

World Maritime University

The Maritime Commons: Digital Repository of the World Maritime University

Maritime Safety & Environment Management
Dissertations

Maritime Safety & Environment Management

8-27-2017

Research on the maritime search and rescue cooperation mechanism in the South China Sea

Cancan Qin

Follow this and additional works at: https://commons.wmu.se/msem_dissertations



Part of the [Other Public Affairs, Public Policy and Public Administration Commons](#), and the [Social Work Commons](#)

This Dissertation is brought to you courtesy of Maritime Commons. Open Access items may be downloaded for non-commercial, fair use academic purposes. No items may be hosted on another server or web site without express written permission from the World Maritime University. For more information, please contact library@wmu.se.

WORLD MARITIME UNIVERSITY

Dalian, China

**Research on the Maritime Search and Rescue
Cooperation Mechanism in the South China Sea**

By

QIN CANCAN

The People's Republic of China

A research paper submitted to the World Maritime University in partial
Fulfillment of the requirements for the award of the degree of

MASTER OF SCIENCE

(MARITIME SAFETY AND ENVIRONMENTAL MANAGEMENT)

2017

© Copyright Qin Cancan, 2017

DECLARATION

I certify that all the material in this research paper that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me.

The contents of this research paper reflect my own personal views, and are not necessarily endorsed by the University.

(Signature): Qin Cancan

(Date): June 19, 2017

Supervised by:

Zhu Yuzhu

Professor

Dalian Maritime University

Assessor:

Co-assessor:

ACKNOWLEDGEMENTS

I am very proud to be a member of Maritime Safety and Environmental Management (MSEM) 2017 at WMU and DMU, and this paper is an important part of my studies to apply for the master degree of this subject. I appreciate to all people who have supported and helped me in various ways during my studies.

I am profoundly thankful to my supervisor Prof. Zhu Yuzhu for guiding me through this work and providing me with invaluable advice and insight into the subject matter. His rich knowledge and rigorous research attitude will benefit me in my future professional career and whole life.

I also deeply appreciated all professors in the MSEM 2017 program. Their professional knowledge broadened my eyesight and give me a great source of inspiration and confidence for the completion of my studies. I remain very grateful to all classmates of MSEM 2017 for sharing their views and experiences.

Last but not least, I am everlastingly grateful to my beloved parents and wife who are always encouraging me by offering their full support and tolerating my long absence during the studies, and thank my lovely daughter, always able to bring me happiness when I am tired.

ABSTRACT

Title of Research Paper: **Research on the Maritime Search and Rescue Cooperation Mechanism in the South China Sea**

Degree: **MSc**

As the geographic location of the South China Sea is quite important with abundant resources, it is necessary to establish the effective maritime search and rescue (SAR) cooperation mechanisms in the area of South China Sea for the marine accidents that may happen during the process of offshore operation or cargo transportation. However, due to the long-standing disputes over the South China Sea Power rights between the neighboring countries of the South China Sea and the other reasons, there still some problem in the cooperation of maritime search and rescue.

The disappearance of the MH370 was a wake-up call for the region to focus on SAR capacity-building. With the gradual attention of the Chinese government to maritime search and rescue in the South China Sea, the establishment of the cooperation mechanism for maritime search and rescue in the South China Sea is also a necessary trend.

This dissertation elaborates the current situation and problems of SAR mechanism in South China Sea, analysis of the barriers of establishment of the system and introduce the cooperation mechanism of SAR in similar seas, so as to seek the regional cooperation approach of the SAR mechanism in the South China Sea.

KEY WAORDS: South China Sea, Search and Rescue, Cooperation Mechanism.

TABLE OF CONTENTS

DECLARATION	I
ACKNOWLEDGEMENTS.....	II
ABSTRACT	III
TABLE OF CONTENTS	IV
LIST OF FIGURES AND TABLES	VI
LIST OF ABBREVIATIONS	VII
Chapter 1	1
Introduction	1
1.1 Background of Research	1
1.2. The objectives of research.....	2
1.3. Structure and Approaches	3
Chapter 2.....	4
Characteristics of maritime search and rescue and the basic situation of the South China Sea.	4
2.1 Characteristics of maritime SAR.....	4
2.1.1 Statutory	4
2.1.2 Coordination	5
2.1.3 Emergency	6
2.2 Current Situation of the South China Sea	6
2.2.1 Geography.....	7
2.2.2 Shipping.....	8
2.2.3 Meteorology	9
2.3 Basis for Establishing a Cooperative Mechanism in the South China Sea.....	10
2.3.1 The political and economic cooperation.	10
2.3.2 The search and rescue cooperation.	11
Chapter 3.....	13
Analysis of current conditions on the cooperation mechanism of maritime SAR in the South China Sea.	13
3.1 China's Role in Promoting Regional Cooperation in the South China Sea Search and Rescue	13
3.2 Cooperation in Maritime Search and Rescue Exercises.	14
3.3 Cases of Cooperation in Maritime SAR in the South China Sea.....	15
Chapter 4.....	17
Current Problems in the Cooperation Mechanism of Maritime SAR in the South China Sea.....	17
4.1 Problems on Cooperation in the Field of Laws and Regulations.	17
4.1.1 Lack of Binding Laws and Regulations on Maritime Search and Rescue Cooperation.....	17
4.1.2 Different Countries Joining Different International Conventions.....	18

4.1.3 The level of cooperation is not deep enough	18
4.2 Ineffective Coordination Mechanism on Communication and Information Network among the Countries or Regions	19
4.2.1 Imperfect Construction of Information Network for Maritime Search and Rescue Communication	19
4.2.2 The construction of information network for maritime search and rescue communication is imperfect.....	21
4.3 Backward Search and Rescue Equipment or Facilities in Some Countries	22
4.4 Relevant Parties' Lack of Enthusiasm to Participate in Search and Rescue	25
4.5 Unsound Training Mechanism for Maritime SAR Personnel.....	28
Chapter 5.....	30
Reference of cooperation mechanism of maritime SAR in similar sea areas.....	30
5.1 The SAR cooperation between Australia and Indonesia.	30
5.2 The SAR cooperation in Arctic Ocean.....	31
5.3 Cooperation between the countries of the western India ocean, the Gulf of Aden and the Red Sea coast in Maritime Navigation Safety	33
5.4 Maritime cooperation in Black Sea.	33
Chapter 6.....	35
Recommendations on Improving the Cooperation Mechanism for Maritime SAR in the South China Sea.....	35
6.1 To Make Clear the Way of the South China Sea SAR Cooperation and Responsible institutions	35
6.1.1 Ways of SAR cooperation	36
6.1.2 Establishment of Maritime Search and Rescue Joint Meeting System.....	36
6.2 Establishment of a Maritime SAR Access System.....	38
6.3 Setting up SAR sites and Carry out Joint SAR Exercises	39
6.4 Establishment of Long-term Cooperation and Exchange Plan in Technology, Information and Personnel.....	41
6.4.1 Technical exchange.....	41
6.4.2 Information exchange.....	42
6.5 Establishment of maritime SAR fund in the South China Sea.....	42
6.6 Improvement of Maritime SAR Compensation Mechanism and Incentive Mechanism.....	43
Chapter 7.....	45
Conclusion.....	45
REFERENCES	47

LIST OF FIGURES AND TABLES

Figure 1	The map of the South China Sea.	8
Figure 2	The track of the Typhoon Krosa in 2013.	10
Figure 3	Illustrative map of Areas of Application in the Arctic Search and Rescue Agreement.	32
Figure 4	The example of RCC.	37
Figure 5	Maritime Search and Rescue Responsibility Area of China and China Hongkong in the SAR Convention.	39
Figure 6	Joint search and rescue exercise.	40
Table 1	The number of marine casualties or incidents according to the flag state.	26
Table 2	The number of marine casualties associated with these countries.	27

LIST OF ABBREVIATIONS

ASEAN	Association of Southeast Asian Nations
BSMRCC	Black Sea Maritime Rescue Coordination Center
COLREGS	Convention on the International Regulations for Preventing Collisions at Sea
GISIS	Global Integrated Shipping Information System
IAMSAR	the International Aeronautical and Maritime Search and Rescue Manual
IMO	International Maritime Organization
JRCC	Joint Rescue Coordination Centre
MSA	Maritime Safety Administration
NRB	NanHai Rescue Bureau
RCC	Rescue Coordination Center
RSC	Rescue Sub Centers
SAR	Search and Rescue
SOLAS	The International Convention for the Safety of Life at Sea
UNCLOS	United Nations Convention on the Law of the Sea
USCG	United States Coast Guard

Chapter 1

Introduction

1.1 Background of Research

The South China Sea is an important international transportation corridor with a number of important and busy shipping lines. There is a large number of ships sailing here every day. The South China Sea area is rich in fishery resources and is a famous fishing ground that has attracted a large number of fishermen to fish in this area. It is also rich in mineral resources and the exploitation of oil and gas has increased steadily in various countries or regions. There is a dispute over sovereignty among the countries or regions around the South China Sea. At the same time, the weather in the South China Sea is changeable, the situation in the sea is complicated, and the shipwreck is frequent, all of which make the SAR in the South China Sea more difficult and complex.

