

# 國際海洋資訊

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## 《國家海洋政策白皮書》—— 擘劃我國海洋政策的藍圖

National Ocean Policy White Paper:  
Creating a Blueprint for National Ocean Policy

## 澳洲海洋資訊

Australia Ocean Information



海洋委員會  
Ocean Affairs Council

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## Embrace an Open Mind - Build a High-quality Marine Nation!

Translated by Linguitronics

Minister of the Ocean Affairs Council: Chung-Wei Lee

Since the announcement of the Australia Oceans Policy in 1998, the International Year of the Ocean, Australia has been promoting its oceans policy for more than 20 years. Sharing the experience of this established maritime country is the highlight of this issue of International Ocean Information. The abundant resources and ecological environment of the ocean are worthy our care and maintenance. While engaging in ocean-based recreational activities, we should also make an effort to learn about the ocean in order to coexist with the ocean in a safe manner. One hundred million people visit Australian beaches every year. Thus, this issue of International Issues introduces the reader to how Australia is preventing and reducing safety risk, through risk assessment, classification, and safety information websites. On the use of abundant ocean energy resources, Latest News talks about the latest developments in Australia's tidal power generation and wave power generation demonstration projects. The focus of this issue's Regulatory Systems is how Australia, in the current globalized world, protects its unique marine ecology and responds to The International Convention for the Control and Management of Ships' Ballast Water and Sediments established by the International Maritime Organization (IMO). The impact of the pandemic on the world's cruise industry has greatly affected Australia's own cruise industry, which had generated an output of AUD 5.2 billion in 2018. This issue's Industry Dynamics focuses on the status and strategies of the cruise industry in facing the difficulties in maintaining social distancing and a downturn in tourism.

Taiwan is a mountainous country surrounded by sea and possessing rich natural resources. Saluting to the ocean with an open attitude can enrich our culture and broaden our perspective. This issue's Special Report introduces the National Ocean Policy White Paper approved on this year's (2020) National Oceans Day. It presents Taiwan's policy planning and attempts in ocean governance from the aspects of marine rights and interests, safety, and conservation. We also hope to encourage readers to get to know the ocean, learn from the ocean, and build a high-quality ocean country, together!



Image by Des Kerrigan from Pixabay  
<https://pixabay.com/photos/shark-great-barrier-reef-underwater-2683184/>

## National Ocean Policy White Paper: Creating a Blueprint for National Ocean Policy

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Translated by Linguitronics

Keywords: Ocean Basic Act, National Ocean Policy White Paper, maritime nation, marine policy, ocean affairs, ecological, safe, prosperous

The Ocean Basic Act is the framework of the overall ocean policy of our nation in building an ecological, safe, prosperous, and sustainable maritime nation, and establishing the foundation for our maritime legal system. According to Article 15, Paragraph 1 of the Ocean Basic Act, the government shall release a white paper on national marine policy within one year after the implementation of the Act, and shall periodically review and amend it in accordance with its performance and developments at home and abroad. The announcement and implementation of the National Ocean Policy White Paper presents to the citizens the country's policy intent and planning in ocean governance. Hence, the National Ocean Policy White Paper formulates the policy direction for ocean affairs, shows the government's determination in laying the foundation for the ocean, and serves as a blueprint for national marine development strategies.



Front cover of the National Ocean Policy White Paper  
Image by The Ocean Affairs Council



Back cover of the National Ocean Policy White Paper  
Image by The Ocean Affairs Council



## Introduction

The President announced on November 20, 2019, the implementation of the Ocean Basic Act. This is the 8th basic law of Taiwan (Footnote 1). The establishment of the Ocean Basic Act is a declaration of the nation's overall ocean policy and integration of ocean affairs. The overall ocean policy of Taiwan is to create a high-quality marine nation that is ecological, safe, and prosperous; to safeguard national marine rights and interests; to enhance national marine scientific knowledge; to deepen diversified marine culture; to create a healthy marine environment; to promote sustainable resources; to improve the development of the marine industry; and to promote regional and international marine affairs cooperation (Article 1 of the Ocean Basic Act). To implement Taiwan's ocean policy, the National Ocean Policy White Paper is to be released within a year following implementation of the Ocean Basic Act. Governments at all levels shall cooperate by discussing the policies and administrative measures within their jurisdiction. In accordance with the Act, the National Ocean Policy White Paper was published in June this year (2020), and it proposes the following national ocean policies: 1. Build regional strategic thinking and defend the rights, interests, and sovereignty over marine territories; 2. Implement maritime law enforcement methods and promote regional security cooperation; 3. Maintain marine ecological health and optimize marine environmental quality; 4. Establish industrial development goals and encourage blue industry upgrade; 5. Build an ocean-friendly culture among citizens and cultivate nationwide oceanic thinking; 6. Foster scientific development momentum and build scientific research capabilities.

