 has a detailed introduction on the current conditions of domestic environmental protection, governmental policies on environmental protection and the results of implementation thereof, as well as a proposal of primary strategy for environmental protection policies (Table 6.3). Therein, Director Tsai Hsun Hsiung of EPA indicated that the issue of environmental protection has been developed into an international issue, so all the citizens should contribute effort for the environment for the sustained utilization of resources, the existence and development of humanity, as well as the improvement of quality of living.

In collaboration with the Three-year Sprint Plan of Stage One Concerning the Vision of Economic Development for 2015 promoted by the Executive Yuan, EPA seeks to 'foster an innovative and prosperous economy' and 'cultivate a society that care about justice' for a beautiful Taiwan that 'cultivates a sustainable green environment' based on the core values of prosperity, justice and sustainability. As such, *the Action Plan Towards Environmental Protection Sustainability in Taiwan* was promulgated and proposed in 2007 as the focus of work between 2007 and 2009. The content of the Plan included 22 sub-plans that cover air, water, waste materials, environmental impact evaluation, environmental monitoring, *et al.*.

6.5 TECHNICAL MANAGEMENT, IMPLEMENTATION AND ENFORCEMENT

6.5.1 Environmental Impact Assessment

Environmental Impact Assessment Act was passed in 1994 regulating various types of developmental behavior, and those that are not compliant with the regulations are not permitted to proceed, in order to guard against and reduce the negative impact of such behavior on the environment. It is on this basis that the projects relating to the development of industrial zones, ports, mining and energy that could potentially pose adverse influences on the environment must furnish EIA, in which an environmental monitoring plan is also included.

Although civilian participation is regulated in *Environmental Impact Assessment Act* according to the current conditions, yet with the development units undergoing significant development projects, civilians feel that they do not have substantive participatory capability even though they are in the public hearings, and there is a great discrepancy between the assessment conclusions of the government and civilian

expectations because most people do not understand the essence, purpose, system and operating procedure of an environmental impact assessment (Lee, 2006).

6.5.2 Strategic Environmental Assessment

The SEA system in Taiwan has its origin in the legislation of *Environmental Impact Assessment Act* at the end of 1994, and *Operating Guidelines Concerning Strategic Environmental Assessment* was enacted 1997 as the basis for SEA development; the document was subsequently revised into *Regulations Concerning Strategic Environmental Assessment* in 2000 and is still in force today. Therein the Regulations, 14 detailed policy items in 9 categories suspicious of having environmental impact must proceed to policy environmental assessment, yet only five cases have been completed as of today (Table 6.4). Marine environmental protection policies, however, is not included in the detailed policy items, such as marine policy and coastal protection policy, as well as development and management guidelines concerning marine development and mid-, long-term plan on coastal protection.

Table 6.4 An overview of detailed policy items of SEA required to be implementation in Taiwan

Policy	Items	Note
Industrial policy	The establishment of industrial zones	Case 1
	Industrial policy concerning energy-intensive infrastructure	
Mining development policy	The development and supply of sand and gravel	
Developmental policy concerning water resource	Developmental policy concerning water resource	Case 4
Policy concerning land use	The establishment of golf courses	Case 2
	Land used for agricultural production, and large-scale usage alteration of conservation land into non-agricultural use	
	New or expanded urban development plan (applicable only to areas of 10 hectares and above)	
	Range alteration concerning the preservation zone for water source, quality and quantity	
	Range alteration concerning the preservation zone for the water source, quality of drinking water	Case 3
Energy policy	Energy development guidelines	
Policy concerning animal husbandry	Pigs breeding	
Transportation policy	Significant railway and highway development	Case 5
Policy concerning waste materials processing	Garbage processing	
Policy concerning the processing of nuclear waste materials	Re-processing of used nuclear fuel from nuclear power plants	

Source: Adapted by the researcher from the project of Environment Protection Administration (Chang, 2008)

Since the current SEA system in the country is of case-based environmental assessment, the issues encountered since the implementation of SEA in the country are analysed as follows. First of all, the developmental space for future policy or strategy directions still exists on a technical level, as does the aspects of involved

issues. There is a potentially severe deficiency in regards to the figures of parameters as background information or for forecast in terms of characteristic, degree and positioning, and very few successful cases or experiential models exist. Furthermore, due to the ambiguity regarding the definitions of policies, plans or proposals in SEA process, responsibilities designated for all decision-making or other relevant units are also ambiguous, and there is a lack in public participation. Therefore, there is indeed the need to conduct examinations based on past experience of implementation, and to explore more appropriate operating procedures and assessment methods (Chang, 2008).

6.5.3 Monitoring

EPA began the task of monitoring since 1997 in order to ascertain the current conditions and historical changes of rivers, underground water, reservoirs, marine areas and marine areas for leisure purposes as references for the establishment of control strategies of water pollution. Initial monitoring frequency, items and stations were incomplete until 2002 when the task of monitoring on the water quality along Taiwan coastline was expanded to a total of 17 marine areas and a total of 97 water quality monitoring stations; the number of monitoring stations was increased to 104 in 2006. According to the monitored results in 2007 on water quality at 19 coastal waters of the country (104 monitoring stations), as well as a comparison based on the 7 parameters pertaining to the monitored items, categorization of the marine environment and standards on marine environmental quality, namely pH, quantity of dissolved oxygen, lead, copper, mercury, zinc and cadmium, the passing rate for all the aforementioned items reached 99%, and the water quality of marine areas is generally good (EPA, 2007b). Continual monitoring and the construction of a database containing long-term monitoring on the water quality of water body are needed to

ensure the quality of the water body in the living environment of people. Since the resources regarding water quality monitoring are scattered, however, the coordination amongst relevant authorities is expected to strengthen the monitoring system of water quality, in order to integrate the information on water quality monitoring of water body, and gradually integrate the data of water quality monitoring from different authorities in collaboration with the development of environmental information database in the future.

6.5.4 Geographic Information System

EPA now has an 'environmental information database' analysing environments such as rivers, reservoirs, marine areas and underground water, as well as 'water pollution source management information system' analysing the permit information concerning all the registered businesses nationwide, in which 36 businesses are of marine discharge. However, no investigative analysis has been conducted concerning marine pollution and marine environmental quality. So, further assistance to the task of environmental protection can be done through the implementation of a management information system on marine pollution sources, continual integration of environmental information database, the use of environmental geographical information system to provide support in the decision making regarding environmental protection, as well as the integration of various administrative operating systems.

6.5.5 Marine Protection Area

It is clearly stated in *Agenda 21 – Guidelines of Sustainable Development Strategies in the Republic of China* released by the Executive Yuan in 2000 that habitat protection is the simplest and most effective method for the restoration of marine

based life forms, as well as advocated therein for the increase in the number and area of MPA, so that by 2020, 20% of the economic waters along the coast and coastal waters designated as protection area. In addition, the policy objective is clearly stated in *Ocean Policy White Paper*: important coastal wetlands and sand hill terrains should be listed for further control and protection; the short-term objective is to include the 5% of marine areas surrounding Taiwan into MPA, including areas such as corals, lagoons, estuaries, beaches and ledges; objective for 2010 is 10% of marine area, and 20% in 2020 to be included into MPA in order synchronize with the global objective.

Article 8 of *MPCA* stipulates that central governing authority, namely EPA, may draw up marine control zones according to the water quality of marine areas, and Article 29 of *Water Pollution Control Act* stipulates that the governing authorities of special municipalities, counties and cities may draw up and publish water quality control zones according to the conditions of water pollution within their respective jurisdictions. However, the current government has yet to draw up marine control zones facing the depletion of marine resources and destruction to the marine environment because of the pollution and overdevelopment of the marine environment. In the future, therefore, as the governing authority of environmental protection proposes and draws up marine control zones, the scope of zoning must exclude the various protection zones (Table 6.5) published by relevant authorities governing designated business entities for the subsequent zoning of the ‘marine control zones’ according to the conditions of pollution regarding the water quality of the body of water for control purposes.

Table 6.5 The list on the number of various protection, preservation and conservation zones drawn up along the coast of Taiwan

Unit for the draw-up	Laws cited	Title	Quantity
Council of Agriculture	Fisheries Act	Protection ledge no-fishing zone	28
	Fisheries Act	Artificial fishing reef no-fishing zone	57
	Fisheries Act	Fishing resource protection zone	24
	Cultural Heritage Preservation Act	Natural preservation zone	19
	Wildlife Conservation Act	Wildlife protection zone	14
	Wildlife Conservation Act	Important wildlife habitat for Coastal protection zone	10
Construction and Planning Agency	The Protection Plan for the Natural Environment along Coastal Areas in Taiwan	Coastal protection zone	12
	National Park Act	National park	2
Tourism Bureau, Ministry of Transportation and Communications		Designated national littoral scenic area	6
Others		Coastal wetland	25

Source: Researcher's own compilation

The government has applied extensive EIA, GIS, monitoring, and MPA in the environmental protection and resources conservation. However, for the existing procedure of environmental estimation, there are only five procedures in the decision-making of environmental estimation for the public participation, include review of description of environmental impact, the public meeting, stage of category delimit of estimation, location survey and debate, as well as review of report of environmental impact estimation. Participators always limit to governments and

scholars, but local participator seldom join in the procedure. This reveals local residents that it is not easy to get the review information about development in the first stage so that cause the deadlock confronting each other, or dispute of extensive environment protection because lack of communication (Wang, 2001). Finally, SEA has existed in the implementation regulation of environment impact estimation in the government's policy in 2000, but there are only five cases at present (Wang, 2007). It has not been applied to marine affairs.

6.6 ASSESSMENT OF MANAGEMENT

This section provides an overview of the management assessment in the waste disposal and pollution sector for understanding the foundational problems with regard to marine policy and marine environmental management in Taiwan (please see Section 3.5).

Due to the difference in the usage degree and purpose regarding the water body of the marine environment, as well as that in the means of control, when it comes to any suspicious deterioration or special needs concerning the quality of the marine environment, considerations should be taken for the establishment of requirements of 'marine control zones', in that not only the standards of marine environmental quality and environmental characteristics of the marine environment should be taken into account, said requirements must also respond to the needs for special marine environments demanded by the governing authorities of target businesses. With respect to waste material processing, currently installed marine discharge pipes in operation in Taiwan are located in Bali, Dalinpu, Zuoying and Jhongjhou, with a total of four. Long-term solutions require the effective reduction pollution sources such as coastal urban sewage primarily because public underground sewage systems have not

been constructed, and the sewage produced by coastal households is directly discharged into coastlines or ports; the pollution from urban sewage is the major pollution source discharged into port areas, especially in cities adjacent to major commercial ports. In order to resolve the pollution produced along coastlines, it is suggested that building-type precast sewage processing facilities be installed for coastal water discharge for the collection and processing of sewage on sunny days, in order to reduce the pollution to the water quality along leisure beaches. Therefore, different strategies and tactics should be adopted according to varying pollution sources regarding the handling of marine pollution issues. In addition, EPA began the promotion of setting up Neighborhood Watch Patrol Team for the Water Environment of Rivers along all river basins nationwide, in order to construct a closely knitted auditing network through the collaboration of schools, communities and group resources to set up Neighborhood Watch Patrol Teams for the Water Environment of Rivers in counties and cities nationwide. A total of 332 patrol teams have been set up as of 2007, with a total of 7,582 team members, so the results of execution are abundant (EPA, 2009b).

In the aspect of pollution management, *MPCA* that is closely connected to the marine environment was finally released and enacted as of November 11th, 2000. Before EPA was able to promulgate *Marine Pollution Control Act Enforcement Rules*, however, the event involving oil tanker ‘Amorgos’ polluting Lungkeng of Kenting National Park took place on November 14th, 2001 that tested the capability of the government handling emergency pollution events that could potentially trigger political storms. To seek a solution for the issue of severe pollution on this marine area, the Executive Yuan allocated a total of 260 million New Taiwan Dollars in 2 consecutive years, as well as made substantial investments in both hardware, software

facilities and emergency response training of personnel, with the expectation to provide maximum results for the handling of marine pollution events in the future. The immaturity of handling marine pollution by the government in recent years is causing the gradual deterioration of marine ecology (Zhong, 2007). Because the execution of marine pollution control in the country include international affairs in areas of environmental protection, resources, legal system, vessel administration, insurance and vessels, and relevant authorities include governing, executive, assisting port management authorities, as well as governing authorities for target businesses, the integration of departmental personnel and resources is needed for the implementation of promoting the task of marine pollution control

Furthermore, the government should not convince the public to accept the concepts and ways of marine pollution control simply based on the importance of protecting the environment and resources. Rather, regularly scheduled hearings on the development and resource conservation of coastal areas should be held when promulgating the comprehensive plan of marine management in order to strengthen the communication of opinions between local governments and local people and to set up a public participation system. Meanwhile, the production or publication of printed and video periodicals, books and pictures should be done to reinforce the recognition and education regarding marine resource conservation amongst elementary and middle schools, as well as the general public.

In addition to dealing with land-based sources of pollution, marine construction, the treatment of wastes in the ocean, and pollution from marine vessels, the *MPCA* also stipulates that vessels are liable for any damage they cause vis-à-vis marine pollution. Owners of marine vessels must provide a guarantee or take out liability insurance

against pollution damage; victims may then directly seek compensation from the responsible party's insurance plan. More specifically, owners/operators of general vessels of over 400 tons as well as oil and chemical tanks of over 150 tons are required to put up such a guarantee or hold liability insurance against damage with respect to marine pollution. Thus, the *Act* addresses comprehensively the issue of damage caused by marine pollution and stipulates how liability for such damage is assigned (EPA, 2004).

The *MPCA* also requires that marine vessels install oil pollution prevention and monitoring equipment. Port authorities are also empowered to restrict the movement of vessels suspected of polluting the marine environment or to prevent such vessels from leaving the harbour. Moreover, all port authorities are required to install waste reception facilities and are allowed to collect disposal fees for such services (Ysia and Chou, 2004).

6.7 CONCLUSION

Since the establishment of the EPA in 1987, marine environmental protection and marine pollution prevention have improved significantly. Public awakening to the importance of protecting the environment came about primarily as a result of the 'green oysters' in Erhjin Estuary and the Amorgos oil spill.

Although several problems still exist, e.g. a huge amount of land-point pollution, the weak response of the private sector, particularly oil and vessel industries, to implement pollution reduction measures, and waste discharge from urban and industrial areas, marine pollution will continue to decrease if Taiwan's authorities and

stakeholders consistently work together to develop environmental protection and sustainable development strategies.

To sum up, Taiwan's authorities have paid attention to facilitate marine environmental protection. Management performance has contributed to a gradual improvement in environmental quality. However, authorities and stakeholders need to continue their efforts to effectively prevent marine pollution.

The EPA can direct attention to pollution problems in local coastal zones and implement measures to reduce them, through its clean beach and maintenance of the environment plan in coastal areas, and also supervise local government as well as local people in removing the pollution.

The current strategies concerning the environmental protection on the marine environment are: improvement on river and estuary pollution, reduction in land-based sources pollution, enhancement in the response capability for marine pollution, training personnel for the conservation of the marine environment, strengthening of monitoring and control on the marine environment and the establishment of marine area advance warning system, *et al.*. Since the affairs pertaining to the protection of the marine environment are scattered amongst the governmental departments, the existence of interdepartmental 'coordination and communication method' coincidentally demonstrates the interdependence between environmental protection and coast guard patrol authorities; the weakness, however, is that the division of labor is not well done, so there is no centralized coordination mechanism with regards to the scattered utilisation of manpower and materials. Further, 'law enforcement mechanism' and 'executive power' are scattered amongst the departments, so unless

all the relevant authorities can give away their respective egoism toward effective coordination and communication, there can easily be situations where the policies and execution amongst law enforcement systems are not synchronized.

CHAPTER 7

MARINE ENVIRONMENTAL PROTECTION AND CONSERVATION

7.1 INTRODUCTION

In order to research the fundamental problems and difficulties within the existing marine policy and marine environmental management system in Taiwan, marine environmental protection and conservation is a selected subject for this research (please see Section 3.3.5). Taiwan is a small in terms of its area occupying merely three thousandths of the entire land area of the world, yet the waters around the island contain as much as 10% of the total marine species of the world. The excellent geographical position of Taiwan, located at the fringe of the largest Continental Shelf and the northern end of the East Indies provides it with an abundant variety and amount of marine species. In the coastal aspect, western Taiwanese coastlines are shallow sand beaches with many estuaries and mangroves, and two shoal lagoons with extraordinarily high fisheries productivity, i.e. Cyigu and Dapeng Bay. Along the eastern side are deep-sea ecological systems several thousand meters underneath the ocean.

There is an abundance of other marine biological resources such as coral-reefs, coastal wetlands (including lagoons), as well as mangrove ecological resources, planktons, benthos and radial marine life forms, which in turn contribute to the development and culture of other resources such as fisheries. Coral reefs are important nursing areas for coastal fisheries; coastal wetlands and mangrove ecology are the main breeding areas for fry supplies, important food chains for coastal ecology and migrant life forms, as well as the primary gene pool for coastal life forms; planktons and benthos are the most important foundation for fisheries and marine ecological system; whales, dolphins, turtles, whale sharks, sea birds, all have the

addition tourist and leisure value. Thus, it is extremely crucial to maintain the health of the marine ecological environment.

As already noted above (Chapters 5 and 6) it is to adopt a holistic approach to exclusive fishing right zones and marine environmental protection. However, since there is no single organisation overseeing and implementing integrated marine management, related departments have been influenced by departmental egoism, and integrated marine management has been difficult to achieve and implement.

As in most countries, the drivers of marine and coastal management in Taiwan too are such as environmental crisis, government initiative(s), the Earth Summit (1992) prescriptions, depletion of natural resources, pollution, and ecosystem damage. For example, the Ramsar Convention, which came into effect in 1975, prescribes the protection of waterfront habitats and the preservation of wetlands; Agenda 21 was approved at the Earth Summit in 1992 as a blueprint for sustainable development by means of resources conservation and integrated management; and the Bali Declaration in 2005 announced common consensus on the sustainable development of marine resources and coastal communities. To balance development needs and sustainable development of marine environment in Taiwan, it is necessary to view conservation as the axis around which other considerations revolve in any development or planning policy. This Chapter explores the current conditions of marine environmental protection and conservation in Taiwan from the perspectives of conservation and management of biodiversity.

7.2 DEVELOPMENT: CONSERVATION LOCATIONS AND INITIATIVES

According to the nine objectives established by the International Union for Conservation of Nature (IUCN), protection areas can be divided into 6 categories; Taiwan already has 12% of its total area in various protection areas, most of which are on the land and few are MPA. There is a variety of protection areas in the country pursuant to different laws and regulations (please see Table 6.5); for instance, ‘National Parks’ are pursuant to *National Park Act*, ‘Nature Reserves Areas’ pursuant to *Cultural Heritage Preservation Act*, ‘Important Habitat Environments/Wildlife Protection Areas’ pursuant to *Wildlife Conservation Act*, ‘Coastal Protection Areas’ pursuant to *Natural Environment Protection Plan for Taiwan Coastal Areas*, ‘National Scenic Areas’ pursuant to *Tourism Development Act*, and ‘Fisheries Resources Conversation Zones’ pursuant to *Fisheries Act, et al.*. Further discussion is given focusing on the aforementioned MPAs and reserves areas.

7.2.1 National Park

National Park Act stipulates that ‘Be it enacted for the purpose of preserving the nation’s unique natural scenery, wild fauna and flora and historic sites and providing public recreation and areas for scientific research’. Therefore, this is of ‘national park’ category according to IUCN categorization. Kenting National Park is an example with a marine protection area of 15,185.15 hectares that only occupies 0.60% of Taiwan’s 12-nautical marine waters (Table 7.1) (Shao, 2003). It has been very difficult pertaining to the management and maintenance of the marine waters belonging to Kenting National Park, especially with respects to jet skies, land-based pollution caused by water and soil conservation, as well as fish poisoning and bombing. With the addition of light penalties imposed in *National Park Act* and difficulty of enforcement, various issues repeatedly arise (Lai, 2007).

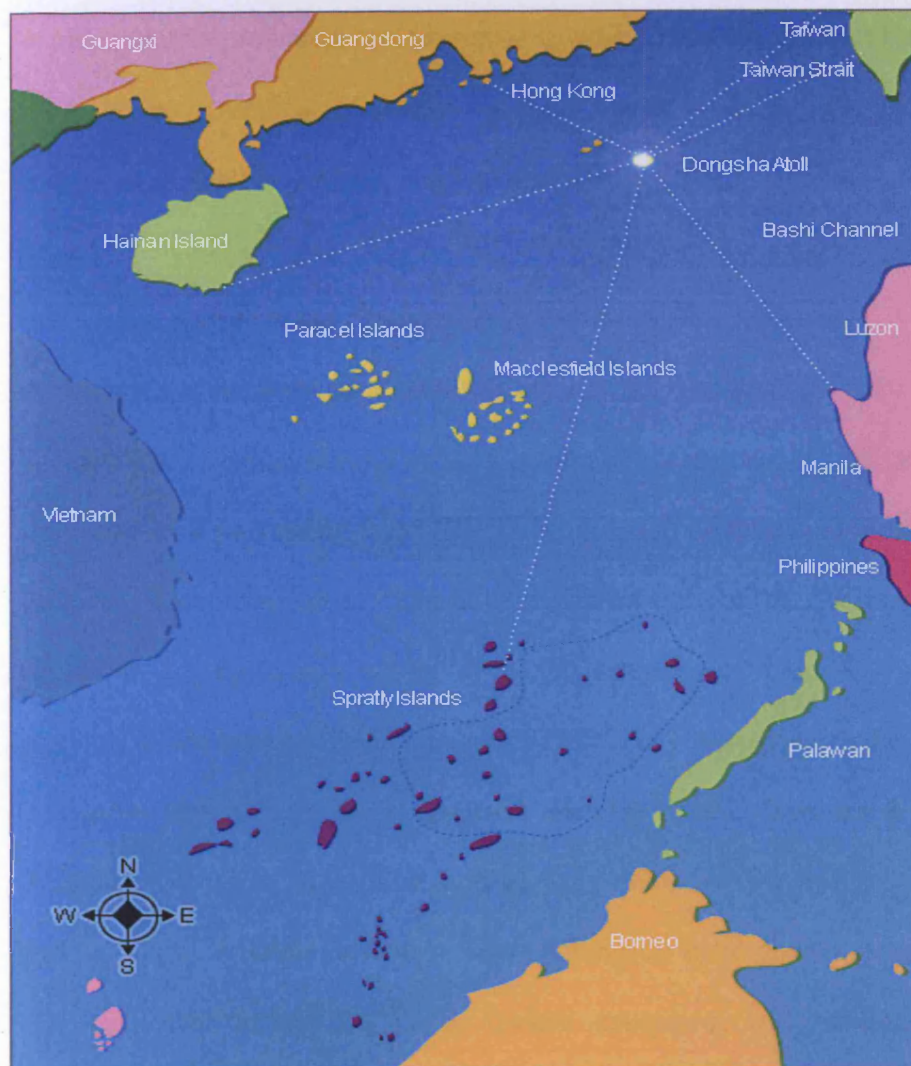
Moreover, MOI established Dongsha Atoll National Park (Figure 7.1) in 2007. Encompassing an area as large as 353,000 hectares, the marine national park safeguards the important atoll of the West Pacific, ensuring the abundant marine resources. Its immense range also makes it the largest national park of the nation. Marine National Park Administration Office executes the management and administration of Dongsha Atoll National Park, marking a milestone the sustained management of marine conservation in Taiwan (CPAMI, 2007).

Table 7.1 The details of Nation Parks of Taiwan

Area	Name of national park	Area (hectare)
South district	Kenting National Park	land: 18,083.50 sea: 15,185.15 total area: 33,268.65
Central district	Yushan National Park	105,490
North district	Yangmingshan National Park	11,455
East district	Taroko National Park	92,000
Central district	Shei-pa National Park	76,850
Offshore island	Kinmen National Park	3,719.64
Offshore island	Dongsha National Park	land: 174 sea: 353,493.95 total: 353,667.95
South area	Taijiang National Park	land: 4,905 sea: 34,405 total: 39,310
		land: 312,677.14 sea: 403,105.04 total: 715,782.18 A land area about the island of Taiwan 8.64%

Source: Source: Adapted by the author from Ministry of the Interior (2011)

Figure 7.1 Location map of the Dongsha Atoll National Park



Source: Adapted by the researcher from the Construction and Planning Agency, Ministry of the Interior website (CPAMI, 2006)

7.2.2 Nature Reserves Area

Nature Reserves Area is the Coastal Nature Protection Area sanctioned by the COA pursuant to *Cultural Heritage Preservation Act*, with a total of 5 places and a total area of 527.54 hectares. Theoretically, Nature Protection Area should belong to ‘Strict Natural Reserve’ in IUCN (Shao, 2003) because of its stricter protection over target species and their habitats, but the research and conservation functions of Nature

Reserves Area are weaker, only various research or academic groups are permitted to enter conducting research, and no active scientific research, maintenance of historical relics or environmental promotion is done. There exists the plan for strengthened management, but has yet to be implemented (EPA, 1995).

7.2.3 Important Habitat Environment/Wildlife Protection Area

According to the Important Wildlife Habitat Environment (IWHE) sanctioned by *Wildlife Conservation Act*, COA is in charge of such a task and its promulgation for the purpose of preventing these IWHEs from being destroyed by major construction projects. Therefore, areas that have been sanctioned as IWHEs do not have accompanying aggressive conservation and management plans, but rather, they are reserved as the core and buffering zones of Wildlife Protection Areas, so they should belong to 'Habitat/Species Management Area' in IUCN. There are 8 IWHEs and 11 Wildlife Protection Area, with a total area of 5, 406.32 hectares. However, the jurisdiction of Wildlife Protection Areas belongs to local governments (Article 10 of *Wildlife Conservation Act*). With limited manpower and funding, the level of jurisdiction over Wildlife Protection Areas varies, resulting in different effects in conservation (Lai, 2007; Shao, 2003).

7.2.4 Coastal Protection Area

The *Natural Environmental Protection Plan for the Coastal Areas of Taiwan* implemented by the MOI is another plan most closely connected with MPA. There are 11 Coastal Protection Areas sanctioned pursuant to the *Plan*, with a total of 128, 326 hectares, 4 of which are incorporated into National Parks and designated Scenic Areas for further management and the remainder of which are under local governments for measures of protection. *Natural Environmental Protection Plan for the Coastal Areas*

of Taiwan divides protection areas into Natural Protection Areas and Level I Protection Areas. Actions that alter any current ecological characteristics and natural landscapes are strictly prohibited, and the protection over natural resources within such areas is strengthened, hence belonging to 'Managed Resource Protected Areas' in IUCN. Pertaining to Regular Protected Areas, the maintenance of current utilization of resources without affecting ecological characteristics and natural landscapes is permitted, so they should belong to 'Protected Landscape/Seascape' in IUCN (Shao, 2003; MOI, 1984).

7.2.5 Designated National Scenic Areas

The Tourism Bureau, Ministry of Transportation and Communications has sanctioned Designated National Scenic Areas pursuant to *Tourism Development Act* for the purpose of developing tourism industry, with 7 marine areas and a total of 118,557.641 hectares, fitting the specifications of 'Protected Landscape/Seascape' in IUCN. Although there are prohibitions and penalties stipulated in the *Tourism Development Act* pertaining to the picking or catching, fishing of natural resources within Designated National Scenic Areas, but difficulty of enforcement results in ineffective management of illegal acts committed by tourists (Shao, 2003; MOI, 1984).

7.2.6 Fisheries Resources Conservation Zones

In order to ensure the growth of fisheries while strengthening the conservation of the ecological environment of coastline marine areas, the FA began assisting local governments as of 1978 to sanction Fisheries Resources Conservation Zones pursuant to *Fisheries Act*; as of yet, 26 places have been sanctioned with a total of 4,357.529 hectares, primarily focusing on specific species and placing length-of-catch and

seasonal limitations on several economic marine life forms (please see Section 5.5.2). Thus, these Zones should belong to 'Habitat / Species Management Area' in IUCN. However, the government has yet to conduct protection measures from the perspective of ecological system (Shao, 2003); in other words, the conservation of fisheries resources should be combined with overall habitat environment.

On the whole, the short-term objective of the *Ocean Policy White Paper* is to place the 5% of water areas surrounding Taiwan into MPA (please see Section 6.5.5). Adding the area of all the so-called 'Protection Areas' and subtracting the overlapping portions, the total area has already reached 233,709.71 hectares, occupying 29.38% of the 3-nautical-mile marine area, and 9.31% of the 12-nautical-mile marine area of Taiwan. Although these figures have exceeded the short-term objective stipulated in the *Ocean Policy White Paper*, yet most of them are merely nominal without any factual execution, so they are only 'paper parks' (Shao, 2003).

7.3 GOVERNMENT

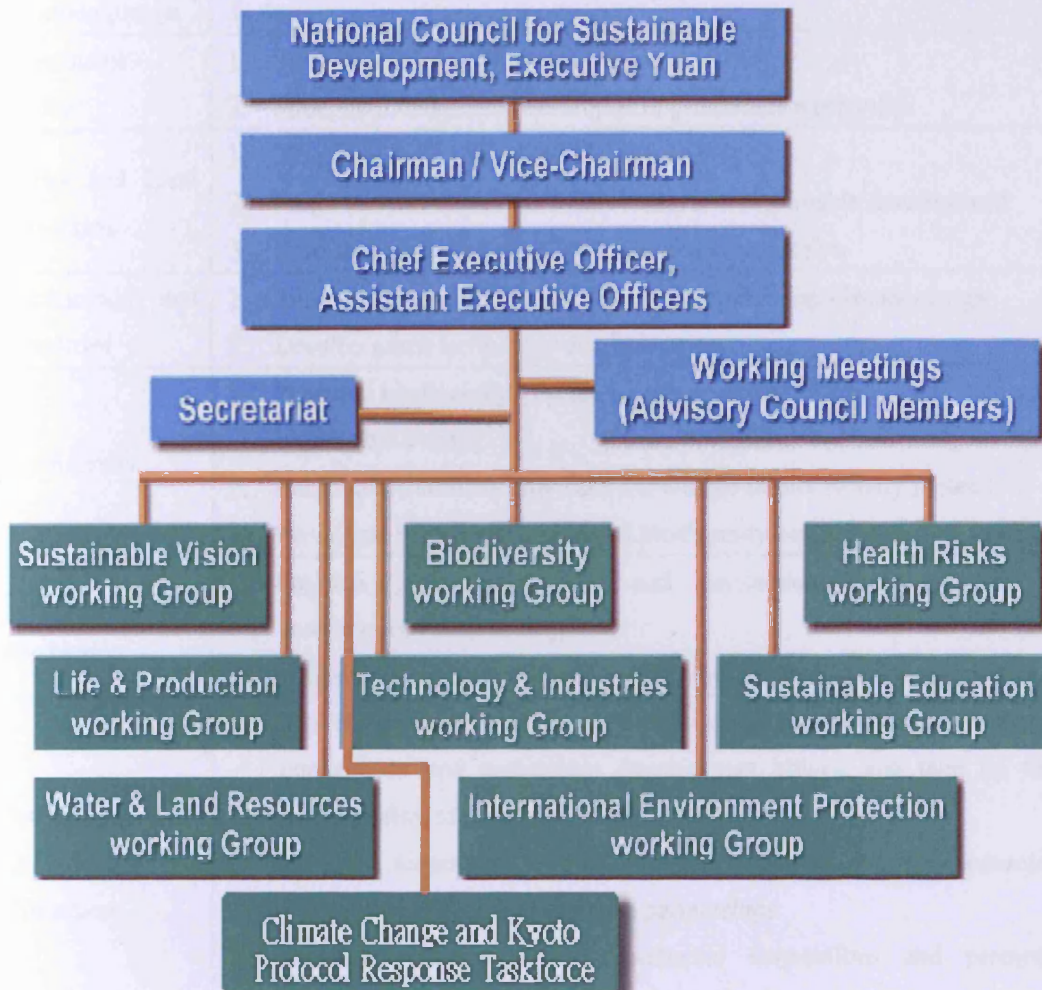
7.3.1 Administration

7.3.1.1 National Council for Sustainable Development

The Executive Yuan in order to enhance the protection of the environment and ecology, guarantee social fairness and justice, promote economic development, and establish a green silicon island, so as to promote citizens' living standards and pursue national sustainable development, has set up the NCSD in accordance with Article 29 of the *Basic Environmental Act*. The NCSD will have one chairman, the position to be concurrently held by the Premier; there will be one vice-chairman, the position to be concurrently held by the Vice Premier. The NCSD will have 25 to 31 council members, who are composed of ministers-without-portfolio, administrators of government agencies, experts and scholars, and representatives of civil groups.

Eight working groups are established under NCSD (Figure 7.2), the tasks of which are shown in Table 7.2. Comprehensive and integrated planning and execution are conducted regarding energy, water resources, social wellbeing, biodiversity and culture heritage, *et al.* based on the environmental characteristics of Taiwan, in order to foster economic development, societal creation and effective integration of environmental conservation for further incorporation into the dynamic blueprint of national development in order to achieve the objective of national sustainable development encompassing ‘sustainable ecology’, ‘comfortable environment’, ‘secure society’ and ‘open economy’. Major documents on completed after the establishment of NCSD on sustainable development include: (1) *Agenda 21 – Guidelines of Sustainable Development Strategies in the Republic of China* in May, 2000; (2) *Taiwan Sustainable Development Action Plan* in December, 2002; (3) *Taiwan Declaration On Sustainable Development* in January, 2003; (4) *Taiwan Sustainable Development Indicators* in June, 2003; (5) the *Taiwan Agenda 21: Vision and Strategies for National Sustainable Development* in November, 2004 (NCSD, 2009a).

Figure 7.2 Organisational Structure of the National Council for Sustainable Development



Source: Adapted by the researcher from the National Council for Sustainable Development website (NCSD, 2009b)

Table 7.2 Working groups and task of National Council for Sustainable Development

Working groups	Task
Sustainable Vision	<ol style="list-style-type: none"> 1. Set sustainable development vision 2. Strengthen sustainable development promotion mechanism
Water and Land Resources	<ol style="list-style-type: none"> 1. Promote national land sustainable plan 2. Promote water resources conservation and sustainable development 3. Promote green urban and rural plan and construction
Technology and Industries	<ol style="list-style-type: none"> 1. Raise energy and resources efficiency and develop cleaner energy 2. Develop green technology and industries
Biodiversity	<ol style="list-style-type: none"> 1. Promote biodiversity research, conservation, utilizing and fair and reasonable sharing 2. Raise public consciousness and knowledge of biodiversity protection 3. Participate in regional and global biodiversity conservation cooperation
Life and Production	<ol style="list-style-type: none"> 1. Promote green production and consuming and establish a resource-recycling society 2. Integrate production, life, and ecology and promote green construction
International Environmental Protection	<ol style="list-style-type: none"> 1. Actively participate in the activities of international environmental conventions and sustainable development affairs, and take up the responsibility of a member of global village 2. Promote sustainable development, international environmental cooperation affairs, and establish partnerships 3. Abide by international environmental conventions and promote complementary regulation systems
Health Risks	<ol style="list-style-type: none"> 1. Promote health risk evaluation mechanism 2. Set up health risk management system
Sustainable Education	<ol style="list-style-type: none"> 1. Instill sustainable development concept into the public's daily life and school education 2. Integrate government, the public, industries and school resources to promote sustainable development education 3. Proceed with related research of sustainable development education and international cooperation

Source: Adapted by the researcher from the National Council for Sustainable Development website (NCSD, 2009c)

7.3.1.2 Environmental Protection Administration

EPA is in charge of environmental protection and its vision is 'blue skies and green earth', 'verdant mountains and pristine water' and 'sustainable homeland', and hereunder is the Office of Sustainable Development that pursues national sustainable development (Please see Section 6.3.1.1). With regards to environmental protection policy, from the initial strengthening of environmental education and propaganda on environmental protection, Taiwan remains limited to merely 'pollution control', and the tasks of 'conservation' and even issues relating to the environment improving economy and society are the responsibilities of other departments.

7.3.1.3 Council of Agriculture

Endemic Species Research Institute is a designated testing and research unit that actively promotes, on behalf of the government, the tasks of biodiversity conservation, survey and research. In addition, a major task of FA is fisheries resources conservation, including the planning of Coastal Fisheries Resources Conservation Zones, strengthening the protection and conservation of fisheries resources, and making up the deficiency in natural fisheries production by reforming fishery reefs (the launch of artificial fish reefs) and resource cultivation (release fish seeds), with the hope of restoring the economic fisheries resources that are at the brink of deterioration or exhaustion, so that fisheries resources may be sustainably developed and utilized. Therefore, fisheries resources conservation is the key to future developmental success of offshore and coastal fisheries in Taiwan (FA, 2009).