The missing of Malaysia Airlines flight MH370 caused great pressure on the countries or regions around the South China Sea. Due to the lack of bilateral or multilateral agreements between the countries or regions in the respect of facilitating joint SAR operations, the search of Malaysia Airlines flight MH370 encountered embarrassment from the beginning. (Liu Xiao, 2014) Although many countries participate in search and rescue operations and strong investment was also involved, there were still some problems revealed in this SAR operation, such as the information obtained being chaotic, the communication and coordination between countries being not smooth, and the expertise of SAR being backward and so on. (Zhang Han, 2014) However, it is

gratifying that, as a result of the accident, the establishment of a joint SAR mechanism in the South China Sea is becoming a consensus among the countries or regions concerned.

The scholars have done a lot of research on the international maritime SAR. These achievements are mainly reflected as follows: 1. The research on International Conventions on maritime SAR; 2. The present situation of maritime SAR mechanism in China. These research findings are mainly concentrated on the aspects of the defects and improvement on the existing maritime SAR system. At the same time, they researched the problems of local search and rescue work in China. However, there are few studies on the international SAR of the South China Sea, especially from the perspective of regional cooperation. Therefore, it is of important theoretical value and practical significance to research the international maritime SAR cooperation mechanism in the South China Sea.

1.2. The objectives of research

(1) Through the analysis of the specific connotation, the mechanism and the relevant legal norms of maritime search and rescue, it can provide the specific systems that in accordance with the cooperation mechanism of the South China Sea search and rescue.

(2) Through the combination of theory and practice, the specific system and the search and rescue practice in the South China Sea are combined to obtain a search and rescue cooperation mechanism in line with the current situation of South China Sea.

(3) Through the study of the cooperation mechanism of the search and rescue in the

South China Sea, we will provide a train of thought for resolving the sovereignty dispute over the sea. We should shelve disputes and cooperate with each other to jointly safeguard peace and safety in the South China sea.

1.3. Structure and Approaches

This paper introduces the basic situation of the South China Sea, and analyzes the existing problems in the search and rescue cooperation mechanism. By the way of introducing the experience of cooperation mechanisms in other similar seas, under the framework of the international convention, we draw lessons from the advantages of these excellent cooperation mechanisms and combine the actual conditions of the South China Sea to provide some suggestions for the existing cooperative mechanism. Based on this idea, the content is divided into the following parts:

- (1) Characteristics of maritime SAR and the basic situation of the South China Sea.
- (2) The analysis of current conditions on the cooperation mechanism of maritime SAR in this area.
- (3) Analysis of the problems existing in the cooperation mechanism.
- (4) Reference of cooperation mechanism of maritime SAR in similar sea areas.
- (5) Recommendations on improving the cooperation mechanism for maritime SAR in the South China Sea.

Chapter 2

Characteristics of maritime search and rescue and the basic situation of the South China Sea.

2.1 Characteristics of maritime SAR

Maritime search and rescue generally refers to the search, rescue and other actions taken by the salvage force after obtaining maritime distress information. The following sections will introduce the characteristics of maritime SAR.

2.1.1 Statutory

The statutory of maritime SAR mainly refers to the rights and obligations of the maritime SAR actors in the search and rescue process, which must be explicitly authorized by the law. At the same time, there are also corresponding specific provisions of the law on the scope, measures and procedures of maritime search and rescue. It has been accepted that the best way of ensuring and improving safety at sea is by developing international standards and rules that are followed by all shipping nations (IMO, 2013). The responsibility of states to supply help and assistance for persons and vessels in distress at sea is articulated in several international agreements and conventions, such as the United Nations Convention Law of Sea (UNCLOS), the 1974 International Convention for the Safety of Life at Sea (SOLAS) with many of its amendments, the 1979 International Convention on Maritime Search and Rescue (SAR Convention) and the 1989 International Convention on Salvage (Salvage Convention). (Michal Luszczuk, 2014) Besides, the International Aeronautical and Maritime Search and Rescue (IAMSAR) Manual provides a common policy, i.e, the main body of SAR and the measures to facilitate consultation when it is needed.

2.1.2 Coordination

The coordination mainly refers to maritime search and rescue is usually accomplished by the coordination of several main bodies and a number of fields. Only through correct coordination and cooperation, can maritime SAR operation be carried out in an orderly manner and achieve the preset goal. Maritime SAR involves many departments, such as fisheries, meteorology and medical treatment, and sometimes involves cooperation among several countries. (Qu Bo, 2015) The personnel from different departments and different countries may have different level of search and rescue professional skills and different countries have different procedures for maritime search and rescue operations. In order to avoid the cooperation being not tacit, the division of labor in search and rescue being not clear and search and rescue resources being wasted in the SAR cooperation among various countries or regions, it is necessary to set up relevant coordination and arrangement departments.

The main search and rescue bodies stipulated in the SAR Convention amendment include rescue coordination centers (RCC) or rescue sub centers (RSC), as well as search and rescue units. (SAR Convention, 2006) Once acquiring distress information, through the assessment and treatment of rescue coordination center, the Specific SAR units shall be designated and coordinate the personnel in distress, search and rescue units and other RCC or RSC to implement this work. If maritime search SAR involves several states, the parties shall be in cooperation with other states “to help ensure the provision of adequate shore-based communication infrastructure, efficient distress alert routing, and proper operational coordination to effectively support search and

rescue services”. (IMO, 1979)

2.1.3 Emergency

The emergency maritime SAR means that the relevant departments of SAR at sea cannot predict which ship will be in which voyage where and what shipwreck will occur before the occurrence of dangerous situations. (Li Shidong, 2000) Under the trend of economic globalization, with the development of economy in various countries, the technology has been improved, the exploration and exploitation of marine resources has also spread every corner of the world, and this leads to the result of dangerous marine sites covering the whole world’s sea area, which undoubtedly adds to the difficulty of search and rescue. (He Yang, 2014)

In order to protect the safety of persons in distress and property, and ensure maritime shipping security, the Maritime SAR departments in each state should increase efforts to upgrade monitoring equipment for maritime dangers, strengthen maritime SAR training of professional staff, improve maritime search and rescue professional skills to achieve rapid response to the acquisition of maritime emergency information and implement the SAR operations timely.

2.2 Current Situation of the South China Sea

2.2.1 Geography

The South China Sea is vast and connects many neighboring countries and regions. It is about 3000 kilometers long and about 1700 kilometers wide, covering an area of about 3 million 590 thousand square kilometers. (Bi Hua, 2011) The countries or regions surrounding the South China Sea are China, China Hongkong, China Taiwan, China Macao, Vietnam, Philippines, Malaysia, Indonesia, Brunei, and Thailand. The figure below shows the geographical situation of the South China Sea. It is very difficult to protect maritime security in the vast sea by means of a national or search and rescue unit. Therefore, we must seek coordination and cooperation with the neighboring countries or regions in the South China Sea in order to complete the search and rescue mission in this area in a good and secure way.

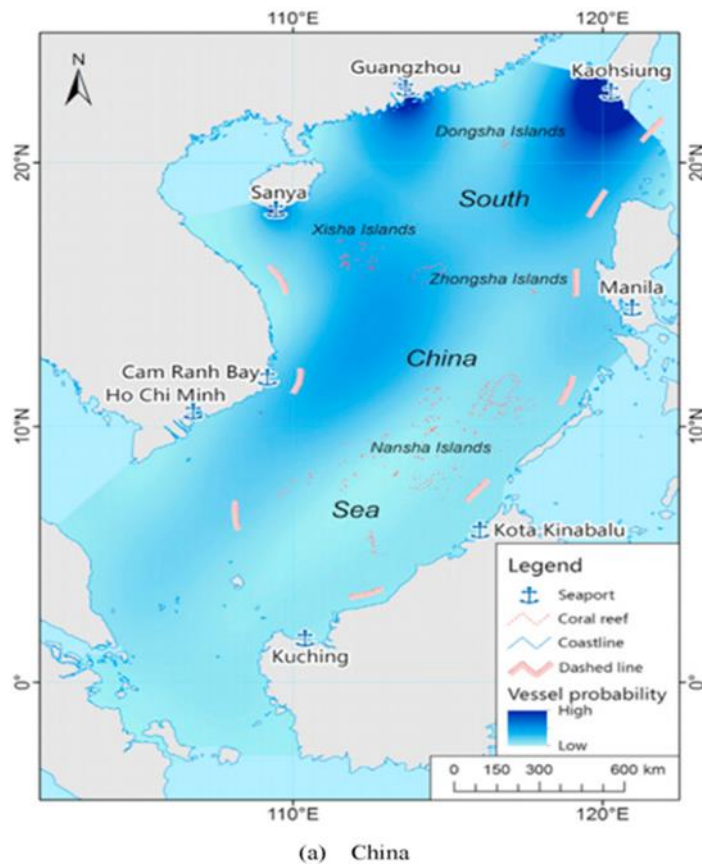


Figure 1: The map of the South China Sea.
Source: China Cartographic Publishing House

2.2.2 Shipping

The shipping route in the South China Sea is busy and the ship density is large. In recent years, the economic cooperation between China and ASEAN (Association of Southeast Asian Nations, whose members include Malaysia, Indonesia, Thailand, Philippines, Singapore, Brunei, Viet Nam, Laos, Burma and Kampuchea) countries has become increasingly active with the establishment of the China-ASEAN Free Trade Area, and the number of merchant ships from China and ASEAN countries has also been increasing. (Li Jinming, 2015) On the other hand, the South China Sea is the only way for the Middle East to import oil into Southeast Asia and Northeast Asia, and

is also an important fishing ground. Thus, it is easy to cause marine accidents here due to intensive passage of merchant ships, oil tankers, fishing boats from different countries.