## National Ocean Policy White Paper

### I. Introduction of the National Ocean Policy White Paper

Since Taiwan is surrounded by the sea, ocean governance is of relevance to the overall development and competitive advantage of the country. There are regulations relating to ocean affairs in the country's constitution, and the government has declared ocean policies over the years. However, the first ocean policy to be declared in the form of a white paper is the Ocean White Paper, published in 2001, followed by the National Oceans Policy Guidelines in 2004, and the Ocean Policy White Paper in 2006.

With the establishment of the Ocean Affairs Council, and upholding the legislative spirit of the Ocean Basic Act, relevant ministries and departments, experts and scholars on ocean affairs were invited to jointly compile the National Ocean Policy White Paper. The National Ocean Policy White Paper is a document published in accordance with the Ocean Basic Act, and is the country's first ocean policy document compiled according to the law. It functions to guide the government in implementing ocean policies, and will be used as the blueprint for the government's ocean policies, facilitating joint promotion of ocean affairs by departments and local governments.

The National Ocean Policy White Paper comprises 8 chapters, namely: Chapter 1 Introduction, Chapter 2 Ocean Rights Protection and Governance, Chapter 3 Safety, Law, and Order on the Sea, Chapter 4 Ocean Conservation and Environmental Protection, Chapter 5 Marine Industry Development and Innovation, Chapter 6 Marine Culture, Education, and Talent Training, Chapter 7 Scientific Marine Research and Technical Development, and Chapter 8 Future Prospects, as well as Appendix 1 Table of Responsibilities of the Taiwan Marine Management System and Appendix 2 Table Showing a Chapter and Section Comparison of the Ocean Basic Act and National Ocean Policy White Paper.

The publication of the National Ocean Policy White Paper aims to let the government and the individual fully appreciate the advantages of Taiwan being surrounded by the sea. With foresight and



innovative thinking, we can expand our ocean development, allowing Taiwan to gain infinite opportunities from the ocean rather than being limited by it.

## II. Content of the chapters and sections of the National Ocean Policy White Paper

An explanation of each chapter and section of the National Ocean Policy White Paper is provided below. Chapter 1 Introduction is not subdivided into sections; it explains that Taiwan is a maritime nation for which the ocean is the most important path ahead. Chapter 2 Ocean Rights Protection and Governance discusses protection of marine rights, which are related to the subsistence and development of a nation; Chapter 8 Future Prospects raises the point that the ocean is an important niche for national development; these two chapters do not contain specific goals or strategic guidelines. This article presents and discusses the current situation for all aspects of ocean affairs and important issues as raised in chapters 3 through 7 and also raises specific goals and strategic guidelines. These are discussed in summary below.

**[I] Chapter 1 Introduction** specifies the vision and policy goal of ocean development.

**[II] Chapter 2 Ocean Rights Protection and Governance** comprises 4 sections, Section 1: Maritime situation and international participation; Section 2: Marine rights and interests and homeland security; Section 3: Marine administrative organization and legal system; Section 4: International governance trends and practices.

**[III] Chapter 3 Safety, Law, and Order on the Sea** comprises 3 sections, Section 1: Safeguard national maritime safety; Section 2: Strengthen maritime public security activities; Section 3: Improve disaster prevention and rescue capacity.

The strategies for Section 1 Safeguard national maritime safety are: Ensure marine navigation safety, reduce damage and loss. Specific measures include: 6 measures, including building the nationwide Maritime Domain Awareness (MDA) system.

Strategies for Section 2 Strengthen maritime public security activities are: Stop illegal activities from entering the country so as to maintain social stability. Specific measures include: 6 measures, including review and amendment of relevant laws and regulations.