7.3.1.4 Construction and Planning Agency, Ministry of the Interior

The Construction and Planning Agency of the Ministry of the Interior (CPAMI) is the central governing authority in charge of the planning, utilisation and management of

national land resources of Taiwan. National Park Division is set up under CPAMI in charge of the planning, construction and management of national parks, matters of conservation and coordination, the planning, construction and management of metropolitan parks, as well as matters pertaining to the planning, conservation and coordination of the natural environment (e.g., Dongsha Atoll National Park). The vision is CPAMI is as follows: to promote resource conservation in nation parks, implementation of biodiversity conservation, strengthening of environmental education relating to national parks, promotion of ecological tourism, creation of excellent-quality natural facility and environment, and the implementation of sustainable development of resources (CPAMI, 2009).

7.3.1.5 Council for Cultural Affairs

It is stipulated in *Council for Cultural Affairs Organisation Act* that responsible matters relating to biodiversity are of the aspect of cultural heritage preservation. Pursuant to *Cultural Heritage Preservation Act*, Council for Cultural Affairs is responsible for the inspection and designation of Ecological Preservation Areas and Nature Reserves Areas, as well as endangered animal and plant species.

7.3.1.6 Coast Guard Administration

Pursuant to regulations of *Coast Guard Act*, marine conservation is a task carried out by CGA. Although CGA is not the governing authority for the sanctioning of MPAs, yet once the said task is completed, CGA is responsible for the tasks of law enforcement and control protection areas (CGA, 2009b).

7.3.1.7 Local governments

Article 7 of *Basic Environmental Act* stipulates that ‘*Local governments, in view of the needs of natural and social conditions within the local jurisdiction, may draft autonomous laws and regulations and environmental protection plans, in accordance with the laws and regulations and national environmental protection plans in the foregoing paragraph, and promote and implement such laws and regulations and plans*’. Therefore, the governing authority for county and city governments concerning conservation is Department of Construction or Department of Environmental Protection.

As a whole, Taiwan has often been excluded from the drafting of environment-related international treaties and agreements due to its special international position, but with abundant biodiversity, Taiwan cannot exclude itself from international participation in relevant matters pertaining to conservation and the utilisation of other bio-resources. Currently, the International Environmental Protection working group is established under NCSO for the engagement in international affairs, and chief administrative officers of central and local governments of the country should maintain biodiversity in collaboration with relevant international activities and current domestic conditions. However, governing authorities are scattered in different departments, resulting in disputes concerning overlapping in responsible tasks, waste of administrative resources and ambiguity of responsibility (Huang, 2005).

7.3.2 Legislation

Since the abolition of the *Martial Law* in 1987, the people of Taiwan finally had the opportunity to know the sea, and gradually began developing coastal and marine resources. The promulgation of *Law on the Territorial Sea and the Contiguous Zone*

of the Republic of China and Law on the Exclusive Economic Zone and Continental Shelf of the Republic of China in 1998 has affirmed the legal foundation for the management and jurisdiction within 200 nautical miles of marine areas.

The current environmental laws of which EPA is in charge belong to the scope of ‘pollution control’, such as *Environmental Impact Assessment Act*, *Water Pollution Control Act*, *Marine Pollution Control Act*, and *Waste Disposal Act*. Relevant laws belong to the scope of ‘conservation’ include *Fisheries Act* and *Wildlife Conservation Act* of which COA is in charge, as well as *National Park Act*, *Regional Planning Law* and *Urban Planning Law* of which MOI is in charge; in addition, Ministry of Economic Affairs is in charge of *Water Resources Law* and *Mining Law*.

Cultural Heritage Preservation Act was promulgated in 1982 that marked the earliest legislation concerning ecological conservation. It is stipulated in Section 5 of Article 3 that ‘Vistas of Natural Culture: natural areas, animals, plants, or rocks and rock formations designated as being of value in preserving historical culture or preserving natural environments’. Several Nature Reserves Areas and ecological conservation areas are established based on the said provision. In addition, *Cultural Heritage Preservation Act* and *Regulation of Cultural Heritage Preservation Act* provide simple penalties that are light-weighted and hence being unable to pose any deterrent effect. Since the governing authority is MEA (Article 6), also, no substantive help is offered for the fostering of conservation. In addition, *Wildlife Conservation Act* was promulgated in 1989 and was amended in 1994. It is clearly stated in Article 1 that ‘This act has been enacted to conserve wildlife, protect species diversity and maintain the balance of natural ecosystems’. Also, Articles 8, 9, 10, 11 and 13 provide more comprehensive regulations and penalties regarding the protection of wildlife habitats;

alien species were first mentioned in Article 14. In terms of current MPA-related laws and regulations in Taiwan, *Wildlife Conservation Act* still provides more a definite basis and is more applicable (Lai, 2007), but the *Act* remains to be supplemented with regards to the sanctioning and management of ‘marine ecosystems’, ‘Lagoon ecosystems’ and ‘Island ecosystems’ (Shao, 2003). Based on *Cultural Heritage Preservation Act*, these articles give more definite regulations on the definition and system of natural cultural landscapes (Yang, 2004).

Unfortunately, *Cultural Heritage Preservation Act* and *Wildlife Conservation Act* are confined to specific species, and there is only *Wildlife Conservation Act* with the absence of *Wild Plants Protection Act*, so biodiversity cannot be genuinely covered, and hence the inability of actual enforcement for the lack of legal basis during citations (Shao, 2003). The *National Park Act* legislated in 1972 seems to be able to supplement for the lack of protection over habitats; Article 1 of the *Act* states, ‘*Be it enacted for the purpose of preserving the nation’s unique natural scenery, wild fauna and flora and historic sites and providing public recreation and areas for scientific research, that is hereby created the National Park Act*’. The national parks established under *National Park Act* not only can be used for ecological conservation, academic research, but also for residents for leisure and environmental education. As opposed to the Nature Reserves Areas under *Cultural Heritage Preservation Act*, funding and human resources are also more abundant (Yang, 2007).

However, the notion of ecological conservation has yet to be built up at the time when *National Park Act* was legislated, the primary focus of which was the provision of leisure functions for residents. Therefore, there were no accompanying provisions with regards to the legitimacy of various construction projects for national parks, the

livelihood of local residents, *et al.*, causing damage to the ecological resources within national parks such that in terms of the conservation of biodiversity, national parks cannot obtain trust from the general public. For example, Kenting National Park was under scrutiny precisely because of the difficulty to achieve the balance between ecological conservation and the daily needs of local residents (Yang, 2007).

Although other laws in the country relating to ecological conservation such as *Fisheries Act* contain stipulations to protect fisheries resources, there is a lack in marine resources conservation and the legal mechanism for the sanctioning of MPAs. Combining with the deficiency in the notion of conservation and the absence of unified administration authority, the tasks of management and citations are unable to be implemented leading to the unsatisfactory results of promotion (Lai, 2007). Also, the governing authorities for the aforementioned laws and regulations are not exactly the same, for instance, the governing authority of *Cultural Heritage Preservation Act* is MEA, *Wildlife Conservation Act* of COA, and National Parks Division is under the jurisdiction of MOI. Without any collaboration and coordination from these governmental departments, the force of conservation is weakened due to all of them going to different directions (Yang, 2007).

It is under such insufficiency of relevant laws as well as research information that the coastlines and marine areas of Taiwan are under overdevelopment, the survival of ecological environment is neglected causing the disappearance of coastline ecology and the slow depletion of marine resources. Moreover, the management of coastlines has been the point of conflict regarding development and conservation; for instance, the controversy of Binan Industrial Zone even drew the attention from the international community. At this juncture, the *Coast Act* was drafted with the view of

caring after both development and conservation, hopefully to provide the legal basis for the overall management and administration of coastlines. Through years of discussion and deliberation, this *Act* has yet to be legislated (Tsai and Chiang, 2002; Zhu, 2005), and the articles therein only stipulate that the status of Coastal Protection Areas can be annulled or altered when the value thereof is lost or reduced, thus not taking into account the effort of conservation and restoration, but rather, ‘encouragement’ for damage and destruction (Chiau, 2006).

Because the legislative purposes for conservation laws are different, so are the degrees of imposed penalties, only *Cultural Heritage Preservation Act*, *Wildlife Conservation Act* and *National Park Act* are tailor-made for conservation. The penalties imposed in *Cultural Heritage Preservation Act* and *National Park Act* are too light to pose any deterrence to illegal acts (Ke, 1987; Chen, 1997).

7.3.3 Human resources

7.3.3.1 Environmental education in school

When EPA was first established, the environmental education in Taiwan was still in its infancy: there were no dedicated staffs or units to do the planning and promotion. Also, there were not many NGOs to promote environmental protection. As a result, although there was awakening of the environmental protection awareness, it was hard to produce environmental protection consensus and take actions to protect environment due to the lack of environmental protection knowledge. Therefore, in order to promote environmental education, the Third Group in the Comprehensive Planning Department of EPA was specifically set up to promote the environmental education and its advocacy. Its main work is to develop education policies and programs that promote environmental protection, to promote environmental education

in schools and society, to execute environmental protection work, to prepare environmental protection supporting materials, and to assist in the communication of environmental protection organisation: to promote environmental education in a basic, systematic, and planned fashion through formal or informal education systems. After 20 years' effort, the concept, knowledge, attitude, and actions for environmental protection in the populace has made significant progress (Huang, 2008).

The EPA and the MOE have devised the '*Implementation plan for enhancing environmental education in primary and secondary schools*' since 1990. In the end of 1997, the implementation target was expanded to include high (vocational) schools and colleges and universities and the *plan* was modified to become 'a 3 year *plan* for enhancing environmental education in school'. It is revised every 3 years to serve as the basis of promoting environmental education in school.

7.3.3.2 Environmental education in community

EPA has been promoting the environmental volunteer system in coordination with local environmental protection agencies since September, 1991. At the end of 2006, the number of environmental volunteers exceeded 120,000. In addition to assist local environmental agencies in holding environmental studies, training, and irregular cadre conferences, it also, established the environmental education volunteer group to promote environmental education throughout the country in 2001. Furthermore, in order to promote environmental education comprehensively, in long term, and with more depth, it drafted the *Environmental Education Act* at the end of 2005 and submitted it to the Executive Yuan to be forwarded to the legislative Yuan for deliberation.

7.4 POLICY DEVELOPMENT

The build up of the notion of ecological conservation in Taiwan is at least a decade late comparing with other countries. Since individuals advocating conservation from the civilian sector ushered the movement of mangrove conservation in 1976 that woke up the attention to wetland conservation, relevant governmental authorities and the civilian sector all make effort for conservation. Coastal resource conservation also became a major issue. The Council for Economic Planning and Development and MOI requested the academia to conduct a series of research on coastal conservation plans as of 1982. Initially, the conservation task in Taiwan focused on single species, for example, mangroves of Guandu, Taiwan Landlocked Masu Salmon of Cyjiawan River, *et al.*; *Wildlife Conservation Act* was birthed with such a background in mind (Yang, 2007). Marine conservation is an issue receiving international attention. With respect to Taiwan that is surrounded by seas, the policy implementation on sustainable management of the sea is the most urgent strategy that preserves the oceans and balances marine ecology. Being aware of the importance of marine conservation, the government has put in place a series of marine conservation policies in the last 3 decades (Table 7.3).

Table 7.3 Details of marine conservation policies

Year	Name of policy	Aim	Strategy	Tools/Technologies/Measures
1987	the Environmental Protection Policy Guidelines	Protect natural environment and maintain ecological balance for sustainable use by future generations	<ol style="list-style-type: none"> 1.Environmental protection and economic development should both be taken into account in the context of long-term national interests 2.Civilian and industrial sectors should bear the responsibility of jointly making the effort with the government in environmental protection 3.Increase public investment in environmental protection, actively promote the conservation of natural and cultural resources in order to improve the quality of living 4.Propaganda regarding the promotion of environmental education to enhance citizens' environmental consciousness; speed up the cultivation of professionals, develop science and technology relating to environmental protection 5.Strengthen legal, administrative and information systems to foster the efficacy of environmental protection tasks 	<ol style="list-style-type: none"> 1.Strengthen legal system 2.Strengthen administrative system 3.Protect natural, social and cultural resources 4.Reasonable and effective use of resources 5.Expand the investment on public facilities on environmental protection 6.Strengthen the task of industrial pollution control 7.Provide assistance to environmental protection businesses 8.Strengthen the task of environmental impact assessment 9.Strengthen environmental education, as well as research and development

1998	the National Environmental Protection Plan	<ol style="list-style-type: none"> 1. Protect environmental resources and pursue sustainable development 2. Actively participate global environmental protection matters, and collaborated execution 	<ol style="list-style-type: none"> 1. Pursue sustainable use of resources 2. Protection over environmentally sensitive areas 3. Assurance of mutual benefit 4. Maintenance of biodiversity 	<ol style="list-style-type: none"> 1. Establishment of laws 2. Environmental Impact Assessment 3. Environmental Monitoring 4. Environmental inspections 5. Environmental information 6. Training 7. Education
2001	the Marine White Book	<ol style="list-style-type: none"> 1. Restore the biodiversity of coastal marine areas, stabilize marine ecological system 2. Participation in international fisheries cooperation to promote joint nursing and management, and reasonable use of resources 		
2002	the Taiwan Sustainable Development Action Plan	Implementation of national land conservation	<ol style="list-style-type: none"> 1. Use the concept of ecological system to direct the use of national land resources 2. Strengthen coastal and marine area conservation and management 	<ol style="list-style-type: none"> 1. Promote a national survey on green resources, in order to integrate all departmental jurisdictions on different conservation area and protection areas 2. Governmental authorities conduct

				<p>adjustment on the management and relevant plans regarding the use of land in conservation areas</p> <p>3.The sanctioning of Coastal Protection Area, drafting of coastal protection plans</p>
2004	<p>the Taiwan Agenda 21: Vision and Strategies for National Sustainable Development</p>	<p>1.Sustainable Environment 2.Sustainable Economy 3.Sustainable Society</p>	<p>1.Principles of Environmental Carrying Capacity and Balanced Consideration 2.Principles of Cost Internalization and Prioritization of Prevention 3.Principles of Social Fairness and Intergenerational Justice 4.Principle of Equally Stressing Technological Innovation and System Reform 5.Principles of International Participation and Public Participation</p>	

Source: Researcher's own compilation

It is mentioned in the *Environmental Protection Policy Guidelines* of 1987 that *environmental protection and economic development should both be taken into account in the context of long-term national interests*. If any malignant influence is done to the natural environment in the process of economic development, environmental protection should be given precedence. According to Item 1, Article 3 in Chapter 3 of the *Environmental Protection Policy Guidelines*, the government ‘should sanction certain areas as national parks, water-source or ecological protection areas, conservation areas for endangered species or wild animals, plants, as well as preservation zones for special landscapes, sceneries, history or culture. Any construction and activities taking place in the said areas and zones shall not interfere with the principle of sustainable use and conservation of resources. Deliberate consumption and abuse of estuarial and coastal wetlands, mangrove swales and coastal sand hills should be prevented; over-exploitation of coastal and river sandstones is prohibited’, but provided that the *Guidelines* have a very high status, the document is not legally binding (Chiau, 2003; Shao, 2003).

In *Construction and Planning White Book* proposed by the CPAMI in 1996, ‘strengthening the usage and management system for the utilisation of coastal land’ and the establishment of *the Coastal Act* are mentioned (CPAMI, 1996), and a summary is given concerning the issues facing current coastal management, such as the absence of designated authorities and laws today governing the use of land of Taiwanese coastal areas, and the attitude of most governmental authorities regarding coastal management as secondary with a small amount of managerial manpower and funding poured in. In addition, there is a lack of overall understanding concerning coastal resources and the ecological system resulting even misuse. What is more, the government has yet to furnish an overall coastal management plan as the guideline for

the protection and harmonious development of coastal areas, causing accelerated deterioration of the quality of coastal environmental resources and producing all sorts of environmental problems (Zhu, 2005).

National Environmental Protection Plan was approved by the Executive Yuan 1998 and is now the guideline plan and fundamental directive concerning environmental protection. Therein, the final year of reaching the established objectives is 2011 (Table 7.3), and 2001, 2006 and 2011 are set as short-, mid- and long-term schedules for plan execution.

In order to participate in the ever-increasing international actions of marine conservation, and in response to the promulgation of the *UNCLOS*, the RDEC completed the *Marine White Book* in 2001 unveiling the objectives and vision for future marine policy in Taiwan from the aspects of maintaining the security of marine areas, sustainable management of marine resources and concern for humanistic marine development. Extended coverage on marine conservation is given in the chapter *Sustainable Management of Marine Resources*, including marine environmental protection and marine pollution control, coastal management, utilization and management of marine resources, as well as marine-area tourism, leisure and management, providing relevant authorities concrete directions when drafting

The NCSD is currently the highest decision-making authority in Taiwan concerning sustainable development, and in *Taiwan Sustainable Development Action Plan* completed in 2002, the purpose is to firmly establish the vision for national sustainable development and sustainable development indicators and implement

national sustainable development with concrete work content (Table 7.3). Therein the *Plan*, not only a mechanism is set up for dialogue between governmental and civilian sectors, but also award measures are drafted to encourage civilian participation. In the future, the survey and monitoring on land areas, wetlands and biodiversity will be completed, and at least 5% of marine areas will be sanctioned as MPA. Relevant governmental authorities make the most considerable effort because of the highest status of the *Plan*, and the *Plan* will inevitably play a pivotal role in the research and promotion of the issue because it is by far the basis for the source of administration and funding regarding the survey, research and sanctioning of MPA (Shao, 2003).

NCSD approved *Taiwan Agenda 21: Vision and Strategies for National Sustainable Development* in 2004 with the vision of ‘Sustainable Taiwan Island’ and emphases of ‘Sustainable Environment’, ‘Sustainable Economy’ and ‘Sustainable Economy’. Five principles are set up in *Taiwan Agenda* (Table 7.3) to ensure marine biodiversity and sustainable utilisation.

7.5 TECHNICAL MANAGEMENT, IMPLEMENTATION AND ENFORCEMENT

7.5.1 Environmental Impact Assessment

With time, relevant EIA regulations have been announced under the *Environmental Impact Assessment Act* including EIA implementation processes, guidelines, review specifications and technical specifications. This demonstrates that the EIA system is constantly updated to cope with the needs of social and natural environment, and also aiming at developing a rational EIA system (Lee, 2003).

The *Environmental Impact Assessment Act* was already passed and enacted by EPA in 1994, but with every developmental project being a partial-area case, the EIA process is not able to block the passage of such said case with true numerical figures and evidence under the insufficiency of background ecological data, the complexity of involved ecosystems and the difficulty for existing knowledge and technologies to conduct accurate assessment like marine physics or chemistry is capable of. The consequence is still the dispute between 'environmental protection' and 'economics', and in the midst of it, it is inevitable that fishermen fight for their compensation or feedback that is usually resolved with money and condition passage of the case. What is more controversial is that coastal land is state-owned and cannot privately owned, but since the government is eager in attracting civilian investments, the said provision was amended in 1995 to 'lease to own', and local governments were vested with administrative discretion to approve or not. Such act undoubtedly presents a severely negative impact on the long-term development of the country. To thoroughly resolve the issue, the integration and amendments to relevant laws are needed, and marine geography should be sanctioned into national geographical planning, to first of all place important sensitive marine wetlands that need conservation into various levels of protection areas, and the rest of it can be placed under 'areas that can be developed' for development and utilization upon EPA inspection and approval, in order to consider both ecosystem conservation and economic development. However, this remains to be a controversial issue because the *Coastal Act* is pending review in the Legislative Yuan, and the smooth promotion and enforcement upon passage remain to be seen (Chiau, 2003).

7.5.2 Strategic Environmental Assessment

Although country currently has a suitable tool, i.e., EIA and SEA, yet relevant laws are incomplete. For example, cultural and forestry policies that greatly impact the environment, as well as economic and trade policies that could cause tremendous impact to the environment though they are not directly connected to the developmental behavior; the said policies are yet to be included into the assessment categories of SEA.

On account of the above, it is the belief of the author that the primary task for the planning of the trends of future environmental policy is to foster interdepartmental integration in the government in terms of environment and sustainable thinking, to ensure that all decisions would go through overall considerations in order to improve the operational efficiency of the government and gradually make SEA more comprehensive (please see Section 6.5.2) (Huang, 2008).

In addition, there is not systematic and comprehensive review and evaluation in Taiwan regarding all currently enacted laws in the context of the environment or sustainability. It is the belief of this study that one of the foci for the trends of future environmental policy in the country should be the development of comprehensive policies and sustainable mechanisms (Huang, 2008).

7.5.3 Monitoring

Due to the narrow space of Taiwan, dense population and accelerated economic development, coastal wetlands are under constant abuse of coastal development. Combining with the discharge of waste water along riverbanks that flows to the sea via estuaries, the marine ecology of the seas surrounding Taiwan and environment

continues to deteriorate, and hence the dire need to promote marine environmental protection. However, all six long-term ecology monitoring stations are located in inland mountain areas, and not one of them is near marine areas. Of all the five national parks in mainland Taiwan, only Kenting National Park has marine areas, but it is also difficult to obtain sufficient manpower and funding for surveys or research, or to conduct the task of coral reef conservation (Chiau, 2003).

‘Sustainable Vision Working Group’ of NCSD has developed 111 sustainable development indicators after 4 years, which took into consideration of the feasibility and stability of data acquisition, the meaning to connect with public policies, and the possibility of compliance with international standards, then selected indicators with sustainable development meaning and representation and divided into two systems: ‘Island Taiwan’ and ‘Urban Taiwan’. It took 40 indicators in six domains: ecological resources, environmental pollution, social pressure, economic pressure, system response, sustainable development of urban areas and developed into the ‘Taiwan Sustainable Development Indicators’ (Table 7.4), which have been published every year since 2003 on a regular basis (Huang, 2008).

Table 7.4 The sustainable trend for environmental and ecological indicators

1988-2005

Category	Name of Indicator	Sustainable trend
Ecological resources		
Land use	Ratio of non-resource production area	↘
	The ratio of natural coastline	↘
Biological resources	Ratio of undamaged forest area	=
	Catch volume per unit effort	↗
biodiversity	Eco-sensitive land	↗
Land and water resources	Effective water resources	↘

Note: = means no change

Source: Adapted by the researcher from the project of Environment Protection Administration (Huang, 2008)

7.5.4 Geographic Information System

In order to achieve the goal of sustainable management of oceans, there must be a clear understanding of the changes taking place in the natural environment to prevent the over exploitation of the marine resources by mankind, which will undoubtedly impact the marine environment. The accurate marine environment data is key to the sustainable management of ocean and coastal line. The marine environment data is an important foundation for marine related academic research, environmental assessment, and coastal conservation or protection. (Kao et al., 2005). EPA has been actively involved in the relate matters of ‘Asia Pacific Economic Cooperation (APEC), Marine Resource Conservation Working Group’ since 1997 and has been promoting the project of ‘Ocean Models and Information System for the APEC Region’ since 1997, the purpose of which is to build the entity, theory, and Community Ocean Models for APEC and establishes an information exchange system

for marine environment survey data and satellite remote sensing data in Asia-Pacific area to help promoting environmental protection and marine resource conservation in Asia-Pacific area.

Furthermore, COA, in 2003, accomplished 2,607 hectares reforestation by the general populace, 598 hectares ecological reforestation on State/public land, 1,891 hectares landscape forestation on plain and green landscaping, and 64 hectares of coastal forest ecosystem restoration. It also, at the same time, constructed the national network mechanism for green educational training and technical counselling and completed the building of a green resources database. In 2005, it completed the building of the Taiwan biological resources database with about 700 thousand entries of information currently, which is the most complete national biological resources database in Taiwan (Li, 2006).

7.5.5 Marine Protection Area

At present, MPA related ideas are still developing in reality; also, the designation and management of MPA in Taiwan has been quite inadequate compared to that of land in the past. Additionally, MPA related laws and regulations are too numerous at present: their legislated intend, provisions, severity of penalties are all different, which result in multiple jurisdiction problem and the lost of their deterrent role. As a result, policies and programs have become propaganda only and have no real meaning (Chiau, 2006). The relationship between these laws and regulations, whether they need to be consolidated or there is a need to enact a separated '*Marine Conservation Act*', all needs to be resolved. This is also an institutional problem of multiple jurisdiction of marine conservation, authority level too low, and overlapping of jurisdiction. Currently, the authority in charge of marine environmental protection

rests on the Conservation Division under the COA, which focuses more on forest (including fresh water) and less on ocean in natural ecosystem. The protection of economic resources belongs to the FA. FA's policies emphasized mostly on industrial development and hardware building in the past. Non-economic resources, such as the decline of coral reefs, are most in need of emergency establishment of MPA. However, the central government expects the local government to coordinate and communicate with NGOs and then apply to the central government before it will agree on the designation; it is quite hopeless (Chiau, 2003).

7.6 ASSESSMENT OF MANAGEMENT

The marine habitats surrounding Taiwan are highly diversified because of the surrounding seas and the many offshore islands (Shao, 2003). However, the nation has still not fully grasped the importance of its status as an island nation because of the continuous 'focus on the land and neglecting the sea', leading to its negligence of the value of marine management, administration and resulting in the many issues that the current marine conservation policies have resulted in. In addition, due to over-fishing, destruction to habitats, pollution, the introduction of alien species and global climate changes in the last three decades, the marine ecological system has experienced considerable destruction (Shao, 2003); probing into the reasons, it is believed that the general public's insufficient knowledge on marine life forms, deviation from the concepts on marine ecological conservation (Shao, 2003; Hsieh, 1993), and the Taiwanese' love for, and thus the high demand for seafood, have all put pressure on fish catches. This has led to the phenomenon of steady consequential exhaustion of the resources (Lai, 2007). The pressures from coastal development, pollution and interference and the destructive forces pertaining to leisure activities all contribute to

accelerated deterioration of the current coastal ecology in Taiwan (Shao, 2003) and they show no signs of abating (please see Section 6.2)

Currently, the main problems which the sustainable management of marine biology resources in Taiwan faces include: (1) overfishing and illegal fishing, such as the habitat destruction caused by intensive bottom trawling operation and trawling nets invading offshore coral reefs. (2) habitat destruction such as coastal industrial zones, and garbage dumps. (3) pollution, such as: river pollution. (4) The introduction of alien species, such as the intentional release or unintentional escape of alien species which are introduced by shallow sea culture. (5) global change, such as: climate change. In order to solve the above problems, the most fundamental, simple, and effective method should be designated 'MPA', which calls for an integrated coastal management for the entire coast, enhance ocean territory planning, and consolidate or revise outdated laws and regulations. At the same time, the pollution and habitat destruction caused by land-based or sea borne activities, including fisheries, should be banned strictly, the survey, monitoring, and storage in database of coastal ecological resources should be promoted as soon as possible, and the advocacy and education should be enhanced (Chiau, 2003).

However, facing the pollution of marine environment, the depletion of marine resources caused by over exploitation, and the damage of marine environment, merely protecting endangered species alone is not enough to preserve the marine ecosystem; 'habitat conservation' is the focus of current marine conservation (Cheng, 2008). Furthermore, non-government conservation awareness has risen. When there are conflicts between the site selection of emerging industrial areas and wetlands, which are important to ecological value, the conflict or confrontation between development and conservation are quite frequent (Tsai and Chiang, 2002). Therefore, the

designation of MPA is surely important, but it is more important to be able to manage effectively to achieve the purpose of the designation, i.e. to protect biodiversity, to maintain ecosystem functions, and to restore the depleted fisheries resources so that the resources can be utilized sustainably.

Moreover, the notion of ‘resource’ is in a state of flux in Taiwanese legal system. There still exist certain viewpoints and perspectives that remain to be mediated in the *Coastal Act* (draft) strenuously promoted by the MOI for decades but yet to be passed in the legislature. It will be a delight to witness the establishment of the MPA by Taiwanese authorities in order to cultivate and maintain biodiversity, meanwhile constructing a complete selection and implementation system for the MPA. That is, hopefully, regulations pertaining to ‘Marine Functional Zone’ may be set up so that the ‘marine industry’ that depends on the sea may find its rightful place, and the sea can become the resource for the prosperity of all walks of life (Chiau, 2006).

7.7 CONCLUSION

Because Taiwan’s resource is quite limited and the natural environmental conditions are quite poor, the resources planning and management depends on the integration of executive branch power to enhance the policy performance. Additionally, the current spirit of Taiwan’s marine resources conservation follows the general concept of containment, which produced protection measures such as prohibition of fishing area and prohibition of fishing period (please see Section 5.5.2). Although there are also ‘release fish seeds’ and ‘launch artificial fish reefs’ to increase the amount of resources, currently, the reduction of marine resources is an undisputed fact. There is an important reason that the conservation law is not effective, i.e. the cognitive bias of fisherman toward marine resources. Traditionally, fishermen regard that the marine

resources is public and render the fishing operations on the sea becoming a war to compete for resources: 'If I don't catch them today, some one will'. Such kind of concept has become a deep rooted idea (Hsieh , 1993).

Also, it can be seen from the above-mentioned policies and regulations that there was a multiple jurisdiction situation in Taiwan's natural conservation work in the past: Legislative intends are not uniform, provisions are different, penalties are light, and policies are mostly declarative or preliminary. The actual performance is not pronounced. As for the current laws and regulations, they may involve MPA in their implementation scope or purpose, but their purposes are still mainly to fulfill their established business and they do not deal with MPA in many details (Shao, 2003). Moreover, the legislation of the *Coastal Act* has not been completed for more than 10 years, which make the coastal management lacking of basic legal basis for a long period of time and many environmental impacts can not be resolved; In addition to ineffectual legislature, there are too many types of coastal area development, which involve too wide range of interest and are prone to controversies: it is one of the reasons that render the legislature speed slow. Before the legislation of the *Coastal Act*, the only reliance to manage the coastal area environment and the use of its resources would be other laws and related programs. RDEC developed the '*Marine White Book*' and proposed coastal policy objectives in 2001. However, while the 'Marine Taiwan' awareness has begun to be deep rooted in the general public and the term of 'Sustainable Development' has become familiar to everyone, it remains to be seen whether the government and the society will further a reasonable legal action to protect and manage comprehensively coastal resources.

CHAPTER 8

MARINE POLICY AND ENVIRONMENTAL MANAGEMENT IN TAIWAN

8.1 INTRODUCTION

The chapter will discuss the relationships between marine policy and marine environmental management in Taiwan from the four main themes of the questionnaire - organisation and legislation, human resources, policy development and technical management as well as implementation and enforcement. In-depth interviews were also conducted with ocean-related government officers, scholars, stakeholders along with NGOs, to identify the causes of problems brought to light through the survey and to propose potential solutions to these problems. In addition, the chapter will combine the literature review with regard to Taiwan and opinion of interviews in order to find the key problems of marine policy and marine environmental management in Taiwan.

There are four sub-themes – issue, factor, obstacle and improvement which are the management assessment tool in each main theme of the questionnaire. In order to understand the opinion of the respondents, each theme will be divided into paragraphs for discussion (Sections 8.2 – 8.5). The top three results of each sub-theme are used for discussion (Appendix 4). In addition, developing and understanding the framework of marine policy and environmental management can help the government and interested parties prioritise the fields for action so as to address the most pressing issues and select appropriate leverage points to engage in interferences. In the section 8.6, the researcher will discuss and analyse the situations of Taiwan, then compare these with the literature review with regard to Chapter 2 for looking for the solution of these problems and establish a suitable framework for Taiwan with regard to marine policy and marine environmental management.

8.2 ORGANISATION AND LEGISLATION

8.2.1 Issues

8.2.1.1 Government lacks a marine comprehensive management organisation

Taiwan's resource is quite limited, so the resources planning and management depends on the integration of executive branch power to enhance the policy performance (please see Section 7.7). But 'the protection of the marine environment', 'law enforcement mechanism', and 'executive power' in Taiwan are scattered amongst the governmental departments, and utilisation of manpower and materials also scattered. Moreover, there is no centralized coordination mechanism and the problem of respective egoism in each department so that there can easily be situations where the policies and execution amongst law enforcement systems are not synchronized (please see Section 6.7).

The government should establish an overall planning unit in the existing legal and administrative system basis of policy to provide a carry through planning/management/strategy in marine holistic development. However, *'there is none a unit which is responsible for the marine affairs among the government organisations for a long period of time'* (LC17). *'The present marine management is scattered amongst the governmental departments'* (CA15), but *'there is none a dedicated department or unit for assisting the policy development of marine industry'* (TP30). *'Owing to the marine affairs category is very wide, if there is none a dedicated organisation to deal with the problem of marine affairs, it may be relatively troublesome while the great incident occur'* (CA15). In present time, nation-wide integrated marine policies are developed by each country, marine developments and managements also are coordinated by various departments, and an ecosystem-based ocean management be emphasized. As mentioned in section 2.4, The USCOP was

established in the U.S., this organisation can allocate budget to the committee so that it could complete its analysis and publish its findings. Therefore, it is necessary to enhance the co-ordination mechanism between ocean-related organisations, and establish a marine comprehensive management organisation even.

8.2.1.2 Ocean-related Act/regulations are not sound

There are several Acts that directly relate to marine environmental management (please see Table 4.6) for marine environment. However, owing to unity marine affair is adopted for the standard of each Act, there is not yet a comprehensive Act/regulation that oversees the entire marine affairs. However, the legislation of the *Coastal Act* has not been completed for more than 10 years, which make the coastal management lacking of basic legal basis for a long period of time and many environmental impacts can not be resolved. The ocean-related Act/regulation of Taiwan is too scattered, and goals of Act/regulation are inconsistent so that lack of any unified administration authority. In addition, with the lacking of comprehensive planning and communication between agencies, the Act/regulation is incomplete at the time and leads to errors in implementation and integrated management ineffectively. It is under such insufficiency of relevant laws as well as research information that the coastlines and marine areas of Taiwan are under overdevelopment, the survival of ecological environment is neglected causing the disappearance of coastline ecology and the slow depletion of marine resources (please see Section 7.3.2).

The government should have a sound ocean-related Act/regulation in the existing legal and administrative system basis of policy. *'The law is required for any policy to be enforced. Without the law, everything will be in vain'* (PC8). *'You [the*

government] want to implement marine affairs, but there is not yet a dedicated law, how can you *[the government]* implement anything' (FP4)? For example, 'the Fisheries Act mentions the management of resource conservation, but we *[the Central government]* have not agreed on anything yet. It's not that we *[the Central government]* don't care about it. We *[the Central government]* do, but the needed law is not yet completely' (FA3), 'the relevant decree is very fuzzy' (CA15), and 'lack intact Act/regulation' (PC7). However, 'the incomplete law reflects the broken governmental policy. The law reflects the policy, and when the law is separated from the policy, the law becomes useless' (LA20). As mentioned in section 2.6, under the situation for marine special laws was intense demanded in each country. U.S. Congress ratified 'the Oceans Act of 2000' to solve marine management system and lack of specially law. Australia enacted Australia's Oceans Policy for integrating and coordinating existing mechanisms and legislation, but it is the guidelines only rather than direct enforcement activities related to the policy. Consequently, in terms of marine policy and marine management, Taiwan must first develop a sound ocean-related Act/regulation, and need the special law, e.g. the *Marine Management Act*.

8.2.1.3 Ineffectiveness of marine enforcement

Taiwan has not yet developed a dedicated organisation and law at the moment, and the attitude of most governmental authorities regarding coastal management as a secondary priority with a small amount of managerial manpower and funding allocated. In addition, Taiwan's law enforcement organisation of marine management at present disperse to each related unit because of different responsibilities are stipulated in each ocean-related Acts/regulations. The problems of lack of unified administration authority, lack of facilities and budget, and lack of manpower and

professional always exist in fisheries enforcement and marine pollution control. Moreover, 'law enforcement mechanism' and 'executive power' are scattered amongst the departments so that the problem of respective egoism occurs among the relevant authorities and ability and efficacy of marine enforcement can also be influenced (please see Section 6.7).

The reasons of ineffectiveness of marine enforcement include '*lack of budget*' (UL22, LL18, LC17), '*lack of professional manpower in implementation*' (UA24), 'lack of coordination mechanism' (LL18), '*the incomplete policy and law*' (PC7, CL13, LA20, UA24), '*the public may not obey the law*' (CL13), and '*political influence*' (LL18, LA20, UA26). In addition, '*it may be the law enforcers are not professional enough. The lack of professionalism leads to poor performance, and the central authority gets the false idea that human resources are not allocated well enough*' (CL13). In the fisheries enforcement, '*some law enforcers are not the authority [the centre government or local government], and they might avoid the sensitive problems, and this affects the enforcement*' (LL18). Factors contributing to the ineffectiveness of marine enforcement today can be seen from the prior statements. The similar situation also occurred in other countries, for instance, since 1982, coastal states begun to manage its oceans flow UNCLOS within 200 nautical miles. Because there are no laws to support Australia's Oceans Policy, there are no direct enforcement activities related to the policy. China provides the necessary legal means to achieve integrated ocean management, and provide rules to follow for marine developments and uses. To summarize the above results, it is clear that the best way is to have dedicated decrees for integrated ocean management and integrate and coordinate existing mechanism to plan for different development behaviours.