2.2.3 Meteorology

The navigational meteorology and sea conditions of the South China Sea will affect the safety of ship navigation. The Islands and reefs are numerous in part of the South China Sea and submerged reef spread all over, so here is also known as "dangerous zone". At the same time, the South China Sea is a famous typhoon and monsoon area in the world, which poses a serious threat to the safety of ships at sea and personnel. (Su Shipeng, 2008) The next figure shows the track of NO.30 Typhoon in this area in October 2013. Therefore, it can effectively guarantee the safety of the ships by the means of strengthening regional cooperation in the search and rescue of the South China Sea.

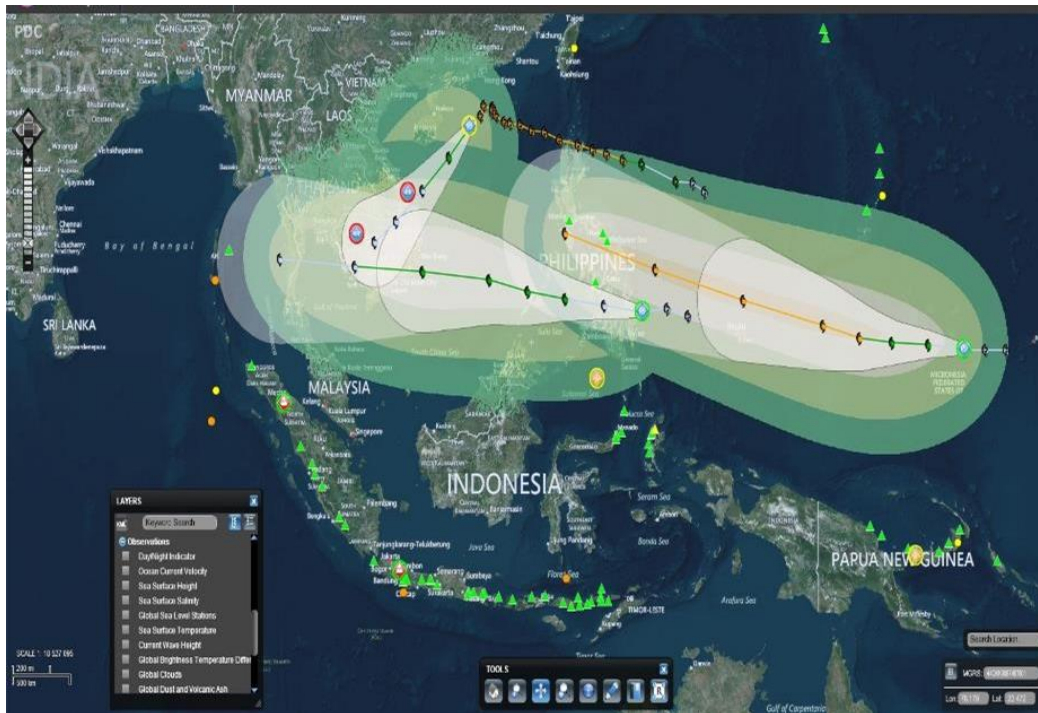


Figure 2: The track of the Typhoon Krosa in 2013.
 Source: Disaster Monitoring and Response System of ASEAN

In brief, the maritime search and rescue characteristic as well as the vast sea, larger number of ships, bad weather conditions and other factors in this area determine the great responsibility and arduous task of life salvage at sea in the South China Sea, and it is of urgent need to strengthen regional cooperation in maritime search and rescue.

2.3 Basis for Establishing a Cooperative Mechanism in the South China Sea

2.3.1 The political and economic cooperation.

Since the opening of the formal dialogue in 1991, China has maintained good

neighborly relations and close cooperative relations with ASEAN countries in such fields as political mutual trust, economic and trade exchanges and cultural exchanges. China and ASEAN have formed a cooperative pattern of "three levels and nine fields". The three levels are "bilateral", "sub regional", "10+1". (Zheng Huaiyu, 2017) "Bilateral relations" means that the relations between China and Indonesia, Vietnam, Laos, Cambodia, Burma, Thailand, Malaysia relations have been upgraded to comprehensive strategic partnership.

In "sub regional cooperation", China and ASEAN countries have conducted fruitful pragmatic cooperation in land transportation, energy and other fields under the framework of the Greater Mekong sub-regional economic cooperation.

In terms of "10+1", in 1997, the "ASEAN + China" leaders meeting mechanism was established, and China joined the Treaty of friendship and cooperation in Southeast Asia and established a strategic partnership with ASEAN.

2.3.2 The search and rescue cooperation.

In 2010, ASEAN adopted the Declaration of Cooperation in the Search and Rescue of Persons and Vessels in Distress at Sea. The Declaration encouraged members to designate a national Rescue and Coordination Centre, to establish direct communication channels to share information, and promptly extend support upon request to assist in SAR operations.

The Declaration also encouraged members to strengthen capacity on SAR, to promote

cooperation with dialogue partners, and to maintain a directory of national Rescue and Coordination Centers. It called for the development and strengthening coordinated regional approaches to SAR, and for regional policies, operational mechanisms, and a communication system to prepare for and ensure a rapid and effective response to a distress situation. (Paul Sinclair, 2014)

Chapter 3

Analysis of current conditions on the cooperation mechanism of maritime SAR in the South China Sea.

In recent years, the countries or regions surrounding around the South China Sea have paid more attention to the regional cooperation in maritime SAR to ensure the safety of navigation in this area. The countries or regions continued to communicate and coordinate, holding relevant meetings on maritime search and rescue cooperation, and having signed a series of multilateral agreements and bilateral agreements which result in some relevant provisions on this cooperation. At the same time, they actively promote cooperation in maritime SAR exercises and made efforts and attempts for the establishment of the cooperation mechanism for maritime SAR in the South China Sea.

3.1 China's Role in Promoting Regional Cooperation in the South China Sea Search and Rescue

In early 1990s, China and the surrounding countries or regions in the South China Sea began to communicate with the problem of maritime SAR, and reach some agreements that provide a reliable guarantee for the rapid and effective cooperation in the adjacent waters. In November 2002 China and ASEAN signed the "Declaration on the Conduct of Parties on the South China Sea"(DOCP) and stressed: " Pending a comprehensive and durable settlement of the disputes, the Parties concerned may explore or undertake cooperative activities..." and one of the important way is " search and rescue cooperation". (Li min, 2009)

Therefore, since the signing of the declaration, China has carried out 6 cooperation projects, such as maritime search and rescue, with countries or regions around the South China Sea. In September 2007, the third meeting of the China-ASEAN maritime consultative mechanism was held in Qingdao, where the representatives of China MSA and the maritime authorities of the ASEAN countries have conducted consultations and talks on maritime emergency response, search and rescue, and other issues.

In July 2011, a senior-officials meeting on the implementation of the DOCP was held in Bali Island, Indonesia. The Chinese side set up a series of cooperation initiatives for the establishment of a special technical committee for navigation safety and search and rescue, which received active response from all sides. Subsequently, in January 2012, the fourth senior-officials meeting of the DOPC discussed the establishment of special committees for navigation safety and SAR, and decided to hold a seminar on maritime SAR. In February 2012, the leaders of China and ASEAN signed the plan of action for the implementation of the declaration, emphasizing dialogue and cooperation in such areas as maritime navigation and traffic safety, maritime SAR, and the humanitarian treatment of persons in distress at sea. The representatives of China MSA and the ASEAN have indicated that they would continue to strengthen their close cooperation in maritime search and rescue and jointly improve maritime search and rescue capabilities. (Shi Chunlin, 2013)

3.2 Cooperation in Maritime Search and Rescue Exercises.

China has held joint maritime search and rescue exercises with countries and regions around the South China Sea for many times. In recent years, China often carries out various forms of joint maritime search and rescue exercises with the SAR forces of the

countries or regions surrounding the South China Sea for the purpose of improving the rapid organization, coordination and command capability of life salvage in this area and training maritime search and rescue team. In October 2004, the China Maritime Administration and the Philippines Coast Guard held joint search and rescue sand table exercises code-named "Sino Philippine cooperation 2004" in Beijing and Manila, respectively. In August 2012, China and Vietnam successfully held the first joint maritime search and rescue emergency communication exercise. In September 2016, the China-ASEAN joint maritime SAR desktop maneuver was held in Guangzhou.

Besides, China and ASEAN are also ready to cooperate in building a national platform for maritime SAR Hotline. The project plans to build a China-ASEAN joint maritime emergency response platform in these countries, and achieve the interconnection and interworking of emergency response through public network and satellite transmission network.