Strategies for Section 3 Improve disaster prevention and rescue capacity are: Improve life-saving and rescue capacity at sea. Specific measures include: 3 measures, including making use of advanced technologies to improve disaster prevention technology.

**[IV] Chapter 4 Ocean Conservation and Environmental Protection** comprises 3 sections, Section 1: Enhance prevention of marine pollution; Section 2: Attain sustainable management of marine resources; Section 3: Accelerate ecological conservation work.

Strategies for Section 1 Enhance prevention of marine pollution are: 1. Improve sea pollution prevention capacity, reduce marine debris. 2. Protect the ocean environment, ensure clean sea water. Specific measures include: 7 measures, including refining the Marine Pollution Control Act and being in line with international standards.

Strategies for Section 2 Sustainable management of marine resources are: 1. Protect marine ecological environments to attain sustainable ocean development. 2. Promote joint maintenance and management in the fishery industry, and reasonable utilization of resources. 3. Take into consideration marine resources development and utilization as well as ecological conservation. Specific measures include: 8 measures, including establishing fishery policies that comply with sustainability.



The strategies for Section 3 Accelerate ecological conservation work are: 1. Protect marine ecosystems, build healthy habitats. 2. Preserve marine biodiversity, develop sustainable marine resources. Specific measures include: 7 measures, including building basic information on nationwide marine biodiversity.

**[V] Chapter 5 Marine Industry Development and Innovation** comprises 4 sections, Section 1: Optimize industrial strategies and layouts; Section 2: Cultivate an environment for industrial development; Section 3: Build an industrial value-chain; Section 4: Strengthen industry guidance policies.

Strategies for Section 1 Optimize industrial strategies and layouts are: Guide the country's marine industry in key directions, establish frameworks for marine industry development, raise marine industry competitiveness. Specific measures include: 2 measures, including promoting innovation in the blue economy.

The strategies for Section 2 Cultivate an environment for industrial development are: Cultivate environments such as the geographic spaces, funding, regulatory systems, manpower and talent, industry technologies, and marketing required for industrial development. Specific measures include: 4 measures, including completing marine spatial planning and rules for sea use in accordance with the Ocean Basic Act and this policy white paper.

The strategies for Section 3 Build an industrial value-chain are: Build a marine industry value-chain, public-private partnerships, and international links to strengthen industrial capacity and bolster international competitiveness. Specific measures include: 3 measures, including taking inventory and building various marine industry value-chains.

The strategies for Section 4 Strengthen industry guidance policies are: Establish exhaustive industry guidance policies to facilitate smooth development of the marine industry. Specific measures include: 6 measures, including mutual assistance and cooperation across industries, expanding the global market, establishing private brands to promote investment.

**[VI] Chapter 6 Marine Culture, Education, and Talent Training** comprises 4 sections, Section 1: Preserve traditional marine culture; Section 2: Develop diversified marine culture; Section 3: Raise the ocean literacy of the citizenry; Section 4: Cultivate marine manpower.

The strategies for Section 1 Preserve traditional marine culture are: 1. Value the indigenous peoples' traditional marine culture and wisdom, and their heritage skills of boat and raft making, respect the method of marine resource utilization, promote Taiwan's local marine culture. 2. Develop a system of marine culture knowledge, be dedicated to conservation of marine culture. Specific measures include: 4 measures, including respecting the indigenous peoples' wisdom and philosophies in using the sea.

The strategies for Section 2 Develop diversified marine culture are: Diverse development of marine culture, build the marine awareness of the citizenry. Specific measures include: 4 measures, including building the marine culture awareness of the citizenry.

The strategies for Section 3 Raise the ocean literacy of the citizenry are: 1. Promote through multiple channels, popularize marine knowledge. 2. Combine with educational resources, foster oceanic thinking. Specific measures include: 5 measures, including implementing national marine education.

The strategies for Section 4 Cultivate marine manpower are: 1. Enhance talent cultivation system, strengthen the foundation of the marine industry. 2. Cooperate with national development needs, cultivate marine professionals. 3. Strengthen the indigenous peoples' traditional system of knowledge in sea navigation, cultivate marine knowledge in modern indigenous peoples, and thereby preserve the indigenous peoples' traditional knowledge in sea navigation. Specific measures include: 4 measures, including improvement of the education system, enhancing professional training.