8.2.2 Factors

8.2.2.1 Lack of environmental development principles in the legal system

With a lack of emphasis on the ocean, Taiwan's marine legal system is also insufficient (RDEC, 2006). Taiwan's coast-related Act and regulation do not treat coastal areas as sensitive areas and manage them accordingly, resulting in conflicts between the development and conservation of the sensitive and fragile marine soil. For example, the only regulation that covers the conservation and utilisation of coastal resources at the time is the Commercial Port Act and the Fishing Port Act. The regulations about promotion of industrial development and utilisation indicate the lack of the concept of sustainable management (RDEC, 2006). Although other laws in the country relating to ecological conservation such as *Fisheries Act* contain stipulations to protect fisheries resources, there is a lack in marine resources conservation and the legal mechanism for the sanctioning of MPAs. Consequently, it is under such insufficiency of relevant laws as well as research information that the coastlines and marine areas of Taiwan are under overdevelopment, the survival of ecological environment is neglected causing the disappearance of coastline ecology and the slow depletion of marine resources (please see Section 7.3.2).

The main difficulty that applies in relation to the legal and administrative system is lack of environmental development principles in the legal system. *'Actually there is a conflict between the economy and environmental protection'* (FN6). *'Taiwan pays more attent to exploitation then neglects environmental protection and conservation'* (UA24). *'The government upholds the notion of "focusing on the land and despising the sea" and does not pay attention to environment'* (FC7) led to *'marine environment has been destroyed'* (CL13), *'Marine Protection Area has been neglected'* (CN16), *'the decree is not completely'* (FA3), *'lack of comprehensive*

planning' (PN11), and *'lack of a complete Act/regulation of marine policy and management'* (FP4). All of these which are the main problems at present. Moreover, *'the protection of marine environment is inevitable, and sustainable utilisation of resources, the completed Act/regulation and administrative management system are also necessary'* (PL9). *'What is the economic direction and environmental goal? The government actually doesn't yet have a clear economic direction and the environmental goal.* Of course, *'this development is not necessarily an utter collaboration between local units, as some parts of it involve the central government's planning'* (PC7). For example, *'take the development of the harbors on the West Coast. When the fishermen ask for a fishing port, the government will build them one, and when an industrial unit needs a industrial harbour, the government will construct one for it as well. The whole of the development does not simultaneously pay attention to the entire landscape and environmental protection. Just because some need one, the government will develop it on a large scale, so there are no clear-cut regulations for the development and management of the ocean'* (UA24). Moreover, *'political factors also had an effect on the promotion of policies and legislations'* (PA10), and *'a response from the political arena or the citizenry will sacrifice or distort the goals of the sustainable management of fishery resources. This is a very common situation'* (UC21).

8.2.2.2 Lack of political will

With increasing diversity in marine environment usage, integrated marine environmental management becomes essential. But owing to lack of the common consensus in marine protection in Taiwan and leader and ministers concern less in marine issues, they do not deal with MPA in many details. Moreover, there is not a common consensus in political affairs resulting in the legislation of the *Coastal Act*

has not been completed for more than 10 years, which make the coastal management lacking of basic legal basis for a long period of time and many environmental impacts can not be resolved. Therefore, in addition to ineffectual legislature, at present reliance can only be upon other laws and related programs to manage the coastal area environment and the use of its resources (please see Section 7.7). Consequently, it is long overdue for Taiwan to establish an organ to comprehensively manage the ocean and to draw up an all-around developmental policy and a managerial bill. As a result, the marine comprehensive management cannot be conducted efficiently.

‘In the past, while Taiwan was legislating, she always looked at the ocean from the angle of the land, so the error of the angle would lead to a slew of discrepancies in actual executions’ (LL19). In addition, *‘our politicians don’t care about the sea, because there are no voters in this regard’* (PC7). *‘This is especially true when ocean policy legislation is being promoted’* (PA10). *‘If political power can support [marine affairs], and fully supports marine development.Establishment of Ministry/Committee of Marine Affairs and application of fund.If there is funding, it will not be difficult to form the needed agencies such as a marine authority’* (CA15). However, the opposite is the truth. The problem of lack of political will is one of factors faced by legal and administrative system. Some environmental problems arisen in the world such as the deterioration of the environment because of the unsustainable production and consumption of developed countries, and the damage done to the global climate and life-support system because of the industrialized society. All of these urge each country pay attention to the integration of the environment and development. The WSSD encourage to apply ecologically oriented methods in place of priority consideration of economic development in

marine development to achieve the goal of sustainable marine utilisation (please see section 2.2).

8.2.2.3 Economics is the priority

Coastal management is always a conflict point in the governmental development and conservation. Since Taiwan is an island with little flat land and densely populated, there is a serious shortage of land resources. As a result of ongoing industrial and commercial development, construction has increasingly extended to coastal areas, causing excessive use of coastal areas, as well as industrial areas contains one third of the national coastline even more (please see Section 5.2.2). The development in Taiwan has brought astounding economic achievements, but also led to the ever-increasing issue of severe environmental pollution. In addition, despite the extended governmental effort on industrial development, environmental protection is deemed as secondary; the accelerated deterioration of marine pollution seems an obvious trend (please see Section 6.2.1.1). Due to point source and non-point source pollution in Taiwan carries large amounts of pollutants into rivers which subsequently flow into oceans causing the water increasingly deteriorated quality of ocean water. Moreover, various industrial zones are adjacency to the ocean that indirectly results in the predicament of the preservation of marine ecology (RDEC, 2006).

‘Economic growth and environmental protection usually clash with each other. When a country is boosting the economy, if ideal environmental protection is insisted, the whole development of the economy will suffer great impacts’ (FN6). However, ‘the government has no long-term planning and developmental objectives in terms of the development of the ocean, and the development and management of the ocean is not accompanied by clear-cut regulations’ (UA24). ‘What is the economic direction and environmental goal? The government actually doesn’t yet have a clear economic

direction and the environmental goal' (PC7). Moreover, *'the government is unable to stand up to the influence of legislators and conglomerates'* (LA20). *'When the economic growth seems splendid, the environment has been severely damaged'* (FN6). Due to Taiwan government thought the factor of economics is the priority; this not only influenced development of marine policy and formulation of legislation, but also caused the destruction of marine environment.

8.2.3 Obstacles

8.2.3.1 Political factors affect the effectiveness of management

Local government is the executive level of marine management in Taiwan, but it usually carries out policy with difficulty because of the limitation of no real power, manpower and funds, or is unable to consider holistic marine benefit for local economic development lead to the victim of environmental resources. For example, fisheries' policies being affected by political wrangling such as coral reef fisheries resulted in influencing effectiveness of marine management (please see Section 5.5.2). Therefore, in the aspect of marine management, the most serious problem is the law enforcement is affected by many factors to lead to be unable to carry out completely, especially political factors affect effectiveness of management.

'Our nation is rule by law, but our public opinion representatives [politicians] are actively intervening in everything' (LL19). Therefore, political factors affect effectiveness of management. *'A lot of the factors behind local characteristics and fishermen's interests are political considerations'* (CL13). Owing to *'compromise of politics, compromise of will of the people'* (CA15), and *'the interference of political power'* (LL18) all will cause negative influence on marine management. LA20 thinks *'Whether the Government can stay free of the influences from the politicians and*

financial groups is a key factor that determines improvement [effectiveness of management]’. Therefore, ‘we should use the positive political influences to support marine development’ (CA15).

8.2.3.2 Lack of ability of marine enforcement and maritime patrol

The CGA is responsible for a variety of missions, such as maritime law enforcement, maritime service, and marine affairs. The CGA concentrates on the prevention of smuggling and illegal immigration, so it pays less attention to illicit fishing, with a mere 3,000 maritime law enforcement officers at the Maritime Patrol Directorate General, and the problem of fishery products smuggling is exacerbating as well. Moreover, fisheries administration units are also responsible for law enforcement and the protection of fishing vessels, but owing to the current shortages of government manpower, equipment and funds, only 200-odd persons are working at the Fisheries Agency with only one 275-ton patrol boat, plus several small-sized coastal patrol boats owned by a few local fisheries administration organs. The energy of execution is apparently insufficient. To sum up, the inadequacies of Taiwan’s fishing law enforcement, equipment and funds have caused a raft of management measures for fishery resources to become ineffective, resulting in the decrease of fishery resources and damage of habitats. (please see Section 5.3.1.3)

‘The government is lacking in related professional talent (FP4 and LA20) and essential facilities (LA20), has no adequate expertise in law enforcement, and has no overall planning for what the professionals need’ (PC7). For example, ‘fisheries administration units are not granted necessary power to enforce the law, the police units feel quite indifferent and do not do their utmost to enforce the related laws properly, and the penalties are too lenient’ (FN6). ‘The CGA barely has the expertise

to clamp down on fish poisoning, electrocution and bombing’ (UP25). ‘In fishing law enforcement, there is no adequate mechanism for fisheries administration organs and coast guard units to support each other closely’(UA21). In addition, ‘the government’s relevant budgets have been decreasing year on year, so the number of personnel at the Maritime Patrol Directorate General, which is responsible for maritime law enforcement, has remained unchanged all the way, which has in turn impacted the efficiency of maritime law enforcement. The reduction of personnel budget has had an effect on public servants’ law enforcement’ (LL18). To sum up, the strength and expertise of the government in enforcing maritime laws are still insufficient. All other countries also faced similar harsh condition, owing to enforcement is done by different departments in the U.S., recommendations for enforcement were mostly on improving the collaborations, training for law enforcers, information sharing, and field inspections. Tasks implemented of management and legislation of natural resource in Australia is often carried out by law enforcement agencies and the military. The UK marine enforcement teams are quite diverse and the situation is similar to Taiwan. Japan’s marine law enforcement is handled solely by its Coast Guard. It is therefore clear that different countries have different approaches and division of tasks in marine enforcement according to specific conditions.

8.2.3.3 The same region is administered by multiple units would have questions of departmental egoism

Taiwan governing authorities are scattered in different departments, resulting in disputes concerning overlapping in responsible tasks, waste of administrative resources and ambiguity of responsibility (please see Section 7.3.1.7). Also, the governing authorities for the aforementioned laws and regulations are not exactly the

same. Therefore, without any collaboration and coordination from these governmental departments, the force of conservation is weakened due to all of them going to different directions (please see Section 7.3.2). Therefore, to avoid the issue of departmental egoism in marine management, given the unclear policy and a lack of communication between governmental agencies, the pros of having an integrative agency outweighs the cons. In addition, it seems more important that the government whether has complete marine relevant Act/regulation or not. And, effective marine management can only be achieved by also having a law dedicated to marine management as this allows better integration.

The same region is administered by multiple units would have questions of departmental egoism in marine management. *'There is no a unify organisation in the central government at present'* (TL28). *'In the aspect of vertical, there may be many units in charge of sea areas, and lack of horizontal coordinating mechanism among each units'* (LL18). In addition, *'there is lack of the norm of Act/regulation'* (FP4) so that *'each unit thinks it is not my business when something happen'* (TP30). *'Right now the central government has many marine departments, but they do not work with each other well enough. When a problem involves a department, other departments do not provide help, and they don't think it's their problem,[In addition,] We have a superior authority [the centre government], and he follows orders from his authorities. During our [local governments] implementation, that person also doesn't treat problems as his responsibility if it involves another agency [local government]'* (CL13). Just because of this, the problem of departmental egoism influence administrative efficacy.

8.2.4 Improvement

8.2.4.1 Establish a comprehensive management organisation or mechanism

Governing authorities of marine management in Taiwan are scattered in different departments because of different duties of various ocean-related Acts/regulations, resulting in disputes concerning overlapping in responsible tasks, waste of administrative resources and ambiguity of responsibility (please see Section 7.3.1.7). This situation also caused the problem of departmental egoism influence administrative efficacy at the same time (please see Section 8.2.3.3). If the government could establish a comprehensive management organisation or mechanism, the above problem would be solved so that could help development of marine policy and management.

‘Owing to the present marine management is scattered amongst the governmental departments’ (CA15), and ‘the central government and local governments do not fully coordinate and plan their allocation and utilisation of resources’ (PC7). Therefore, ‘cross-agency integration needs to be specifically separated and delegated in order for it to be implemented’ (CA15). Moreover, ‘the central government should establish an unify unit with powerful or the sound horizontal co-ordination mechanism’ (UC21), ‘in order to have a complete blue print [planning] for a comprehensive marine environmental planning or other marine management’ (FP4). According to the section 2.3, nation-wide integrated marine policies are developed by each country, marine developments and managements also are coordinated by various departments, and an ecosystem-based ocean management be emphasized. U.S. established the USCOP, and allocated budget to the committee so that it could complete its analysis and publish its findings.

8.2.4.2 Strengthen marine enforcement and maritime patrol system

Owing to Taiwan surround by seas and her jurisdiction waters overlap with nearby nations, Taiwanese fishermen's rights are being compromised resulted from the overlap jurisdiction of fisheries rights. Issues such as fishermen from mainland China fishing in Taiwanese waters, cross-strait fishery disputes, and Taiwanese fishermen being seized or murdered by Chinese fishermen are frequent and seriously threaten Taiwanese fishermen's rights (RDEC, 2006). For example, many fishing craft from Mainland China operate in the sea areas adjacent to Taiwan so that the quantity of whitefish flying fish roe caught is difficult to estimate and sustainability of such resources is difficult to achieve (please see Section 5.5.3). Therefore, according to *The Coast Guard Act* and *Regulation of the Relationship between Taiwan Residents and Mainland China Residents*, the CGA not only seeks to ensue that fishing craft from Mainland China do not operate in the restricted waters and prohibited waters of Taiwan, but also to assist the competent fisheries authorities in implementing the matter of maintaining fisheries' resources, and handing over cases where Taiwan fishing craft have violated the *Fisheries Act* to the competent fisheries authorities to deal with and impose discipline. In addition, in order to achieve sustainable utilisation of fisheries resources in offshore and coastal waters, the effectiveness is dependent on the patrol and protection of fisheries to prevent the illegal catching, harvesting and processing of aquatic animals and plants (please see Section 5.5.5).

In terms of marine management, '*Right now many of our regulations are ambiguous, making enforcement very difficult. Because the law enforcers are not the authority, they may stay away from sensitive issues*' (LL18). Therefore, '*it is necessary to formulate sound bill, establish a specific marine organisation in terms of mechanism*'

(PC7, PC8, PL9, CA15, LC17, TP30), *'increase personnel and apparatus funds'* (CA15), *'cultivate ocean-related professional person, and enhance in-service training'* (FA3 and LL18). *'Before a solely responsible organ can be established, it is relatively important to set up a proper mechanism of contact and coordination'* (FA3). Consequently, there is more room for improvement regarding the integration and actualization of the systems of marine enforcement. For example, establishment of a marine law enforcement and service network, cooperation with the policy of governmental organisation reformation to establish a specific marine organisation and Act, actively adjust the structure and human resources of CGA, actively implement marine enforcement, and enhance awareness of legislation for strengthening efficiency of implementation.

8.2.4.3 Enact a sound Bill

Policies and programs in Taiwan have become propaganda only and have no real meaning at the moment (please see Section 7.5.5). In addition, Taiwan lack of dedicated legislation, and the factor of economics is the priority so that can not care after marine conservation (please see Section 7.3.2). Therefore, in the present stage, it is urgent to draw up a comprehensive bill (ex. the *Coast Act*) and incorporate the principles of the environment and development into it in a bid to give marine management a solid legal basis so that marine management regulations can be perfected. In doing so, a legalized foundation can be established for the overall marine management, and administrative efficiency can be boosted so as to conduct marine management effectively.

'Because at present Taiwan's marine management laws involve a good number of government ministries without a perfect legal system (FC1) and comprehensive

regulations (PC7) to regulate it, and out-of-date regulations are unable to meet the needs of the time, it is necessary to ponder on the current situation so as to adjust it (LA20). In addition, *'the nation's marine and coastal management laws (FP4) and a solely responsible agency (LL19) are lacking, hence resulting in such problems as the absence of legal authorization, overlapping of jurisdictions (LA20) and departmental egoism, (FP4) while government agencies are conducting marine management. 'Management means acting in accordance with the law' (UA24), so 'the government should accelerate the legislation for coastal management' (FP4), for example, 'the Coast Act' (LA20).*

8.3 HUMAN RESOURCES

8.3.1 Issues

8.3.1.1 People lack marine accomplishments

Education policy is an important constituent of the overall state policy. Due to some martial law-induced maritime taboos and a continental ideology, it has become a tradition for the overall state policy to kind of 'focusing on the land and despising the ocean'. Guided by this principle of the nation, the education policy unavoidably follows the direction by taking a mainlander's perspective on viewing maritime issues. Schools have only a trifling amount of materials to educate marine concepts to students, and as a consequence, it is general that people in Taiwan not only know very little about the ocean but also lack awareness and recognition on marine conservation topics. For majority education administrative organisations, they neither hold a comprehensive marine education policy or program nor sufficient budget or personnel for this specific domain. Another reason that marine education has long been neglected is that there is not enough funding for the school to purchase software and hardware facilities that can be used to promote marine education (MOE, 2007).

For those national edition textbook published prior to 2001, only 2.86% of the entire elementary school's textbook content, 4.28% of junior high school's, and 2.78% of high school's are concepts relevant to marine education. For higher education institutions (i.e., colleges or above), general marine education is simply inadequate (MOE, 2008). For the teaching materials, marine concepts take only a small proportion of the course content of natural science, earth science, or biology. Furthermore, not much teaching materials for art and social science are available for maritime aesthetic, social, and cultural topics, and there is also a lack of recreational marine activities. It is not easy for students to develop a broader and global vision for marine environment and resources or international maritime convention. For general high schools, non-marine related vocational schools, and comprehensive high schools, they provide only fundamental marine education. Whereas in university general education, there are only few courses relevant to marine topics. There is no need to mention the insufficiency of marine education in humanities and social, law and politics, natural science, and technology domains (MOE, 2007).

It has been a long time that the government invests poorly in marine education. There is also a lack of systemic planning, teamwork, and integration of the country's resources. The executive strategic plans also require more systemic integration, visionary outlook, and projection of the future (Tsai, 2007). *'Because the overall environment as well as the general society in Taiwan are not very interested in marine issues, marine education and training in Taiwan is rather underdeveloped'* (UA24).

8.3.1.2 Failure to solve the problem of lack of employment opportunities for marine graduates

Taiwanese are unfamiliar with the ocean and also fear for its illusive nature. Since little, people have often been warned to avoid participating in ocean-related recreational activities or told the old saying that ‘those who work at the sea have only half the life left’, i.e., it is too dangerous to take a maritime-related career. As a result, after the people grow up, they have little knowledge about the ocean, their fears of the ocean remain, and only few of them dare to have a career at the sea. Part of this phenomenon is also due to inadequate education for correct marine concepts. Students, as a result, have little or no opportunity to learn about the ocean. In Taiwan, primary education for marine technical personnel starts from vocational schools and comprehensive high schools, whereas maritime professional education starts from colleges. According to the current school enrollments as well as the analysis of the student characteristics, it can be found that recruiting students is getting harder and attracting high quality students to enroll in the schools is not as easy as before. What makes the situation worse is that the ratio for graduates to join the marine industry is very low (please see Section 5.7).

In addition, with the improved standard of living and the fact that marine jobs requiring labors to leave their hometowns and work long hours in isolation, not many people are willing to join the marine industry. Therefore, it is imperative to improve the overall concept and work environment. Since marine technical jobs involve marine operations and unpredictable situations, the supply of marine talents is lacking with limited protection in the job market (RDEC, 2006). From the above, *‘We actually have marine talents, but the government doesn’t know how to employ them. After those students graduate they do not get into marine jobs, it’s a waste of*

[educational] resources' (FP4). It leads to *'many marine school graduates do not get into marine-related jobs'* (PN11).

8.3.1.3 Lack of marine comprehensive management talent

Besides a regular school education system, governmental organisation education and development system and NGOs social education system are also part of the marine talent development system in Taiwan (RDEC, 2006). Nonetheless, marine management is not a truly emphasized area in Taiwan (please see section 7.1), and there are various issues that need be attended, for example, the curriculum of marine education and training system is still incomprehensive, and also there is a poor match between the current talent training and the requirement from the industry (RDEC, 2006). Prior to 2001, there were a total of 16,481 students enrolled in all the majors in marine colleges and schools in Taiwan. Among these students, 3,858 of them were graduates, but none of them had selected UNCLOS or maritime policy as the major. Since the Institute of the Law of the Sea was established in the National Taiwan Ocean University in 2001, there were 80 students who selected UNCLOS as the major. Nonetheless, only 20 of them had graduated. Since 2005, there have not been any college students who take UNCLOS or maritime policy as the major. For graduate schools, only 124 students majored in UNCLOS, and no students who had majored in maritime policy and affairs were graduated. As a result, our country is facing a shortage of management personnel for maritime affair (Tsai, 2007).

'For Taiwan's educational investment, the Ministry of Education of Taiwan did not realize until now that there is a significant drop in the number of people studying abroad. As a consequence, the government has advanced an elite program this year. Yet this only one program is not enough for cultivating maritime personnel' (PA10).

‘More efforts are required to resolve this lack of professional personnel working for the government’ (FP4, PA20).

8.3.2 Factors

8.3.2.1 The notion of ‘focusing on the land and despising the sea’

Prior to abolishing the martial law in 1988, maritime and seacoast were regarded as important military strategic points and they were under rigorous military restriction. The coastal zones then were guarded by the Coastal Defense Troops of Marine Police Bureau, and except regular fishermen, common people did not have access to the sea. This kind of situation had fostered an anxious attitude among the people toward the ocean, and the development of maritime culture was hindered. In addition, influenced by a continental ideology and culture, the education policy had adopted a continental perspective, i.e., viewing the maritime from the continent. The common education for all levels of schools offered very limited courses for cultivating maritime culture among the students. As a result, ocean is something that has long been forgotten and blocked away from the vision (MOE, 2007).

‘Although Taiwan [the government] always talk about how important the sea is and how it relies on the sea, what the government or the public demonstrates does not suggest an ocean state as they mostly focus on the land. Marine-related issues were not considered by the decision-makers or stated on the policies we took to Taiwan. It is clear that the current legal basis we need for formulating policies is all land-oriented’ (CN16).

8.3.2.2 People seldom commune with ocean

Marine environmental protection and reasonable resource development and application are the core issues for maritime communities. Since 1960 when the economic and social development started, those high-pollution industries have caused significant impacts and damages to the land and the marine environment of Taiwan. Part of the reason is that the public do not have adequate concepts related to the conservation and utilisation of marine resources. Estuaries and the surrounding water environment have been polluted by industrial sewerage and heavy metals, which destroys the aquaculture of the coastal water. The marine bio-resource has also been gradually depleted because of damaged aqua-habitats from the offshore to the pelagic zone, a high density fishery, and global environmental changes. Some nations have noticed those threats and recognized the importance of marine resources, and thus they have already worked on marine conservation and initiated sustainable marine resource utilisation. Most of these nations have a high economic development as well as a high quality living environment, such as those countries in the northern Europe including Finland, Norway, Sweden, Denmark and Iceland.

Cultivating marine knowledge, affection, and actions is dependent upon marine experiences. Providing a more in-depth marine experience could also attract people to work in the marine industry and choose marine-related recreational activities as well as living environment. Nevertheless, schools, including maritime affair related majors, rarely offer marine activities. At present, maritime community educational organisations, relevant private organisations, and all levels of schools have worked on holding more and more activities to promote marine education. Asides from cooperating with environmental ecological education, most of the activities are related

to marine science or to seasonal maritime culture. However, marine experience activities are not commonly available at this moment.

Part of the reason that marine experience has not been emphasized by schools is due to the forbidden maritime-culture that exists in the society. Furthermore, for a safety consideration, schools do not encourage or may even put restriction on coastal or marine experience types of learning. The schools also lack the capacity and experience for planning marine experience activities. At the present stage, providing an excellent quality and safe location for holding marine experience activities that have a rich and colorful content should be the focus for promoting marine experience activities (MOE, 2007).

Therefore, 'to carry out marine universal education in the school system, it is necessary to include marine teaching materials in every subject of schools from kindergartens all the way to high schools. It is also important to prepare some professional, experiential teaching materials for the courses. Most importantly, the concentration should be on experiential education: the best way for the kids to learn how to make use of the ocean and to protect the ocean is to let them get in touch with the ocean, to actually experience the ocean, and to learn about the ocean' (EA32).

8.3.2.3 Lack of TV advertisements and programmes

Taiwanese are unfamiliar with the ocean and also fear for its elusive nature. Since little, people have often been warned to avoid participating in ocean-related recreational activities or told the old saying that “those who work at the sea have only half the life left,” i.e., it is too dangerous to take a maritime-related career. As a result, after the people grow up, they have little knowledge about the ocean, their fears of the

ocean remain, and only few of them dare to have a career at the sea. Part of this phenomenon is also due to inadequate education for correct marine concepts. Students, as a result, have little or no opportunity to learn about the ocean. However, *'Education can be conducted diversely. You can teach the public about the sea through activities, seminars, and the media'* (FC1).

In addition, in Taiwan, primary education for marine technical personnel starts from vocational schools and comprehensive high schools, whereas maritime professional education starts from colleges. According to the current school enrollments as well as the analysis of the student characteristics, it can be found that recruiting students is getting harder and attracting high quality students to enroll in the schools is not as easy as before. What makes the situation worse is that the ratio for graduates to join the marine industry is very low (MOE, 2007).

8.3.3 Obstacles

8.3.3.1 Education policy lay particular stress on 'consider the sea from the thought of land'

It has been a long time that the overall state policy are more concentrated on the land than on the ocean. Guided by this principle of the nation, the education policy unavoidably follows the direction by taking a mainlander's perspective on viewing maritime issues. Schools have only a trifling amount of materials to educate marine concepts to students, and as a consequence, it is general that people in Taiwan not only know very little about the ocean but also lack awareness and recognition on marine conservation topics. For majority education administrative organisations, they neither hold a comprehensive marine education policy or program nor sufficient budget or personnel for this specific domain. Another reason that marine education

has long been neglected is that there is not enough funding for the school to purchase software and hardware facilities that can be used to promote marine education (MOE, 2007).

‘Part of the reason the government has put less focus on marine education is that the GDP from the marine industry are comparatively insignificant and have less influences on the government’ (FP4). ‘It is wrong that the funding we have for marine education is distributed equally as that for college education. We know that marine operations are in the sea instead of land, and they are more expensive, and money is needed if we want to get close to the ocean, study it, understand it, control it, and use it. I wish the government could realise this and provide special funding for marine education so we [in the universities] can do those things’ (EA32). For example, Vessels and equipments for student’s internship have to be prepared according to those relevant regulations of the international maritime affair conventions. There is a steady increase in the cost on the vessels, the modification, improvements, diesel fuels, insurances, and port charges. In addition, the maintenance charge increases as the boat’s age increases. Nonetheless, subsidy from the government for these internship vessels has shrunk over the years; there was a 60% reduction from 1998 to 2003 (The Control Yuan, 2004). Therefore, *‘If the government could reach a consensus and care about how resources should be utilised, I believe the output of marine education would be better’ (UA24).*

In order to development enough marine and coastal talents, the nations have started working on marine science research, education and training, as well as put in much funds and human resources, such as the U.S. USCOP demands the government to double the funding for research and education, allowing marine science research units

and schools to develop national marine talents. Besides national support, more and more data indicates the importance of spontaneous implementation of marine education by NGOs, industrial circles, and people (please see section 2.9).

8.3.3.2 Type of cultivation of marine talent and supply and demand of industry in the drop of quality and quantity

‘There is a serious gap between the agencies for practices and the education agencies. This phenomenon is especially apparent in those aquaculture vocational schools’ (UC21). Traditionally, maritime talent development is focused on aquaculture, food science, marine engineer, shipping and transportation, and shipbuilding. More recently, because of the booming of marine knowledge economy and information technology as well as their applications in the marine affair industry, conventional industries have undergone developmental transformation while new emerging marine industries keep joining the market. As a consequence, maritime professional schools have added various new items to the repertoire, including Department of Marine Biotechnology, Department of Marine Leisure and Tourism, Department of Marine Transportation and Management, Department of Aquatic Sports and Leisure. Nevertheless, responses from the marine industry suggest that it is still not an easy task to find professional personnel that they look for. In fact, it is not limited to the marine industry but in other industries as well. The major reason is that both the traditional as well as emerging school departments have no idea what types of personnel are truly required by the industries. For example, there has been a steady decrease of students in vocational schools or colleges for maritime navigation or marine engineer majors; in contrast, the number of students in universities or higher is increasing each year. The result is that lesser and lesser people would ‘get on board’

and start a marine-related career, and those available talent cannot meet what is actually required by the industry.

Besides the types and the quantitative variations, the quality of the talent and their competence, both the professional and the general core competence, also failed to satisfy the industry's standard. Because of the information and technological development in the marine industry, there has been an evolution of the working environment as well as the required knowledge and technology in the marine industry. Take the crew members for an example, in addition to having a competence of using technological information, they also need to be capable of getting involved in foreign crew member management, to have a fair amount of knowledge in *UNCLOS* regulations, maritime laws, management of maritime affairs, and to possess language and communication skills. Take aquaculture for another example, besides possessing a professional aquaculture competence, it is important to have knowledge in biotechnology, management, and marketing. At this stage, schools have failed to response fast enough to this industrial transformation. When tailoring corresponding strategies, it is important to include institution as well as organisation personnel, facilities, and funding into consideration (MOE, 2007).

However, a talent gap in the marine industry is the most urgent issue waiting to be solved at this moment. From marine engineering (including shipbuilding, environmental engineering, harbour and river engineering), marine transportation (maritime navigation, marine engineering, shipping and transportation management) to the utilisation of marine resources (fishery, aquaculture, and food science), they either face an enormous amount of pressure from the transformation of the industry or are threatened by a gap in manpower. The public in general know very little about the

marine industry; in fact, they may even hold a negative perception toward the marine industry, which may either directly or indirectly affect students' willingness to select maritime education. The quality and quantity of the marine industry talent, as a consequence, are affected as well (Tsai, 2007).

8.3.3.3 Lack of ability of cultivation of marine affairs management talent

Currently, there are ten marine-related colleges and universities in Taiwan. Their mission is to provide professional marine knowledge to undergraduate as well as graduate students, and they offer various marine courses including marine biology, ocean science, ocean and fishery, marine environment and engineering, as well as the Law of the Sea. Nonetheless, prior to 2004, few of these schools offered maritime affair courses, and there is no relevant curriculum available. 'Taiwan still needs to review its education in a comprehensive manner' (PC7). Therefore, *'in terms of education, we [the government] need to let the students understand the sea. Taiwan's marine education focused too much on the technical aspect when it should focus on the marine policy or marine culture. This situation needs to be improved at the moment'* (TN31).

Education and training of staffs of the government and related organisations depend on various research and science units, academic machinery, and industrial circles, and the government for promoting together to improve professional ability of marine talents in Taiwan. In the education aspect, one of main question is insufficient human resource. For example, between 2001 and 2004, 2,001 persons have completed professional training on marine pollution control domestically, 112 internationally. Half of the aforementioned trainees were CGA employees; those who were sent to EPA sponsored training sessions on marine pollution have no employment

relationship with EPA, so training instructors are not able to demand trainees' learning attitude; some of the trainees were reaching the end of their military service leading to ineffective implementation of education and waste of resources. In addition, Coastal and Maritime Patrol Directorates General have separate personnel training and study centres hosting respective education and training courses, thus causing scattering and waste of resources (please see Section 6.3.3.2.2). It is apparent from the above that dispersion of human resources and lack of consistency result in insufficient and waste human resources. Therefore, *'To train marine talents, you [the government] need an integrative educational authority for ocean-related governmental agencies and NGOs'* (PL9). In addition, on-the-job and specialised training need to be held once per year at least. In the aspect of training, *'I believe on-job training is a must. New information is made available in today's world, and we can only learn the latest things through on-job training. And on-job training must be attended regularly'* (FA3). Consequently, education is essential because of marine common consensus of people can be promoted by the promotion of marine education. *'But the problem is we [the government] don't have funding or the planning of funding, and this is because a goal of such education is not yet determined. The current marine activities are not all positive promotion'* (PC7). Consequently, Taiwan should provide long-term funding for marine research, education, and promotion, develop the know-how of sustainable marine management, continue to improve the public's marine awareness, and help the marine industry upgrade and develop (please see section 8.5.2) (RDEC, 2006).

8.3.4 Improvement

8.3.4.1 Promote the basic education of marine knowledge and strengthen marine courses and teaching materials in schools

Marine education content should concentrate on both knowledge and practices. For the knowledge aspect, it is important to cultivate correct marine concepts among people in Taiwan from pre-school, elementary school, to junior high school education. The government should work on educating the people for basic marine knowledge such that people in Taiwan know about the ocean, love the ocean, make a good use of the ocean, treasure the ocean, and possess a global marine vision and fundamental marine literacy.

From a practical aspect, the learning plan for marine education should focus on offering marine (water) experiences at high quality and safe locations. Besides offering rich activity content in the marine experience, information relevant to marine knowledge should be blended into the activities. This kind of marine experience can have a profound effect on knowledge acquisition. It can also attract excellent talent to join the field of marine development, as well as cultivate the people of practical maritime abilities (MOE, 2007).

In the past, marine education was not much emphasized by the fields in education. Although Taiwanese are living on an island surrounded by water, their maritime awareness and knowledge are quite inadequate. Fortunately, the Ministry of Education had issued '*A White paper on the Marine Education Policy*' and '*The Curriculum Guideline for Marine Education in Primary and Secondary Schools*', which can be considered as the milestones in the education history. Now marine education courses have been fully launched at schools (Tsai, 2007).

The first step for promoting marine internalization education is to establish a system for cultivating future primary level teachers who are equipped with marine knowledge and a continue education system for primary level teachers from elementary, junior high, and senior high schools. Therefore, the government should support a general structural curriculum for cultivating primary marine knowledge education for the future and organize university instructors and researchers from public social educational institutions and research organisations to act as group leaders to work with primary-level teachers for research learning and compiling. Eventually this group can be further advanced into a compiling and research office and become a sustainable mechanism for hierarchical construction of marine education. In addition, there should be a comprehensive assistance for the regular education to perform functions of non-regular education system. It is also important to integrate and to promote marine science research and marine education by using results from marine science research to construct fruitful marine teaching materials and their database. Furthermore, a marine education research resource center can be established steadily to form a marine education information system (Tsai, 2007).

Taiwan should reinforce courses on marine ecology, local environment, marine science and technology, and marine regulation and law for the elementary/junior high school, advanced education, vocational education, and adult education, in order to promote the understanding of the ocean in all educational levels (RDEC, 2006). Meanwhile, *'we need to let students go to the sea on our boats [the CGA] and experience what it's like to patrol the waters'* (LC17). *'At the moment marine education in primary schools only takes up 2.54% of the entire curriculum. It would be better for environmental groups to conduct the education. Those groups or the*

Fishermen's Association could conduct promotional activities. I think it is usefully
(PC7).

There are many online and printed materials on marine-related topics. Annual reports, statistics, newsletters, and periodicals are also being published to promote each year's marine affairs (RDEC, 2006). *'Education can be conducted diversely. You can teach the public about the sea through activities, seminars, and the media'* (FC1). Taiwanese do not have a sufficient public awareness on marine-related issues. One approach to correct this situation is to enhance the distribution of information relevant to marine culture through publishing or production of books, plane advertisements, and visual or audio information about marine resources and management. Another approach that is beneficial for policy promotion and development is to set up marine-specific websites for spreading marine culture information and various advertising activities to enhance people's public awareness via the World Wide Web.

8.3.4.2 Enhance fishermen's/other sea users' education and training

Countries world wide are devoted in promoting economic and technology development. A long dependency on the land has nearly exhausted its resources, and as a result, the focus now has been shifted to marine resource development and utilisation. According to this trend, maritime affair development will certainly become the foundation for a sustainable development of Taiwan because marine resources of Taiwan are abundant with a great diversity. As international maritime affairs become more active, and maritime competition among countries gets white hot, the Taiwanese government in the *'Ocean Policy White Paper'* issued in 2006 specifically stated that *'to attract talent toward marine development and to cultivate high quality marine*

professionals' is a policy goal to secure Taiwan's maritime advantages and competitiveness internationally.

The marine industry encompasses a wide range of areas. At the present stage, the government should concentrate on some focus areas that offers more benefits, conduct a systemic analysis on the qualities of the industry's professional manpower, and investigate and discuss modes for cultivating talent for every professional field. Then for the next step, it is to integrate all the available resources and to deliberately assist colleges, universities, and vocational schools to cultivate high quality professionals, especially professionals with an international maritime vision and a capacity for handling international maritime affairs (MOE, 2007).

Since 2008 the Ministry of Education has initiated the project for cultivating talent for marine technology practices in universities and colleges (Marine Education Enhancement Project Office, 2007). The purpose of this project is to actively incorporate the industries, research institutions, and schools together for constructing a university and industry liaison system platform for practical education as well as giving guidance for constructing the platform successfully. Another goal is to integrate the schools with the industries, the government, and research together to construct an internship platform for maritime law and policy practices such that the students can act as a media to practically get involved in giving assistance on handling affairs related to laws and policies. This is an excellent opportunity to carry out practical experience learning. *'As for fishermen education, there are various private resource conservation organisations in addition to the fishery administration agency to implicitly educate or give guidance to the fishermen'* (UC21).