3.3 Cases of Cooperation in Maritime SAR in the South China Sea

In recent years, it is becoming increasingly close on cooperation in the field of maritime SAR among countries or regions surrounding the South China Sea. Many successful practices have been carried out in maritime distress information exchange and assistance in maritime SAR. The cooperation of maritime SAR in the South China Sea has made certain achievements.

In September 2005, a Chinese fishing boat was affected by the big waves and drifted to the sea area near Malaysia. At the request of the Chinese, Malaysia sent its military with maritime SAR coordination centers to rescue the fishermen in distress in time.

In May 2006, a large number of Vietnamese fishing vessels affected by typhoon and lost connect in the waters near the Dongsha Islands. At the request of the Vietnamese government, China Maritime SAR center organized the South China Sea Rescue Bureau, Hongkong flight service team and other specialized search and rescue forces to the target waters for rescuing these vessels rapidly. In the end, 15 Vietnamese fishing boats were successfully rescued, 330 Vietnamese fishermen were provided with food and medicine, and 22 Vietnamese fishing boats were supplied with fuel and fresh water.

On December 3, 2010, a ship of Panama nationality "HONG WEI" capsized in the South China Sea with 12 crew members rescued by the merchant ship "SHUN TON" and 2 crew members missing. China dispatched the rescue ship Sea "NANHAIJIU 113" and "Coast Guard NO. 31" to search the missing crew members.¹

These rescue cooperation operations show that the establishment of the search and rescue cooperation mechanism in the South China Sea is possible, and the parties concerned should abandon the dispute and participate in emergency rescue of fishing boats, merchant ships, passenger ships in this area actively.

¹ The case number in GISIS is C0008364.

Chapter 4

Current Problems in the Cooperation Mechanism of Maritime SAR in the South China Sea

Although some practical actions have been taken by the countries or regions around the South China Sea in search and rescue cooperation, and some achievements have been made, there are still many problems in this cooperation.

4.1 Problems on Cooperation in the Field of Laws and Regulations.

4.1.1 Lack of Binding Laws and Regulations on Maritime Search and Rescue Cooperation.

Although there are some negotiations and a number of agreements signed by the surrounding countries or regions of South China Sea on maritime SAR cooperation, they are lack of specific rules for implementation and most of them are without common bindings, and the terms of the rights and obligations of countries or regions are also not clear enough. The search and rescue level of the surrounding countries or regions in the South China Sea is generally backward, and it is almost blank in the specific operation of cooperation in search and rescue. There must be corresponding laws and regulations as guidelines so as to ensure that the cooperation in the field of maritime SAR in the South China Sea can be conducted in an orderly way. (Shi Xianghong, 2008) At present, there is no guiding document on maritime search and rescue cooperation due to the lack of relevant laws and regulations on it, which has a

certain impact on the extensive development of maritime SAR cooperation.

4.1.2 Different Countries Joining Different International Conventions

Due to differences in national policies, development level, interests, and historical aspects of these countries or regions, they selected to join different conventions among the existing international conventions relating to maritime search and rescue. For example, China, Vietnam, Singapore, Thailand, Philippines, Malaysia, Indonesia and Kampuchea signed up the "1974 SOLAS Convention", but Thailand and Philippines do not choose to join this convention. Malaysia, Kampuchea, Thailand and Philippines have not chosen to join the 1979 SAR Convention for different reasons. Philippines did not join the 1972 International Regulations for Preventing Collisions at sea(COLREGS) for its own consideration, which is contrary to the accession of most countries around the South China sea. (Li Yilong, 2012)

In fact, international conventions generally only bind contracting parties. Because the Conventions that these countries have endorsed is not consistent, the rights and obligations of the contracting parties and the non-contracting parties are different, the partners are in unequal status in maritime search and rescue, which, to some extent, has increased the difficulty of cooperation in maritime search and rescue.

4.1.3 The level of cooperation is not deep enough

At present, China has only signed bilateral cooperation agreements or frameworks with

several countries. The scope of cooperation is narrow and the level of cooperation is not deep enough. Because China has territorial sovereignty disputes with some ASEAN countries in the South China Sea, although China has carried out a number of cooperation projects in maritime search and rescue cooperation, it is still in the stage of "one case one discussion", and the effect of all-round and multi-field cooperation based on real international level is not prominent and needs to be deepened and expanded. (Zhu Jianzhen, 2015) China and ASEAN countries have been actively promoting cooperation in many fields of maritime search and rescue, however, from the implementation of the project, there are too many basic fields such as sand table exercises, maritime exercises, exchanges, consultation meetings, while it rarely involves cooperation between key technologies and systems. The content that really involves cooperation habits and cooperation strategy is still in its infancy.

4.2 Ineffective Coordination Mechanism on Communication and Information Network among the Countries or Regions

4.2.1 Imperfect Construction of Information Network for Maritime Search and Rescue Communication

In maritime search and rescue cooperation, it is helpful to respond the danger rapidly and rescue vessels and personnel in distress in time with the establishment of a sound communication and coordination mechanism. In order to effectively protect the safety of life and property at sea, some relevant provisions were made in the 1979 SAR Convention: "Parties should enter into agreements with neighboring States setting forth the conditions for entry of each other's search and rescue units into or over their

respective territorial sea or territory”. (SAR convention, 1979) If one contracting state needs to enter the waters of other Contracting States for the requirement of maritime SAR, other contracting parties shall provide convenience to the State Party and allow the maritime SAR forces of the State Party to enter and implement maritime search and rescue. However, in practice, due to various disputes in the South China Sea, this provision has not been complied with by the countries or regions around this area, which has also hindered the smooth development of the maritime SAR operations.

In addition, because there is no exact channel of communication between the parties in advance, it is difficult to communicate the information among the parties. Once the ships in the disputed sea area or sensitive sea come across dangers or accidents, the maritime danger information needs to be transmitted through the complicated procedure to realize the exchange, which will result in the failure of timely assistance. The imperfect communication and coordination mechanism has seriously affected the effectiveness of maritime SAR cooperation in various countries or regions around the South China Sea.

Take Searching for the missing Malaysia Airlines MH370 in 2014 as an example. In the first phase of the search and rescue, the parties involved in the search and rescue urgently required Malaysia authorities to provide authoritative and accurate information. However, the Malaysian side tried to control the release of information in order not to expose military information. At the same time, they cannot achieve coordination between government departments, resulting in the lack of unified and accurate information release. Consequence of this is that the joint search and rescue forces from various countries were at a loss as to what to do. As a result, the international community wasted a week in the Gulf of Thailand on search and rescue operations because Malaysia's official publication of accurate information lags behind.

(Liu Guoqiang, 2014) Similar events emerged in an endless stream. Not until the twelfth day after the incident did Malaysia establish a rescue coordination center (RCC) after consulted with other countries.

Moreover, it increased the difficulty of this operation for lack of necessary information and support or cooperation from Malaysia, the leading Party. In the third stage of the search, the Australian Maritime Safety Bureau asked the Malaysian side to provide a cargo list of the flight in order to compare suspicious objects, but Malaysia failed to do so. (Kong Dejing, 2014)

4.2.2 The construction of information network for maritime search and rescue communication is imperfect.

The success of maritime search and rescue operations requires all aspects of work to be done at the same time, in which the smooth access to maritime distress information is the most important. At present, some countries or regions in this area can not obtain maritime distress information effectively and timely because of their own policies and economic level and other factors even if there are some rescue bases. (James Hookvi, 2014) The construction of dangerous report information network is also very imperfect, and the capacity to deal with maritime distress information is rather weak, both of which delay the search and rescue operations.

The standby ships and rescue sites that the countries set in the South China Sea often can not get maritime distress information in the first time. Instead, it is the National Maritime Search and rescue center on shore or other responsible department on shore

that will receive reports of distress at sea first, and then make a reasonable response to the information and report it to the ships on duty and rescue stations. There is no doubt that the best rescue time at sea has been lost in these links.

In addition, a ship in distress will be affected by the wind, water flow and other factors, and the ship will move, which makes the distress place often differ from that in the report. This greatly increases the difficulty of maritime search and rescue operations. Therefore, it is particularly important for the success of maritime search and rescue operations to improve the maritime SAR communication network in the South China Sea and the capacity of the rescue base to obtain maritime distress information.

4.3 Backward Search and Rescue Equipment or Facilities in Some Countries

The maritime search and rescue equipment and rescue facilities in some countries or regions around the South China Sea are generally lagging behind because of the limitation of economic level. In operation of searching for Malaysia Airlines MH370, there is an obvious gap between Southeast Asian countries and the western developed countries, whether in search and rescue equipment, or in search and rescue technology.

The first is the lack of specialized marine rescue equipment. Among the vessels involved in the rescue operation, only the vessels from China such as “NANHAIJIU 101”, “NANHAIJIU 115”, “DONGHAIJIU 101” and “Coast Guard 01” have specialized rescue equipment, while those from Southeast Asian countries have been temporarily involved in the search and rescue. The second is the lack of efficient aerial search equipment. Compared with those aircraft of the United States P-3C and P-8A that can detect 76 meters underwater and search 770 square kilometers of sea area

within 4 hours, (USCG, 2016) the aircraft in Southeast Asian countries mainly rely on visual observation of low altitude flight to search and rescue, and lack the corresponding deep-sea detection capability.