**[VII] Chapter 7 Scientific Marine Research and Technical Development** comprises 3 sections, Section 1: Integrate information from marine scientific research; Section 2: Enhance basic marine surveying; Section 3: Lead the upgrading of the marine industry.

The strategies for Section 1 Integrate information from marine scientific research are: 1. Develop marine scientific research, strengthen international exchange. 2. Integrate information from scientific research, add value to application services. Specific measures include: 4 measures, including effective planning of databases, promoting integration and exchange of marine information.

The strategies for Section 2 Enhance basic marine surveying are: 1. Strengthen basic survey capacity, cross-country and cross-industry cooperation and exchange. 2. Implement the latest scientific technologies, improve the benefits of data usage. Specific measures include: 5 measures, including strengthening the research capacity of scientific research vessels.

The strategies for Section 3 Lead the upgrading of the marine industry are: 1. Integrate domestic technological advantage, innovative marine industry technologies. 2. Cultivate marine industry talents, promote industrial development and technological upgrading. Specific measures include: 3 measures, including linking marine skills with technologies.

**[VIII] Chapter 8 Future Prospects** comprises 4 sections, Section 1: Build the marine awareness of the citizenry, allowing them to be close to, understand, and love the ocean; Section 2: Establish orderliness in the utilization and governance of the ocean; Section 3: Achieve the vision of a maritime nation with oceanic thinking; Section 4: Manage the ocean, set course for the world.

## Conclusion

Today, coastal countries around the world are putting more emphasis on the ocean, and actively developing towards the sea. Facing the challenges of the new oceanic era, we have to build the country's national power for the long-run through systems, policies and operations, and move towards ocean development.

Taiwan's historical development is closely related to the ocean. To boost national power, Taiwan has to head towards ocean development. The perspectives beyond the ocean are infinite and vast. Therefore, we should learn about and respect the ocean, and utilize marine resources wisely. The government is currently establishing the Tribute to the Sea policy, which will be based on five principles: openness, transparency, service, education, and responsibility. Through regulatory adjustment, cultivating a friendly environment, and establishing friendly measures, it encourages the citizens to learn about the ocean, be close to the ocean, go into the ocean, and clean the ocean. We need to face the ocean and learn from the ocean. We also encourage the citizens to have the courage to be close to the ocean and go into the ocean, to see the magnificent sea and sky, broaden their perspectives, and have an open mind.

The National Ocean Policy White Paper is a tangible manifestation from the country in implementing and developing a new oceanic era. The National Ocean Policy White Paper's publication and implementation show the government's strong ambition and character to develop ocean affairs, as well as represents the determination of the citizens in managing and venturing to the ocean. The National Ocean Policy White Paper will bring about the flourishing of the nation's ocean affairs, attaining an ecological, safe, prosperous and sustainable maritime nation.

Footnote 1: The other seven basic laws and acts are: Basic Environment Act (December 11, 2002), Educational Fundamental Act (December 11, 2013), Fundamental Communications Act (November 9, 2016), Fundamental Science and Technology Act (June 14, 2017), Hakka Basic Act (January 31, 2018), The Indigenous Peoples Basic Law (June 20, 2018) and Cultural Fundamental Act (June 5, 2019).

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- [1] The Ocean Affairs Council, National Ocean Policy White Paper (2020). P.1-100.
- [2] Ocean Basic Act. Promulgated under Presidential Decree Hua-Tsong 1 Yi No. 10800126571 on November 20, 2019.



## Beach Hazard Ratings and Beach Safety Website

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Keywords: Australia, beach safety, beach hazard ratings

The vast coastline of Australia covers 35,877 km. There are around 12,000 beaches with around 100 million visitations annually. However, safety risks exist in beach environments. They are associated with beach hazards (e.g., big waves, strong currents, submerged rocks and rip currents), people's knowledge of ocean water conditions, swimming skills and experiences. To avoid and minimize water safety risks, Australia conducted hazard evaluations of all beaches and assigned a hazard rating for each beach. Moreover, a website dedicated to beach safety was established, which serves as safety guidance for domestic and international beach goers.