8.3.4.3 Strengthen manpower and financial resources of marine affairs management in education and training

Additional agencies and talents for marine and coastal management are needed at the central and local levels in order to promote implementation (the *National Oceans Policy Guidelines*). Development-oriented marine research covering aquatic products, marine affairs, and development of marine education also needs to be implemented in order to train needed talents. Reinforce the education and training for marine talents. Include 'marine affairs' on the national examination, and include jobs such as marine administrators' and 'marine engineers' aside from the existing departments such as 'marine resource', 'fishery', and 'aquaculture' as a way to better allocate marine human resources (RDEC, 2006).

To cultivate talent for maritime affairs and marine technology, the Ministry of Education has offered ten full-time lecturing positions for domestic universities since 2006. Meanwhile, curriculum for maritime laws and policy education was launched as well. Started from 2005, Marine Law and Marine Policy is included in the study and research field for the general studying abroad governmental funding. '*In the past, there were very few openings with regard to the cultivation of marine talent for government-funded marine scholarship, but it's increasing these two years*' (CA15). '*Nowadays very few people would want to work in marine-related jobs. The government does not provide a good educational environment or increase the opening for jobs and scholarship*' (PN11).

8.4 POLICY DEVELOPMENT

8.4.1 Issues

8.4.1.1 Marine resources declines continuously

Due to overfishing, destruction to habitats, pollution, the introduction of alien species and global changes in the last three decades, the marine ecological system is destroyed; probing into the reasons, it is believed that the general public does not have sufficient knowledge concerning marine life forms, the concepts on marine ecological conservation is deviated, and Taiwanese citizens enjoying consuming seafood, so that the pressure on fishery catches cannot be alleviated leading to the consequential phenomenon of slow exhaustion. In addition, the pressure originated from coastal development, pollution and interference, destructive force pertaining to leisure activities remains at the increasing trend, causing accelerated deterioration of the current coastal ecology in Taiwan (please see Section 7.6).

‘In terms of issues of marine policy, the most important one is that our marine resources are exhausted. It is the biggest problem. We still need to enhance the situations with regard to marine environmental management, lack of marine enforcement, marine pollution, and ecological conservation’ (CL13). In fact, ‘the ecological environment was so much in the past, but we did not care about conservation led to pollution and overfishing then the resources became less’ (UN26).

In addition, management measures fail to implement effectively, and then cause the predicament that marine sustainable development today.

8.4.1.2 Ineffectiveness of marine environmental management

Development of marine environmental management in Taiwan has changed from marine control and marine use, to marine protection. The Marine Affairs Promotion Committee also approved the *National Oceans Policy Guidelines* in 2004 and established six groups to improve marine environmental management practice (please see Section 4.3.1). Moreover, *the Environmental White Paper* published by the government in 2006 has a detailed introduction on the current conditions of domestic environmental protection, governmental policies on environmental protection and the results of implementation thereof, as well as a proposal of primary strategy for environmental protection policies (please see Section 6.4 and Table 6.3). The government also plans to complete the coastal management system and the utilization of coastal areas, reinforce the permit of coastal development, establish the coastal management information and environment monitoring system, establish the concept of crisis-prevention, and reduce environmental impacts for the main strategy (RDEC, 2006).

There are ten interviewees responded ‘marine environment protection and management’ should be given consideration when the government develops marine policy. Sustainable development emphasizes the consideration of environmental protection and development. ‘*Marine environmental protection and management must work with sustainable development, and this is because if we do not have good marine environmental protection and management, we cannot achieve marine sustainable development*’ (FA3). ‘*In fact, the management of marine resources, related ecological resources and conservation, and marine development are all related to sustainable development*’ (FP4). Consequently, this shows if marine environmental protection and

management can collocate with sustainable development, it will contribute to the development of the marine policy.

8.4.1.3 Lack of marine comprehensive management

Because of the notion of ‘focusing on the land and despising the sea’ in the past, leading to negligence of the government to value marine management and administration (please see Section 7.6). In addition, owing to lack of dedicated organisation and legislation, and integrated coastal management plan for marine comprehensive management, causing accelerated deterioration of the quality of coastal environmental resources and producing all sorts of environmental problems (please see Section 7.4). For example, marine pollution caused by the government did not have comprehensive consideration of ocean and land for pollution control of rivers and seas. Moreover, point source pollution such as urban sewage, industrial wastewater, animal husbandry wastewater, as well as non-point source pollution such as agricultural recycled water or surface erosion that carries large amounts of pollutants into rivers which subsequently flow into oceans causing the water increasingly deteriorated quality of ocean water (please see Section 6.2.1).

In addition, ‘*the policy of marine use can only be well conducted with a clear, macro-level plan*’ (FC1). ‘*We need rules governing the use of the sea for various conflicts*’ (LA20). ‘*Regional management is very important*’ (CL13). But due to the government lacks the mechanism of marine comprehensive management at the moment lead to conflicts of sea use occur. The conflicts of sea use hinder the country from sustainable development, and destroy the economic of nature conservation and social benefit.

8.4.2 Factors

8.4.2.1 Pay attention to sustainable utilisation of marine resource

The goal of Guidelines for the *National Sustainable Development Strategy of Taiwan* and the *Marine White Book* is focusing on sustainable development in the marine environment (please see Section 4.3.1). However, facing the pollution of marine environment, the depletion of marine resources caused by over exploitation, and the damage of marine environment, merely protecting endangered species alone is not enough to preserve the marine ecosystem (please see Section 7.6). Due to policies and regulations that there was a multiple jurisdiction situation in Taiwan's natural conservation work in the past and policies were mostly declarative or preliminary, the actual performance is not pronounced (please see Section 7.7). In recent years, with the increased awareness of an 'Oceanic Taiwan', more attention is being paid to the sustainable development of the marine environment, and all the responsible organs have adopted related managerial measures respectively, but whether they are effective or not are still unknown and will be observed later.

Because the marine resources are exhausted day by day, 'pay attention to sustainable utilisation of marine resource' is the first factor should be considered when the government is formulating marine policy. '*We have to do our utmost to conserve these resources for the future generations' sustainable utilisation*' (PL9). '*If we can make good use of the sea water and the sea's resources, perhaps many disasters can be prevented*' (FC1).

As mentioned before, It is explicitly stated in Chapter 17 of Agenda 21 that coastal states should take actions on sustainable use and conservation of marine living resources of the high seas and under national jurisdiction to sustainable development

(please see section 2.2). Furthermore, the Chapter 17 asked each country should pay attention to conservation and sustainable utilisation of fisheries resources of the high seas in order to avoid over fishing of fisheries resources.

8.4.2.2 Pay attention to marine environment protection

It was not until the establishment of EPA in 1987 that a series of environmental protection policies was drafted (please see Table 6.3). *The National Environmental Protection Plan* as the foundation of short-, medium- and long-term implementation of environmental protection measures of the country. The plan is not only the top-level plan of the country but also is an important milestone for the task of environmental protection. Furthermore, as of 1999, EPA began encouraging and assisting local governments to promulgate *County (Municipal) Environmental Protection Plan* as a means to comprehensively implement the task of environmental protection; these county (municipal) plans on environmental protection were complete at the end of 2002 (please see Section 6.4). What is more, the government has yet to furnish an overall coastal management plan as the guideline for the protection and harmonious development of coastal areas, causing accelerated deterioration of the quality of coastal environmental resources and producing all sorts of environmental problems (please see Section 7.4).

There are three interviewees responded ‘pay attention to marine environment protection’ should be considered when the government is formulating marine policy. ‘*Although Taiwan always talk about how important the sea is and how it relies on the sea, what the government or the public demonstrates does not suggest an ocean state as they mostly focus on the land*’ (FP4). ‘*Almost all pollutions generated on land*

[will] go to the sea,But they [the Central government] have no comprehensive planning at all' (PN11). *'The most important issues in the existing marine policy are the depletion of marine resources and destruction to the marine environment'* (CL13). In the past, *'jetties are built to deal with coastal issues, and the environment is damaged as a result'* (FL2). Habitats of marine organism also reduces rapidly. Thus it can be seen that the government should consider the factor of sustainable utilisation of marine resource when it is formulating marine policy. In addition, how to enhance coastal zone protection is also needed to be solved at the moment.

8.4.2.3 Following the international development trend of marine policy and management

In order to protect the marine environment and due to growing international recognition of the importance of conserving marine resources, several important acts, regulations and plans were promulgated or drawn up (please see Section 4.3.1). *The National Environmental Protection Plan* is in collaboration with *the Comprehensive Developmental Plan for State-Owned Land* in 2000, the year 2001 was set as the duration. It is explicitly stated in the objectives of the plan that the active participation to the international affairs pertaining to environmental protection, collaboration to execute the global task of sustainable development. Also, as the aim of the *Marine White Book* is also explicitly stated that participation in international fisheries cooperation to promote joint nursing and management, and reasonable use of resources (please see Section 6.4 and Table 7.2).

There are three interviewees responded 'following the international development trend of marine policy and management' should be considered when the government

is formulating marine policy. *'In the aspect of conservation, international regulations focus on utilizing natural resources sensibly so that they are not exhausted, as well as involve a raft of resources conservation measures'* (FA3). At present, *'the international community already has some principles for every country to observe, so if we incorporate them into our current domestic regulations, they can be materialized'* (LA20). However, *'the matching related measures the international community is demanding now have not been properly incorporated into our domestic regulations'* (FA3). *'It is essential for us to work with the world, [The government] must follow certain international regulations as this would enrich our marine content, and therefore we must have a comprehensive management, marine environmental protection, sustainable development of resources, integrated administrative management system, and related Act/regulation'* (PL9).

8.4.3 Obstacles

8.4.3.1 Lack of policy of marine comprehensive management

The marine environment in Taiwan is under heavy pressure from rapid development and diverse uses, thus the central government has begun to devote much time and effort to improving marine environmental management practice. In the aspect of fisheries, government's offshore and coastal fisheries' policy has still focused on further measures to reduce fleet size, limit vessel building, and maintain fish stocks (please see Section 5.2.1). In the aspect of marine environmental protection, it was not until the establishment of EPA in 1987 that a series of environmental protection policies was drafted (Table 6.3). In addition, owing to marine conservation is an issue receiving international attention, and being aware of the importance of marine conservation, the Executive Yuan has put in place a series of marine conservation

policies in the last 3 decades (please see Table 7.2). However, owing to many organisations and management units in charge of marine affairs, there is not yet a unified or prospective set of policy and measure regarding marine affairs (RDEC, 2006). What is more, the government has yet to furnish an overall coastal management plan as the guideline for the protection and harmonious development of coastal areas, causing accelerated deterioration of the quality of coastal environmental resources and producing all sorts of environmental problems (please see Section 7.4). Thus it can be seen that the Government adopted a series of measures of marine conservation and management , but lead to the awkward situation which lack of comprehensive planning/management/strategy in the marine management today because of the obstacles which are the influence of political power (please see Section 5.5.2), the absence of unified administration authority (please see Section 6.7), multiple jurisdiction problem (please see Section 7.7), and insufficiency of relevant laws (please see Section 7.3.2). All of these causes the awkward situation with regard to lack of policy of marine comprehensive management in marine management today.

There are five interviewees responded the main obstacle to management of the marine environment is related to ‘lack comprehensive planning/management/strategy’. Owing to ‘*some people [means government officers] understand the ocean incompletely, it is not clear while they plan the marine affairs. Moreover, items of plan may only involve a part rather than the planning of the whole. It is to say that they only planed the solution while the problem occured, but not planed a long-term and prospective planning. ... Basically, there is a lack of professionalism, This involves the government’s understanding of its entire policies. If they do not understand their own policies, they won’t know what the real problems are. This*

forms a cycle, and this is how the gap is formed (PC7). In addition, *‘when forming its policies, the government did not listen to NGOs’ suggestions when they can be important. The decision makers need to consider those suggestions, but they often don’t do that’* (FP4).

8.4.3.2 Lack concept of sustainable development in government

In the aspect of the marine management, due to the government lacks the concept of sustainable management, resulting in many problems. For example, ecological resources and habitats are depleted and lack of regional collaboration, the emphasis on the seafood culture leads to conflicts between fisheries and conservation, MPA does not yet have a complete system, coastal enforcement still needs to be improved, information on ecologies is still insufficient, and conservation-related concepts are outdated (RDEC, 2006).

There are three interviewees responded the main obstacle to management of the marine environment is related *‘lack concept of sustainable development in government’*. *‘We need to understand the concept of sustainable development and then actualize it, but so far it is not yet actualized. I think the government lacks the concept of sustainable developmentSometimes, it’s the political pressureThe concept of sustainable development is continuous. Politicians must not think about their own interests, but from what we see, that is the case. Although they have the concept, they don’t put it in practice’* (FP4).

8.4.3.3 Government has not promulgated explicit marine protection plan

The goal of national ocean policy is to establish an integrated ocean country, and guild marine development in the future by the *National Oceans Policy Guidelines*. Moreover, Taiwan has responded to the concept of sustainable development be initiated by the international society, and adopt the conception of sustainable marine ecology and generations justice to establish marine management system of marine environmental protection, marine conservation, and reasonable utilisation (the *National Oceans Policy Guidelines*). However, the absence of designated authorities and laws today governing the use of land of Taiwanese coastal areas, and the attitude of most governmental authorities regarding coastal management as secondary with a small amount of managerial manpower and funding poured in. In addition, there is a lack of overall understanding concerning coastal resources and the ecological system resulting even misuse. What is more, the government has yet to furnish an overall coastal management plan as the guideline for the protection and harmonious development of coastal areas, causing accelerated deterioration of the quality of coastal environmental resources and producing all sorts of environmental problems (please see the Section 7.4).

Government has not promulgated explicit marine protection plan is the main obstacle to management of the marine environment. *‘For a very long time, the government’s marine policy has been unclear. For example, what is the center-piece of marine development, and what is the most important goal? The answers are not definite at all’* (UP25). And *‘even the prospects of marine development or development objectives are lacking, and there are no clear-cut regulations for the management of marine development’* (UA24). Also, ‘marine management are scattered in different departments, for example, the CGA in charge of marine enforcement and

implementation of marine pollution, but authorized administration of marine pollution is the EPA. Therefore, it is still very confused now, and there should be a very clear competent authority and a whole operation' (PL9). Moreover, *'There are few measures that deal with the future. They [means government officers] only think of a solution and policy after they see a problem.'* (FA3). *'A slew of factors, such as political ones, have resulted in the inability to push forward related policies and bills'* (PA10), leading to the absence of an explicit marine protection plan by far, and the problems of marine environmental protection and management.

From other countries' experience, All countries enacted special laws for oceans and promulgated explicit marine policy in order to achieve entire object of marine environmental issues (please see section 2.2). For example, U.S. governes ocean in accordance with each main issue, and published effective and coordinated ocean policy, and *'An Australian Marine Conservation Strategy'* also promotes formulation of a more comprehensive marine policy (please see section 2.3 & 2.4).

8.4.4 Improvement

8.4.4.1 Enhance marine comprehensive management

The dramatic economic and industrial progress in Taiwan for the past 3 decades, combining with the accelerated growth in population, cause the gradual depletion of natural resources (please see Section 6.4). Moreover, the management of coastlines has been the point of conflict regarding development and conservation (please see Section 7.3.2). In the aspect of fisheries resources, owing to Taiwan's fisheries have suffered the negative consequences of overfishing, mixed catch, habitat destruction, pollution, and a decrease in catch of large fish species, offshore and coastal fisheries' resources have been gradually depleted (please see Section 7.6).

‘Therefore we must have a comprehensive management, marine environmental protection, sustainable development of resources, integrated administrative management system, and related Act/regulation’ (PL9). However, *‘ocean would be destroyed in the process of marine development and utilisation, but how to reduce the situation of destruction for effectiveness of utilisation of marine resources. I think marine policy should enhance this’* (UA24). Also, at the moment, the government should establish a sustainable management system based on the ecosystem-based belief, in collaboration with the status of marine ecological resources, consider local governments’ abilities of implementation, and enhance marine comprehensive management for preventing the abuse and depletion of resources. Moreover, the government also has to establish a prospective system that allows the consistent and sustainable productivity of eco-resources for toward the aim of sustainable development.

8.4.4.2 Enhance marine environment protection

Towards the end of the period (1983-1987), protection of the marine environment became an increasingly important issue, and several protected areas were established and the Executive Yuan drew up Environmental Protection Policy Guidelines in 1987, and use as *‘Increase public investment in environmental protection, actively promote the conservation of natural and cultural resources in order to improve the quality of living’* to be one of strategy of the Guidelines (please see Section 4.3.1 and Table 7.2). In addition, Director Tsai Hsun Hsiung of EPA indicated that the issue of environmental protection has been developed into an international issue, so all the citizens should contribute effort for the environment for the sustained utilisation of resources, the existence and development of humanity, as well as the improvement of quality of living (please see Section 6.4). However, the immaturity of handling marine

pollution by the government in recent years is causing the gradual deterioration of marine ecology, and the primary mission of Environmental Protection Bureau of the local government was to focus on land-based environmental protection, and the capacity of marine pollution control was apparently lacking (please see Sections 6.6 and 6.3.1.6). Since the government upholds the notion of ‘focusing on the land and despising the sea’, the performance of education policy and activity is poor. The policies did not adjust follow the development of times and economics result in incorrectness of marine-related understanding and cognition among the public, and job hunters are also put in the predicament of ‘focusing on the land and despising the sea’.

There are four interviewees responded the government should ‘enhance marine environment protection’ in development of marine policy. *‘For now, the sector of marine environmental protection is considered weak’* (PC7), as *‘in the past, Taiwan paid more attention to industrial development but less attention to conservation and environmental protection’* (UA24), *‘hence resulting in grave damage to the marine environment. Those affected places should be allowed some time to rest and recover’* (CL13). *‘Among the issues of marine policies, the most important one is to prevent the exhaustion of marine resources, so great efforts should be made in terms of marine pollution and ecological conservation’* (CL13). In order to solve above problems, the duty and responsibility of marine protection should be properly arranged, and the coastal and marine ‘the Blue Territory’ planning should be completed as soon as possible to establish comprehensive system of MPA for protecting and nurturing diverse marine resources. In addition, *‘instilling the concept of marine conservation to the public is also imperative. We should try to boost the citizenry’s awareness of*

marine protection in school and community education' (TL28), as well as collaborate with the forces in society to enhance marine environmental protection.

8.4.4.3 Implement the concept of sustainable development within marine policy

Both the *Environmental Protection Policy Guidelines* of 1987 and the *National Environmental Protection Plan* of 1998 used as 'strengthen legal system' to promote environmental protection (please see Table 7.2). In order to ensure the growth of fisheries while strengthening the conservation of the ecological environment of coastline marine areas, the FA began assisting local governments as of 1978 to sanction Fisheries Resources Conservation Zones pursuant to *Fisheries Act* (please see Section 7.2.6). In addition, the release and implementation of Basic Environmental Act in 2002 provides the legal basis for the aforementioned national and local plans of environmental protection, so that the strategy and construction of relevant laws on environmental protection are becoming more comprehensive (please see Section 6.4). However, the regulations regarding marine management and its authorities are still insufficient in Taiwan (RDEC, 2006). What is more, it is under such insufficiency of relevant laws as well as research information that the coastlines and marine areas of Taiwan are under overdevelopment, the survival of ecological environment is neglected causing the disappearance of coastline ecology and the slow depletion of marine resources (please see Section 7.3.2).

There are three interviewees responded the government should have 'sound ocean-related Act/regulation' in development of marine policy. '*The biggest reason why certain policies cannot be implemented is because there are no Act/regulations over a complete marine policy and management*' (FP4). '*We would be unable to*

facilitate marine sustainable development without closely matching relevant laws' (FA3). And '*under the rule of regulations, all sides' cooperation and education'* (UA24) are also indispensable for an effective enforcement. Thus it can be seen that the government should establish explicit marine policy, sound Act/regulation and mechanism, and implement the concept of sustainable development within marine policy, operate in coordination region plan, each plan of specialty and resource under *the Comprehensive Developmental Plan for State-Owned Land* to consider the whole ocean development, and advance marine functional planning for establishing marine management system. The system can be a standard of integrated base among different departments, organisations, and domains.

According to other countries' experience, U.S. ratified 'the Oceans Act of 2000', Australia had established marine and coastal management decree according to the international laws and Australia's constitution (please see section 2.6), and UK adopts a legal system, classified, meticulous, and cross-reference to each others, to limit development behaviours. These countries used as comprehensive Act/regulation to achieve the object of limit of marine development (please see section 2.6).

8.5 TECHNICAL MANAGEMENT, IMPLEMENTATION AND ENFORCEMENT

8.5.1 Issues

8.5.1.1 The regulations are executed by local governments, which are frequently limited by real political power

Politics is involved resulted in obstacles regarding administration to influence the effectiveness of management. In terms of fisheries law enforcement and management measures, management measures still need to be improved. In addition, due to the

influence of politics, the coral fishery has been reopened, and the government reviewed the operating of trawlers within 3 nautical miles of the coast and decided to relax all-round prohibition of the activities. However, this decision will undoubtedly lead to draining of the pond to get all the fish and also obstruct the development of conservation (please see Section 5.5.2).

‘Political power may exist in any country, especially in the more democratic ones, so the interference of political power is unavoidable, especially when some representatives of the people become irrational, which will cause the law-enforcing authorities a lot of trouble’ (FA3). There are four interviewees responded ‘The regulations are executed by local governments, which are frequently limited by real political power’. *‘Because the politicians think about elections, whenever you want to give out a ticket, politicians will be involved’* (LL18). ‘Should the central or local authorities succumb to the intimidation of political power, a raft of problems will occur’ (UN26). *‘If you want things to be improved, you need to see whether the government can curb the influences from the politicians and financial groups’* (LA20). Therefore, too much political intervention would only make things worse.

8.5.1.2 Ineffectiveness of marine conservation and environmental protection

In the past, Taiwan pursued the development of economy to establish any amount of industrial areas. In addition, owing to pollution increase day by day, the marine ecology of the seas surrounding Taiwan and environment continues to deteriorate (please see Section 7.5.3). In view of this, EIA was already passed and enacted by the government in 1994, but the EIA process is not able to block the passage of such said case with true numerical figures and evidence under the insufficiency of background ecological data to conduct accurate assessment (please see Section 7.5.1). Moreover,

owing to the designation and management of MPA in Taiwan has been quite inadequate, related Act/regulations are not sound, and an institutional problem of multiple jurisdiction of marine conservation, authority level too low, and overlapping of jurisdiction (please see Section 7.5.5) led to the force of conservation is weakened (please see Section 7.3.2). On the other hand, some fishermen lack the concept of conservation and knowledge of laws, and the illegal activities continue without let up (please see Section 5.5.2) so that the government can not implement management and enforcement. All of these show the problem of ineffectiveness of marine conservation and environmental protection.

At present, Taiwan focuses more on development than on environmental protection and conservation (UA24). *‘Basically, the problem we are worried about is that all the waste water is being dumped to the sea. If the government doesn’t do anything about the waste water, it will pollute the entire environment, especially the coastal areas, and this is a serious problem. Dykes are built to deal with coastal issues, and the environment is damaged as a result’* (FL2). Therefore, this also accelerates the destruction of the marine environment and resources. However, how to implement protection and conservation of marine resources has already become the most important subject at present.

8.5.1.3 Marine development and marine conservation cannot be well balanced in local government

The narrow landscape, dense population, urbanisation and industrialisation of Taiwan result in massive discharge of point source pollution and non-point source pollution that carries large amounts of pollutants into rivers which subsequently flow into oceans. The industrial development in the 1980s helped the economy grow at full

speed. However, because environmental protection was neglected, the problem of environmental pollution has since exacerbated day by day, resulting in a trend in which marine pollution is deteriorating swiftly. The many coastal industrial parks have directly caused the predicaments of marine ecological conservation (please see Section 6.2.1).

‘Taiwan focuses more on development than on environmental protection and conservation’ (UA24). ‘Actually there is a conflict between the economy and environmental protection. If the country wants to develop its economy but insists on environmental protection, too, the economic development will be affected. The formulation of the policy of environmental protection should be progressive and accepted by the industry and public..... After the economy developed, our environment was seriously damaged. The formulation of the policy of environmental protection should be progressive and accepted by the industry and public’ (FN6). However, ‘what is the economic direction and environmental goal? The government actually doesn’t yet have a clear economic direction and the environmental goal’ (PC7). Thus it can be seen that due to the rapid development of the economy and industrialization in the past, the overall marine environment has now been rendered imbalance. In the mean time of the economic development, how to balance the marine environment and conservation is also one of the current important issues.

8.5.2 Factors

8.5.2.1 People lack understanding of the concept of marine environment protection and marine resource conservation

Due to overfishing, destruction to habitats, pollution, the introduction of alien species and global changes in the last three decades, the marine ecological system is

destroyed; probing into the reasons, it is believed that the general public does not have sufficient knowledge concerning marine life forms, the concepts on marine ecological conservation is deviated, and Taiwanese citizens enjoying consuming seafood, so that the pressure on fishery catches cannot be alleviated leading to the consequential phenomenon of slow exhaustion (please see Section 7.6). On the other hand, beach-cleaning or marine protection activities held by the government and private groups are often combined with the protection of marine ecology but lack the understanding of marine culture. Therefore, comprehensive protection of marine ecosystems is difficult to be implemented. Taiwan's current seafood-related cultural activities are aimed at the business aspect, including the tuna festival in Dong-gang and stone tidal weirs in Penghu. They are only applied to marine utilisation instead of understanding the marine ecosystem and how to protect it, resulting in marine resources being neglected and abused (RDEC, 2006).

People whether have the concept of marine environment protection and marine resource conservation is the important factor that the government whether fulfil implementation and enforcement of policy. *'In terms of management, many controversies are caused by citizens' individual interests. Even if we have great policies, they might fail to be carried out because of the fear of opposition from the masses, which will result in the environment being damaged'* (UA24). For instance, *'some fishermen might more often than not engage in overusing the ocean's waters and even further damage natural resources due to their concern about private interests'* (UC21). *'Traditional fishermen do not know well about how to sensibly utilize the ocean owing to education standards and education philosophy. This is under the influence of the nation's special qualities and traditions. It is not easy to*

change the factors caused by decades of accumulated educational problems' (FP5).

People lack understanding of the concept of marine environment protection and marine resource conservation is one of factors of ineffectiveness of marine conservation and environmental protection.

8.5.2.2 Political influence

The interference of political power not only hinders local governments' clamp-downs on illegal acts but also delays the drafting and passing of bills relating to marine policies and the establishment of a solely responsible organisation for marine management (please see Sections 8.5.1.1 and 4.4.1). In addition, politicians also turn political affairs into a political issue causing the obstacle to implementation and enforcement of policy (RDEC, 2006). It is quite obvious that political problem is the key point of the obstacle to enforcement so that influence the effectiveness of management.

'Political factors will affect the efficiency of management. In light of the current societal environment, the government can barely defend itself against the influences of representatives of the people and conglomerates' (LA20). 'The current political environment of Taiwan is rather distorting: excessive swelling of public opinion and public representatives exert undue pressure to the executive branch of the government resulting in a huge gap in the enforcement of the laws and sometimes even not enforced at all' (UC21), 'the advancing of policies and bills has been delayed' (UC21), and 'law enforcement and clamp-downs have been meddled with' (LL18, UC21). Therefore, political influence is the factor that the government can not fulfil implementation and enforcement of policy effectiveness.

8.5.2.3 Managers lack of concept of marine comprehensive management

It is apparent that marine management in Taiwan lacks the concept of sustainable development and that over exploitation has led to the current problems. For example, overfishing, habitat destruction, pollution, and the introduction of alien species (please see Section 7.6). Although the government introduced related management measures in the aspect of fishery (please see Section 5.2.1) and marine pollution (please see Section 6.4), there is a lack of overall understanding concerning coastal resources and the ecological system resulting even misuse. What is more, the government has yet to furnish an overall coastal management plan as the guideline for the protection and harmonious development of coastal areas, causing accelerated deterioration of the quality of coastal environmental resources and producing all sorts of environmental problems (please see Sections 7.4). In addition, combining with the deficiency in the notion of conservation and the absence of unified administration authority, the tasks of management and citations are unable to be implemented leading to the unsatisfactory results of promotion (please see Section 7.3.2).

‘The sea areas are constantly used by the counties and cities: sometimes coordinated by the central government; sometimes is done by the local government individually. Whatever it is, it lacks comprehensiveness with matching measures and completeness’ (FP5). *‘The government doesn’t really understand the ocean, that’s why the ocean is never their priority [implementation of the government’s policies]’* (FP4). Therefore, *‘the government should push forward with a national coastal management policy as soon as possible. Only when there is a national coastal management policy, it is possible to carry out tasks related to marine management and marine sustainable development and to plan for other matters related to the sea’* (FP4). After the entire

policy and laws for coastal management are enacted, it is possible to carry on a comprehensive marine management. In summary, for an effective implementation of a marine policy, whether the management personnel possess the concept of marine comprehensive management is particularly important.

8.5.3 Obstacles

8.5.3.1 Lack of marine comprehensive management mechanism

At present, the mechanism of marine comprehensive management in Taiwan is still not completely, such as management measure of fisheries and mechanism are less effective, therefore cannot achieve effective management and sustainable utilisation of all aspects of fisheries (please see Section 5.3.2). However, marine affairs should respond to the conflicts regarding the utilisation of resources in nearby coastal regions and waters. There is a gap between the central government's policy and how it is carried out locally, and communication between relevant agencies is lacking. At the moment, there are also too many problems with marine management; it lacks the local perspective and is not carried in a macro perspective (RDEC, 2006). In addition, combining with the deficiency in the notion of conservation and the absence of unified administration authority; therefore, without any collaboration and coordination from these governmental departments, the force of conservation is weakened due to all of them going to different directions (please see Section 7.3.2).

'Right now marine management is scattered in different agencies' (CA15), and 'there is no solely responsible organ or unit that can help carry out the development policy of the entire marine industry' (TP30). On the contrary, 'each organ minds their own business and horizontal liaison between them is lacking' (LA20). In addition, the

government itself lacks an all-around marine policy and special coastal (marine) laws to materialize marine management. Moreover, *'when formulating a policy, the central government does not consider the local level when each place has its own characteristics'* (CL13). As a matter of fact, *'in the past, in terms of local government to the ocean matter, because the central government also lacks 1 coordinating organisation, the coordination part of the enforcement authority in the local government is rather inadequate'* (TL28). There is almost no interaction between the responsible departments in the central government and those in the local government due to the uncertainty in the policy. Local governments only participate in the fishery policy and are rather non-participative in communicating with other parts, the pollution control, and the ecology conservation. For example, on the enforcement of the marine pollution laws, the gap in the understanding of responsibilities will generate problems hinder coordination among organisations. And, *'the central government and local governments do not fully coordinate and plan their allocation and utilisation of resources'* (PC7). In summary, the lack of a co-ordination mechanism for comprehensive marine management will hamper the promotion and implementation of a national coastal management policy resulting in the inability to carry out the marine comprehensive management effectively.

8.5.3.2 Technical tools of marine conservation and environmental protection can not implement effectiveness

Although the Government currently has assessment tools, i.e., EIA and SEA, yet relevant laws are incomplete. For example, cultural and forestry policies that greatly impact the environment, as well as economic and trade policies that could cause tremendous impact to the environment though they are not directly connected to the developmental behaviour; the said policies are yet to be included into the assessment

categories of SEA (please see Section 7.5.2). Due to the ambiguity regarding the definitions of policies, plans or proposals in SEA process, and there is a lack in public participation cause imbalance between marine development and conservation (please see Section 6.5.2). Although public participation is regulated in *Environmental Impact Assessment Act* according to the current conditions, yet with the development units undergoing significant development projects, civilians feel that they do not have substantive participatory capability even though they are in the public hearings, and there is a great discrepancy between the assessment conclusions of the government and civilian expectations because most people do not understand the essence, purpose, system and operating procedure of an environmental impact assessment (please see Section 6.5.1). In the aspect of MPA, the current laws and regulations, they may involve MPA in their implementation scope or purpose, but their purposes are still mainly to fulfil their established business and they do not deal with MPA in many details (please see Section 7.7). Moreover, the function of resources conservation cannot be developed effectively because enforcement and operations management in fisheries' resources conservation zones cannot be practised completely. Also, due to lack of manpower of management and budget, management of fisheries' resources conservation zones exists on paper only (please see Section 5.5.4).

Marine development and marine conservation keep well balance is closely linked to the effective implementation of the sound marine policy. *'If we can strike a balance between development and protection, then the economy and the marine environment both can be taken good care of. Nevertheless, at present, Taiwan focuses more on development than on environmental protection and conservation'* (UA24). In fact, the goal of conservation is to utilise natural resources sensibly and permanently. The reason why conflictions take place is because too much attention is being paid to

short-term livelihoods and interests. Therefore, government officials should administer related affairs using public power, be held responsible for the decisions they make, and modify and correct erroneous actions before it's too late. Unfortunately, this kind of mechanism has been absent. *'It is clear that Taiwan's government does not care about these matters. Efforts such as marine protection areas are still being put off'* (FN16). In addition, the insufficiency of Taiwan's SEA has resulted in the imbalance between the overall marine development and environmental protection and conservation.

8.5.3.3 The absence of unified administration authority in marine enforcement

The legal system of the past in the country has been 'focusing on the land and despising the sea', and put less emphasis on the management of marine areas (please see Section 6.3.2). Owing to Taiwan has not yet dedicated organisation and law at the moment, law enforcement mechanism and executive power are scattered amongst the departments (please see Section 6.7), lack of ability of organisations of marine enforcement and maritime patrols, and the problem of respective egoism occur among the relevant authorities (please see Sections 8.2.3.2 and 8.2.3.3) so that ability and efficacy of marine enforcement have been influenced deeply.

'In terms of a system, we need to have a dedicated marine agency (e.g. the Ministry of Marine Affairs), integrate related marine management units and personnel in a bid to carry out the marine policy, regulations and precise law enforcement from the top down so that the effect of law enforcement and administrative efficiency can be enhanced' (PC8, CN16). Therefore, *'we need to establish a solely responsible organ to administer marine affairs as soon as possible'* (LC17). In addition, owing to *'lack of the dedicated legislation'* (FP4) and *'the Act/regulations are not sound'* (FA3,

CA15 and PC7), *'The law enforcers also lack a complete law that they can follow. Right now [on the problem of enforcement] they are only dealing with the symptoms instead of the root'* (FC1). To sum up, owing to lack of the dedicated organisation and legislation, the absence of unified administration authority in marine enforcement to influence the effectiveness of marine enforcement.

8.5.4 Improvement

8.5.4.1 Enhance mechanism of public participation

People are influenced by the thought culture of the land in which they live, and the government strictly controlled people's access to the coast for activities for a long period. As a consequence, people seldom participate in marine activities resulting in the education problem of marine equipment (please see Section 5.3.3.1.3). Owing to marine education has long been neglected and people lack of marine accomplishments (Please see Section 8.3.1.1), people concern about marine affairs less. Therefore, regularly scheduled hearings on the development and resource conservation of coastal areas should be held when promulgating the comprehensive plan of marine management in order to strengthen the communication of opinions between local governments and local people and to set up a public participation system. Meanwhile, the production or publication of printed and video periodicals, books and pictures should be done to reinforce the recognition and education regarding marine resource conservation amongst elementary and middle schools, as well as the general public (please see Section 6.6).

Therefore, *'based on the premise that environmental protection and ecological conservation go first, before a policy is formulated and carried out, fishermen on the ground should be allowed to take part and express their opinions via the holding of*

public hearings and information meetings so that the government can have a solid foundation to govern and draw up laws and ordinances’ (UN26). That is to say, ‘the participation of the masses should be regarded as an essential part of the process. On the one hand, correct notions can be passed down. On the other hand, consensus can be reached successfully’ (TC27). Also, ‘we fight those who violate the law with public awareness, the people, and the media for the sake of marine environmental management, ... They [public awareness, the people, and the media] are helpfully to management of marine environment’ (FN6). To sum up, through public participation and other mechanisms for opinion expression, it can not only forge a consensus and obtain the support of the public but also facilitate the implementation and the enforcement of the marine policy.

8.5.4.2 Promote SEA and MPA actively

In the future, the goal of main policy of the management of coastal area in Taiwan should first focus on protecting coast lines, establishing MPA, and promoting the rational use and conservation of coastal resources. The strategy for the implementation is to: gradually unify the conservation areas throughout Taiwan, and gradually complete a complete MPA in order to protect and develop marine resources. At the same time, the primary strategies are to develop a complete coastal management system, plan coastal use, improve the coastal area development permit system, establish the coastal management information and monitoring system, establish the concept of crisis prevention, and reduce environmental impacts (RDEC, 2006). However, there is not systematic and comprehensive review and evaluation in Taiwan regarding all currently enacted laws in the context of the environment or sustainability. It is the belief of this study that one of the foci for the trends of future environmental policy in the country should be the development of comprehensive

policies and sustainable mechanisms (please see Section 7.5.2). In addition, in order to solve the sustainable problem of marine ecological resources, the most fundamental method should be designated 'MPA,' which calls for an integrated coastal management for the entire coast (please see Section 7.6). However, there is not systematic and comprehensive review and evaluation in Taiwan regarding all currently enacted laws in the context of the environment or sustainability (please see Section 7.5.2).