Compared with other countries or regions surrounding the South China Sea, there is a larger number of maritime search and rescue equipment in China and they are more advanced in performance. Take the South China Sea Rescue Bureau as an example, it has two big rescue tugs with 14000 kw and 12000 kw respectively, seven rescue tugs with 9000 kw, which can carry out search and rescue in the ocean. (NRB, 2017) Besides, warships can be dispatched to the mass search and rescue operations. For example, in the search and rescue of Malaysia Airlines MH370, China sent two warships to participate in the operation.

In China's maritime search and rescue mechanism, the existing equipment plays an important role. Nevertheless, it may not meet the requirements of the whole South China Sea for the search and rescue, because there are many disadvantages in the long distance maritime search and rescue, such as slow speed and inconvenient supply of ships. In the event of Malaysia Airlines MH370 missing, China's maritime search and rescue forces arrived the incident waters after nearly 40 hours, which greatly delayed the best time for rescue. Moreover, in the search and rescue process, the rescue ships shall spend many days sailing back to reach designated ports for the supply, and thus reduces the actual effective time of maritime search and rescue.

Philippines's maritime search and rescue equipment includes search and rescue ships, search and rescue helicopters, which are all managed by the coast guard. Malaysia Maritime Administration Bureau has patrol ships, fixed-wing aircraft and search and rescue helicopters and so on. (Li Hongjun, 2008) Vietnamese search and rescue

equipment mainly includes naval vessels and inshore patrol boats. In Indonesia, the search and rescue mission is also operated by the Navy. But due to the economic level and international arms sanctions, the equipment aging seriously, and it is difficult to adapt to the bad weather and long-distance search and rescue operations. (Ju Hailong, 2011) Brunei's maritime forces are mainly Brunei Royal Navy with 61 various types of patrol boats, whose main task is to safeguard maritime sovereignty, implement maritime search and rescue and support for government enforcement at sea and so on. (Shu Donghai, 2010) This equipment is not only small in number, in tonnage, but also rather old. There are still many difficulties in dealing with maritime long-distance search and rescue operation under extreme weather.

In all, the number of search and rescue equipment in these countries is not enough, and the performance is at a lower level. At the same time, the countries or regions surrounding the South China Sea are developing countries or regions except Singapore, and their medical, logistical, communications and other hardware conditions that affect search and rescue are generally lagging behind. The next accident illustrates this reality very well.

On January 2, 2012, when the ship "THERESA DUA" was navigating in the South China Sea, its crew was injured while operating the crane without authorization and supervision practice. The ship immediately sought medical assistance from the Philippines coast guard. However, they were unable to provide the requested medical assistance and eventually the crew died because the rescue was not in time.²

To sum up, the countries around the South China Sea except for China, have the

² The case number in GISIS is C0009175.

following characteristics in maritime search and rescue equipment and rescue facilities:

- (1) the number of maritime search and rescue equipment is relatively small;
- (2) the performance of maritime search and rescue equipment is poor;
- (3) the rescue capability is poor.

4.4 Relevant Parties' Lack of Enthusiasm to Participate in Search and Rescue

IMO marine accident statistics database shows that there are about 89 shipwrecks in the South China Sea from May 24, 1984 to May 24, 2014, of which 60 were very serious, 21 were serious, 1 were less serious, and 7 were not classified.³ In view of the fact that the official search and rescue disaster is mainly carried out by the maritime search and rescue institutions in the South China Sea, the formation and operation of the search and rescue cooperation mechanism in the South China Sea are largely determined by these countries. Because of these countries are not convenient flag, the nationality of the ship can be identified as the primary standard to determine the closeness of relationship between these countries and the shipwrecks. If we retrieve the IMO database with the keyword of flag state, the statistics of shipwrecks that belongs to these countries can be obtained, as is shown in table 1.

Table 1: The number of marine casualties or incidents according to the flag state.

³ IMO marine accident statistics database divides the grades of marine accidents into: very serious casualties; serious casualties; less serious casualties; marine incidents

state	Number of casualties	percentage	the level of the casualties			
			very serious	serious	less serious	marine incidents
China	13	34	8	4	1	
Vietnam	8	21	6	2		
Thailand	5	13	3	2		
Singapore	4	11	2	1		1
Philippines	2	5	1	1		
Malaysia	2	5	2			
Indonesia	2	5	2			
Kampuchea	2	5	2			

Source: The database of GISIS. Retrieved March 4, 2017 from the World Wide Web: <https://webaccounts.imo.org/Common/WebLogin.aspx?App=GISISPublic&ReturnUrl=https%3a%2f%2fgisis.imo.org%2fPublic%2fMCI%2fDefault.aspx> and compiled by author.

Of course, it can only reveal the relationship between these countries and the search and rescue in the South China Sea to a certain extent according to the statistics of the nationality of the ship in the shipwreck. Due to the open registration in the shipping market, the ships, which are actually controlled and operated by the countries of the South China Sea, will often hang open registry flag. These countries are closer with these ships while they are the maritime interests concern compared with the flag.

In addition, in maritime search and rescue practice, a country or region is usually active or requested to search and rescue at sea when a shipwreck occurs in its own waters or near waters. Therefore, for a comprehensive study on the relationship between these countries and the search and rescue in the South China Sea, it is necessary to combine the maritime search and rescue entity, the accident spot, coastal state, accident reporter and other indicators for statistical analysis besides the analysis from the angle of flag state. (Xiang Li, 2014) If we take the indicators of the nationality of the ship, the place where the shipwreck occurs, the maritime search and rescue entity, the marine accident

reporter, and the coastal state as a criterion, the relationship between such countries and 89 maritime accidents in the South China Sea is shown as table 2:

Table 2: The number of marine casualties associated with these countries.

State	Marine Casualties	Percentage(%)
China	40	44.9
Vietnam	7	7.9
Thailand	5	5.6
Singapore	5	2.2
Philippines	2	2.2
Malaysia	2	2.2
Indonesia	2	2.2
Kampuchea	2	2.2

Source: The database of GISIS. Retrieved March 4, 2017 from the World Wide Web: <https://webaccounts.imo.org/Common/WebLogin.aspx?App=GISISPublic&ReturnUrl=https%3a%2f%2fgisis.imo.org%2fPublic%2fMCI%2fDefault.aspx> and compiled by author.

It shows that the substantive links between these countries and the maritime accidents in the South China Sea are more different from the comparison in the angle of flag state. The above statistics shows that in the South China Sea there are 40 maritime accidents associated with China, which rank first and account for 44.9% of the total number of shipwreck in the South China Sea. The statistics of table 1 and table 2 illustrate that China and Vietnam are at the forefront in term of the number of shipwreck accidents, or the number of maritime accidents that have a substantial connection with them in the South China Sea. The accident rate in other countries is very low, and there are only a small number of marine accidents.

Therefore, there are great differences in the national interests of the countries or regions surrounding the South China Sea in the field of maritime search and rescue,

which has resulted in the extreme lack of internal motivation for the real cooperation between other countries or regions around the South China Sea and China in carrying out maritime search and rescue. It hindered the establishment and perfection of the cooperation mechanism for maritime search and rescue in the South China Sea.

In addition, there are sovereignty disputes between the neighboring countries of the South China Sea and China or between themselves, and the international relations around the South China Sea are complex and changeable. The cooperation of SAR in the South China Sea lacks mutual trust, mutual assistance and mutually beneficial international relations.

4.5 Unsound Training Mechanism for Maritime SAR Personnel

The professional level of maritime search and rescue personnel around the South China Sea is generally low. It is a difficult task for Search and rescue personnel to make a correct and effective response to the sudden distress at sea and take the corresponding emergency measures. This shows that the search and rescue personnel should possess high professional quality and professional skills. China has a professional rescue team, while most other countries or regions surrounding the South China Sea do not have special maritime rescue personnel, and their search and rescue personnel training mechanism is not perfect.

The number of professional rescue personnel is insufficient and their skill poor which will have a significant impact on the decision-making and implementation of the sudden maritime danger at sea. (Cen Xuanren, 2015) The main impact are as follows:
(1) Wrong judgment of maritime danger;

- (2) Hesitant to deal with the danger at sea, thus resulting that it delays the best time for maritime search and rescue;
- (3) Inappropriate emergency treatment methods and measures in the process of dealing with maritime danger.

At present, the countries or regions around the South China Sea have made some progress in the cooperation of personnel exchanges in search and rescue areas, but the cooperation at this stage is far from enough to achieve the goal of jointly ensuring the safety of maritime navigation in the South China sea.

Chapter 5

Reference of cooperation mechanism of maritime SAR in similar sea areas.

The SAR Convention aims to establish an international coordination system to ensure the efficiency and safety of rescue operations. Therefore, states parties are encouraged to conclude SAR agreements with neighbouring states to regulate and coordinate SAR operations and services in the agreed maritime zone.

.