Beaches offer marine recreational opportunities but pose safety risk

Image by Chung-Ling Chen

The vast coastline of Australia covers 35,877 km, and when all islands are included the length increases to 59,736 km [1]. There are around 12,000 beaches [2], offering opportunities for marine recreation (e.g., swimming, surfing and fishing) and attracting around 100 million visitors annually. In particular, the Gold Coast, 66 km southeast of Brisbane, and the Bondi Beach, 7 km east of Sydney, are popular tourist sites, attracting a huge flux of visitors and bringing about enormous economic benefits.

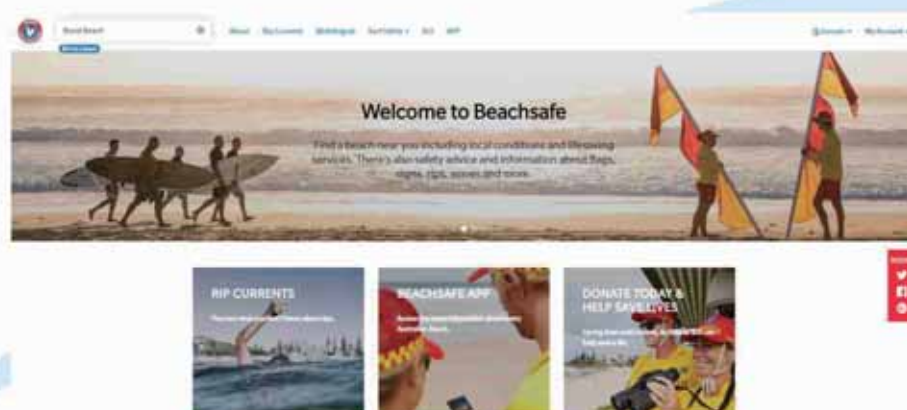
However, safety risks exist in beach environments. Illustratively, big waves, water depth, strong currents, submerged rocks, rip currents etc. are all potential hazards. In particular, those who do not have or have poor swimming skills are likely to drown if they are in any of these hazards. Common factors to drowning are identified, including lack of knowledge of ocean water conditions; ignorance, disregard or misjudgement of the hazardous water condition; unrestricted access to dangerous areas or facilities; unpatrolled beaches; inability on the part of the person in difficulty to cope with the conditions; and lack of education and training in water safety, personal survival and lifesaving [1]. Swimming in a rip is the number one cause of drowning. In addition to drowning, bites or stings by marine animals and cuts by marine litter may cause potential injuries in beach environments. Various types of potential injury in beach environments are presented in Table 1 [3].

To enhance water safety and reduce incidents of death and injury, Surf Life Saving Australia (SLSA), in collaboration with University of Sydney and relevant government agencies, published the Australian Coastal Public Safety Guidelines (1st edition) in 2007. It presents a comprehensive account of information and guidelines on coastal public safety, covering the aspects of provision of safer coastal environments, coastal safety signs, and operations of beaches etc. SLSA further conducted hazard evaluations of all beaches and assigned a hazard rating for each beach. The hazard ratings were incorporated in the beach safety website, which offers the information pertaining to a specific beach and surf safety information. This article is to introduce beach hazard ratings and the beach safety website (called Beachsafe, url: <https://beachsafe.org.au/>). Both are key to water safety in terms of increasing beach goers' knowledge of water safety as well as facilitating them to cope with potential hazards.

Table 1/ Examples of hazards and potential injury in beach environments

| Hazard type       | Potential injury   | Example of mechanism                      |
|-------------------|--------------------|-------------------------------------------|
| Water             | Immersion          | Drowning                                  |
| Marine animal     | Bite or sting      | Blue-ring octopus                         |
| Litter/rubbish    | Cuts               | Broken glass                              |
| Wave action       | Broken bones       | Broken collarbone from dumping            |
| Equipment         | Head injury        | Hit by surfboard                          |
| Cliffs            | Fall               | Trip on cliff edge                        |
| Water pollution   | Infection          | Gastroenteritis from faecal contamination |
| Underwater object | Spinal cord injury | Diving into sandbar                       |
| Criminal activity | Assault            | Robbery                                   |