The government should consider marine environment protection and marine resource conservation in development marine policy. *'Marine environmental protection and management must work with sustainable development'* (FA3). *'The management of marine resources, related ecological resources and conservation, and marine development are all related to sustainable development. The government should pay attention to marine environment protection and resource conservation even more, and promote national coastal management policy. Thus, marine management, marine sustainable development, and related plans would be implemented completely'* (FP4).

Therefore, because of Taiwan is an island surrounded by sea, if the government can pay special attention to establish MPAs, recruit more marine management staffers, properly distribute budgetary funds and enforce managerial regulations, and push forward the mechanism of SEA actively, the realisation of sound marine management and facilitation of sustainable development will be achieved.

The nations have different plans to materials the marine policy, but their main focus is the MPAs plan, marine spatial planning, coastal management plan, while an ecosystem-based ocean management is the trend in their managerial efforts. To conduct marine planning, the nations have started marine monitoring, using GIS to

construct a marine and coastal information system. Besides utilizing marine spatial planning, UK also relies on SEA to prevent environmental impacts caused by the marine development policy (please see section 2.9).

8.5.4.3 Enhance co-ordination between ocean-related management departments

The affairs pertaining to marine management are scattered amongst the governmental departments at the moment, and all the relevant authorities have their respective egoism and incomplete mechanism of coordination and communication lead to management efficiency be influenced seriously. For example, due to the affairs pertaining to the protection of the marine environment are scattered amongst the governmental departments, the limitations of EPA on its executive capabilities and insufficient equipment, it cannot handle significant events relating to marine oil spill and pollution; current COA organisation, equipment and manpower do not have the law enforcement capacity of citing port-area pollution and handling oil pollution in a fishing port, so the importance of interdepartmental policy measures, communication, coordination and collaboration is apparent (please see Sections 6.3.1.1 and 6.3.1.3). As a consequence, the government should enhance coordination between ocean-related management departments in the situation which the government does not have a specific marine management organisation.

‘It is imperative to set up a sound mechanism of co-ordination and liaison between involved government organs. However, at present, the horizontal liaison is not being conducted properly, which is a problem that should be dealt with head-on. Because there is an obstinate departmental egoism existing among the organs’ (LL18), and ‘sensible regulations and policies pertaining to marine management are absent, the government lacks a proper interaction and a relationship of coordination and liaison

vertically as well as horizontally' (FP4), *'like the promulgation and coordination of the Marine Pollution Control Act'* (PL9). And *'in terms of marine affairs, the Executive Yuan has a mechanism of division of labour for all its ministries and councils, but the effect of such integration is basically limited. There should be a powerful organ at the top to coordinate all sides, or there should be a sound horizontal liaison mechanism'* (UC21). Only in so doing can the efficiency of administrative management be increased so as to materialize marine comprehensive management and facilitate sustainable marine development.

8.6 SYNTHESIS – A FRAMEWORK APPROACH

With the booming economic and the government's focus on economic development, and lack of political will, various important industrial developmental projects have been initiated in the coastal areas of Chang Bing, Yunlin, outer islands, and Lin Yuen. (please see Chapter 4). These projects have caused significant damages on ecological habitats such as wetlands, lagoons, coral reefs, and estuaries, as well as river pollution problems. There was no standard for marine pollution controlling works to refer to until the *Marine Pollution Control Act* was passed in the year 2000. Nonetheless, because of a lack of environmental development principles in the legal system and an absence of the *Coastal Act*, coastal and marine management has not been carried out effectively. In addition, the uncompleted conservation act for marine resources as well as insignificant penalties also indirectly causes the disappearance of coastal ecological habitats and the reduction of marine resources (please see Chapter 7). Meanwhile, because a region is often administered by various authorities, departmental egoism often causes an inconsistent administration. To solve this problem, it is important to establish a marine comprehensive management mechanism or some dedicated organisations. Since many departments are involved in marine pollution control and

marine conservation works in Taiwan, an integration of these departments is especially important (please see Chapters 6 and 7). Although a Marine Affair Promotion Committee was established in 2004, this committee does not have sufficient power, budget, or manpower to effectively manage marine affairs (please see Chapter 4). Furthermore, those organisations of marine enforcement and maritime patrols do not have enough capacity to effectively work on marine enforcement, and as a result, fishery management measures such as fishery resource conservation area, limitations on fish catch size, and the launch of artificial fish reefs cannot be implemented successfully. In the end, there is a gradual deterioration of fisheries' resources (please see Chapter 5 and Section 8.2).

Prior to abolishing the *Martial Law* in 1988, maritime and seacoast were regarded as important military strategic points and therefore were under rigorous restriction. The coastal zones then were guarded by the Coastal Defense Troops of Marine Police Bureau, and except regular fishermen, common people did not have access to the sea. This type of environment had fostered an anxious attitude toward the ocean among the people in Taiwan, and plus there has been a long-lasting concept of 'focusing on the land and despising the sea'. Because the people rarely have a chance to visit the ocean and a lack of promotional TV commercial and programs to introduce about the oceans, the education policy have adopted the 'focusing on the land and despising the sea' sort of concept. Furthermore, there is qualitative and quantitative variation between the types of maritime affair talent available and the demands from the industry, as well as a lack people with maritime affairs management competence. At the end, the people in Taiwan have inadequate marine literacy; the graduates from maritime affair related schools cannot find a job easily; and there is a significant talent shortage for maritime affairs management (please see Section 8.3). Take year 2005

for example, there were 3,980 people graduated from marine-related majors, which accounted for 1.18% of all the college and university graduates in Taiwan. Nevertheless, there were only 2% of the marine-major graduates who actually worked in marine-related fields, and that was a very low ratio. Even though in 1987 the *Environmental Protection policy Guidelines* had stressed on reinforcing environmental education and research development (please see Chapter 6), the emphasis on environmental conservation education for marine and coastal zones was still not enough until the ‘Amorgos oil spill’ pollution event. Thereafter, the CGA started to send the staffs for training both domestically and abroad. Yet because the staffs for training in the EPA are not officially in charged by EPA, the instructors have little influence on the trainees’ learning attitude (please see Chapter 6).

The concepts of sustainable marine resources and marine environmental conservation were not much stressed in the earlier period, and the government when making the policy also neglected the importance of environmental sustainability. This phenomenon is especially apparent in the fishery industry. For livelihood reason, it is very difficult for the fishermen to accept this sustainability concept: there is no way to prohibit illegal activities of fishing using poisons, explosives, and electricity as well as trawling against regulations (please see Chapter 5). According to the global development of marine policy and management, it is clear that marine comprehensive management has played a more and more important role in marine sustainable development (please see Chapter 2). Nonetheless, when the government in Taiwan is making the policies, they rarely took marine comprehensive management into consideration. Furthermore, the government also failed to provide a definite and clear marine policy action plan. For example, even though there is the PDMAP, the only function of it is to put together all the plans from each governmental department.

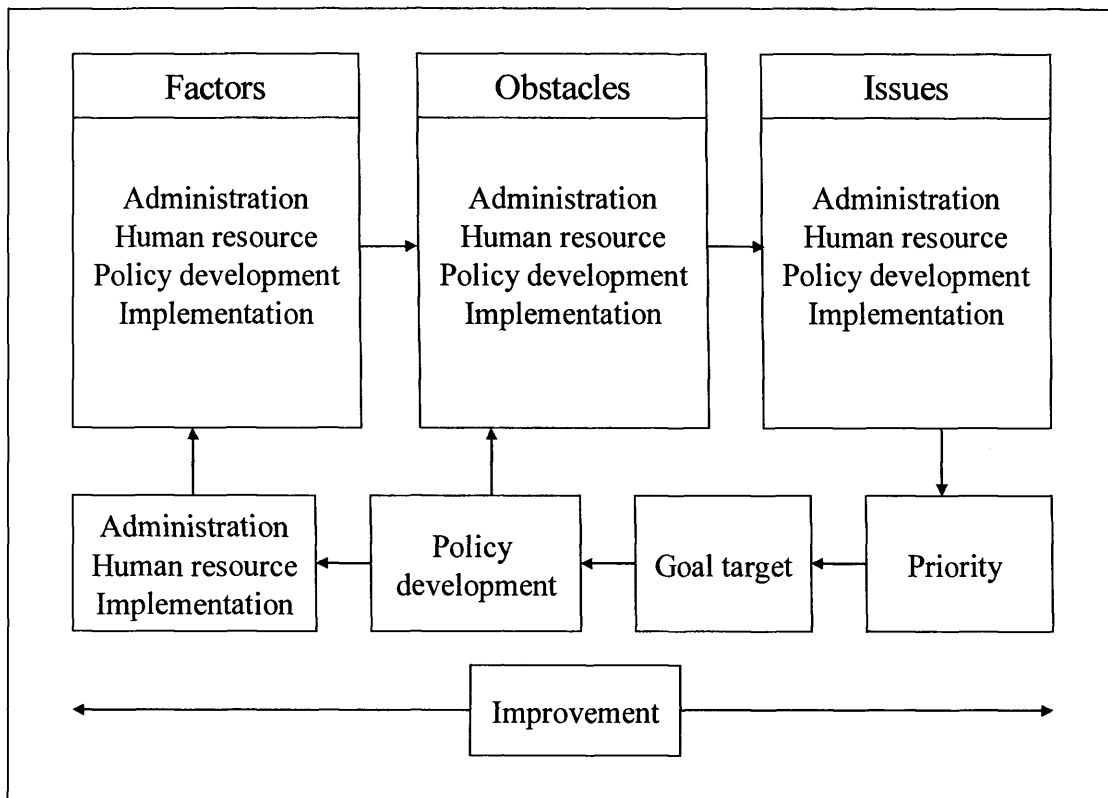
There is neither innovative nor visionary (please see Chapter 4) action plan to effectively prevent the deterioration of marine resources, the destruction of marine environment, and marine pollution (please see Section 8.4).

Neither the people nor the government has marine environmental protection and marine resource sustainability concepts, and as a result, it is difficult to carry out marine conservation and environmental protection measures, such as EIA and MPA. SEA too, has not been applied on marine environmental management, and as a consequence, it is very difficult for the local government to enforce the law without interference from political forces, to find a balance between marine development and conservation, and to protect the marine ecological habitats from destruction (please see Chapter 7). Meanwhile, there are no monitoring mechanism for sea area pollutions, sea area environmental quality, and marine ecology. It is urgent, consequently, to integrate a marine ecological environment database using the geographic information system (please see Chapters 6 and 7). In addition, there is no general vertical as well as horizontal managerial coordination mechanism available; this situation may cause a competitive utilisation of the marine and coastal zone resources among various governmental departments. Furthermore, there is no consistent sea area law-enforcement routine power; for example, the FA holds the fisheries administrative penalty right, but the enforcement has to be carried out by the CGA. The outcome is that the CGA does not put sufficient emphasis on illegal fishery activities. One solution is to learn from the Japanese government by setting up fisheries' oversight officials or supervisor as a way to unify the fishery enforcement routine power (please see Chapter 5) and thus avoid ineffective marine conservation and marine environmental protection (please see Section 8.5).

From the abovementioned issues, including factors and obstacles related to organisation and legislation, human resources, policy development, as well as technical management and implementation and enforcement, it is clear that the priority is to find a solution for the issues on marine policy and environmental management in Taiwan. There are four themes for improving the current situation (Figure 8.1). First, it is important to set up a marine comprehensive management organisation or mechanism, and to strengthen marine enforcement and maritime patrol system. Within the maritime patrol authority, a coordination and communication approach could demonstrate that the CGA has the need to cooperate with other relevant business organisations. It is still very important too to establish a mutual agreement among leaders of every business department as well as the enforcement agency to avoid inconsistency between the policy and the practice (please see Chapter 6). The above measure is following the international trend for ocean governance. Furthermore, in order to avoid departmental competition for sea area resources due to departmental egoism as well as to facilitate negotiation between the central and the local government, it is necessary to set up a cabinet-level cross-departmental committee within the central and the local government. Some examples are the Japan's Communication Conference, Canada's federal and province joint arrangements, UK coastal region management forums. The purpose is to facilitate the local government to cooperate with the marine policy from the central government for coastal and marine management (please see Chapter 2). Meanwhile, a complete marine and coastal law to function as sources of laws for marine management by the government is strongly required (please see Chapter 2). One example is the *Marine and Coastal Access Act* of UK. In contrast, the failure to pass the *Coastal Act* in Taiwan has become an impediment for coastal management of the country. In addition, the government should budget sufficient funding for science

research and education to augment the fundamental marine education, aquaculture proficiency, and to cultivate talent for marine affair management in Taiwan. Another action that should be taken is to encourage NGOs, the general industries, and the public for self-direct marine education in order for marine education to take place at every social level. Moreover, for developing the policy, the government should put focus on the concept of marine comprehensive management and sustainable development. The state's general marine management plan should be established on the basis of ecological system and to strengthen the quality as well as the quantity of the country's marine talent in order to satisfy demands from the marine affairs management. Last but not the least, the government should actively implement SEA, MPA, Marine Spatial Planning, and mechanisms of public participation, as well as decreasing political interference and carrying out ecological-based management to protect the marine environment and to conserve marine resources.

Figure 8.1 The framework of marine policy and environment management



Source: Researcher's own work

8.7 CONCLUSION

Although Taiwan is an island country surrounded by seas, marine affairs have been neglected for long because of a long lasting *Martial Law* and the nation's policy for focusing on the land and despising the sea. The development of marine policy and environmental management in Taiwan is far behind those advanced countries. Only recently did the public start to pay attention to marine and coastal environmental and resource issues. However, there are few education materials available on marine environmental protection and marine ecological conservation. Also, the people in Taiwan used to care little about topics related to marine environment. As a result, it is getting harder and harder to carry out policy development, organisation and legislation, capacity building, and the actual implementation. Therefore, it is

necessary to start on the marine education to galvanize the citizen's attention to the marine environment, to nurture marine affairs experts, and even to obtain their support to marine policy development, organisation re-engineering, and the enactment and modification of laws to establish a new and coordinated nation-wide comprehensive marine management organisation or mechanism as well as laws such as the *Coastal Act*. to integrate all government departments horizontally and vertically. At the same time, public participation and co-management should be used to include all stakeholders to carry out all marine comprehensive management measures such as MPA, Marine Spatial Planning, SEA, and marine monitoring. Only by doing so, it can move the coast and ocean of Taiwan toward sustainable development.

CHAPTER 9

CONCLUSION

9.1 INTRODUCTION

For all nations' increasing sea use, problems such as conflicts over national sovereignty, destruction of environment and resources, and conflict of utilisation have also been on the rise. Therefore, the nations have held the United Nations Conference on the Human Environment, the United Nations Conference on the Law of the Sea, the UNCED, and the WSSD to regulate each nation's sea use and ensure a sustainable utilisation while ecosystems are preserved. To respond to FCCC, the Convention on Biological Diversity and Agenda 21, the nations have started the procedures such as the integration of the environment and development, the integration of sector, and the integration of nation.

Each nation's marine policy is aimed at marine comprehensive management and sustainable development, and they all have started marine comprehensive management in order to meet the demands in the international conventions and action plans with the focus on an ecosystem-based ocean management. At the moment the nations face similar sea issues, including over-fishing, land-based sources pollution, receding coastlines, oil spill pollution, the destruction of habitats, conflict of utilisation, and so on. To solve these problems of environment and resources, the nations have been adjusting their system of national marine policy and environmental management.

Taiwan is an island country surrounded by seas. It has a rich and varied coastal terrain. Its sea has been giving birth to a variety of marine living resources due to the rendezvous of Oyashio current and Kuroshio current. In recent years, the usage of

marine and coastal resources by citizens surges dramatically, along with population growth, rapid economic development, and the relaxing of coastal control. However, because Government has long held the notion of ' focusing on the land and despising the sea ' and the pursuit of economic growth, it is rather indifferent toward marine policy development and environmental management, let alone recognizes the relationship between these two. It also led to issues such as marine environment destruction and the deterioration of marine resources in Taiwan. Therefore, the main theme of this study has been to explore the interrelationship between marine policy and marine environmental management in Taiwan through a better understand of their organisation and legislation, human resources, policy development, and implementation. Therefore, this chapter will start with the explanation of the concept and methodology of the research theme follow with a summary of the key findings of this research and their implications. The framework for the interrelationship between marine policy and marine environmental management will also be emphasised.

9.2 CONCEPT AND METHODOLOGY

In recent years, Taiwan has experienced rapid changes in sea use and marine resources management. Today it faces many challenges in protecting the marine environment. Although the government has put a lot of effort towards improving marine management practices, fundamental problems and difficulties still exist within the marine policy and marine environmental management system. This study has been carried out to comprehend the situation of fisheries, waste disposal and pollution, and marine environmental protection and conservation in Taiwan in order to establish the relationship between its marine policy and marine environmental management so as to identify the issues and appreciate the best way forward for sustainable marine development.

Based on the nature of the study a qualitative research method, inclusive of questionnaire surveys and semi-structured interviews, was adopted. Three themes with regard to management elements within the concept have been evaluated to review the marine policy and marine environmental management system. Management tools were used to evaluate government organisation and legislation, human resources, policy development, technical management, implementation and enforcement. Field research data has been used to investigate the relationship between marine policy and marine environmental management.

9.3 KEY FINDINGS AND THEIR IMPLICATIONS

9.3.1 Organisation and legislation (factor-obstacle-issue-improvement)

9.3.1.1 Lack of dedicated organisation of marine comprehensive management or mechanism

In Taiwan, because there is only limited development in marine economy and citizens have been indifferent to ocean for a long period of time, the leaders and heads of departments are generally not interested in marine issues. For a long period of time, the responsibility of marine management has been dispersed in various ministries; there are no government agencies dedicated to marine policy and environmental management. As a result, duplication of work causing a waste of administrative resources and disputes due to unclear responsibilities are rather frequent. Therefore, it is necessary to establish an organisation or mechanism dedicated to comprehensive marine management so that it can resolve the problems mentioned above effectively and facilitate marine policy development and environmental management.

9.3.1.2 The *Coastal Act* has not been passed

With a lack of emphasis on the ocean, Taiwan's marine legal system is also insufficient. Taiwan's coast-related Act and regulation do not treat coastal areas as sensitive areas and manage them accordingly, resulting in conflicts between development and conservation of the sensitive and fragile marine soil (please see Section 8.2.2.1). Local government is the executive level of marine management in Taiwan, but it usually carries out policy with difficulty because of the limitation of no real power, manpower and funds, or is unable to consider holistic marine benefit for local economic development lead to the victim of environmental resources (please see Section 8.2.3.1). At the moment, the legislation of the *Coastal Act* has not been completed for more than 10 years, which make the coastal management lacking of basic legal basis for a long period of time and many environmental impacts can not be resolved (please see Section 8.2.1.2). Management means acting in accordance with the law, so the government should accelerate the legislation for coastal management, for example, the *Coast Act*.

9.3.1.3 Ineffectiveness of marine enforcement

The CGA was established in 2000, and it's duty is in charge of Anti-smuggling as well as prevention of illegal entry. However, the domains of fisheries patrols and protection, marine environmental protection, and the *MPCA* only are it's executive affairs. Moreover, the CGA has mere 3,000 maritime law enforcement officers at the Maritime Patrol Directorate General, so it pays less attention to illicit fishing. On the other hand, fisheries administration units are also responsible for law enforcement and the protection of fishing vessels, but owing to the current shortages of government manpower, equipment and funds, fisheries law enforcement always depend on marine enforcement of the CGA (please see Section 8.2.3.2). Moreover, 'law enforcement

mechanism' and 'executive power' are scattered amongst the departments so that the problem of respective egoism occur among the relevant authorities and ability and efficacy of marine enforcement can also be influenced (please see Section 8.2.1.3). Therefore, it is necessary to strengthen marine enforcement and maritime patrol systems, increase personnel and equipment funds, cultivate ocean-related professional knowledge, and enhance in-service training. Therefore, before a solely responsible organ can be established, it is relatively important to set up a proper mechanism of contact and coordination (please see Section 8.2.4.2).

9.3.2 Human resources (factor-obstacle-issue-improvement)

9.3.2.1 People lack of marine accomplishments

Prior to abolishing the *Martial Law* in 1987, the coastal zones were guarded by the Coastal Defense Troops of Marine Police Bureau, and except regular fishermen, common people did not have access to the sea. This kind of situation had fostered an anxious attitude among the people toward the ocean. In addition, influenced by a continental ideology and culture, the education policy had adopted a continental perspective, i.e., viewing the maritime environment from the continent. The common education for all levels of schools offered very limited courses for cultivating maritime culture among students (please see Section 8.3.2.1). The overall state policy is more concentrated on the land than on the ocean. Guided by this principle of the nation, the education policy inevitably follows the direction of taking a mainlander's perspective on viewing maritime issues. Schools have only a trifling amount of materials to educate marine concepts to students, and as a consequence, it is general that people in Taiwan not only know very little about the ocean but also lack awareness and recognition of marine conservation topics. For the majority of education administrative organisations, they neither hold a comprehensive marine

education policy or program nor sufficient budget or personnel for this specific domain. Another reason that marine education has long been neglected is that there is not enough funding for the school to purchase software and hardware facilities that can be used to promote marine education (please see Section 8.3.3.1). Therefore, owing to lack of ocean basic education, courses, and teachers lead to people lack of marine accomplishments (please see Section 8.3.1.1). Also, it is necessary to promote the basic education of marine knowledge and enhance related courses and contents in the schools. It is important to cultivate correct marine concepts among people in Taiwan from pre-school, elementary school, to junior high school education. The government should work on educating people in basic marine knowledge so that people in Taiwan know about the ocean, love the ocean, make a good use of the ocean, treasure the ocean, and possess a global marine vision and fundamental marine literacy (please see Section 8.3.4.1).

9.3.2.2 The problem of lack of employment opportunities for marine graduates

Taiwanese are unfamiliar with the ocean and also fear for its elusive nature. As children, people have often been warned to avoid participating in ocean-related recreational activities or told the old saying that ‘those who work at the sea have only half the life left’, i.e., it is too dangerous to take a maritime-related career. As a result, after the people grow up, they have little knowledge about the ocean, their fears of the ocean remain, and only few of them dare to have a career at sea. Part of this phenomenon is also due to inadequate education for correct marine concepts, this is because of lack of TV advertisements and programmes at the same time (please see Section 8.3.2.3). In the recent years, because of the booming of marine knowledge economy and information technology as well as their applications in the marine affairs industry, conventional industries have undergone developmental

transformation while new emerging marine industries keep joining the market. Nevertheless, responses from the marine industry suggest that it is still not an easy task to find professional personnel. The major reason is that both the traditional as well as emerging school departments have no idea what types of personnel are truly required by the industries, and the quality of the talent and their competence also failed to satisfy the industry's standard (please see Section 8.3.3.2). As a result, the ratio for graduates to join the marine industry is very low (please see Section 8.3.1.2). Therefore, it is necessary to attract talent toward marine development, cultivate high quality marine professionals, and actively involve the industries, research institutions, and schools together for constructing a university and industry liaison system platform for practical education as well as giving guidance for constructing the platform successfully (please see Section 8.3.4.2).

9.3.2.3 Lack of marine comprehensive management talent

Cultivating marine knowledge, affection, and actions is dependent upon marine experiences. Providing a more in-depth marine experience could also attract people to work in the marine industry and choose marine-related recreational activities as well as living environment. As a result, people can make use of the ocean and protect the ocean is to let them get in touch with the ocean, actually experience the ocean, and learn about the ocean (please see Section 8.3.2.2). Currently, there are ten marine-related colleges and universities in Taiwan. Their mission is to provide professional marine knowledge to undergraduate as well as graduate students. Nonetheless, prior to 2004, these schools did not offer maritime affairs courses, and there is no relevant curriculum available. As a result, lack of cultivation of marine affairs management talent (please see Section 8.3.3.3). Since 2005, there have not been any college students who take *UNCLOS* or maritime policy as the major. For

graduate schools, only 124 students majored in *UNCLOS*, and no students who had majored in maritime policy and affairs were graduated. As a result, Taiwan is facing a shortage of management personnel for maritime affairs (please see Section 8.3.1.3). Therefore, it is necessary to strengthen manpower and financial resources of marine affairs management in education and training. Meanwhile, curriculum for maritime laws and policy education was launched in 2005. Marine Law and Marine Policy is included in the study and research field for the general studying abroad governmental funding for Cultivating marine comprehensive management talent actively.

9.3.3 Policy development (factor-obstacle-issue-improvement)

9.3.3.1 Marine resources decline continuously

Because the marine resources are exhausted day by day, for example, Taiwan's fisheries have suffered the negative consequences of overfishing, mixed catch, habitat destruction, pollution, and a decrease in catch of large fish species, the component of the catch has become smaller and younger in age. Thus, offshore and coastal fisheries' resources have been gradually depleted (please see Sections 8.4.1.1 and 8.4.2.1). The government lacks the concept of sustainable management, resulting in many problems. For example, ecological resources and habitats are depleted and lack of regional collaboration, the emphasis on the seafood culture leads to conflicts between fisheries and conservation, MPA does not yet have a complete system, coastal enforcement still needs to be improved, information on ecologies is still insufficient, and conservation-related concepts are outdated (please see Section 8.4.3.2). This is also the root cause of the predicament that marine sustainable development faces today (please see Section 8.4.1.1). Therefore, it is necessary to implement the concept of sustainable development within marine policy, and then the government can follow the policy to implement marine environmental protection and

management, marine conservation, marine pollution control, and marine management (please see Section 8.4.4.3).

9.3.3.2 Ineffectiveness of marine environmental protection

Over the past 20 years, Government pursued economic development and ignored factors of marine environmental protection during the development of marine policy (please see Section 8.4.2.1). This situation has resulted in the government not having a sound marine environmental protection plan. However, the primary mission of Environmental Protection Bureau of the local government was to focus on land-based environmental protection, and the capacity of marine pollution control was apparently lacking (please see Section 8.4.4.2). As a result, the destruction of marine environment is becoming more and more common, which includes that most construction projects, such as garbage dumping ground, Ocean Engineering, river dredging, dams building, and the use of reclaimed land, are developed along the coastline. Hence the coastline is compromised constantly. It also results in a substantial reduction in wetlands as well as the destruction of lakes and estuaries. Therefore, coastal wetland reserves should be designated in time to protect the environment and enhance marine environmental protection.

9.3.3.3 Lack of marine comprehensive management

The international development trend of marine policy and management should be considered when the government is formulating marine policy; marine comprehensive management and sustainable development are the key points in each nation's development of marine management especially (please see Section 8.4.2.3). Since the Government began to pay attention to marine management, the Government have adopted a series of measures of marine conservation and management, but lead to the

awkward situation which lack of comprehensive planning/management/strategy in the marine management today because of the obstacles which are the influence of political power, the absence of unified administration authority, multiple jurisdiction problem, and insufficiency of relevant laws. All of these causes the awkward situation with regard to lack of policy of marine comprehensive management in marine management today (please see Section 8.4.3.1). The importance of this topic can be found from issues concerning marine pollution control. If Government can not take into consideration of the land and the sea comprehensively and conducts pollution prevention in the river area and the sea area at the same time, the marine pollution will not be eliminated completely (please see Section 8.4.1.3). Therefore, a marine comprehensive management policy is needed to facilitate the marine environmental protection and marine pollution control effectively and thus achieve marine and coastal sustainable development.

9.3.4 IMPLEMENTATION (FACTOR-OBSTACLE-ISSUE-IMPROVEMENT)

9.3.4.1 The regulations are executed by local governments, which are frequently limited in terms of real political power

To a democratic society, it is almost impossible for Government to resist the influence of public representatives due to the consideration of votes (please see Section 8.5.2.2). Especially in the matter of marine enforcement, it is very common to see fragmentation of authorization, for example, political intervention in the enforcement of fishery laws: if some fishermen are arrested due to violation of the fishery laws, these illegal fishermen might not be persecuted to the end of judicial process after they are arrested by CGA personnel and sent to the fishery department of the local government because of the political intervention of a legislator or a councilor or even a County Executive (please see Section 8.5.3.3). As a result, MPA exists in name only

and marine conservation and environmental protection regulations cannot be implemented fully. Hence, the effectiveness of marine conservation and environmental protection is difficult to demonstrate (please see Section 8.5.1.2). Therefore, based on the premise that environmental protection and ecological conservation go first, before a policy is formulated and carried out, fishermen on the ground should be allowed to take part and express their opinions via the holding of public hearings and information meetings so that the policy can obtain the support of the public and key stakeholders (please see Section 8.5.4.1).

9.3.4.2 Ineffectiveness of marine conservation and environmental protection

The general public does not have sufficient knowledge concerning marine life forms, the concepts on marine ecological conservation is deviated, and Taiwanese citizens enjoying consuming seafood, so that the pressure on fishery catches cannot be alleviated leading to the consequential phenomenon of slow exhaustion. Therefore, people lack understanding of the concept of marine environment protection and marine resource conservation is one of factors of ineffectiveness of marine conservation and environmental protection (please see Section 8.5.2.1). Although, currently in Taiwan, there are tools to enforce marine conservation and environmental protection such as EIA and the MPA, because it is not high in the priority of the people, public participation for relevant environmental issues is not strong resulting that the enforcement tools such as EIA and MPA cannot be carried out effectively (please see Section 8.5.3.2). Thereby, the important ocean habitats, marine environment, and biological resources of the country are constantly being destroyed and reduced (please see Section 8.5.1.2). Consequently, the goal of the main policy of the government should first focus on protecting coast lines, establishing MPAs, and

promoting the rational use and conservation of coastal resources. The strategy for the implementation is to: gradually unify the conservation areas throughout Taiwan, and gradually complete a sound MPA in order to protect and develop marine resources. At the same time, the government must have sound EIA and SEA systems which are also important (please see Section 8.5.4.2).

9.3.4.3 Marine development and marine conservation cannot be well balanced in local government

Taiwan has long been ignoring the marine and coastal management due to a lack of awareness of the ocean for a long period of time. As a result, its government officials mostly manage with a mentality of parochialism and have no concept of consolidation of departments, disciplines, ocean in the land-ocean and comprehensive coastal management (please see Section 8.5.2.3). This situation led to lack of a marine comprehensive management mechanism. Currently marine management is scattered in different agencies, and there is no solely responsible organ or unit that can help carry out the development policy of the entire marine industry. On the contrary, each organ minds their own business and horizontal liaison between them is lacking. It is difficult to implement the marine policy and environmental management (please see Section 8.5.3.1). Therefore, all departments in the central and local governments will pursue their own agenda competing to develop marine and coastal resources and spaces, resulting in an unbalance in economic development and environmental protection (please see Section 8.5.1.3). As a consequence, the government should enhance coordination between ocean-related management departments in the situation which the government does not have a specific marine management organisation. Only in so doing can the efficiency of administrative management be increased so as

to materialize marine comprehensive management and facilitate sustainable marine development (please see Section 8.5.4.3).

9.4 THE FRAMEWORK FOR MARINE POLICY AND ENVIRONMENTAL MANAGEMENT

In theory, there exists a very comprehensive and coherent relationship between Taiwan's marine policy and marine management. Therefore, any policy toward marine and coastal issues and all management operations designed around it must be formulated under the condition of a complete understanding of their factors, issues, obstacles, and improvements. And Government policies, strategies and management actions must be formed and implemented through a series of planning and implementation process. Therefore, a framework for marine policy and environmental management is proposed in this study. The system method is used to analyze four themes: Government's organisation and legislation, human resources, policy development, and technical management, implementation and enforcement. Factors, issues, obstacles, and improvements within each theme are also explored.

By doing so, one can understand clearly the relationship between the Ocean policy development and environmental management operations in Taiwan (please see Section see Section 8.6) and locate the key points in the Taiwan ocean and coastal management issues to implement and adjust Taiwan marine policy even further as a countermeasure. This framework successfully analyses the interrelationship between the marine policy and the marine environmental management while at the same time, allows policy makers to have a clear understanding where the gaps are in the policy and management operations designed around it so that they can adjust the priority of

issues in a timely manner and set goals and aims to promote marine and coastal sustainable development.

9.5 CLOSING REMARKS

Taiwan is surrounded by sea and has a wide, extensive coastline and ocean which provides habitats for many marine organisms and other resources. Because Taiwan is densely populated, the coastline is the location of many different kinds of activities. Since the lifting of *Martial Law* in 1987, each development plan has failed to take into consideration the sensitive and fragile ecosystem of coastline and ocean, which has been damaged as a result of overfishing, pollution, and large-scale constructions. The three cases examined in this thesis, fishery management, marine pollution control, and environmental protection management, show the need for the adoption of a holistic approach towards integrated marine management.

Based on the findings, future recommendations include: (1) Institutional reform, such as the establishment of special organisation for overseeing and implementing integrated marine management; (2) Special legislation, such as the *Coast Act* for marine environmental protection; (3) Capacity building in the marine field by way of enhancement of education and training, and increasing public awareness on the importance of marine resources management; (4) Improve technical management and promote sustainable development in areas such as MPA, EIA, GIS, monitoring and SEA for implementing marine comprehensive management.

The research has also considered global and national developments in other parts of the world. The integrated marine management characteristics, advantages and experiences of six countries has served as a useful reference for identifying problems

with and identifying solutions for Taiwan's existing marine management practices. A framework for marine policy and environmental management has been established using the research themes. Finally, it is has been established that good interaction between marine policy and marine environmental management is a necessity for sustainable marine development.