5.1 The SAR cooperation between Australia and Indonesia.

Australia and Indonesia concluded such an agreement in 2004. (IMO, 2004) The agreement designates the national RCCs for the agreed SAR region, and defined the ways by which the RCCs interact or exchange information, and carry out cross-border search and rescue operations. In these cross-border operations, the rescue force of one State can enter another country's territorial waters without any authorization, while it should only notify the coastal RCC that its operation. There is a general criterion that the area where the vessel in distress is located determines the responsibility of RCC to carry out an operation. The RCC that is responsible for the area shall organize the operation. If the location of the vessel in distress is unknown, the RCC that received the distress information is responsible for it. (Seline Trevisanut, 2010)

Such an agreement technically and operatively implements the obligation laid out in the Convention, which provides that where needed, neighbouring States shall cooperate through regional agreements to promote and maintain adequate and effective SAR services. It also reduces the risks of non-rescue incidents. Moreover, there is an

economic advantage for the contracting parties that they can share the costs of organizing and implementing search and rescue operations.

5.2 The SAR cooperation in Arctic Ocean.

On May 12, 2011, the members of the Arctic Council agreed to conclude the Arctic Sea-Air search and rescue cooperation agreement in Nuuk City, Greenland. (Betsy Baker, 2012) The objective of the Arctic SAR Agreement is clear: “to strengthen aeronautical and maritime search and rescue cooperation and coordination in the Arctic.” (Arctic Council, 2011) The agreement has a binding effect on each state party. At the same time, the agreement stipulates that countries are solely responsible for certain areas and should establish air and maritime search and rescue coordination centers (RCCs) in their respective regions, and coordinate the maritime search and rescue operations within the command area. The next figure shows the responsibility areas for each party.



Figure 3: Illustrative map of Areas of Application in the Arctic Search and Rescue Agreement.

Source: Norwegian Ministry of Justice and Public Security.

The agreement contains provisions requiring and permitting access to another country's area for search and rescue purposes. Each of the Arctic countries is responsible for the Arctic region as defined in the Arctic SAR Agreement, and all eight countries share information on their Rescue Coordination Centers. It is agreed that the boundary between the maritime search and rescue liability zone and the border between countries do not affect each other, and the delineation of the maritime search and rescue responsibility area is not related to the territorial scope of the countries. The agreement also enables cooperation in the sharing of real-time meteorological and ocean observations, forecasts and warnings, the use of ship reporting systems for search and rescue purpose, and the sharing of other information and expertise among

countries to facilitate the search and rescue of the Arctic. After the signing of the agreement, the cooperation of members in the field of maritime search and rescue gradually deepened, and a number of joint maritime search and rescue exercise are held. Canada hosted the first simulation exercise under the Agreement in October 2011. (Betsy Baker, 2012)

5.3 Cooperation between the countries of the western India ocean, the Gulf of Aden and the Red Sea coast in Maritime Navigation Safety

In January 2009, 17 government leaders of the West Indian Ocean, the Gulf of Aden and the Red Sea met in Djibouti, and all countries expressed concern about the piracy activities. At the meeting, the countries reached a consensus and promulgated a code of conduct to work together to combat piracy. The implementation of the code of conduct to achieve the common goal of cooperation against pirates, and specifically provides the way of preventing and fighting against piracy activities. The introduction of the code of conduct plays a significant role in the fight against piracy for the countries in the West Indian Ocean, the Gulf of Aden and the Red Sea coast, and since then maritime attacks and robbery have greatly reduced. (Cao Kun, 2009) The code of conduct clearly sets out the rights, obligations and cooperation of the partners, which enables the signatories to act according to their circumstances and follow the prescribed order.

5.4 Maritime cooperation in Black Sea.

The coastal countries of the Black Sea jointly signed the Cooperation Agreement on

Maritime Search and Rescue Services in the Black Sea in 1998. (Wen Yajun, 2015)

The agreement recognizes existing or future bilateral search and rescue agreements between coastal States. Article 5 of the Agreement deals with the provisions of coordination and cooperation. The area of search and rescue responsibility for the Black Sea area should be established in accordance with bilateral or multilateral agreements, and States Parties should actively cooperate in the area of search and rescue responsibility. The definition of the search and rescue area is not related to the delimitation of the national boundary on sea. Article 6 provides that, unless otherwise agreed by the contracting Party, a party shall, in accordance with its own relevant laws and regulations, grant the right to other contracting party to enter or to act in its territorial sea or territory only for the purpose of determining the location of the search rescuing the survivor. Article 7 provides for the search and rescue of countries in the location of exchange of information, equipment performance and so on. (BSMRCC, 1998)

Since then, the Black Sea coastal countries have subsequently signed a number of bilateral search and rescue agreements, and most directly provided the search and rescue areas, search and rescue operations of the competent authorities and other procedures. And from 2004 to 2014, the annual meeting of the Black Sea coastal search and rescue cooperation has been carried out. (Chen Xiaohu, 2010) Each meeting would require all participating countries to report their own search and rescue progress, and specific search and rescue related issues would be discussed in the meeting. Since 2005, the joint search and rescue exercises have been conducted every two years to enhance the coordination of search and rescue operations in search and rescue units of the countries of the Black Sea.

Chapter 6

Recommendations on Improving the Cooperation Mechanism for Maritime SAR in the South China Sea.

The importance of the South China Sea area is increasing, since the route has become much busier with so many ships passing through it every day. At the same time, with the increasing development of marine resources and marine breeding activities, the probability of maritime incidents in the South China Sea has also increased. Therefore, it is necessary to strengthen and improve the cooperation of maritime search and rescue at the South China Sea. The incident of Malaysia Airlines MH370 makes the countries concerned fully aware of the importance and urgency of establishing a cooperation mechanism for search and rescue. At the 2014 Nanyang Forum, China formally proposed an initiative to establish a cooperation mechanism, saying that "it is necessary to act as soon as possible to discuss the establishment of a joint mechanism for joint maritime search and rescue operations and to enhance related capacity-building". (Liu Jianchao, 2014) According to the history and reality of the countries or regions around the South China Sea, a joint operation mechanism for regional maritime search and rescue will be gradually established. Specifically, the following recommendations are made on the improvement of the cooperation mechanism for maritime search and rescue in the South China Sea.

6.1 To Make Clear the Way of the South China Sea SAR Cooperation and Responsible institutions

6.1.1 Ways of SAR cooperation

In the South China Sea, the form of cooperation between China and ASEAN can be used for reference in the form of SAR cooperation. China and ASEAN have established cooperation mechanisms for maritime search and rescue in the South China Sea, including the "China-ASEAN" maritime business mechanism and the transport ministers meeting of China and ASEAN (10+1). (Zeng Peng, 2010)

The countries or regions around the South China Sea can learn from the above model to negotiate and sign treaties or agreements on cooperation in maritime search and rescue. Vietnam, the Philippines, Malaysia and other countries in ASEAN could use a unified identity to participate in the South China Sea SAR cooperation negotiations, so that these countries or regions will have a better platform to negotiate the search and rescue issues. It also reduces the difficulty of the SAR cooperation negotiations as it reduces the subject of negotiation. At the same time, it shall allow partners to reach a specific bilateral SAR agreement on the basis of search and rescue cooperation mechanism in the South China Sea.

6.1.2 Establishment of Maritime Search and Rescue Joint Meeting System

On the basis of the experience of the inter-country dialogue mechanism, the maritime search and rescue joint meeting system, which is attended by the maritime departments of the countries or regions around the South China Sea, can be established to be responsible for the maritime SAR cooperation in the South China Sea.

Through the establishment of the system of maritime SAR joint meeting, which will be held regularly, the partners shall research how to strengthen the South China Sea maritime SAR cooperation and how to enhance national maritime SAR capabilities and so on. The joint meeting can be identified as the main responsibility for maritime search and rescue institutions, which is mainly responsible for the coordination and command, responsible for the unified reception of rescue requests to promote cooperation and information exchange of the search and rescue forces from various regions. (Zhou Jiang, 2007) Meanwhile, a joint rescue coordinator center (RCC, see Figure4) in the South China Sea will be set up in the permanent body of the joint conference, which is responsible for the information collection and dispatch the SAR force, etc.



Figure 4: The example of RCC.

6.2 Establishment of a Maritime SAR Access System

As a result of historical and cultural reasons, Asian countries have linked the division of responsibility for maritime life search and rescue on the sea to territorial sovereignty, leading the Northwest Pacific region to become the only region in the world that does not have a clear search and rescue area. The next figure shows the maritime search and rescue responsibility area of China and China Hongkong in the SAR Convention. Although some countries or regions have not joined the SAR Convention, but in the South China Sea maritime search and rescue cooperation, they can follow the relevant provisions of the Convention on maritime search and rescue responsible area to delineate maritime SAR areas in the South China Sea. And it is agreed that the maritime SAR area and the border between the state does not affect each other, the delineation of the maritime SAR area has nothing to do with the territorial scope of each country. (Zhao Jianwen, 2005) In shall establish a maritime SAR access system for the purpose of requesting and granting permission to enter another State's area to operate search and rescue when it necessary.

On the one hand, it avoids the territorial disputes in the South China Sea that bring obstacles to maritime search and rescue cooperation in this area. On the other hand, it can also specify the specific maritime search and rescue obligations of neighboring countries or regions and strengthen their awareness of search and rescue.