Source / Morgan D. 2006. Chapter 15 Surf beach risk and safety. In: Wilks J, Pendergast D, Leggat P, editors. Tourism in Turbulent Times. Oxford: Elsevier Ltd, p. 217-229



Beach safety website  
Source/ <https://beachsafe.org.au/>



## Beach hazard ratings

The ABSAMP (Australian Beach Safety and Management Program) was developed 1990 by Professor Andrew Short from the University of Sydney Coastal Studies Unit in conjunction with Surf Life Saving Australia. This program has identified hazards that affect bathers and rates the safety of the beach. The beach hazard rating is calculated by determining the beach type and wave height (Table 2) [4]. The rating is on a scale of one to ten, where one (1) is the least hazardous and ten (10) is the most hazardous. Beaches with ratings of 1 to 3 are least hazardous, with ratings of 4-6 are moderately hazardous, with ratings of 7-8 are highly hazardous, and with rating of 9-10 are extremely hazardous. The beach hazard ratings and details are provided in Table 3.

As indicated in Table 2, the higher the wave height, the more hazardous the beach, and at the same wave condition, the dissipative beach is more hazardous than the reflective type. However, it is worth noting that the beach hazard rating is done under prevailing wave conditions and the current beach type. The hazard rating of a specific beach may therefore increase when conditions alter e.g. with increasing wave height and winds. The rating may need to be revised if the beach has evolved into another type over a long period of time. Furthermore, a hazard rating is applied to an average person and thus the hazard may be greater or less, depending on an individual's own water skills, and understanding and competence in relation to a certain area.

Table 2/ Beach hazard rating calculation matrices

| Wave height<br>Beach type | <0.5(m) | 0.5(m) | 1.0(m) | 1.5(m) | 2.0(m) | 2.5(m) | 3.0(m) | >3.0(m) |
|---------------------------|---------|--------|--------|--------|--------|--------|--------|---------|
| Dissipative               | 4       | 5      | 6      | 7      | 8      | 9      | 10     | 10      |
| Longshore bar and trough  | 4       | 5      | 6      | 7      | 7      | 8      | 9      | 10      |
| Rhythmic bar and beach    | 4       | 5      | 6      | 6      | 7      | 8      | 9      | 10      |
| Transverse bar and rip    | 4       | 4      | 5      | 6      | 7      | 8      | 9      | 10      |
| Low tide terrace          | 3       | 3      | 4      | 5      | 6      | 7      | 8      | 10      |
| Reflective                | 2       | 3      | 4      | 5      | 6      | 7      | 8      | 10      |

Source / Surf Life Saving New South Wales. 2016. Coastal Public Safety Risk Assessment.  
Sydney: SLS New South Wales

Table 3/ Beach hazard ratings

| Hazard rating | Details                                                                                                                            |
|---------------|------------------------------------------------------------------------------------------------------------------------------------|
| <b>1-3</b>    | Least hazardous: weak currents; however, supervision still required, in particular for children and poor swimmer                   |
| <b>4-6</b>    | Moderately hazardous: The level of hazard depends on wave and weather conditions, with the possibility of strong rips and currents |
| <b>7-8</b>    | Highly hazardous: Experience in strong rips and currents required                                                                  |
| <b>9-10</b>   | Extremely hazardous: strong rips and currents, and large breakers                                                                  |

Source / Surf Life Saving New South Wales. 2016. Coastal Public Safety Risk Assessment.  
Sydney: SLS New South Wales

As for the beach type as indicated in Table 2, six types were proposed by Wright and Short (1984). The parameters determining the beach type are breaker height, incident wave frequency and beach gradient. The two extremes are fully dissipative and highly reflective. The dissipative type exhibits flat and shallow beaches with relatively large subaqueous sand storage and wide surf zones. The first line of breaking waves is at long distance from the shore. By contrast, the reflective type corresponds to steep beaches with small subaqueous sand storage and no surf zone. Waves break near the shore. In addition to the two extremes, four intermediate types each of which possess both reflective and dissipate elements, are: longshore bar and trough (LBT), rhythmic bar and beach (RBB), transverse bar and rip (TBT) and low tide terrace (LTT). Rip currents generally occur in these four types of beaches [5] [6].