Bibliography

Field survey – List of interviewees

In-depth interview - List of interviewees

References cited in the thesis

Field survey – List of interviewees

Name	Date	Place	Position
Tong-Ming Wu	29/12/2004	Office	Professor and Head, Department of Maritime Police; Central Police University
Wei-Hsin Ting	27/12/2004	Office	Professor, Department of Maritime Police; Central Police University
Chia-Ta Chen	29/12/2004	Office	Professor, Department of Maritime Police; Central Police University
Guo-Shen Chen	29/12/2004	Office	Associate Professor, Department of Maritime Police; Central Police University
Jing-Fen Wei	29/12/2004	Office	Associate Professor, Department of Maritime Police; Central Police University
Mu-Chien Lin	15/11/2004	Taipei	Associate Professor, Department of Maritime Police; Central Police University
Hsien-Wen Chen	29/12/2004	Office	Assistant Professor, Department of Maritime Police; Central Police University
Kuo-Tien Lee	16/11/2004	Office	Professor, Department of Fisheries Resources Management, Marine Conservation National Taiwan Ocean University
I Huang	22/01/2005 24/01/2005	Office	Professor, National Taiwan Ocean University
Chih-Ching Chang	16/11/2004 25/11/2004	Office	Professor and Head, Department of Shipping and Transportation; National Taiwan Ocean University
Guang-Ming Liu	16/11/2004	Office	Professor, Department of Environmental Biology and Fisheries Science; National Taiwan Ocean University
Ching-Hsiewn Ou	06/11/2004 05/11/2004 30/11/2004 06/12/2004 14/12/2004 21/12/2004 28/12/2004 04/01/2005	Office	Associate Professor, Department of Environmental Biology and Fisheries Science; National Taiwan Ocean University
Solomon Y.H. Chen	28/12/2004 04/01/2005	Office	Associate Professor, Department of Merchant Marine; National Taiwan Ocean University
Kuan-Hsiung Wang	28/12/2004	Office	Associate Professor, Institute of the Law of the Sea; National Taiwan Ocean University
Chen-Yo Choh	25/12/2004	Office	Associate Professor, Institute of the Law of the Sea; National Taiwan Ocean University
Shyh Tsann Yeh	25/12/2004	Office	Lecturer, Department of Transportation and Navigation Science; National Taiwan Ocean University

Shun-Hsyung Chang	18/12/2004	Office	Vice-President, National Kaohsiung Marine University
Yi-Chih Yang	18/12/2004	Office	Associate Professor and Head, Department of Shipping and Transportation Management; National Kaohsiung Marine University
Gordon, K.C. Shang	18/12/2004	Office	Associate Professor, Department of Shipping and Transportation Management; National Kaohsiung Marine University
Yann-huei Song	26/01/2005	Office	Research Fellow/Deputy Director, Insitute of European and American Studies; Academia Sinica
Shao-Chuan Wang	04/12/2004 05/12/2004	Yiland	Rear Admiral, Ministry of National Defence
Chian-Tshiz You	05/01/2005	Office	Deputy Administrator, Coast Guard Administration
Xiang-Tai He	05/01/2005	Office	Head, Coastal Patrol Directorate General, Coast Guard Administration
Li-Chuan Yang	05/01/2005	Office	Director general, North Coast Guard Bureau, Coast Guard Administration
Chin-Long Lin	05/01/2005	Office	Chief Secretary, Maritime Patrol Directorate General; Coast Guard Administration
Tian-Shou Chen	25/12/2004	Taipei	Vice-President, Fisheries Agency, Council of Agriculture
Hong-Cheng Tsao	25/12/2004	Taipei	Director, Deep Sea Fishery Research and Development Center; Fisheries Agency, Council of Agriculture
Shui-Yuan Chang	06/12/2004	Keelung	Director, Ocean Development Bureau; Keelung City Government
Hsing-Wu Chang	02/11/2004	Office	Chairman, Kaohsiung Fishermen's Association
Peter S.C. Ho	25/12/2004	Taipei	President, Overseas Fisheries Development Council of the Republic of China
Chang-Ling kuo	25/12/2004	Taipei	Captain and Secretary General, The Master Mariners' Association of the Republic of China
Yu-Wei Wang	21/12/2004	Keelung	Assistant Researcher, Chinese Maritime Research Institute
Sophie W. Huang	18/12/2004	Taipei	Lawyer, Lin & Associates Maritime Law Office
Wan- Fang Yang	02/11/2004	Kaohsiung	Practitioner, Fishing Company

In-depth interview - List of interviewees

	Organisation	University, Organisation	Position	Name	Date	Location	Code.
fisheries	central government	Fisheries Agency	Deputy Director-General	Tain-Shou Chen (1)	17/03/06, 15:00	office	FC1
	local unit	Penghu County Government	Director-General, Agriculture and Fishery Bureau	Liou-Tzong Hwu (2)	20/03/06, 11:47	office	FL2
	academic	National Taiwan Ocean University	Associate Professor, Department of Environmental Biology and Fisheries Science	Ching-Hsiewn Ou (3)	07/04/06, 14:05	office	FA3
	private sector	1. Fisherman, Gungliau Fishermen's Association 2. Taiwan Fisheries and Marine Technology Consultants, Inc.	1. Former Executive Secretary General 2. Manager, Technical Department	1. Jie-Chun Lin (4) 2. Tomas Chen (5)	1. 16/03/06, 18:12 2. 07/04/06, 17:38	1. Interviewee's home 2. Café in National Taiwan Ocean University	1.FP4 2.FP5
	NGOs	Taiwan Fisheries Sustainable Development Association	Secretary General	Ming-Tien Chang (6)	29/03/06, 11:25	Café in National Taiwan Ocean University	FN6
marine pollution	central government	1. Environmental Protection administration 2. Coast Guard Administration	1. Director, Department of Water Quality Protection 2. Senior Specialist	1. Jen-Tse Hsu (7) 2. Hai-Nin Yang (8)	1. 17/03/06, 09:56 2. 27/03/06, 09:57	1. office 2. office	1.PC7 2.PC8
	local unit	Pingtung County Government	Director, Bureau of Environmental Protection	Ho-Cheng Hsu (9)	22/03/06, 16:12	office	PL9
	academic (Member of Marine Affairs Committee)	National Taiwan Ocean University	Associate Professor, Department of Merchant Marine; Head, Centre for Maritime Safety and Security	Solomon Y.H. Chen (10)	29/03/06, 09:53	office	PA10
	private sector NGOs	Hengchun Marine Biology Protection Association	Executive Secretary General	I-Shun Chen (11)	22/03/06, 20:40	Café in Kaohsiung Culture Park	PN11

marine environment protection and conservation	Central government	Fisheries Agency	Director-General	Dah-Wen Shieh (12)	03/03/06, 14:30	office	CC12
	local unit	Penghu County Government	Senior Specialist, Agriculture and Fishery Bureau	Shu-Ling Liu (13)	20/03/06, 14:15	office	CL13
	academic (1. is the Member of Marine Affairs Committee)	National Taiwan Ocean University	1. Professor, Institute of Marine Resource Management 2. Professor and Director, Institute of Marine Resource Management	1. Wen-Yen Chiau (14) 2. Kwang-Ming Liu (15)	1. 27/03/06, 19:30 2. 24/03/06, 12:37	1. Restaurant in Taipei 2. Restaurant in Keelung	1.CA14 2.CA15
	private sector	-----	-----	-----	-----	-----	-----
	NGOs	Penghu Zooxanthellae Association	Executive Secretary General	Heng-I Xie (16)	21/03/06, 14:13	office	CN16
marine enforcement	Central government	Coast Guard Administration	Deputy-Minister	(17) Chian-Tshiz You	27/03/06, 08:30	office	LC17
	local unit	Maritime Patrol Directorate General 1. Gungliau 2. Penghu	1. Commander, 16 th Maritime Patrol General 2. Commander, 16 th Maritime Patrol General	1. Shaw-Dong Chen (18) 2. Shi-Qing Ho (19)	1. 16/03/06, 16:15 2. 21/03/06, 18:20	1. office 2. office	1.LL18 2.LL19
	academic	National Taiwan Ocean University	Professor and Former Director	I Huang (20)	16/03/06, 21:30	Interviewee's home	LA20
	private sector	-----	-----	-----	-----	-----	-----
sea utilisation	Central government	Fisheries Agency	Director, Fisheries Regulation Division	Ming-Ho Huang (21)	17/03/06, 10:58	office	UC21
	local unit	Penghu County Government	Magistrate	Chian-Fs Wang (22)	21/03/06, 08:50	office	UL22
	Academic (1. is the Member of Marine Affairs Committee)	National Taiwan Ocean University	1. Professor, Institute of Applied Geosciences; Member, Science and Technology Council to the President of Taiwan 2. Associate Professor, Department of Merchant Marine	1. Chao-Shing Lee (23) 2. Bin Lin (24)	1. 24/03/06, 14:05 2. 16/03/06, 14:10	1. office 2. office	1.UA23 2.UA24

	private sector	Taiwan Fisheries Research Institute	Director, Penghu Marine Biology Research Center	Wann-Sheng Tsai (25)	21/03/06, 11:00	office	UP25
	NGOs	Penghu Fishermen's Association	Executive Secretary General	Da-Zhou Xu (26)	20/03/06, 15:12	office	UN26
marine tourism	central government	Ministry of Transportation and Communications	Director, Tourism Bureau	Benjamin A. B. Chen (27)	22/03/06, 09:14	office	TC27
	local unit	Penghu County Government	Director, Tourism Department	Tung-Lin, Hung (28)	21/03/06, 09:33	office	TL28
	academic	National Penghu University	Associate professor and Director, Department of Leisure Management	Shyi-Liang Yu (29)	22/03/06, 10:40	office	TA29
	private sector	Fish World Travel center	Boss	Ader (30)	24/03/06, 11:33	office	TP30
	NGOs	Taiwan Cetacean Society	Secretary General	Ming-Hua Lee (31)	17/03/06, 17:12	office	TN31
marine education	academic	1.National Taiwan Ocean University 2.Central Police University	1.Professor and President 2.Professor and Former Director, Department of Maritime Police	1.Kuo-Tien Lee (32) 2.Wei-Hsin Ting (33)	1.07/04/06, 10:07 2.13/03/06, 16:00	1.office 2.Interviewee's home	1.EA32 2.EA33

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Appendices

Appendix 1 Questionnaire questions

Appendix 2 Questionnaire results

Appendix 3 Interview questions

Appendix 4 The top three results of Questionnaire

Appendix 1

Appendix 1.1 Questionnaire questions (English)

Appendix 1.2 Questionnaire questions (Chinese)

Appendix 1.1 Questionnaire questions (English)

Marine policy and marine environmental management in Taiwan Questionnaire

This questionnaire is from a PhD student at the School of Earth, Ocean and Planetary Sciences in Cardiff University. I am currently researching marine policy and marine environmental management in Taiwan. I would be grateful if you could take a few moments to answer this confidential questionnaire.

The questionnaire should take about 20-25 minutes to complete. You will be asked to tick a box or write down your answer. Please be assured that all information provided by you will remain strictly confidential and anonymous. Thanks for your time and valuable feedback.

Jui-Chung Kao
Cardiff University, UK.

Definition:

Marine policy is a set of goals, directives and intentions of country to pursue the entire benefits of marine and protection of marine environment. In addition, marine environmental management is the process by which marine environment are controlled to achieve the desire objectives of marine policy. Therefore, it is important to figure out the relationship between marine policy and marine environmental management in order to solve the emerging problems we face in Taiwan, especially in formulation, adoption and implementation of marine policy to protect the marine environment.

1. RESPONDENT DETAILS

1.1 Name of Organisation:

- central government local unit academic private sector NGOs
other

1.2 Type of respondent: fishery marine environment protection and conservation

- marine enforcement marine utilisation marine tourism other

1.3 Position held:

1.4 Date of completion:

1.5 Contact Tel:

1.6 E-mail:

2. LEGAL AND ADMINISTRATIVE BASIS OF POLICY

2.1 What are your main concern's issues with regard to the existing legal and administrative system basis of policy? (Please tick all that apply and rank your top three, 1=first, 2=second, 3=third)

Tick Rank

- politics influence the development of ocean and legislation
- ocean-related Act/regulations are not sound
- communication and co-ordination cross ministries/agencies
- communication and co-ordination between central and local government
- ineffectiveness of marine enforcement
- government lacks a marine comprehensive management organisation
- legislators lack the marine perspective
- other
- don't know/no opinion

2.2 With regard to marine management, do you agree with the following statements? (Please tick all that apply)

- economic is the priority
- differences in implementation exist between central policymaking and local execution
- lack of environmental development principles in the legal system (e.g. principles of sustainable development, polluter pays, precautionary, etc.)
- a special organisation has not been established
- lack of marine management budget
- lack of political will
- low penalty of law
- fishermen/other sea users don't want to co-operation
- other
- don't know/no opinion

2.3 In relating to the legal and administrative system do any of the following difficulties apply? (Please tick all that apply and rank your top three, 1=first, 2=second, 3=third)

Tick Rank

- lack of ability of organisations of marine enforcement and maritime patrols
- lack of international experience of marine enforcement (e.g. deal with international fishery disputes, enforce a ban of piracy)
- lack of complementary measure for sea use in the legal system
- the same region is administered by multiple units would have questions of departmental egoism

- the coastal Act* has to enact as soon as possible
- political personages do not care marine legislation
- government connive marine environment destruction due to developmental benefits
- fishermen/other sea users lack law knowledge
- lack of budget for marine enforcement (e.g. lack of far sea patrol vessels)
- the legislative system does not pay attention to the management of sea area so much lack of sound system of marine enforcement
- political factors affect the effectiveness of management
- some fishermen/other sea users don't obey law (e.g. illegal fishing, smuggling)
- no difficulties
- other
- don't know/no opinion

2.4 In your opinion, to what extent do you agree with the following statements that the existing marine legal and administrative system be strengthened?

(A) modification of existing marine legislation (e.g. increase principle of sustainable development)

- (1) agree strongly (2) agree slightly (3) neutral
(4) disagree slightly (5) disagree strongly (6) don't know

(B) establish the Ministry of Marine Affairs

- (1) agree strongly (2) agree slightly (3) neutral
(4) disagree slightly (5) disagree strongly (6) don't know

(C) strengthen marine enforcement and maritime patrol system (e.g. increase enforcement budget and personnel, enhance coordination with the Coast Guard Administration, enhance to enforce a ban of illegal fishing, etc.)

- (1) agree strongly (2) agree slightly (3) neutral
(4) disagree slightly (5) disagree strongly (6) don't know

(D) enact a sound bill (e.g. the Coastal Act)

- (1) agree strongly (2) agree slightly (3) neutral
(4) disagree slightly (5) disagree strongly (6) don't know

(E) increase marine budget

- (1) agree strongly (2) agree slightly (3) neutral
(4) disagree slightly (5) disagree strongly (6) don't know

(F) establish the Marine Affairs Committee

- (1) agree strongly (2) agree slightly (3) neutral
(4) disagree slightly (5) disagree strongly (6) don't know

(G) increase penalties of for breaking the law

- (1) agree strongly (2) agree slightly (3) neutral

- (4) disagree slightly (5) disagree strongly (6) don't know
- (H) establish a comprehensive management organisation or mechanism
- (1) agree strongly (2) agree slightly (3) neutral
- (4) disagree slightly (5) disagree strongly (6) don't know
- (I) no change needed
- (1) agree strongly (2) agree slightly (3) neutral
- (4) disagree slightly (5) disagree strongly (6) don't know
- (J) other
- (1) agree strongly (2) agree slightly (3) neutral
- (4) disagree slightly (5) disagree strongly (6) don't know

3. CAPACITY-BUILDING IN EDUCATION AND TRAINING

3.1 What are your main concern's issues with regard to marine education and training?

(Please tick all that apply and rank your top three, 1=first, 2=second, 3=third)

Tick Rank

- failure to solve the problem of lack of employment opportunities for marine graduates (e.g. increase job openings for those performing well in national marine affairs examinations)
- government does not devote sufficient resources to the development of marine education
- lack of marine teachers and equipments in ocean university/college
- the cultivation of high level talents in specialty fields concerning the ocean, marine policies and laws, and comprehensive management
- insufficient investment of marine education
- lack of marine education and training
- people lack of marine accomplishments
- lack of marine comprehensive management talent
- fewer and fewer people want to devote themselves to marine industries
- other
- don't know/no opinion

3.2 With regard to marine education and training, do you agree with the following statements? (Please tick all that apply)

- government focuses less on marine education and training than other education aspects
- lack opportunities after graduation

- ineffective implementation of marine education
- there were very few openings with regard to the cultivation of marine talent for government-funded marine scholarship
- threatened by a gap in manpower
- both the traditional and emerging school departments have no idea what types of personnel are truly required by the industries
- lack marine experience activities in the school education
- people seldom commune with ocean
- government already proclaim focus on it but doesn't carry out it
- ineffective implementation of marine on-job training
- the common education for all levels of schools offered very limited courses for cultivating maritime culture among the students
- unsuitable resource distribution on marine education
- lack of TV advertisements and programmes
- the notion of 'focusing on the land and despising the sea'
- other
- don't know/no opinion

3.3 What do you perceive to be the main obstacles to promoting marine education and training?
(Please tick all that apply and rank your top three, 1=first, 2=second, 3=third)

Tick Rank

- | | | |
|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | education policy lay particular stress on 'consider the sea from the thought of land' |
| <input type="checkbox"/> | <input type="checkbox"/> | lack of ability of cultivation of marine affairs management talent |
| <input type="checkbox"/> | <input type="checkbox"/> | lack of sound system of marine education and training |
| <input type="checkbox"/> | <input type="checkbox"/> | lack of public interest |
| <input type="checkbox"/> | <input type="checkbox"/> | lack of integrated institutions of marine research (e.g. academic research institutions of marine affairs) |
| <input type="checkbox"/> | <input type="checkbox"/> | lack of a budget for marine education and training |
| <input type="checkbox"/> | <input type="checkbox"/> | jobs have low remuneration compared to other sectors |
| <input type="checkbox"/> | <input type="checkbox"/> | type of cultivation of marine talent and supply and demand of industry in the drop of quality and quantity |
| <input type="checkbox"/> | <input type="checkbox"/> | lack of ocean-related talent (e.g. lack of marine scientific talent and teacher) |
| <input type="checkbox"/> | <input type="checkbox"/> | other |
| <input type="checkbox"/> | | don't know/no opinion |

3.4 With respect to marine education and training to what extent do you agree with the following statements?

(A) increase budget for marine education and training

- (1) agree strongly (2) agree slightly (3) neutral
(4) disagree slightly (5) disagree strongly (6) don't know

(B) enhance fishermen's/other sea users' education and training (e.g. in terms of legislation, marine environmental protection)

- (1) agree strongly (2) agree slightly (3) neutral
(4) disagree slightly (5) disagree strongly (6) don't know

(C) strengthen manpower and financial resources of marine affairs management in education and training

- (1) agree strongly (2) agree slightly (3) neutral
(4) disagree slightly (5) disagree strongly (6) don't know

(D) promote the basic education of marine knowledge and strengthen marine courses and teaching materials in schools

- (1) agree strongly (2) agree slightly (3) neutral
(4) disagree slightly (5) disagree strongly (6) don't know

(E) other

- (1) agree strongly (2) agree slightly (3) neutral
(4) disagree slightly (5) disagree strongly (6) don't know

4. POLICY DEVELOPMENT

4.1 In your opinion, what are the priority issues of Taiwanese marine policy? (Please tick all that apply and rank your top three, 1=first, 2=second, 3=third)

Tick Rank

- | | | |
|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | marine resources declines continuously |
| <input type="checkbox"/> | <input type="checkbox"/> | ineffective implementation of marine conservation |
| <input type="checkbox"/> | <input type="checkbox"/> | lack of marine comprehensive management |
| <input type="checkbox"/> | <input type="checkbox"/> | ineffective implementation of fisheries management |
| <input type="checkbox"/> | <input type="checkbox"/> | ineffectiveness of marine environmental protection |
| <input type="checkbox"/> | <input type="checkbox"/> | lack of the ability of marine enforcement and maritime patrol |
| <input type="checkbox"/> | <input type="checkbox"/> | less scientific research of the sea |

- ocean-related Act/regulation
- ineffective implementation of marine pollution
- ineffective implementation of coastal zone management
- marine tourism development influence marine ecology
- lack of the equipment of marine disaster rescue system
- marine culture education has not been popularized
- few courses of marine education and training
- overlap of marine jurisdiction (e.g. overlap of EEZ and continental shelf)
- other
- don't know/no opinion

4.2 When the government is formulating marine policy, which of the following factors should be considered? (Please tick all that apply)

- following the international development trend of marine policy and management
- pay attention to co-ordination of government departments/agencies
- pay attention to marine environment protection
- pay attention to sustainable utilisation of marine resource
- pay attention to conservation of marine biology resource
- pay attention to marine tourism development
- pay attention to co-ordination between central and local government
- pay attention to the sound of marine legislation
- pay attention to marine comprehensive management
- pay attention to fisheries management
- pay attention to the implementation of the system of marine policy and management
- pay attention to marine scientific research
- take account of ocean user's opinion in order to avoid conflict (public participance)
- other
- don't know/no opinion

4.3 What do you perceive to be the main obstacles to managing the marine environment? (Please tick all that apply and rank your top three, 1=first, 2=second, 3=third)

Tick Rank

- politics influence
- lack concept of sustainable development in government
- lack of the co-ordination system among ocean-related agencies
- lack of sound ocean-related Act/regulation (e.g. lack of specific Act of coastal management)
- over-reliance on economic priorities
- lack of the interaction between central government and local government
- lack of policy of marine comprehensive management
- lack of marine budget (e.g. developmental budget of scientific research of the sea is lower than other scientific research)
- users lack awareness of environment protection of marine ecosystem
- government does not pay attention to the development of marine policy
- government has not promulgated explicit marine protection plan
- the international status is weak
- other
- don't know/no opinion

4.4 With regard to the Government focus upon in development of marine policy, to what extent do you agree with the following statements?

(A) promote international position (e.g. participate in international marine organisations or fishery organisations)

- (1) agree strongly (2) agree slightly (3) neutral
 (4) disagree slightly (5) disagree strongly (6) don't know

(B) enhance marine comprehensive management

- (1) agree strongly (2) agree slightly (3) neutral
 (4) disagree slightly (5) disagree strongly (6) don't know

(C) enhance integrated management of coastal zone

- (1) agree strongly (2) agree slightly (3) neutral
 (4) disagree slightly (5) disagree strongly (6) don't know

(D) enhance marine environment protection

- (1) agree strongly (2) agree slightly (3) neutral
 (4) disagree slightly (5) disagree strongly (6) don't know

(E) enhance conservation of marine biology resources

- (1) agree strongly (2) agree slightly (3) neutral
 (4) disagree slightly (5) disagree strongly (6) don't know

(F) enhance marine industrial development (e.g. marine tourism)

- (1) agree strongly (2) agree slightly (3) neutral

- (4) disagree slightly (5) disagree strongly (6) don't know
- (G) increase marine budget
- (1) agree strongly (2) agree slightly (3) neutral
- (4) disagree slightly (5) disagree strongly (6) don't know
- (H) enhance marine enforcement and maritime patrol (e.g. increase manpower and equipment, and strict enforcement of legislation)
- (1) agree strongly (2) agree slightly (3) neutral
- (4) disagree slightly (5) disagree strongly (6) don't know
- (I) implement the concept of sustainable development within marine policy
- (1) agree strongly (2) agree slightly (3) neutral
- (4) disagree slightly (5) disagree strongly (6) don't know
- (J) sound administrative management system (e.g. integrated co-ordination system of government departments/agencies)
- (1) agree strongly (2) agree slightly (3) neutral
- (4) disagree slightly (5) disagree strongly (6) don't know
- (K) enhance the interaction between central government and local government
- (1) agree strongly (2) agree slightly (3) neutral
- (4) disagree slightly (5) disagree strongly (6) don't know
- (L) enhance scientific research of the sea and monitoring
- (1) agree strongly (2) agree slightly (3) neutral
- (4) disagree slightly (5) disagree strongly (6) don't know
- (M) enhance marine education and training
- (1) agree strongly (2) agree slightly (3) neutral
- (4) disagree slightly (5) disagree strongly (6) don't know
- (N) enhance co-ordination of ocean-related government departments/agencies
- (1) agree strongly (2) agree slightly (3) neutral
- (4) disagree slightly (5) disagree strongly (6) don't know
- (O) other
- (1) agree strongly (2) agree slightly (3) neutral
- (4) disagree slightly (5) disagree strongly (6) don't know

5. IMPLEMENTATION AND ENFORCEMENT

5.1 What are your main concern's issues with regard to implementation and enforcement of policy/legislation? (Please tick all that apply and rank your top three, 1=first, 2=second, 3=third)

Tick Rank

- marine development and marine conservation cannot be well balanced in local government
- lack of public awareness lead to obstruction of implementation

- the assignment and usage of resources and law enforcement are not planned and executed with full co-ordination between central and local government
- regulations that are executed by local governments, since they are frequently limited by outlay
- the regulations are executed by local governments, which are frequently limited by real political power
- lack of awareness by national level policy decision-makers of the impact of their decisions at local management level
- decision-makers in marine affairs are not aware of the impact of national decisions at the local level
- managers lack the concept of sustainability
- regulations that are executed by local governments, since they are frequently limited by human resources
- lack of effort/commitment between implementation and enforcement personnel
- ineffectiveness of marine conservation and environmental protection
- other
- don't know/no opinion

5.2 With regard to implementation and enforcement of policy/legislation, do you agree with the following statements? (Please tick all that apply)

- people lack understanding of the concept of marine environment protection and marine resource conservation
- political influence (e.g. political benefits, to lobby illegally, voting consideration)
- coastal environment worsens caused various environmental problems
- managers lack of concept of marine comprehensive management
- lack of the prospective plan
- enforcer's professional knowledge is insufficient lead to influence the efficiency of enforcement
- conflict of sea use (e.g. fisheries and conservation)
- most people do not understand the ocean so that it is unable to reach common consensus
- do not have better interaction between government and fishermen/other sea users
- other
- don't know/no opinion

5.3 In your opinion, what are the obstacles to implementation and enforcement of policy? (Please tick all that apply and rank your top three, 1=first, 2=second, 3=third)

Tick Rank

- lack of sound ocean-related information and science database (e.g. marine environmental database, database of fishery management, etc.)
- the absence of unified administration authority in marine enforcement
- economic development is the priority (e.g. government connives in marine environment destruction due to developmental benefits)

- lack of marine budget
- lack of co-ordination mechanism of marine comprehensive management
- technical tools of marine conservation and environmental protection can not implement effectiveness (e.g. SEA and MPA)
- lack of education and professional training of marine enforcement personnel (e.g. lack of marine management talent)
- the departmental egoism among management organisation lead to influence the effectiveness of management
- lack of a sound ocean-related Act/regulations
- illegal sea use (e.g. illegal fishing, pollution of marine resources)
- ocean users' attitude
- other
- don't know/no opinion

5.4 In your opinion, to what extent do you agree with the following statements that the existing implementation and enforcement be strengthened?

(A) enhance mechanism of public participation

- (1) agree strongly (2) agree slightly (3) neutral
 (4) disagree slightly (5) disagree strongly (6) don't know

(B) promote SEA and MPA actively

- (1) agree strongly (2) agree slightly (3) neutral
 (4) disagree slightly (5) disagree strongly (6) don't know

(C) keep a balance between marine development and marine resources conservation

- (1) agree strongly (2) agree slightly (3) neutral
 (4) disagree slightly (5) disagree strongly (6) don't know

(D) establish an environmental monitoring system in order to avoid environmental destruction

- (1) agree strongly (2) agree slightly (3) neutral
 (4) disagree slightly (5) disagree strongly (6) don't know

(E) reduce the ocean-related conflict between government and people

- (1) agree strongly (2) agree slightly (3) neutral
 (4) disagree slightly (5) disagree strongly (6) don't know

(F) establish a sound ocean-related Act/regulations

- (1) agree strongly (2) agree slightly (3) neutral

- (4) disagree slightly (5) disagree strongly (6) don't know
(G) implement relevant management tools (e.g. MPA, SEA)
(1) agree strongly (2) agree slightly (3) neutral
(4) disagree slightly (5) disagree strongly (6) don't know
(H) increase manpower and equipment of marine enforcement
(1) agree strongly (2) agree slightly (3) neutral
(4) disagree slightly (5) disagree strongly (6) don't know
(I) strengthen the marine science base (e.g. more research)
(1) agree strongly (2) agree slightly (3) neutral
(4) disagree slightly (5) disagree strongly (6) don't know
(J) better provision of information/data to users
(1) agree strongly (2) agree slightly (3) neutral
(4) disagree slightly (5) disagree strongly (6) don't know
(K) increase the marine budget
(1) agree strongly (2) agree slightly (3) neutral
(4) disagree slightly (5) disagree strongly (6) don't know
(L) the law enforcement departments/agencies have to implement and administer by law
(1) agree strongly (2) agree slightly (3) neutral
(4) disagree slightly (5) disagree strongly (6) don't know
(M) enhance ocean-related education and advertisements
(1) agree strongly (2) agree slightly (3) neutral
(4) disagree slightly (5) disagree strongly (6) don't know
(N) enhance co-ordination between ocean-related departments/agencies
(1) agree strongly (2) agree slightly (3) neutral
(4) disagree slightly (5) disagree strongly (6) don't know
(O) other
(1) agree strongly (2) agree slightly (3) neutral
(4) disagree slightly (5) disagree strongly (6) don't know

6. Any additional ideas, views or comments may be attached to the questionnaire, and would be greatly appreciated.

Thank you for your assistance

Appendix 1.2 Questionnaire questions (Chinese)

臺灣海洋政策與海洋環境管理問卷調查

您好：

首先，感謝您抽空協助本研究進行問卷調查。本研究的目的是在於調查臺灣海洋政策和海洋環境管理二者之間的互動關係，並從漁業、海洋污染、海洋保育和執法等方面來探討目前海洋政策在法律、行政、組織等制度層面上的發展。希望藉由此份調查能進一步瞭解海洋政策和海洋環境管理在臺灣海洋事務上所扮演的角色。您所提供的寶貴意見，將作為本研究的重要參考依據，所填寫的資料都將受到保密，不會移作他用，敬請安心填寫並請勿遺漏。

由衷感謝您的協助，並祝您身體健康，事事如意！

英國卡地夫大學

研究生：高瑞鍾 敬上

指導教授：Dr. Hance D Smith

第一部份：基本資料

1. 受訪者工作單位：

中央單位 地方單位 學術研究單位 海洋產業 非政府組織 其他

2. 工作類別： 漁業 海洋環保 海域執法 海洋利用 海洋觀光 其他

3. 職稱：

4. 受訪日期：

5. 聯絡電話：

6. E-mail:

第二部份：政策的法令與行政基礎

1. 對於目前執行海洋政策的行政體系及其法令依據，您所關心的議題為何？(請依據您的意見，在適當的「」內先勾【複】選「」，後以 1,2,3 按順序排列前三者)

勾選 順序

- 政治左右海洋與立法的發展
- 海洋相關法規不健全
- 跨部會間缺乏溝通協調
- 中央與地方間缺乏溝通協調
- 海域執法不彰

- 政府缺乏海洋綜合管理的機構
- 立法者缺乏海洋遠景
- 其他
- 不知道/無意見

2. 關於海洋管理，你是否同意下列各項見解。(請依據您的意見，在適當的「」內勾【複】選「」)

- 經濟發展為優先考量
- 政策執行之差異存在於中央政府的決策與地區的執行兩者之間
- 法律制度未納入環境與開發之原則(例如：永續發展、污染者付費、公平正義原則等)
- 海洋專責機構尚未成立
- 海洋管理經費不足
- 政治意願的缺乏
- 法令罰則太輕
- 漁民/其他海洋使用者不願配合
- 其他
- 不知道/無意見

3. 關於法令與行政體系，所面臨的問題為何？(請依據您的意見，在適當的「」內先勾【複】選「」，後以 1,2,3 按順序排列前三者)

勾選 順序

- 海域執法與巡護機構能力不足
- 海域執法缺乏國際經驗(例如：國際漁業糾紛處理、海盜取締)
- 法律制度缺乏配套措施
- 不同行政單位在管理同一地區時，會產生本位主義之問題
- 海岸法未能儘快制定
- 政治人物不關心海洋立法
- 由於開發所帶來的利益，導致默許海洋環境受到破壞
- 漁民/其他海洋使用者缺乏法律知識
- 海域執法缺乏預算(例如：遠洋巡護船不足)
- 法令體制對於海域管理不甚重視
- 海域執法體系不健全
- 政治因素影響管理效能

- 沒有問題
- 其他
- 不知道/無意見

4. 您認為如何強化目前的海洋法令與行政體系，你是否同意下列各項見解？

同 無 不 非 不
意 意 同 常 知
意 見 意 同 道

- (1) 修正現行海洋法律(例如：增訂永續發展原則)
- (2) 成立海洋事務部
- (3) 強化海域執法與巡護體系
- (4) 制定完整法案 (例如海岸法)
- (5) 增加海洋管理經費
- (6) 成立海洋事務會
- (7) 加重罰則
- (8) 建立綜合管理之機構或機制
- (9) 維持現狀
- (10)其他 _____

第三部份：人力資源之培訓

1. 您對海洋教育與訓練所關切的議題為何？(請依據您的意見，在適當的「」內先勾

【複】選「」，後以 1,2,3 按順序排列前三者)

勾選 順序

- 海事院校學生之出路問題(例如：國家考試增列海洋職系)
- 政府未致力於海洋教育的發展
- 海事院校之師資與設備不足
- 海洋政策、法律與管理之特殊領域高等人才的缺乏
- 海洋教育投資不足
- 海洋教育與訓練上的缺乏
- 國人海洋素養不足
- 海洋綜合管理人才之不足

- 投入於海洋產業的人越來越少(例如：漁業)
- 其他
- 不知道/無意見

2. 關於海洋教育與訓練，你是否同意下列各項見解。(請依據您的意見，在適當的「」內勾【複】選「」)

- 和其他教育相比較，政府較不重視海洋教育與訓練
- 海上工作辛苦且畢業後缺乏就業機會，造成學校招生不易(學生出路問題)
- 海洋教育不落實
- 國家考試海洋職系名額過少
- 人力斷層的隱憂
- 海洋事務的課程，與產業脫軌
- 學校教育缺乏海洋體驗活動
- 民眾甚少親近海洋
- 政府光說不練
- 海洋在職訓練不落實
- 國民教育中，海洋素養的課程僅佔很少的份量
- 海洋教育資源分配不均
- 電視宣導廣告和節目闕如
- 重陸輕海的觀念
- 其他
- 不知道/無意見

3. 您認為提昇海洋教育與訓練的主要障礙為何？(請依據您的意見，在適當的「」內先勾【複】選「」，後以 1,2,3 按順序排列前三者)

勾選 順序

- 教育政策偏重由陸看海
- 海洋事務管理人才培育能力的缺乏
- 海洋教育與訓練制度不健全
- 民眾缺乏興趣
- 缺乏整合性的海洋研究機構(例如：海洋事務學術研究單位)
- 海洋教育與訓練經費不足
- 和其他工作相比酬勞較低，乏人問津

- 海事人才培育類別與產業供需在量與質的落差
- 缺乏海洋相關人才(例如：海洋科研人才及教育師資方面不足)
- 其他
- 不知道/無意見

4. 關於海洋教育與訓練，你是否同意下列各項見解。

同 無 不 非 不
 意 同 常 知
 意 見 意 意 道

- (1) 增加海洋教育與訓練之預算
- (2) 加強漁民/其他海洋使用者之海洋教育與訓練
 (例如：法治教育、海洋環境保護教育與訓練)
- (3) 強化海洋事務管理教育與訓練之人力與財政資源
- (4) 提昇海洋知識的基礎教育，加強學校相關課程與教學題材
- (5) 其他 _____

第四部份：政策發展

1. 您認為台灣海洋政策之優先議題為何？(請依據您的意見，在適當的「」內先勾

【複】選「」，後以 1,2,3 按順序排列前三者)

勾選 順序

- 海洋資源持續衰退
- 海洋生物保育不落實
- 海洋綜合管理缺乏
- 漁業管理不落實
- 海洋環境保護效力不彰
- 海域執法與巡護能量不足
- 海洋科技研究過少
- 海洋相關法令不完備
- 海洋污染防治不落實

- 海岸帶管理不落實
- 海洋觀光發展影響海洋生態
- 海上搜救系統設備不足
- 海洋文化教育未普及
- 海洋教育與訓練課程過少
- 海洋管轄權重疊之問題(例如：尚未透過談判解決海域與鄰國之重疊問題)
- 其他
- 不知道/無意見

2. 政府制訂海洋政策時，應考量下列那些因素？(請依據您的意見，在適當的「」內勾【複】選「✓」)

- 國際海洋政策與管理之發展趨勢
- 注重政府跨部會間的橫向協調聯繫
- 重視海洋環境保護
- 重視海洋資源之永續利用
- 重視海洋生物資源保育
- 重視海洋觀光產業之發展
- 注重中央與地方政府間的垂直協調聯繫
- 重視海洋法令之健全
- 重視海洋之綜合管理
- 重視漁業管理
- 重視海洋政策與管理體系之執行
- 重視海洋科學研究
- 重視海洋相關使用者之意見，以避免衝突之發生(公眾參與)
- 其他
- 不知道/無意見

3. 您認為海洋管理當前的主要問題為何？(請依據您的意見，在適當的「」內先勾【複】選「✓」，後以 1,2,3 按順序排列前三者)

勾選 順序

- 政治力的影響
- 政府缺乏永續發展之概念

- 海洋相關部門缺乏協調聯繫
- 缺乏健全的海洋相關法令(例如：欠缺海岸管理專責法令)
- 過度依賴以經濟發展為優先考量
- 中央與地方政府缺乏互動
- 缺乏海洋綜合管理的政策
- 投入之海洋預算不足
- 使用者缺乏海洋生態環境保護之意識
- 未重視海洋政策之發展
- 政府未公布明確的海洋環境保護計畫
- 國際地位薄弱
- 其他
- 不知道/無意見

4. 您認為政府在推動海洋事務與研擬海洋政策時，你是否同意下列之作為？

同 無 不 非 不
 意 意 同 常 知
 見 見 意 不 道
 意 意 意 同 道

- (1) 提昇國際地位(例如：參與國際海洋或漁業組織)
- (2) 加強海洋綜合管理
- (3) 加強海岸帶之綜合管理

- (4) 加強海洋環境保護
- (5) 加強海洋生物資源保育
- (6) 加強海洋產業之開發
- (7) 增加海洋預算
- (8) 加強海域執法與巡護(例如：增加人力與設備並嚴格執法)
- (9) 落實永續發展概念於海洋政策中
- (10) 健全海洋行政管理體系(例如：跨部會整合協調機制)
- (11) 加強中央與地方政府之互動
- (12) 加強海洋科技研究與監測
- (13) 加強海洋教育與訓練
- (14) 加強海洋相關部門之協調聯繫
- (15) 其他

第五部份：政策的執行與執法

1. 你對海洋政策之執行與執法所關切的議題為何？(請依據您的意見，在適當的「」內先勾【複】選「」，後以 1,2,3 按順序排列前三者)

勾選 順序

- 地方政府的海洋開發與保育未能取得平衡
- 缺乏公共意識，造成執行阻力
- 中央與地方政府未充分協調聯繫去規劃執行資源和執法的分配與使用
- 地方政府的執行取締往往受到經費的限制
- 地方政府的執行取締受到政治力的介入
- 國家政策決策者不能體會他們的決策對地方管理上的衝擊
- 海洋管理機關事務重疊造成行政資源浪費
- 管理者缺乏永續發展的概念
- 地方政府的執行取締往往受到人力資源的限制
- 執行與執法人員缺乏努力/溝通
- 海洋保育與環境保護成效不彰
- 其他
- 不知道/無意見

2. 關於海洋政策之執行與執法，你是否同意下列各項見解。(請依據您的意見，在適當的「□」內勾【複】選「✓」)