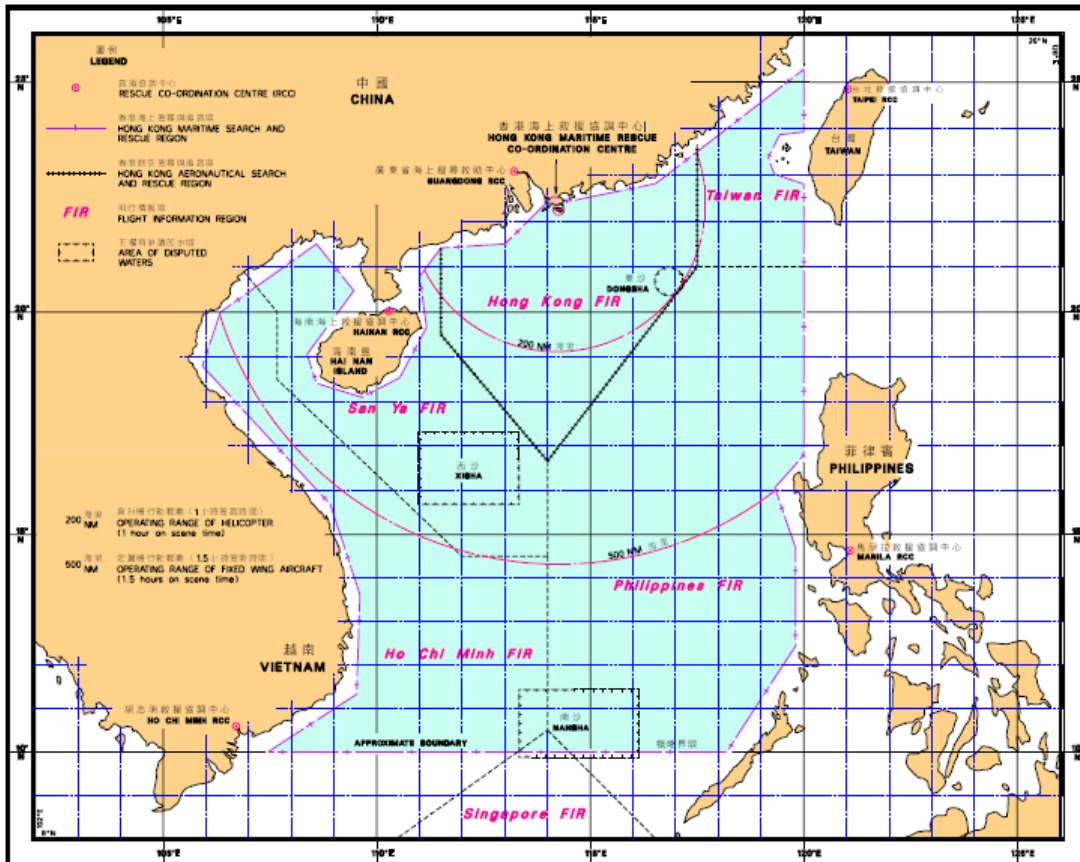


Figure 5: Maritime Search and Rescue Responsibility Area of China and China Hongkong in the SAR Convention.

Source: http://www.mardep.gov.hk/en/pub_services/ocean/home.html

6.3 Setting up SAR sites and Carry out Joint SAR Exercises

Reasonable layout of maritime SAR sites is an important measure to save time and effectively safeguard the property safety of personnel in distress. On the basis of consultation, the surrounding countries or regions in the South China Sea may draw up a scientific layout plan for the South China Sea rescue station. Firstly, according to the accident rate of the specific area the countries shall determine the layout of the rescue site density. Secondly, in the rescue site, these countries may build ports and

airports and other facilities equipped with the appropriate search and rescue forces to cope with the emergency incident in the South China Sea waters. (Wang Xiuwei, 2013)

In the maritime joint SAR exercises, the various countries or regions around the South China Sea can learn from the experience of the Baltic countries. The Baltic coastal countries have established a long-term SAR cooperation, and the joint SAR exercise is a regular activity. In the process of establishing of long-term stability maritime joint SAR exercise mechanism, the collaborative SAR capabilities among the partners are able to be tested and improved. The figure 6 shows the joint SAR exercise between China and China Hongkong on rescuing the passenger ship.



Figure 6: Joint search and rescue exercise.

Source: www.Chinanews.com

For example, China's search and rescue ships and facilities are relatively advanced, so China can provide enough search and rescue forces, and those countries or regions with relatively poor rescue services can provide appropriate supplies and logistical support to ensure the sustainability of maritime search and rescue, thus improving efficiency in actual search and rescue. And in the exercise, the RCC from different parties to the maritime search and rescue center should be fully involved in testing information exchange and communication skills. The problems encountered in search and rescue shall be solved through the exercise.

6.4 Establishment of Long-term Cooperation and Exchange Plan in Technology, Information and Personnel

Cooperation and communication is an important way to improve the level of search and rescue. The relevant provisions of the SAR Convention on international search and rescue cooperation involving SAR exercises, personnel to visit and exchange SAR information, etc. In the South China Sea search and rescue cooperation, we can learn from the provisions of the Convention and formulate long-term cooperation and exchange plan in technology, information and personnel.

6.4.1 Technical exchange.

Technical exchanges shall include regular cooperation meetings, search and rescue practices, training of sending personnel abroad, SAR agencies exchange of visits and equipment technology exchanges and other aspects. (Pourzanjani, 2005) The partners can regularly organize visits between SAR agencies across the country. In the course

of visit, experience, techniques and skills in SAR will be exchanged among different countries or regions and advanced SAR ideas and mechanisms of a country can be used for reference by other countries or regions to make up for their own deficiencies on SAR mechanism. At the same time, it can also strengthen the cooperation in international training courses, and the search and rescue personnel shall be sent to developed countries to carry out training and improve the capabilities of personnel. (SAR Training, 2005)

6.4.2 Information exchange

Information exchange includes sharing and regular communication of distress information and meteorological, hydrological and other aspects of the sea. In a specific SAR cooperation action, the operator should inform the partners of the sea area environmental information and distress information. In regular exchange of information, the parties share information on the environment, climate and other aspects of search and rescue waters, and should strengthen cooperation between the meteorological departments of various countries. (Fan Yemin, 2014)

In the exchange, environmental characteristics of the relevant sea areas should be summarized, and ways of information collection and communication should be constantly innovated, which will provide a powerful information guarantee for specific SAR cooperation practice.

6.5 Establishment of maritime SAR fund in the South China Sea.

Maritime search and rescue costs a lot of money. Because the maritime SAR is public welfare and non-profit, as a government action, its financial should also be supported by each country. However, the level of economic development is different in these countries or regions, resulting in the deficiency of SAR funds, which will inevitably lead to the low capacity of SAR, therefore, one aspect in the establishment of regional cooperation of SAR mechanism is to establish a search and rescue fund. The proportion of the fund countries or regions have to pay can be calculated by referring to a country's sea area and its economic development. In addition, it can also absorb social donations.

China has been actively committed to the South China Sea search and rescue. At the 14th China and ASEAN leaders meeting in Bali, Indonesia in 2011, China announced the establishment of 3 billion yuan of China - ASEAN Maritime Cooperation Fund, and this has gradually formed China-ASEAN multi-level, all-round pattern of maritime cooperation. (Wen Jiabao, 2014) The fund will be used for cooperation on marine issues such as navigation safety, biodiversity and maritime search and rescue.

6.6 Improvement of Maritime SAR Compensation Mechanism and Incentive Mechanism

In present circumstances, social forces play an important role in maritime search and rescue activities, and they have the advantage that many government-level maritime SAR forces do not have. Therefore, the social forces involved in maritime search and rescue shall be compensated and rewarded. (Zhu Yuzhu, 2010)

In the compensation mechanism, there will be some losses more or less in maritime SAR operation for the social forces. Therefore, in the maritime search and rescue cooperation mechanism, partners should use part of the funds to compensate for the social forces involved in maritime search and rescue.

As for incentive mechanism, in the South China Sea maritime SAR mechanism, we can learn from Western countries on the search and rescue personnel incentives. Rewards can be detailed in the regulations, and rewards can be given to organizations or individuals involved in maritime SAR.

Chapter 7

Conclusion

Maritime SAR is a very comprehensive work, and it needs to coordinate the forces and support from different countries and departments. In the South China Sea, the existence of a series of problems, such as disputes over sovereignty and interests in different countries, has greatly affected and hindered the cooperation of maritime SAR. Therefore, there is still a long way to go for the establishment and improvement of the maritime SAR cooperation mechanism in the South China Sea. The relevant parties in this area should actively participate in the process of communication and consultation, make corresponding concessions for the improvement of maritime SAR cooperation, and try to bypass the territorial disputes in the South China Sea in an appropriate way and try to increase cooperation.

This cooperation is not only a technical problem, political factors also played a decisive role in it. Therefore, the realization of search and rescue cooperation requires the joint efforts of the neighboring countries in the South China Sea, which should give full play to the role of the existing platform, such as Such as the ASEAN Regional Forum, the Western Pacific Naval forum, the China-ASEAN maritime consultative mechanism, and the China-ASEAN Maritime Cooperation Forum.