- 人民缺乏海洋環境保護與海洋資源保育之概念
- 政治的影響(例如：政治利益、違法關說、選票考量等)
- 海岸環境惡化，產生各種環境問題
- 管理者缺乏海洋綜合管理的概念
- 缺乏前瞻性之計畫 8.4.3.1
- 執法人員專業知識不足，影響執法效能
- 海洋使用之衝突(ex 漁業與保育衝突)-->8.4.3.2
- 民眾對海洋普遍的不了解，造成無法達成共識
- 政府與漁民/其他海洋使用者未有良好互動
- 其他
- 不知道/無意見

3. 您認為造成政策執行與執法的障礙為何？(請依據您的意見，在適當的「□」內先勾【複】選「✓」，後以 1,2,3 按順序排列前三者)

勾選 順序

- 缺乏完整之海洋相關資訊與科學依據(例如：海洋環境資料庫、漁業管理資料庫等)
- 海域執法事權不一
- 經濟發展為優先考量(例如：由於開發所帶來的利益，導致默許海洋環境受到破壞)
- 缺乏海洋預算
- 海洋綜合管理協調機制缺乏
- 海洋保育與環境保護工具無法有效執行，例如 SEA 政策環評與海洋保護區
- 缺乏執法教育與專業訓練(例如：海洋專業人才不足)
- 管理機關間之本位主義，影響管理效能
- 缺乏健全之海洋相關法規
- 非法使用海洋 (例如：非法捕魚、海洋污染行為)
- 海洋使用者的態度
- 其他
- 不知道/無意見

4. 您認為下列何者有助於加強目前海洋政策的執行與執法？

非常不同意
不同意
無意見
同意
非常同意

- (1) 加強公眾參與機制
- (2) 積極推動政策環評與海洋保護區
- (3) 海洋開發與資源保育保持平衡
- (4) 建立環境監測系統以避免環境受破壞
- (5) 降低政府與民眾的海洋衝突
- (6) 完善海洋相關法規
- (7) 落實相關管理工具(ex. MPA,SEA)
- (8) 增加海洋執法人力與設備
- (9) 強化海洋科學基礎(例如：更多的研究)
- (10) 提供更好的資訊給使用者
- (11) 增加海洋預算
- (12) 執法部門落實依法行政
- (13) 加強海洋相關教育與宣導
- (14) 加強海域海洋管理相關部門之協調連繫
- (15) 其他 _____

第六部份：若有其他建議，請於下列空白處填寫您的寶貴意見。

謝謝您的熱心協助

Appendix 2

- Appendix 2.1 Questionnaire result (Q 2.1.1)**
- Appendix 2.2 Questionnaire result (Q 2.1.2)**
- Appendix 2.3 Questionnaire result (Q 2.2)**
- Appendix 2.4 Questionnaire result (Q 2.3.1)**
- Appendix 2.5 Questionnaire result (Q 2.3.2)**
- Appendix 2.6 Questionnaire result (Q 3.1.1)**
- Appendix 2.7 Questionnaire result (Q 3.1.2)**
- Appendix 2.8 Questionnaire result (Q 3.2)**
- Appendix 2.9 Questionnaire result (Q 3.3.1)**
- Appendix 2.10 Questionnaire result (Q 3.3.2)**
- Appendix 2.11 Questionnaire result (Q 4.1.1)**
- Appendix 2.12 Questionnaire result (Q 4.1.2)**
- Appendix 2.13 Questionnaire result (Q 4.2)**
- Appendix 2.14 Questionnaire result (Q 4.3.1)**
- Appendix 2.15 Questionnaire result (Q 4.3.2)**
- Appendix 2.16 Questionnaire result (Q 5.1.1)**
- Appendix 2.17 Questionnaire result (Q 5.1.2)**
- Appendix 2.18 Questionnaire result (Q 5.2)**
- Appendix 2.19 Questionnaire result (Q 5.3.1)**
- Appendix 2.20 Questionnaire result (Q 5.3.2)**

Appendix 2.1

Q2.1.1 What are your main concern's issues with regard to the existing legal and administrative system basis of policy? (Please tick all that apply and rank your top three, 1=first, 2=second, 3=third)

Items	Total (n=270)	Organisation					Type					
		central government (n=58)	local unit (n=54)	academic (n=53)	private sector (n=52)	NGOs (n=53)	fishery (n=61)	marine environment protection and conservation (n=47)	marine enforcement (n=34)	sea utilisation (n=55)	marine tourism (n=49)	other (n=24)
1. politics influence the development of ocean and legislation	47.4%	50.0%	53.7%	39.6%	51.9%	41.5%	60.7%	38.3%	61.8%	50.9%	28.6%	41.7%
2. ocean-related Act/regulations are not sound	61.5%	70.7%	64.8%	66.0%	51.9%	52.8%	62.3%	66.0%	70.6%	63.6%	51.0%	54.2%
3. communication and co-ordination cross ministries/agencies	34.4%	37.9%	40.7%	34.0%	30.8%	28.3%	34.4%	36.2%	35.3%	52.7%	22.4%	12.5%
4. communication and co-ordination between central and local government	38.1%	19.0%	38.9%	39.6%	57.7%	37.7%	49.2%	27.7%	23.5%	41.8%	42.9%	33.3%
5. ineffectiveness of marine enforcement	61.1%	62.1%	63.0%	66.0%	51.9%	62.3%	50.8%	59.6%	52.9%	70.9%	63.3%	75.0%
6. government lacks a marine comprehensive management organisation	81.9%	84.5%	87.0%	77.4%	80.8%	79.2%	90.2%	80.9%	73.5%	83.6%	73.5%	87.5%
7. legislators lack the marine perspective	55.9%	58.6%	72.2%	50.9%	40.4%	56.6%	55.7%	66.0%	61.8%	58.2%	46.9%	41.7%
8. other	3.0%	1.7%	0%	3.8%	3.8%	5.7%	4.9%	6.4%	0%	3.6%	0%	0%
9. don't know/no opinion	1.1%	0%	1.9%	0%	1.9%	1.9%	0%	0%	0%	0%	4.1%	4.2%

Appendix 2.2

Q2.1.2 What are your main concern's issues with regard to the existing legal and administrative system basis of policy? (Please tick all that apply and rank your top three, 1=first, 2=second, 3=third)

Items	Total (n=270)	Organisation					Type					
		central government (n=58)	local unit (n=54)	academic (n=53)	private sector (n=52)	NGOs (n=53)	fishery (n=61)	marine environment protection and conservation (n=47)	marine enforcement (n=34)	sea utilisation (n=55)	marine tourism (n=49)	other (n=24)
1. politics influence the development of ocean and legislation	40.0%	46.6%	40.7%	32.1%	46.2%	34.0%	49.2%	31.9%	52.9%	43.6%	28.6%	29.2%
2. ocean-related Act/regulations are not sound	49.3%	53.4%	53.7%	56.6%	34.6%	47.2%	42.6%	57.4%	61.8%	49.1%	40.8%	50.0%
3. communication and co-ordination cross ministries/agencies	21.5%	24.1%	18.5%	22.6%	23.1%	18.9%	26.2%	23.4%	20.6%	25.5%	16.3%	8.3%
4. communication and co-ordination between central and local government	23.7%	5.2%	24.1%	20.8%	46.2%	24.5%	32.8%	12.8%	5.9%	23.6%	30.6%	33.3%
5. ineffectiveness of marine enforcement	43.7%	46.6%	31.5%	52.8%	34.6%	52.8%	34.4%	48.9%	32.4%	41.8%	55.1%	54.2%
6. government lacks a marine comprehensive management organisation	72.6%	74.1%	74.1%	73.6%	71.2%	69.8%	77.0%	68.1%	61.8%	76.4%	71.4%	79.2%
7. legislators lack the marine perspective	38.5%	39.7%	50.0%	30.2%	30.8%	41.5%	32.8%	51.1%	50.0%	30.9%	38.8%	29.2%
8. other	1.9%	0%	0%	0%	3.8%	5.7%	4.9%	4.3%	0%	0%	0%	0%

Appendix 2.3

Q2.2 With regard to marine management, do you agree with the following statements? (Please tick all that apply)

Items	Total (n=270)	Organisation					Type					
		central government (n=58)	local unit (n=54)	academic (n=53)	private sector (n=52)	NGOs (n=53)	fishery (n=61)	marine environment protection and conservation (n=47)	marine enforcement (n=34)	sea utilisation (n=55)	marine tourism (n=49)	other (n=24)
1. economic is the priority	56.3%	55.2%	68.5%	64.2%	44.2%	49.1%	52.5%	44.7%	76.5%	56.4%	55.1%	62.5%
2. differences in implementation exist between central policymaking and local execution	51.5%	37.9%	59.3%	54.7%	53.8%	52.8%	49.2%	40.4%	50.0%	56.4%	46.9%	79.2%
3. lack of environmental development principles in the legal system (e.g. principles of sustainable development, polluter pays, precautionary, etc.)	70.4%	67.2%	72.2%	75.5%	71.2%	66.0%	72.1%	57.4%	73.5%	70.9%	75.5%	75.0%
4. a special organisation has not been established	55.6%	65.5%	63.0%	64.2%	36.5%	47.2%	57.4%	55.3%	52.9%	67.3%	46.9%	45.8%
5. lack of marine management budget	42.2%	43.1%	50.0%	52.8%	26.9%	37.7%	44.3%	51.1%	41.2%	43.6%	34.7%	33.3%
6. lack of political will	58.5%	56.9%	63.0%	66.0%	42.3%	64.2%	55.7%	68.1%	47.1%	56.4%	61.2%	62.5%
7. low penalty of law	32.6%	27.6%	31.5%	37.7%	36.5%	30.2%	26.2%	19.1%	50.0%	40.0%	32.7%	33.3%
8. fishermen/other sea users don't want to co-operation	55.6%	50.0%	66.7%	54.7%	61.5%	45.3%	57.4%	51.1%	55.9%	54.5%	59.2%	54.2%
9. other	6.7%	3.4%	1.9%	0%	23.1%	5.7%	18.0%	4.3%	0%	3.6%	4.1%	4.2%
10. don't know/no opinion	1.5%	0%	1.9%	0%	1.9%	3.8%	1.6%	4.3%	0%	0%	0%	4.2%

Appendix 2.4

Q2.3.1 In relating to the legal and administrative system do any of the following difficulties apply? (Please tick all that apply and rank your top three, 1=first, 2=second, 3=third)

Items	Total (n=270)	Organisation					Type					
		central government (n=58)	local unit (n=54)	academic (n=53)	private sector (n=52)	NGOs (n=53)	fishery (n=61)	marine environment protection and conservation (n=47)	marine enforcement (n=34)	sea utilisation (n=55)	marine tourism (n=49)	other (n=24)
1. lack of ability of organisations of marine enforcement and maritime patrols	47.0%	43.1%	50.0%	58.5%	36.5%	47.2%	37.7%	46.8%	55.9%	50.9%	44.9%	54.2%
2. lack of international experience of marine enforcement (e.g. deal with international fishery disputes, enforce a ban of piracy)	37.0%	36.2%	44.4%	39.6%	36.5%	28.3%	39.3%	27.7%	47.1%	45.5%	28.6%	33.3%
3. lack of complementary measure for sea use in the legal system	38.5%	41.4%	37.0%	39.6%	36.5%	37.7%	42.6%	34.0%	52.9%	41.8%	24.5%	37.5%
4. the same region is administered by multiple units would have questions of departmental egoism	45.9%	48.3%	51.9%	47.2%	42.3%	39.6%	57.4%	46.8%	38.2%	49.1%	38.8%	33.3%
5. the coastal Act has to enact as soon as possible	19.3%	17.2%	25.9%	24.5%	9.6%	18.9%	19.7%	19.1%	14.7%	14.5%	24.5%	25.0%
6. political personages do not care marine legislation	44.1%	41.4%	42.6%	37.7%	51.9%	47.2%	52.5%	36.2%	41.2%	47.3%	38.8%	45.8%
7. government connive marine environment destruction due to developmental benefits	41.5%	46.6%	50.0%	54.7%	30.8%	24.5%	39.3%	53.2%	41.2%	49.1%	32.7%	25.0%
8. fishermen/other sea users lack law knowledge	37.4%	41.4%	31.5%	43.4%	42.3%	28.3%	32.8%	38.3%	29.4%	40.0%	44.9%	37.5%
9. lack of budget for marine enforcement (e.g. lack of far sea patrol vessels)	26.7%	27.6%	25.9%	30.2%	21.2%	28.3%	36.1%	27.7%	23.5%	23.6%	18.4%	29.2%
10. the legislative system does not pay attention to the management of sea area so much	14.1%	13.8%	11.1%	13.2%	17.3%	15.1%	8.2%	8.5%	11.8%	25.5%	14.3%	16.7%
11. lack of sound system of marine enforcement	42.2%	51.7%	42.6%	35.8%	34.6%	45.3%	39.3%	34.0%	41.2%	49.1%	44.9%	45.8%
12. political factors affect the effectiveness of management	48.5%	46.6%	61.1%	35.8%	55.8%	43.4%	52.5%	55.3%	38.2%	43.6%	49.0%	50.0%
13. no difficulties	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
14. other	5.6%	3.4%	3.7%	0%	17.3%	3.8%	18.0%	2.1%	0%	3.6%	2.0%	0%
15. don't know/no opinion	3.0%	1.7%	1.9%	0%	3.8%	7.5%	3.3%	6.4%	0%	0%	4.1%	4.2%

Appendix 2.5

Q2.3.2 In relating to the legal and administrative system do any of the following difficulties apply? (Please tick all that apply and rank your top three, 1=first, 2=second, 3=third)

Items	Total (n=270)	Organisation					Type					
		central government (n=58)	local unit (n=54)	academic (n=53)	private sector (n=52)	NGOs (n=53)	fishery (n=61)	marine environment protection and conservation (n=47)	marine enforcement (n=34)	sea utilisation (n=55)	marine tourism (n=49)	other (n=24)
1. lack of ability of organisations of marine enforcement and maritime patrols	36.7%	32.8%	33.3%	45.3%	36.5%	35.8%	26.2%	38.3%	41.2%	40.0%	36.7%	45.8%
2. lack of international experience of marine enforcement (e.g. deal with international fishery disputes, enforce a ban of piracy)	27.8%	25.9%	31.5%	34.0%	23.1%	24.5%	24.6%	23.4%	41.2%	32.7%	26.5%	16.7%
3. lack of complementary measure for sea use in the legal system	25.9%	29.3%	25.9%	30.2%	23.1%	20.8%	26.2%	25.5%	38.2%	29.1%	14.3%	25.0%
4. the same region is administered by multiple units would have questions of departmental egoism	30.4%	25.9%	35.2%	30.2%	28.8%	32.1%	36.1%	25.5%	23.5%	32.7%	32.7%	25.0%
5. the coastal Act has to enact as soon as possible	10.0%	6.9%	11.1%	15.1%	7.7%	9.4%	11.5%	8.5%	2.9%	7.3%	14.3%	16.7%
6. political personages do not care marine legislation	33.7%	34.5%	29.6%	26.4%	36.5%	41.5%	41.0%	29.8%	32.4%	30.9%	30.6%	37.5%
7. government connive marine environment destruction due to developmental benefits	26.7%	34.5%	33.3%	34.0%	19.2%	11.3%	21.3%	38.3%	35.3%	29.1%	20.4%	12.5%
8. fishermen/other sea users lack law knowledge	20.7%	22.4%	16.7%	24.5%	25.0%	15.1%	13.1%	19.1%	14.7%	23.6%	32.7%	20.8%
9. lack of budget for marine enforcement (e.g. lack of far sea patrol vessels)	12.2%	15.5%	14.8%	13.2%	3.8%	13.2%	16.4%	14.9%	17.6%	3.6%	8.2%	16.7%
10. the legislative system does not pay attention to the management of sea area so much	3.3%	1.7%	3.7%	1.9%	3.8%	5.7%	1.6%	2.1%	2.9%	5.5%	4.1%	4.2%
11. lack of sound system of marine enforcement	21.5%	31.0%	18.5%	17.0%	15.4%	24.5%	19.7%	19.1%	20.6%	18.2%	26.5%	29.2%
12. political factors affect the effectiveness of management	26.3%	20.7%	38.9%	15.1%	30.8%	26.4%	26.2%	31.9%	20.6%	29.1%	28.6%	12.5%
13. no difficulties	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
14. other	4.1%	1.7%	1.9%	0%	13.5%	3.8%	13.1%	2.1%	0%	1.8%	2.0%	0%

Appendix 2.6

Q3.1.1 What are your main concern's issues with regard to marine education and training? (Please tick all that apply and rank your top three, 1=first, 2=second, 3=third)

Items	Total (n=270)	Organisation					Type					
		central government (n=58)	local unit (n=54)	academic (n=53)	private sector (n=52)	NGOs (n=53)	fishery (n=61)	marine environment protection and conservation (n=47)	marine enforcement (n=34)	sea utilisation (n=55)	marine tourism (n=49)	other (n=24)
1. failure to solve the problem of lack of employment opportunities for marine graduates (e.g. increase job openings for those performing well in national marine affairs examinations)	53.0%	62.1%	46.3%	60.4%	50.0%	45.3%	65.6%	55.3%	52.9%	52.7%	44.9%	33.3%
2. government does not devote sufficient resources to the development of marine education	48.5%	50.0%	53.7%	54.7%	38.5%	45.3%	49.2%	53.2%	32.4%	60.0%	46.9%	37.5%
3. lack of marine teachers and equipments in ocean university/college	20.7%	24.1%	20.4%	28.3%	11.5%	18.9%	23.0%	25.5%	20.6%	20.0%	18.4%	12.5%
4. the cultivation of high level talents in specialty fields concerning the ocean, marine policies and laws, and comprehensive management	41.5%	39.7%	44.4%	50.9%	28.8%	43.4%	39.3%	38.3%	41.2%	43.6%	49.0%	33.3%
5. insufficient investment of marine education	43.0%	44.8%	61.1%	39.6%	26.9%	41.5%	42.6%	29.8%	58.8%	58.2%	26.5%	45.8%
6. lack of marine education and training	33.7%	41.4%	27.8%	30.2%	38.5%	30.2%	32.8%	31.9%	23.5%	50.9%	26.5%	29.2%
7. people lack of marine accomplishments	57.0%	46.6%	61.1%	56.6%	61.5%	60.4%	50.8%	66.0%	55.9%	49.1%	53.1%	83.3%
8. lack of marine comprehensive management talent	50.7%	53.4%	55.6%	60.4%	36.5%	47.2%	45.9%	40.4%	64.7%	65.5%	44.9%	41.7%
9. fewer and fewer people want to devote themselves to marine industries	44.8%	37.9%	44.4%	41.5%	53.8%	47.2%	67.2%	38.3%	32.4%	41.8%	38.8%	37.5%
10. other	2.6%	0%	0%	0%	9.6%	3.8%	9.8%	2.1%	0%	0%	0%	0%
11. don't know/opinion	1.9%	3.4%	1.9%	0%	1.9%	1.9%	1.6%	2.1%	0%	0%	4.1%	4.2%

Appendix 2.7

Q3.1.2 What are your main concern's issues with regard to marine education and training? (Please tick all that apply and rank your top three, 1=first, 2=second, 3=third)

Items	Total (n=270)	Organisation					Type					
		central government (n=58)	local unit (n=54)	academic (n=53)	private sector (n=52)	NGOs (n=53)	fishery (n=61)	marine environment protection and conservation (n=47)	marine enforcement (n=34)	sea utilisation (n=55)	marine tourism (n=49)	other (n=24)
1. failure to solve the problem of lack of employment opportunities for marine graduates (e.g. increase job openings for those performing well in national marine affairs examinations)	43.3%	48.3%	35.2%	52.8%	46.2%	34.0%	57.4%	46.8%	38.2%	41.8%	34.7%	29.2%
2. government does not devote sufficient resources to the development of marine education	34.1%	31.0%	38.9%	45.3%	25.0%	30.2%	29.5%	44.7%	14.7%	43.6%	40.8%	16.7%
3. lack of marine teachers and equipments in ocean university/college	9.6%	8.6%	13.0%	11.3%	3.8%	11.3%	8.2%	17.0%	11.8%	3.6%	12.2%	4.2%
4. the cultivation of high level talents in specialty fields concerning the ocean, marine policies and laws, and comprehensive management	29.3%	27.6%	29.6%	35.8%	21.2%	32.1%	19.7%	25.5%	32.4%	32.7%	40.8%	25.0%
5. insufficient investment of marine education	28.1%	32.8%	44.4%	20.8%	17.3%	24.5%	24.6%	17.0%	52.9%	30.9%	16.3%	41.7%
6. lack of marine education and training	21.5%	29.3%	16.7%	18.9%	25.0%	17.0%	16.4%	19.1%	17.6%	34.5%	18.4%	20.8%
7. people lack of marine accomplishments	46.3%	29.3%	53.7%	41.5%	55.8%	52.8%	34.4%	55.3%	52.9%	36.4%	46.9%	70.8%
8. lack of marine comprehensive management talent	38.1%	43.1%	37.0%	39.6%	30.8%	39.6%	24.6%	27.7%	58.8%	49.1%	36.7%	41.7%
9. fewer and fewer people want to devote themselves to marine industries	30.7%	27.6%	22.2%	24.5%	46.2%	34.0%	57.4%	27.7%	17.6%	21.8%	22.4%	25.0%
10. other	1.9%	0%	0%	0%	5.8%	3.8%	6.6%	2.1%	0%	0%	0%	0%

Appendix 2.8

Q3.2 With regard to marine education and training, do you agree with the following statements? (Please tick all that apply)

Items	Total (n=270)	Organisation					Type					
		central government (n=58)	local unit (n=54)	academic (n=53)	private sector (n=52)	NGOs (n=53)	fishery (n=61)	marine environment protection and conservation (n=47)	marine enforcement (n=34)	sea utilisation (n=55)	marine tourism (n=49)	other (n=24)
1. government focuses less on marine education and training than other education aspects	51.5%	53.4%	68.5%	56.6%	36.5%	41.5%	44.3%	59.6%	64.7%	41.8%	49.0%	62.5%
2. lack opportunities after graduation	48.5%	55.2%	59.3%	41.5%	38.5%	47.2%	47.5%	57.4%	44.1%	47.3%	49.0%	41.7%
3. ineffective implementation of marine education	27.0%	31.0%	29.6%	26.4%	23.1%	24.5%	24.6%	36.2%	23.5%	29.1%	24.5%	20.8%
4. there were very few openings with regard to the cultivation of marine talent for government-funded marine scholarship	24.4%	20.7%	24.1%	20.8%	25.0%	32.1%	18.0%	34.0%	14.7%	23.6%	26.5%	33.3%
5. threatened by a gap in manpower	23.7%	29.3%	18.5%	17.0%	23.1%	30.2%	23.0%	31.9%	11.8%	23.6%	22.4%	29.2%
6. both the traditional and emerging school departments have no idea what types of personnel are truly required by the industries	21.1%	20.7%	24.1%	22.6%	15.4%	22.6%	19.7%	27.7%	17.6%	18.2%	20.4%	25.0%
7. lack marine experience activities in the school education	33.0%	34.5%	37.0%	39.6%	19.2%	34.0%	24.6%	31.9%	32.4%	45.5%	34.7%	25.0%
8. people seldom commune with ocean	63.0%	65.5%	48.1%	71.7%	67.3%	62.3%	57.4%	53.2%	67.6%	54.5%	75.5%	83.3%
9. government already proclaim focus on it but doesn't carry out it	41.1%	48.3%	33.3%	47.2%	38.5%	37.7%	34.4%	40.4%	41.2%	49.1%	38.8%	45.8%
10. ineffective implementation of marine on-job training	7.4%	10.3%	3.7%	9.4%	9.6%	3.8%	4.9%	10.6%	5.9%	7.3%	8.2%	8.3%
11. the common education for all levels of schools offered very limited courses for cultivating maritime culture among the students	33.7%	36.2%	31.5%	28.3%	53.8%	18.9%	54.1%	25.5%	26.5%	38.2%	24.5%	16.7%
12. unsuitable resource distribution on marine education	36.3%	41.4%	42.6%	37.7%	23.1%	35.8%	32.8%	36.2%	38.2%	41.8%	36.7%	29.2%
13. lack of TV advertisements and programmes	59.6%	56.9%	53.7%	64.2%	46.2%	77.4%	54.1%	55.3%	55.9%	61.8%	63.3%	75.0%
14. the notion of 'focusing on the land and despising the sea'	70.4%	79.3%	68.5%	71.7%	55.8%	75.5%	72.1%	61.7%	70.6%	72.7%	71.4%	75.0%
15. other	3.0%	6.9%	0%	1.9%	1.9%	3.8%	0%	8.5%	2.9%	5.5%	0%	0%
16. don't know/no opinion	0.4%	0%	0%	0%	1.9%	0%	0%	0%	0%	0%	2.0%	0%

Appendix 2.9

Q3.3.1 What do you perceive to be the main obstacles to promoting marine education and training? (Please tick all that apply and rank your top three, 1=first, 2=second, 3=third)

Items	Total (n=270)	Organisation					Type					
		central government (n=58)	local unit (n=54)	academic (n=53)	private sector (n=52)	NGOs (n=53)	fishery (n=61)	marine environment protection and conservation (n=47)	marine enforcement (n=34)	sea utilisation (n=55)	marine tourism (n=49)	other (n=24)
1. education policy lay particular stress on 'consider the sea from the thought of land'	64.1%	53.4%	64.8%	77.4%	59.6%	66.0%	65.6%	59.6%	70.6%	58.2%	65.3%	70.8%
2. lack of ability of cultivation of marine affairs management talent	44.1%	34.5%	44.4%	47.2%	51.9%	43.4%	39.3%	38.3%	55.9%	45.5%	42.9%	50.0%
3. lack of sound system of marine education and training	37.4%	41.4%	42.6%	49.1%	21.2%	32.1%	41.0%	48.9%	38.2%	34.5%	32.7%	20.8%
4. lack of public interest	31.5%	41.4%	37.0%	17.0%	30.8%	30.2%	36.1%	29.8%	20.6%	34.5%	30.6%	33.3%
5. lack of integrated institutions of marine research (e.g. academic research institutions of marine affairs)	44.1%	48.3%	50.0%	47.2%	34.6%	39.6%	32.8%	36.2%	73.5%	47.3%	38.8%	50.0%
6. lack of a budget for marine education and training	38.9%	34.5%	42.6%	47.2%	28.8%	41.5%	26.2%	42.6%	41.2%	50.9%	34.7%	41.7%
7. jobs have low remuneration compared to other sectors	34.8%	37.9%	37.0%	35.8%	30.8%	32.1%	27.9%	34.0%	35.3%	49.1%	34.7%	20.8%
8. type of cultivation of marine talent and supply and demand of industry in the drop of quality and quantity	60.4%	70.7%	61.1%	50.9%	65.4%	52.8%	80.3%	59.6%	52.9%	60.0%	44.9%	54.2%
9. lack of ocean-related talent (e.g. lack of marine scientific talent and teacher)	31.5%	25.9%	31.5%	22.6%	42.3%	35.8%	54.1%	23.4%	17.6%	29.1%	22.4%	33.3%
10. other	1.1%	0%	0%	1.9%	0%	3.8%	0%	2.1%	0%	3.6%	0%	0%
11. don't know/no op	1.9%	0%	1.9%	0%	5.8%	1.9%	3.3%	4.3%	0%	0%	0%	4.2%

Appendix 2.10

Q3.3.2 What do you perceive to be the main obstacles to promoting marine education and training? (Please tick all that apply and rank your top three, 1=first, 2=second, 3=third)

Items	Total (n=270)	Organisation					Type					
		central government (n=58)	local unit (n=54)	academic (n=53)	private sector (n=52)	NGOs (n=53)	fishery (n=61)	marine environment protection and conservation (n=47)	marine enforcement (n=34)	sea utilisation (n=55)	marine tourism (n=49)	other (n=24)
1. education policy lay particular stress on 'consider the sea from the thought of land'	54.1%	50.0%	51.9%	71.7%	34.6%	62.3%	44.3%	53.2%	67.6%	50.9%	65.3%	45.8%
2. lack of ability of cultivation of marine affairs management talent	31.9%	20.7%	29.6%	32.1%	42.3%	235.8%	29.5%	27.7%	38.2%	25.5%	40.8%	33.3%
3. lack of sound system of marine education and training	27.0%	27.6%	33.3%	39.6%	11.5%	22.6%	32.8%	38.3%	26.5%	21.8%	22.4%	12.5%
4. lack of public interest	19.3%	27.6%	20.4%	7.5%	17.3%	22.6%	21.3%	17.0%	8.8%	20.0%	24.5%	20.8%
5. lack of integrated institutions of marine research (e.g. academic research institutions of marine affairs)	28.5%	31.0%	33.3%	24.5%	25.0%	28.3%	13.1%	19.1%	58.8%	27.3%	28.6%	45.8%
6. lack of a budget for marine education and training	26.7%	25.9%	29.6%	32.1%	17.3%	28.3%	14.8%	36.2%	26.5%	36.4%	20.4%	29.2%
7. jobs have low remuneration compared to other sectors	18.1%	20.7%	14.8%	22.6%	17.3%	15.1%	8.2%	19.1%	20.6%	29.1%	20.4%	8.3%
8. type of cultivation of marine talent and supply and demand of industry in the drop of quality and quantity	45.9%	56.9%	40.7%	34.0%	59.6%	37.7%	68.9%	46.8%	35.3%	40.0%	30.6%	45.8%
9. lack of ocean-related talent (e.g. lack of marine scientific talent and teacher)	20.7%	19.0%	18.5%	9.4%	28.8%	28.3%	41.0%	10.6%	5.9%	18.2%	18.4%	20.8%
10. other	1.1%	0%	0%	1.9%	0%	3.8%	0%	2.1%	0%	3.6%	0%	0%

Appendix 2.11

Q4.1.1 In your opinion, what are the priority issues of Taiwanese marine policy? (Please tick all that apply and rank your top three, 1=first, 2=second, 3=third)

Items	Total (n=270)	Organisation					Type					
		central government (n=58)	local unit (n=54)	academic (n=53)	private sector (n=52)	NGOs (n=53)	fishery (n=61)	marine environment protection and conservation (n=47)	marine enforcement (n=34)	sea utilisation (n=55)	marine tourism (n=49)	other (n=24)
1. marine resources declines continuously	68.5%	62.1%	81.5%	77.4%	65.4%	56.6%	70.5%	68.1%	73.5%	72.7%	59.2%	66.7%
2. ineffective implementation of marine conservation	45.6%	43.1%	46.3%	45.3%	59.6%	34.0%	78.7%	38.3%	23.5%	49.1%	26.5%	37.5%
3. lack of marine comprehensive management	46.3%	44.8%	42.6%	39.6%	55.8%	49.1%	47.5%	57.4%	32.4%	54.5%	44.9%	25.0%
4. ineffective implementation of fisheries management	38.5%	36.2%	50.0%	34.0%	30.8%	41.5%	27.9%	63.8%	26.5%	49.1%	30.6%	25.0%
5. ineffectiveness of marine environmental protection	58.5%	62.1%	57.4%	56.6%	53.8%	62.3%	47.5%	74.5%	41.2%	63.6%	57.1%	7.08%
6. lack of the ability of marine enforcement and maritime patrol	22.6%	20.7%	29.6%	24.5%	13.5%	24.5%	27.9%	25.5%	11.8%	23.6%	24.5%	12.5%
7. less scientific research of the sea	18.9%	17.2%	13.0%	30.2%	21.2%	13.2%	11.5%	17.0%	17.6%	29.1%	16.3%	25.0%
8. ocean-related Act/regulation	31.5%	27.6%	27.8%	28.3%	46.2%	28.3%	23.0%	23.4%	17.6%	20.0%	65.3%	45.8%
9. ineffective implementation of marine pollution	34.1%	36.2%	40.7%	26.4%	32.7%	34.0%	37.7%	27.7%	55.9%	36.4%	18.4%	33.3%
10. ineffective implementation of coastal zone management	37.8%	36.2%	50.0%	32.1%	34.6%	35.8%	31.1%	34.0%	52.9%	49.1%	30.6%	29.2%
11. marine tourism development influence marine ecology	32.6%	36.2%	38.9%	37.7%	21.2%	28.3%	29.5%	29.8%	55.9%	38.2%	22.4%	20.8%
12. lack of the equipment of marine disaster rescue system	22.2%	17.2%	27.8%	22.6%	21.2%	22.6%	14.8%	10.6%	44.1%	29.1%	18.4%	25.0%
13. marine culture education has not been popularized	18.1%	17.2%	14.8%	26.4%	11.5%	20.8%	13.1%	12.8%	14.7%	29.1%	20.4%	16.7%
14. few courses of marine education and training	17.4%	13.8%	13.0%	17.0%	17.3%	26.4%	11.5%	21.3%	8.8%	16.4%	18.4%	37.5%
15. overlap of marine jurisdiction (e.g. overlap of EEZ and continental shelf)	31.9%	19.0%	35.2%	45.3%	25.0%	35.8%	26.2%	29.8%	35.3%	40.0%	24.5%	41.7%
16. other	2.6%	0%	1.9%	0%	9.6%	1.9%	9.8%	0%	0%	0%	2.0%	0%
17. don't know/no opinio	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Appendix 2.12

Q4.1.2 In your opinion, what are the priority issues of Taiwanese marine policy? (Please tick all that apply and rank your top three, 1=first, 2=second, 3=third)

Items	Total (n=270)	Organisation					Type					
		central government (n=58)	local unit (n=54)	academic (n=53)	private sector (n=52)	NGOs (n=53)	fishery (n=61)	marine environment protection and conservation (n=47)	marine enforcement (n=34)	sea utilisation (n=55)	marine tourism (n=49)	other (n=24)
1. marine resources declines continuously	56.3%	55.2%	66.7%	67.9%	46.2%	45.3%	59.0%	57.4%	67.6%	52.7%	49.0%	54.2%
2. ineffective implementation of marine conservation	26.3%	24.1%	22.2%	28.3%	42.3%	15.1%	63.9%	10.6%	11.8%	20.0%	16.3%	16.7%
3. lack of marine comprehensive management	29.6%	29.3%	24.1%	22.6%	42.3%	30.2%	36.1%	42.6%	14.7%	25.5%	32.7%	12.5%
4. ineffective implementation of fisheries management	22.6%	29.3%	29.6%	18.9%	13.5%	20.8%	8.2%	55.3%	17.6%	21.8%	20.4%	8.3%
5. ineffectiveness of marine environmental protection	44.8%	44.8%	46.3%	39.6%	42.3%	50.9%	32.8%	57.4%	26.5%	52.7%	46.9%	54.2%
6. lack of the ability of marine enforcement and maritime patrol	11.9%	10.3%	16.7%	13.2%	3.8%	15.1%	16.4%	12.8%	2.9%	12.7%	12.2%	8.3%
7. less scientific research of the sea	6.7%	5.2%	3.7%	7.5%	11.5%	5.7%	0%	2.1%	8.8%	16.4%	2.0%	16.7%
8. ocean-related Act/regulation	17.4%	13.8%	7.4%	11.3%	34.6%	20.8%	6.6%	6.4%	2.9%	7.3%	55.1%	33.3%
9. ineffective implementation of marine pollution	19.3%	20.7%	25.9%	9.4%	17.3%	22.6%	23.0%	10.6%	29.4%	25.5%	8.2%	20.8%
10. ineffective implementation of coastal zone management	21.9%	25.9%	27.8%	17.0%	15.4%	22.6%	16.4%	12.8%	38.2%	25.5%	24.5%	16.7%
11. marine tourism development influence marine ecology	12.6%	20.7%	9.3%	15.1%	1.9%	15.1%	9.8%	14.9%	35.3%	10.9%	6.1%	0%
12. lack of the equipment of marine disaster rescue system	4.8%	3.4%	3.7%	9.4%	5.8%	1.9%	1.6%	0%	17.6%	7.3%	2.0%	4.2%
13. marine culture education has not been popularized	3.0%	3.4%	1.9%	3.8%	0%	5.7%	3.3%	2.1%	0%	0%	8.2%	4.2%
14. few courses of marine education and training	6.3%	3.4%	1.9%	7.5%	5.8%	13.2%	0%	8.5%	5.9%	5.5%	6.1%	20.8%
15. overlap of marine jurisdiction (e.g. overlap of EEZ and continental shelf)	11.9%	5.2%	11.1%	24.5%	3.8%	15.1%	14.8%	4.3%	20.6%	10.9%	8.2%	16.7%
16. other	1.5%	0%	1.9%	0%	5.8%	0%	6.6%	0%	0%	0%	0%	0%

Appendix 2.13

Q4.2 When the government is formulating marine policy, which of the following factors should be considered? (Please tick all that apply)

Items	Total (n=270)	Organisation					Type					
		central government (n=58)	local unit (n=54)	academic (n=53)	private sector (n=52)	NGOs (n=53)	fishery (n=61)	marine environment protection and conservation (n=47)	marine enforcement (n=34)	sea utilisation (n=55)	marine tourism (n=49)	other (n=24)
1. following the international development trend of marine policy and management	62.6%	70.7%	66.7%	67.9%	50.0%	56.6%	62.3%	55.3%	73.5%	70.9%	53.1%	62.5%
2. pay attention to co-ordination of government departments/agencies	41.9%	44.8%	46.3%	47.2%	42.3%	28.3%	50.8%	40.4%	50.0%	38.2%	32.7%	37.5%
3. pay attention to marine environment protection	63.3%	60.3%	66.7%	66.0%	59.6%	64.2%	60.7%	83.0%	50.0%	58.2%	65.3%	58.3%
4. pay attention to sustainable utilisation of marine resource	75.6%	75.9%	77.8%	73.6%	75.0%	75.5%	83.6%	78.7%	67.6%	72.7%	69.4%	79.2%
5. pay attention to conservation of marine biology resource	57.4%	60.3%	64.8%	58.5%	48.1%	54.7%	49.2%	74.5%	47.1%	58.2%	65.3%	41.7%
6. pay attention to marine tourism development	6.3%	5.2%	3.7%	7.5%	9.6%	5.7%	1.6%	6.4%	2.9%	7.3%	8.2%	16.7%
7. pay attention to co-ordination between central and local government	39.3%	44.8%	46.3%	43.4%	25.0%	35.8%	36.1%	38.3%	55.9%	50.9%	32.7%	12.5%
8. pay attention to the sound of marine legislation	37.0%	35.8%	42.6%	43.4%	38.5%	28.3%	44.3%	44.7%	41.2%	29.1%	36.7%	16.7%
9. pay attention to marine comprehensive management	58.1%	67.2%	64.8%	56.6%	40.4%	60.4%	55.7%	55.3%	64.7%	67.3%	53.1%	50.0%
10. pay attention to fisheries management	47.8%	63.8%	53.7%	43.4%	30.8%	45.3%	47.5%	57.4%	61.8%	47.3%	36.7%	33.3%
11. pay attention to the implementation of the system of marine policy and management	36.7%	27.6%	25.9%	56.6%	32.7%	41.5%	29.5%	42.6%	41.2%	34.5%	30.6%	54.2%
12. pay attention to marine scientific research	34.8%	31.0%	27.8%	35.8%	57.7%	22.6%	50.8%	31.9%	20.6%	34.5%	24.5%	41.7%
13. take account of ocean user's opinion in order to avoid conflict (public participation)	27.0%	22.4%	25.9%	24.5%	32.7%	30.2%	19.7%	27.7%	14.7%	23.6%	42.9%	37.5%
14. other	4.4%	5.2%	7.4%	1.9%	7.7%	0%	8.2%	0%	5.9%	7.3%	2.0%	0%
15. don't know/no opinion	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Appendix 2.14

Q4.3.1 What do you perceive to be the main obstacles to managing the marine environment? (Please tick all that apply and rank your top three, 1=first, 2=second, 3=third)

Items	Total (n=270)	Organisation					Type					
		central government (n=58)	local unit (n=54)	academic (n=53)	private sector (n=52)	NGOs (n=53)	fishery (n=61)	marine environment protection and conservation (n=47)	marine enforcement (n=34)	sea utilisation (n=55)	marine tourism (n=49)	other (n=24)
1. politics influence	44.4%	31.0%	46.3%	49.1%	50.0%	47.2%	37.7%	48.9%	41.2%	40.0%	55.1%	45.8%
2. lack concept of sustainable development in government	47.4%	34.5%	35.2%	64.2%	51.9%	52.8%	65.6%	31.9%	47.1%	45.5%	42.9%	45.8%
3. lack of the co-ordination system among ocean-related agencies	29.3%	27.6%	29.6%	22.6%	42.3%	24.5%	31.1%	29.8%	20.6%	30.9%	32.7%	25.0%
4. lack of sound ocean-related Act/regulation (e.g. lack of specific Act of coastal management)	34.4%	39.7%	35.2%	37.7%	21.2%	37.7%	36.1%	38.3%	32.4%	32.7%	34.7%	29.2%
5. over-reliance on economic priorities	29.6%	34.5%	37.0%	34.0%	15.4%	26.4%	19.7%	38.3%	44.1%	36.4%	22.4%	16.7%
6. lack of the interaction between central government and local government	21.1%	13.8%	14.8%	26.4%	34.6%	17.0%	27.9%	10.6%	14.7%	21.8%	22.4%	29.2%
7. lack of policy of marine comprehensive management	63.7%	56.9%	70.4%	66.0%	71.2%	54.7%	77.0%	63.8%	64.7%	61.8%	46.9%	66.7%
8. lack of marine budget (e.g. developmental budget of scientific research of the sea is lower than other scientific research)	38.1%	43.1%	51.9%	35.8%	30.8%	28.3%	36.1%	27.7%	52.9%	47.3%	28.6%	41.7%
9. users lack awareness of environment protection of marine ecosystem	43.7%	46.6%	68.5%	30.2%	32.7%	39.6%	47.5%	44.7%	44.1%	45.5%	44.9%	25.0%
10. government does not pay attention to the development of marine policy	24.8%	17.2%	24.1%	43.4%	17.3%	22.6%	24.6%	21.3%	29.4%	25.5%	24.5%	25.0%
11. government has not promulgated explicit marine protection plan	45.6%	44.8%	50.0%	45.3%	34.6%	52.8%	42.6%	59.6%	23.5%	50.9%	53.1%	29.2%
12. the international status is weak	27.0%	19.0%	25.9%	22.6%	28.8%	39.6%	24.6%	27.7%	11.8%	32.7%	24.5%	45.8%
13. other	5.6%	12.1%	0%	1.9%	9.6%	3.8%	11.5%	8.5%	5.9%	1.8%	2.0%	0%
14. don't know/no opinion	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Appendix 2.15

Q4.3.2 What do you perceive to be the main obstacles to managing the marine environment? (Please tick all that apply and rank your top three, 1=first, 2=second, 3=third)

Items	Total (n=270)	Organisation					Type					
		central government (n=58)	local unit (n=54)	academic (n=53)	private sector (n=52)	NGOs (n=53)	fishery (n=61)	marine environment protection and conservation (n=47)	marine enforcement (n=34)	sea utilisation (n=55)	marine tourism (n=49)	other (n=24)
1. politics influence	35.6%	22.4%	44.4%	39.6%	28.8%	43.4%	24.6%	40.4%	35.3%	32.7%	44.9%	41.7%
2. lack concept of sustainable development in government	34.1%	24.1%	24.1%	50.9%	32.7%	39.6%	44.3%	17.0%	41.2%	38.2%	28.6%	33.3%
3. lack of the co-ordination system among ocean-related agencies	18.1%	24.1%	13.0%	11.3%	26.9%	15.1%	18.0%	21.3%	14.7%	14.5%	22.4%	16.7%
4. lack of sound ocean-related Act/regulation (e.g. lack of specific Act of coastal management)	23.7%	32.8%	20.4%	28.3%	11.5%	24.5%	24.6%	27.7%	26.5%	21.8%	20.4%	20.8%
5. over-reliance on economic priorities	15.2%	24.1%	16.7%	15.1%	7.7%	11.3%	4.9%	19.1%	29.4%	18.2%	16.3%	4.2%
6. lack of the interaction between central government and local government	9.3%	1.7%	13.0%	9.4%	17.3%	5.7%	16.4%	4.3%	8.8%	7.3%	8.2%	8.3%
7. lack of policy of marine comprehensive management	52.2%	48.3%	59.3%	54.7%	57.7%	41.5%	67.2%	53.2%	50.0%	49.1%	36.7%	54.2%
8. lack of marine budget (e.g. developmental budget of scientific research of the sea is lower than other scientific research)	23.3%	29.3%	27.8%	18.9%	25.0%	15.1%	23.0%	12.8%	38.2%	23.6%	22.4%	25.0%
9. users lack awareness of environment protection of marine ecosystem	26.7%	32.8%	40.7%	11.3%	25.0%	22.6%	24.6%	31.9%	26.5%	29.1%	28.6%	12.5%
10. government does not pay attention to the development of marine policy	13.0%	8.6%	9.3%	24.5%	9.6%	13.2%	13.1%	6.4%	14.7%	14.5%	14.3%	16.7%
11. government has not promulgated explicit marine protection plan	27.4%	24.1%	24.1%	26.4%	26.9%	35.8%	21.3%	44.7%	2.9%	23.6%	40.8%	25.0%
12. the international status is weak	12.2%	10.3%	5.6%	5.7%	15.4%	24.5%	4.9%	14.9%	5.9%	14.5%	12.2%	29.2%
13. other	5.2%	12.1%	0%	1.9%	9.6%	1.9%	11.5%	6.4%	5.9%	1.8%	2.0%	0%

Appendix 2.16

Q5.1.1 What are your main concern's issues with regard to implementation and enforcement of policy/legislation? (Please tick all that apply and rank your top three, 1=first, 2=second, 3=third)

Items	Total (n=270)	Organisation					Type					
		central government (n=58)	local unit (n=54)	academic (n=53)	private sector (n=52)	NGOs (n=53)	fishery (n=61)	marine environment protection and conservation (n=47)	marine enforcement (n=34)	sea utilisation (n=55)	marine tourism (n=49)	other (n=24)
1. marine development and marine conservation cannot be well balanced in local government	53.0%	53.4%	42.6%	62.3%	46.2%	60.4%	44.3%	40.4%	76.5%	49.1%	63.3%	54.2%
2. lack of public awareness lead to obstruction of implementation	45.2%	43.1%	51.9%	50.9%	36.5%	43.4%	39.3%	51.1%	47.1%	47.3%	44.9%	41.7%
3. the assignment and usage of resources and law enforcement are not planned and executed with full co-ordination between central and local government	40.7%	31.0%	44.4%	43.4%	53.8%	32.1%	50.8%	31.9%	26.5%	47.3%	38.8%	41.7%
4. regulations that are executed by local governments, since they are frequently limited by outlay	22.6%	20.7%	40.7%	20.8%	15.4%	15.1%	24.6%	17.0%	29.4%	25.5%	18.4%	20.8%
5. the regulations are executed by local governments, which are frequently limited by real political power	57.0%	56.9%	51.9%	56.6%	67.3%	52.8%	70.5%	46.8%	35.3%	61.8%	61.2%	54.2%
6. lack of awareness by national level policy decision-makers of the impact of their decisions at local management level	36.7%	41.4%	46.3%	32.1%	28.8%	34.0%	45.9%	36.2%	14.7%	43.6%	34.7%	33.3%
7. decision-makers in marine affairs are not aware of the impact of national decisions at the local level	26.7%	29.3%	35.2%	26.4%	15.4%	26.4%	34.4%	31.9%	11.8%	21.8%	30.6%	20.8%
8. managers lack the concept of sustainability	48.5%	39.7%	53.7%	64.2%	44.2%	41.5%	42.6%	46.8%	50.0%	61.8%	42.9%	45.8%
9. regulations that are executed by local governments, since they are frequently limited by human resources	34.4%	24.1%	42.6%	34.0%	44.2%	28.3%	41.0%	17.0%	41.2%	41.8%	24.5%	45.8%
10. lack of effort/commitment between implementation and enforcement personnel	22.6%	29.3%	22.2%	22.6%	15.4%	22.6%	16.4%	34.0%	23.5%	29.1%	18.4%	8.3%
11. ineffectiveness of marine conservation and environmental protection	57.0%	56.9%	51.9%	54.7%	55.8%	66.0%	70.5%	57.4%	47.1%	54.5%	55.1%	45.8%
12. other	1.5%	3.4%	0%	0%	0%	3.8%	1.6%	4.3%	0%	0%	2.0%	0%
13. don't know/no opinion	1.5%	0%	1.9%	0%	3.8%	1.9%	1.6%	4.3%	0%	0%	0%	4.2%

Appendix 2.17

Q5.1.2 What are your main concern's issues with regard to implementation and enforcement of policy/legislation? (Please tick all that apply and rank your top three, 1=first, 2=second, 3=third)

Items	Total (n=270)	Organisation					Type					
		central government (n=58)	local unit (n=54)	academic (n=53)	private sector (n=52)	NGOs (n=53)	fishery (n=61)	marine environment protection and conservation (n=47)	marine enforcement (n=34)	sea utilisation (n=55)	marine tourism (n=49)	other (n=24)
1. marine development and marine conservation cannot be well balanced in local government	44.4%	39.7%	37.0%	54.7%	40.4%	50.9%	31.1%	36.2%	73.5%	41.8%	53.1%	41.7%
2. lack of public awareness lead to obstruction of implementation	32.6%	31.0%	35.2%	37.7%	26.9%	32.1%	24.6%	38.3%	32.4%	36.4%	32.7%	33.3%
3. the assignment and usage of resources and law enforcement are not planned and executed with full co-ordination between central and local government	25.6%	13.8%	24.1%	28.3%	36.5%	26.4%	24.6%	21.3%	11.8%	32.7%	30.6%	29.2%
4. regulations that are executed by local governments, since they are frequently limited by outlay	12.6%	10.3%	25.9%	9.4%	9.6%	7.5%	8.2%	10.6%	17.6%	16.4%	10.2%	16.7%
5. the regulations are executed by local governments, which are frequently limited by real political power	40.7%	44.8%	29.6%	43.4%	46.2%	39.6%	44.3%	40.4%	26.5%	43.6%	40.8%	45.8%
6. lack of awareness by national level policy decision-makers of the impact of their decisions at local management level	17.4%	25.9%	29.6%	9.4%	9.6%	11.3%	27.9%	21.3%	5.9%	18.2%	12.2%	8.3%
7. decision-makers in marine affairs are not aware of the impact of national decisions at the local level	10.7%	10.3%	18.5%	9.4%	3.8%	11.3%	18.0%	21.3%	0%	3.6%	10.2%	4.2%
8. managers lack the concept of sustainability	31.5%	29.3%	35.2%	41.5%	25.0%	26.4%	19.7%	27.7%	41.2%	40.0%	36.7%	25.0%
9. regulations that are executed by local governments, since they are frequently limited by human resources	20.0%	13.8%	25.9%	13.2%	28.8%	18.9%	21.3%	10.6%	29.4%	21.8%	12.2%	33.3%
10. lack of effort/commitment between implementation and enforcement personnel	10.0%	15.5%	7.4%	9.4%	5.8%	11.3%	6.6%	14.9%	17.6%	10.9%	8.2%	0%
11. ineffectiveness of marine conservation and environmental protection	38.1%	43.1%	24.1%	37.7%	38.5%	47.2%	44.3%	36.2%	41.2%	29.1%	40.8%	37.5%
12. other	1.5%	3.4%	0%	0%	0%	3.8%	1.6%	4.3%	0%	0%	2.0%	0%

Appendix 2.18

Q5.2 With regard to implementation and enforcement of policy/legislation, do you agree with the following statements? (Please tick all that apply)

Items	Total (n=270)	Organisation					Type					
		central government (n=58)	local unit (n=54)	academic (n=53)	private sector (n=52)	NGOs (n=53)	fishery (n=61)	marine environment protection and conservation (n=47)	marine enforcement (n=34)	sea utilisation (n=55)	marine tourism (n=49)	other (n=24)
1. people lack understanding of the concept of marine environment protection and marine resource conservation	81.9%	77.6%	85.2%	94.3%	82.7%	69.8%	83.6%	83.0%	88.2%	80.0%	71.4%	91.7%
2. political influence (e.g. political benefits, to lobby illegally, voting consideration)	70.7%	69.0%	87.0%	73.6%	55.8%	67.9%	65.6%	80.9%	61.8%	70.9%	75.5%	66.7%
3. coastal environment worsens caused various environmental problems	69.3%	82.8%	70.4%	77.4%	51.9%	62.3%	57.4%	72.3%	85.3%	76.4%	57.1%	79.2%
4. managers lack of concept of marine comprehensive management	69.6%	74.1%	79.6%	75.5%	42.3%	75.5%	68.9%	66.0%	79.4%	78.2%	69.4%	45.8%
5. lack of the prospective plan	54.4%	60.3%	63.0%	64.2%	36.5%	47.2%	50.8%	63.8%	47.1%	65.5%	46.9%	45.8%
6. enforcer's professional knowledge is insufficient lead to influence the efficiency of enforcement	47.4%	46.6%	51.9%	60.4%	32.7%	45.3%	49.2%	51.1%	41.2%	49.1%	51.0%	33.3%
7. conflict of sea use (e.g. fisheries and conservation)	62.6%	58.6%	57.4%	75.5%	67.3%	54.7%	77.0%	61.7%	52.9%	61.8%	57.1%	54.2%
8. most people do not understand the ocean so that it is unable to reach common consensus	68.1%	67.2%	64.8%	81.1%	55.8%	71.7%	60.7%	76.6%	64.7%	72.7%	61.2%	79.2%
9. do not have better interaction between government and fishermen/other sea users	61.9%	55.2%	59.3%	62.3%	76.9%	56.6%	70.5%	55.3%	47.1%	54.5%	69.4%	75.0%
10. other	0.7%	1.7%	0%	0%	1.9%	0%	1.6%	2.1%	0%	0%	0%	0%
11. don't know/no opinion	0.7%	0%	0%	0%	1.9%	1.9%	1.6%	0%	0%	0%	2.0%	0%

Appendix 2.19

Q5.3.1 In your opinion, what are the obstacles to implementation and enforcement of policy? (Please tick all that apply and rank your top three, 1=first, 2=second, 3=third)

Items	Total (n=270)	Organisation					Type					
		central government (n=58)	local unit (n=54)	academic (n=53)	private sector (n=52)	NGOs (n=53)	fishery (n=61)	marine environment protection and conservation (n=47)	marine enforcement (n=34)	sea utilisation (n=55)	marine tourism (n=49)	other (n=24)
1. lack of sound ocean-related information and science database (e.g. marine environmental database, database of fishery management, etc.)	41.9%	34.5%	37.0%	58.5%	38.5%	41.5%	31.1%	36.2%	52.9%	41.8%	53.1%	41.7%
2. the absence of unified administration authority in marine enforcement	47.8%	46.6%	63.0%	43.4%	44.2%	41.5%	55.7%	51.1%	32.4%	60.0%	42.9%	25.0%
3. economic development is the priority (e.g. government connives in marine environment destruction due to developmental benefits)	45.6%	41.4%	46.3%	39.6%	59.6%	41.5%	59.0%	44.7%	26.5%	49.1%	34.7%	54.2%
4. lack of marine budget	20.7%	22.4%	25.9%	26.4%	11.5%	17.0%	26.2%	25.5%	17.6%	23.6%	12.2%	12.5%
5. lack of co-ordination mechanism of marine comprehensive management	58.9%	58.6%	70.4%	62.3%	40.4%	62.3%	49.2%	68.1%	55.9%	67.3%	57.1%	54.2%
6. technical tools of marine conservation and environmental protection can not implement effectiveness (e.g. SEA and MPA)	54.8%	53.4%	48.1%	60.4%	63.5%	49.1%	72.1%	46.8%	41.2%	56.4%	51.0%	50.0%
7. lack of education and professional training of marine enforcement personnel (e.g. lack of marine management talent)	37.4%	43.1%	38.9%	47.2%	25.0%	32.1%	34.4%	36.2%	47.1%	40.0%	36.7%	29.2%
8. the departmental egoism among management organisation lead to influence the effectiveness of management	25.6%	29.3%	25.9%	28.3%	23.1%	20.8%	31.1%	21.3%	32.4%	25.5%	24.5%	12.5%
9. lack of a sound ocean-related Act/regulations	39.6%	50.0%	42.6%	39.6%	28.8%	35.8%	50.8%	34.0%	32.4%	49.1%	30.6%	29.2%
10. illegal sea use (e.g. illegal fishing, pollution of marine resources)	43.0%	41.4%	40.7%	45.3%	42.3%	45.3%	44.3%	40.4%	47.1%	38.2%	42.9%	50.0%
11. ocean users' attitude	32.2%	36.2%	29.6%	20.8%	36.5%	37.7%	32.8%	31.9%	14.7%	38.2%	38.8%	29.2%
12. other	1.9%	0%	0%	1.9%	3.8%	3.8%	4.9%	2.1%	0%	1.8%	0%	0%
13. don't know/no opinio	1.5%	0%	1.9%	0%	3.8%	1.9%	1.6%	4.3%	0%	0%	0%	4.2%

Appendix 2.20

Q5.3.2 In your opinion, what are the obstacles to implementation and enforcement of policy? (Please tick all that apply and rank your top three, 1=first, 2=second, 3=third)

Items	Total (n=270)	Organisation					Type					
		central government (n=58)	local unit (n=54)	academic (n=53)	private sector (n=52)	NGOs (n=53)	fishery (n=61)	marine environment protection and conservation (n=47)	marine enforcement (n=34)	sea utilisation (n=55)	marine tourism (n=49)	other (n=24)
1. lack of sound ocean-related information and science database (e.g. marine environmental database, database of fishery management, etc.)	32.6%	20.7%	27.8%	50.9%	28.8%	35.8%	24.6%	29.8%	44.1%	32.7%	38.8%	29.2%
2. the absence of unified administration authority in marine enforcement	29.3%	31.0%	46.3%	22.6%	25.0%	20.8%	31.1%	31.9%	23.5%	36.4%	26.5%	16.7%
3. economic development is the priority (e.g. government connives in marine environment destruction due to developmental benefits)	30.0%	27.6%	25.9%	18.9%	42.3%	35.8%	36.1%	29.8%	23.5%	32.7%	20.4%	37.5%
4. lack of marine budget	8.9%	12.1%	13.0%	7.5%	3.8%	7.5%	9.8%	12.8%	11.8%	5.5%	8.2%	4.2%
5. lack of co-ordination mechanism of marine comprehensive management	42.6%	44.8%	46.3%	45.3%	26.9%	49.1%	24.6%	55.3%	44.1%	47.3%	44.9%	45.8%
6. technical tools of marine conservation and environmental protection can not implement effectiveness (e.g. SEA and MPA)	40.4%	39.7%	29.6%	41.5%	50.0%	41.5%	54.1%	40.4%	35.3%	30.9%	36.7%	41.7%
7. lack of education and professional training of marine enforcement personnel (e.g. lack of marine management talent)	24.4%	29.3%	25.9%	30.2%	17.3%	18.9%	16.4%	23.4%	38.2%	25.5%	26.5%	20.8%
8. the departmental egoism among management organisation lead to influence the effectiveness of management	13.0%	15.5%	9.3%	7.5%	19.2%	13.2%	13.1%	8.5%	20.6%	12.7%	14.3%	8.3%
9. lack of a sound ocean-related Act/regulations	24.8%	32.8%	25.9%	26.4%	19.2%	18.9%	29.5%	21.3%	17.6%	34.5%	18.4%	20.8%
10. illegal sea use (e.g. illegal fishing, pollution of marine resources)	23.3%	25.9%	18.5%	18.9%	26.9%	26.4%	19.7%	14.9%	32.4%	18.2%	30.6%	33.3%
11. ocean users' attitude	17.0%	19.0%	18.5%	9.4%	21.2%	17.0%	23.0%	10.6%	8.8%	12.7%	26.5%	16.7%
12. other	1.5%	0%	0%	1.9%	1.9%	3.8%	3.3%	2.1%	0%	1.8%	0%	0%

Appendix 3

Appendix 3.1 Interview questions (English)

Appendix 3.2 Interview questions (Chinese)

Appendix 3.1 Interview questions (English)

Marine policy and marine environmental management in Taiwan Interview

1. Respondent details

- 1.1 Name of respondent:
- 1.2 Designation of respondent:
 central government local government academic private sector NGOs
- 1.3 Name of Organisation:
- 1.4 Position held:
- 1.5 Date of completion:
- 1.6 Contact Tel:
- 1.7 E-mail:

2. Organisation and Legislation

- 2.1 So far as your profession concern, could you please describe briefly the cause the issues of organisation and legislation in terms of Government lacks a marine comprehensive management organization, ocean-related Act/regulations are not sound, and ineffectiveness of marine enforcement?
- 2.2 According to the questionnaires results, in your opinion, the relevant factors of organisation and legislation lead to the issues whether are lack of environmental development principles in the legal system (e.g. principles of sustainable development, polluter pays, precautionary, etc.), lack of political will, and economic is the priority?
(1) If yes, what is the interrelation with issues?
(2) If no, could you please describe briefly?
- 2.3 According to the questionnaires results, obstacles to the cause of issues are political factors affect the effectiveness of management, lack of ability of organisations of marine enforcement and maritime patrols, and the same region is administered by multiple units would have questions of departmental egoism. In your opinion, whether these obstacles lead to the cause of issues or the cause of factors?
(1) If yes, what is the interrelation with issues and factors?
(2) If no, could you please describe briefly?
- 2.4 According to the questionnaires results, the improvements of issues are establish a comprehensive management organisation or mechanism, strengthen marine enforcement and maritime patrol system (e.g. increase enforcement budget and personnel, enhance coordination with Coast Guard Administration, enhance to enforce a ban of illegal fishing, etc.), and enact a sound bill (e.g. the *Coastal Act*). What is your opinion? Do you have better improvements?

3. Human resources

- 3.1 So far as your profession concern, could you please describe briefly the cause the issues of human resources in terms of people lack of marine accomplishments, failure to solve the problem of lack of employment opportunities for marine graduates (e.g. increase job openings for those performing well in national marine affairs examinations), and lack of marine comprehensive management talent?
- 3.2 According to the questionnaires results, in your opinion, the relevant factors of human resources lead to the issues whether are the notion of ‘focusing on the land and despising the sea’, people seldom commune with ocean, and lack of TV advertisements and programmes?
- (1) If yes, what is the interrelation with issues?
(2) If no, could you please describe briefly?
- 3.3 According to the questionnaires results, obstacles to the cause of issues are education policy lay particular stress on ‘consider the sea from the thought of land’, type of cultivation of marine talent and supply and demand of industry in the drop of quality and quantity, and lack of ability of cultivation of marine affairs management talent. In your opinion, whether these obstacles lead to the cause of issues or the cause of factors?
- (1) If yes, what is the interrelation with issues and factors?
(2) If no, could you please describe briefly?
- 3.4 According to the questionnaires results, the improvements of issues are promote the basic education of marine knowledge, strengthen marine courses and teaching materials in school, enhance fishermen’s/other sea users’ education and training (e.g. legislation, marine environmental protection), and strengthen manpower and financial resources of marine affairs management in education and training. What is your opinion? Do you have better improvements?

4. Policy development

- 4.1 So far as your profession concern, could you please describe briefly the cause the issues of policy development in terms of marine resources declines continuously, ineffectiveness of marine environmental protection, and lack of marine comprehensive management?
- 4.2 According to the questionnaires results, in your opinion, the relevant factors of policy development lead to the issues whether are pay attention to sustainable utilisation of marine resource, pay attention to marine environment protection, and following the international development trend of marine policy and management?
- (1) If yes, what is the interrelation with issues?
(2) If no, could you please describe briefly?
- 4.3 According to the questionnaires results, obstacles to the cause of issues are lack of policy of marine comprehensive management, lack concept of sustainable development in government, and Government has not promulgated explicit marine protection plan. In your opinion, whether these obstacles lead to the cause of issues or the cause of factors?
- (1) If yes, what is the interrelation with issues and factors?
(2) If no, could you please describe briefly?

4.4 According to the questionnaires results, the improvements of issues are enhance marine comprehensive management, enhance marine environment protection, and implement the concept of sustainable development within marine policy. What is your opinion? Do you have better improvements?

5. Technical management, implementation and enforcement

5.1 So far as your profession concern, could you please describe briefly the cause the issues of technical management, implementation and enforcement in terms of the regulations are executed by local governments, which are frequently limited by real political power, ineffectiveness of marine conservation and environmental protection, and marine development and marine conservation cannot be well balanced in local government?

5.2 According to the questionnaires results, in your opinion, the relevant factors of technical management, implementation and enforcement lead to the issues whether are people lack understanding of the concept of marine environment protection and marine resource conservation, political influence (e.g. political benefits, to lobby illegally, voting consideration), and managers lack of concept of marine comprehensive management?

(1) If yes, what is the interrelation with issues?

(2) If no, could you please describe briefly?

5.3 According to the questionnaires results, obstacles to the cause of issues are lack of co-ordination mechanism of marine comprehensive management, technical tools of marine conservation and environmental protection can not implement effectiveness (e.g. SEA and MPA), and the absence of unified administration authority in marine enforcement. In your opinion, whether these obstacles lead to the cause of issues or the cause of factors?

(1) If yes, what is the interrelation with issues and factors?

(2) If no, could you please describe briefly?

5.4 According to the questionnaires results, the improvements of issues are enhance mechanism of public participation, promote SEA and MPA actively, and enhance co-ordination between ocean-related departments/agencies. What is your opinion? Do you have better improvements?

*** Any additional ideas, views or comments may be attached to the questionnaire, and would be greatly appreciated.**

Appendix 3.2 Interview questions (Chinese)

第一部份：基本資料

1. 受訪者工作單位：

中央單位 地方單位 學術研究單位 海洋產業 非政府組織 其他

2. 工作類別：漁業 海洋環保 海域執法 海洋利用 海洋觀光 其他

3. 職稱：

4. 受訪日期：

5. 聯絡電話：

6. E-mail:

第二部份：組織與立法

1. 你認為(政府缺乏海洋綜合管理的機構、海洋相關法規不健全、海域執法不彰)的現象的原因為何？
2. 根據問卷調查結果顯示，在組織與立法上造成議題的相關因素是否為法律制度未納入環境與開發之原則(例如：永續發展、污染者付費、公平正義原則等)、政治意願的缺乏、經濟發展為優先考量？
 - (1) 如果是，其與議題之相關性為何？
 - (2) 如果不是，請說明您的觀點？
3. 根據問卷調查結果顯示，造成議題的障礙為政治因素影響管理效能、海域執法與巡護機構能力不足，其是否為造成議題之障礙，或為因素之成因？
 - (1) 如果是，其與議題及因素的相關性為何？
 - (2) 如果不是，請說明您的觀點？
4. 根據問卷調查結果顯示，議題的改進之道為教育利害關係人/其他海洋使用者海洋法律知識，以提昇守法之意識、強化海域執法與巡護體系、制定完整法案(ex. 海岸法)，您的觀點為何？是否有其他更好之改進之道？

第三部份：人力資源

1. 你認為(國人海洋素養不足、海事院校學生之出路問題(例如：國家考試增列海洋職系)、海洋綜合管理人才之不足)的現象的原因為何？
2. 根據問卷調查結果顯示，在組織與立法上造成議題的相關因素是否為重陸輕海的觀念、民眾甚少親近海洋、電視宣導廣告和節目闕如？

- (1) 如果是，其與議題之相關性為何？
 - (2) 如果不是，請說明您的觀點？
3. 根據問卷調查結果顯示，造成議題的障礙為教育政策偏重由陸看海、海事人才培育類別與產業供需在量與質的落差、海洋事務管理人才培育能力的缺乏，其是否為造成議題之障礙，或為因素之成因？
 - (1) 如果是，其與議題及因素的相關性為何？
 - (2) 如果不是，請說明您的觀點？
4. 根據問卷調查結果顯示，議題的改進之道為提昇海洋知識的基礎教育，加強學校相關課程與教學題材、加強漁民/其他海洋使用者之海洋教育與訓練(例如：法治教育、海洋環境保護教育與訓練)、強化海洋事務管理教育與訓練之人力與財政資源，您的觀點為何?是有其他更好之改進之道？

第四部份：政策發展

1. 你認為(海洋資源持續衰退、海洋環境保護效力不彰、海洋綜合管理缺乏)的現象的原因為何？
2. 根據問卷調查結果顯示，在組織與立法上造成議題的相關因素是否為重視海洋資源之永續利用、重視海洋環境保護、國際海洋政策與管理之發展趨？
 - (1) 如果是，其與議題之相關性為何？
 - (2) 如果不是，請說明您的觀點？
3. 根據問卷調查結果顯示，造成議題的障礙為缺乏海洋綜合管理的政策、政府缺乏永續發展之概念、政府未公布明確的海洋保護計畫，其是否為造成議題之障礙，或為因素之成因？
 - (1) 如果是，其與議題及因素的相關性為何？
 - (2) 如果不是，請說明您的觀點？
4. 根據問卷調查結果顯示，議題的改進之道為加強海洋綜合管理.加強海洋環境保護.落實永續發展概念於海洋政策中，您的觀點為何?是有其他更好之改進之道？

第五部份：技術管理,執行與執法

1. 你認為(地方政府的執行取締受到政治力的介入、海洋保育與環境保護成效不彰、地方政府的海洋開發與保育未能取得平衡)的現象的原因為何？

2. 根據問卷調查結果顯示，在組織與立法上造成議題的相關因素是否為人民缺乏海洋環境保護與海洋資源保育之概念、政治的影響(例如：政治利益、違法關說、選票考量等)、管理者缺乏海洋綜合管理的概念?
 - (1) 如果是，其與議題之相關性為何?
 - (2) 如果不是，請說明您的觀點?
3. 根據問卷調查結果顯示，造成議題的障礙為海洋綜合管理協調機制缺乏、海洋保育與環境保護工具無法有效執行，例如 SEA 政策環評與海洋保護區、海域執法事權不一，其是否為造成議題之障礙，或為因素之成因?
 - (1) 如果是，其與議題及因素的相關性為何?
 - (2) 如果不是，請說明您的觀點?
4. 根據問卷調查結果顯示，議題的改進之道為加強公眾參與機制、積極推動政策環評與海洋保護區、加強海域海洋管理相關部門之協調連繫，您的觀點為何?是有其他更好之改進之道?

第六部份：若有其他建議，請提供您的寶貴意見。

Appendix 4

**The top three results (Issues – Factors – Obstacles – Improvement) of
Questionnaire**

	Issues	Factors	Obstacles	Improvement
8.2 Organisation and Legislation	<ol style="list-style-type: none"> 1. Government lacks a marine comprehensive management organisation 2. ocean-related Act/regulations are not sound 3. ineffectiveness of marine enforcement 	<ol style="list-style-type: none"> 1. lack of environmental development principles in the legal system (e.g. principles of sustainable development, polluter pays, precautionary, etc.) 2. lack of political will (e.g. politician doesn't care marine legislation) 3. economic is the priority (e.g. government connive marine environment destruction due to developmental benefits) 	<ol style="list-style-type: none"> 1. political factors affect the effectiveness of management 2. lack of ability of organisations of marine enforcement and maritime patrols 3. the same region is administered by multiple units would have questions of departmental egoism 	<ol style="list-style-type: none"> 1. establish a comprehensive management organisation or mechanism 2. strengthen marine enforcement and maritime patrol system (e.g. increase enforcement budget and personnel, enhance coordination with Coast Guard Administration, enhance to enforce a ban of illegal fishing, etc.) 3. enact a sound bill (e.g. the <i>Coastal Act</i>)
8.3 Human resources	<ol style="list-style-type: none"> 1. people lack of marine accomplishments 2. failure to solve the problem of lack of employment opportunities for marine graduates (e.g. increase job openings for those performing well in national marine affairs examinations) 3. lack of marine comprehensive management talent 	<ol style="list-style-type: none"> 1. the notion of 'focusing on the land and despising the sea' 2. people seldom commune with ocean 3. lack of TV advertisements and programmes 	<ol style="list-style-type: none"> 1. education policy lay particular stress on 'consider the sea from the thought of land' 2. type of cultivation of marine talent and supply and demand of industry in the drop of quality and quantity 3. lack of ability of cultivation of marine affairs management talent 	<ol style="list-style-type: none"> 1. promote the basic education of marine knowledge, strengthen marine courses and teaching materials in school 2. enhance fishermen's/other sea users' education and training (e.g. legislation, marine environmental protection) 3. strengthen manpower and financial resources of marine affairs management in education and training

8.4 Policy development	<ol style="list-style-type: none"> 1. marine resources declines continuously 2. ineffectiveness of marine environmental protection 3. lack of marine comprehensive management 	<ol style="list-style-type: none"> 1. pay attention to sustainable utilisation of marine resource 2. pay attention to marine environment protection 3. following the international development trend of marine policy and management 	<ol style="list-style-type: none"> 1. lack of policy of marine comprehensive management 2. lack concept of sustainable development in government 3. Government has not promulgated explicit marine protection plan 	<ol style="list-style-type: none"> 1. enhance marine comprehensive management 2. enhance marine environment protection 3. implement the concept of sustainable development within marine policy
8.5 Technical management, implementation and enforcement	<ol style="list-style-type: none"> 1. the regulations are executed by local governments, which are frequently limited by real political power 2. ineffectiveness of marine conservation and environmental protection 3. marine development and marine conservation cannot be well balanced in local government 	<ol style="list-style-type: none"> 1. people lack understanding of the concept of marine environment protection and marine resource conservation 2. political influence (e.g. political benefits, to lobby illegally, voting consideration) 3. managers lack of concept of marine comprehensive management 	<ol style="list-style-type: none"> 1. lack of co-ordination mechanism of marine comprehensive management 2. technical tools of marine conservation and environmental protection can not implement effectiveness (e.g. SEA and MPA) 3. the absence of unified administration authority in marine enforcement 	<ol style="list-style-type: none"> 1. enhance mechanism of public participation 2. promote SEA and MPA actively 3. enhance co-ordination between ocean-related departments/agencies