At the same time, China should play an important role in SAR cooperation. At present, China is sparing no efforts to constantly improve some existing problems in the search and rescue work procedures, organization and coordination, rescue information system and so on, and is actively participating in regional SAR cooperation to achieve complementary advantages, and striving to play its role in the South China Sea search

and rescue so as to contribute to regional security. For the sake of shipping safety, all countries or regions around the South China Sea should be on the tack of full consultation and cooperation and work together for the construction and improvement of the maritime search and rescue cooperation mechanism in the South China sea.

REFERENCES

- Arctic Council (2011). Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic. Retrieved 28 March 2017, from the World Wide Web: www.arctic-council.org/index.php/en/document-archive/category/20-main-documents-from-nuuk?download=73:arctic-search-and-rescue-agreement-english
- Bi Hua. (2011). The geography of the South China Sea. In *Acknowledge of the South China Sea* (pp. 33-34). Guangxi: Guangxi Normal University press.
- Betsy Baker. (2012). Search and Rescue: International cooperation and the Law of the Sea protect the U.S. Arctic. Retrieved 20 April 2017, from the World Wide Web: https://www.institutenorth.org/assets/images/uploads/articles/Search_and_Rescue-International_cooperation_and_the_Law_of_the_Sea_protect_the_U.S._Arctic_By_Betsy_Baker_Vermont_Law_School.pdf
- BSMRCC. (1998). Agreement on Cooperation Regarding Maritime Search and Rescue Services Among Black Sea Coastal State. Retrieved 5 May 2017, from the World Wide Web: <http://www.bsmrcc.com/files/legal3.pdf>
- Cao Kun. (2009). The IMO Code of Conduct for Combating Piracy have been approved. Retrieved 31 April 2017, from the World Wide Web: <http://www.chinanews.com/gj/qqjs/news/2009/01-31/1543387.shtml>
- Cen Xuanren. (2015). The research on Maritime SAR Cooperation Mechanism of the South China Sea. Unpublished master's thesis, Hainan University, Haikou, China.
- Chen Xiaohu. (2010). An Analysis of the Common Trends of Search and Rescue Organization in the World. *China Shipping*, 5, 36-38.
- Fan Yemin. (2015). Problems and Countermeasures of international joint rescue from Malaysia Airlines MH370 incident. *New Western*, 6, 168-169.
- He Yang. (2014). It is necessary to strengthen maritime search and rescue capability construction to meet the needs of maritime emergency rescue. *Shipping Management*, 9, p26.

- International Maritime Organization (IMO). (1979). SAR convention, 1979: International Convention on the Maritime Search and Rescue, 1979. London: Author.
- International Maritime Organization (IMO). (2013). History of Safety at Sea. Retrieved 20 September 2013, from the World Wide Web: <http://www.imo.org/en/KnowledgeCentre/ReferencesAndArchives/HistoryofSafetyatSea/Pages/default.aspx>
- International Maritime Organization (IMO). (2004). 'Notification of an Arrangement on Search and Rescue between the Government of Australia and the Government of Indonesia and submitted in accordance with paragraph 2.1.4 of the Annex to the 1979 SAR Convention, as amended,' (13 April 2004) SAR.6/Circ.22, available at: <http://docs.imo.org>
- James Hookvi. (2014). Malaysia called for countries that participation in search and rescue flights to strengthen information sharing. Retrieved 20 April 2017, from the World Wide Web: <http://cn.wsj.com/gb/20140320/bas092524.asp>
- Ju Hailong. (2011). The maritime safety policy of Indonesia and its practice. *World economic and political forum*, 3, p32.
- Kong Dejing. (2014). Will Malaysia lose its lead in search and rescue investigation. *Beijing Youth Daily*, p9.
- Li Hongjun. (2008). Navy of Malaysia and Indonesia. *Ordnance Knowledge*, 1, p30.
- Li Min. (2009). Strengthening cooperation between China and ASEAN in search and rescue. *China Shipping*, 6, p19.
- Li Jinming. (2015). Waves of South China Sea- Southeast Asian nations and South China Sea issues. (pp.11-13). Nanchang: Jiangxi University Press.
- Li Shidong. (2000). The Features of Maritime Search and Rescue. *Shipping Management*, 12, p32.
- Li Yilong. (2012). A Study on the Legal Cooperation Mechanism of the Maritime SAR in the South China Sea. Unpublished master's thesis, Hainan University, Haikou, China.

- Liu Guoqiang. (2014). Malaysia flight disappearances: the search and rescue in Gulf of Thailand are in vain. Retrieved 30 May, 2014 from the World Wide Web: <http://www.lifeweek.com.cn/2014/0324/44265.shtml>
- Liu Jianchao. (2014). Malaysia Airlines MH370 incident highlights the importance of joint maritime search and rescue. Retrieved 8 May, 2017 from the World Wide Web: <http://www.chinanews.com/gn/2014/03-29/6008201.shtml>
- Liu Xiao. (2014). Some reflections on MH370 maritime search and rescue. *China Shipping Survey*, 4, 66-68.
- Michal Luszczuk. (2014). Regional Significance of the Arctic Search and Rescue Agreement. Retrieved 1 June, 2017 from the World Wide Web: http://www.rocznikbezpieczenstwa.dsw.edu.pl/fileadmin/user_upload/wydawnictwo/RBM/RBM_artykuly/2014_1_04.pdf
- NRB. (2017). The rescue force in the NanHai Rescue Bureau. Retrieved 8 March, 2017 from the World Wide Web: http://www.nh-rescue.cn/jzll/list_33_lcid_8.html
- Pourzanjani. (2005). Administration, management and training of SAR. Unpublished lecture notes, World Maritime University, Malmö, Sweden.
- Paul Sinclair. (2014). *Strengthening Search and Rescue Cooperation*. Unpublished lecture handout. Expanded ASEAN Maritime Forum, Da Nang, Vietnam.
- Qu Bo. (2015). On cooperation mechanisms of regional search and rescue in South China Sea. *Chinese Journal of Maritime Law*. 26(3), 60-67.
- SAR Convention. (2006). Chapter 2.3 Establishment of rescue co-ordination centers and rescue sub-centers. IMO.
- SAR Training. (2005). *SAR training: Team Leader Training Handbook, 2003-2005*. Hampshire, UK: Author.
- Seline Trevisanut. (2010). Search and Rescue Operations in the Mediterranean: Factor of Cooperation or Conflict? *The International Journal of Marine and Coastal Law*, 25, p523-542.
- Shi Chunlin. (2013). China's participation in regional cooperation in search and rescue

- in the South China Sea. *The New Orient*, 2, 25-30.
- Shi Xianghong. (2008). Strengthen the transformation of government functions and improving the level of maritime search and rescue. *China Maritime Safety*, 6, 38.
- Shu Donghai. (2010). The Perspective of Royal Brunei Navy. *Modern Navy*, 9, p61.
- Su Shipeng. (2008). Climatic characteristics and causes of tropical cyclones in the South China Sea. *Proceedings of the Chinese Meteorological Society in 2008*. p. 1133.
- USCG. (2016). *Cutter, aircraft, and boat datasheets*. Retrieved July 4, 2016 from the World Wide Web: <http://www.uscg.mil/datasheet/index.shtml>
- Wang Xiuwei. (2013). Preliminary study on cooperation mechanism of low sensitive areas in South China Sea. *Journal of Henan University of Economics and Law*, 3, p151.
- Wen Jiabao. (2004, November 18). Speech given at the fourteenth China-ASEAN leaders meeting. Retrieved 20 May, 2017 from the World Wide Web: http://www.fmprc.gov.cn/web/wjb_673085/zzjg_673183/yzs_673193/dqzz_673197/dnygjlm_673199/zyjh_673209/t878623.shtml
- Wen Yajun. (2015). A Study on the Legal Cooperation Mechanism of the Maritime SAR bordering Enclosed or Semi-enclosed Seas. Unpublished master's thesis, South China University of Technology, Guangzhou, China.
- Xiang Li. (2014). The Realistic Choice of the Search and Rescue Mechanism in the South China Sea: An Empirical Analysis Based on Marine Accidents in the South China Sea. *Journal of Hainan University Humanities and Social Sciences Edition*, 6, p50-58.
- Zeng Peng. (2010). Thoughts and suggestions on improving maritime search and rescue capability in the South China Sea. *China Shipping*, 7, 16-18.
- Zhang Han. (2014, April 2). MH370 search and rescue Revelation. *21st Century Business Herald*, p. 8.

- Zhao Jianwen. (2005). On interpretative note on the right of passage of warships in territorial sea made by the contracting parties of UNCLOS. *China Oceans Law Review*, 2, 5-8.
- Zheng Huaiyu. (2017). Discuss on the international cooperation of maritime SAR on the background of “the Belt and Road” initiative. *China Maritime Safety*, 3, 38-40
- Zhou Jiang. (2007). Corner of the Declaration on the Code of Conduct on the South China Sea and its way out. *Southeast Asian Affairs*, 4, 29.
- Zhu Jianzhen. (2015). Discuss about China's participation in the South China Sea maritime search and rescue cooperation. *Chinese Fishery Economy*, 5, 10-15.
- Zhu Yuzhu, Li Qinrong, Li Xiaowen. (2010). The Incentive Mechanism for Maritime Search and Rescue in various countries. *China Maritime Safety*, 12, 39-42.