The beach hazard ratings are easy to use and understand. They can serve as a reference for beach authorities to make management measures pertaining to a specific beach. Moreover, by this rating system, bathers can evaluate the safety risks based on their own water skills and preparations. However, it is noted that this rating system applies to bathers and is established only based on the two factors of wave height and beach types. At the same wave condition, the beach hazard rating may differ for beach users other than bathers. As an illustration, a certain wave condition poses moderate or high hazards to bathers, but may pose small hazards to surfers. Furthermore, other factors such as jetties, underwater rocks, flash rips, poisonous marine animals, sharks, faecal contamination and oil pollution may pose dangers to beach users. These factors should be revealed in the beach information. In light of this, the beach safety website, which will be detailed next, exactly presents not only the beach hazard rating, but also a list of hazards pertaining to a specific beach.

### Beach safety website

Surf Life Living Australia has established a website dedicated to beach safety (Figure 2). The website offers a comprehensive account of the information of more than 10,000 beaches as well as the information of water safety (or called surf safety) [7]. An App (Beachsafe) is offered for free downloading. Multilingual services are also provided, including Korean, Japanese, Hindi, Arabic, traditional Chinese, simplified Chinese etc., catering to non-English-speaking tourists.

#### I. Beach database

The beach database contains the information of all beaches in Australia. A search function is built herein such that users can find nearby beaches, or locate specific beaches where patrolled services, public transportation, parking lots, toilets, and picnic are offered. The information pertaining to each beach include (if any):

- Aerial photos and Google map;
- Summary of the beach;
- Beach hazard rating;
- Today's update of temperature, water temperature and UV rating;
- Weather, swell, wind, tide, and UV rating of today, tomorrow and 7-days forecast;
- Radar of the area surrounding the beach;
- Beach patrolled or unpatrolled, and patrol time schedule;
- Hazards such as large unexpected waves, strong currents, shallow sandbars, flash rips, submerged objects, water pollution, shark, and bluebottles;
- Services offered in the beach, such as parking lots, toilets, wheeled toilets, changing rooms, shower rooms, telephones, dinning, camping, public transportation, and ramps for boats;
- Regulations regarding the activities prohibited, such as jetskiing, fishing, and dog walking.



## II. Information on beach safety

The information on beach safety (or called surf safety in the website) is very diverse, including current, lifeguards tips, flags and signs, the right gear, weather, waves, rocks and reefs, tsunami, marine stingers, tropical stingers, marine creatures, surf skills, and first aid. Take rip currents for example, texts and/or videos were used to convey the information on what rip currents are, how to identify them, how to escape a rip current if you are caught in a rip, and survivor stories.

A rip current is a strong, localized, and narrow current of water which flows away from the shoreline toward the ocean. Rip currents typically reach speeds of 30-60 cm per second. However, some rip currents have been measured at 2m per second. They generally form around low spots or breaks in sandbars, and near structures such as jetties and piers [8]. Rip currents are not easily identifiable. Yet, some of the more recognizable characteristics of a rip current include: 1. a choppy channel of water that has a churning motion; 2. a line of sea foam, seaweed or debris that is moving steadily out to sea; 3. a disrupted pattern of incoming waves [9]. When spotting these characteristics, beach users should beware of potential rip currents, avoid them and swim between the red and yellow flags. Once you are caught in rip currents, try to remember a few simple rules:

- Keep calm. Don't fight the rip current.
- To get out of the rip current, swim sideways, parallel to the beach. When out of the rip current, swim toward shore.
- If you can't escape this way, try to float with the flow until the rip current dissipate completely once it is beyond the surf line, and then swim diagonally away from the rip current, and toward shore.
- If at any time you are unable to reach the shore, draw attention to yourself: face the shore, wave your arms, and yell for help.

## Conclusion

The Executive Yuan recently initiated a policy of respecting the seas to encourage people to understand, get close to, and access to the seas. Five principles constitute the core of this policy are: openness, transparency, service, education and responsibility. The beach hazard ratings and the beach safety website established by Australia are exactly in line with the principles of transparency, education and responsibility. To enhance marine recreational safety, concerned authorities may consider to follow in Australian footsteps and integrate the information of all beaches in Taiwan and further establish beach hazard ratings and the beach safety website. This will improve beach goers' understanding of water safety and potential hazards as well as facilitate them to take appropriate measures when they are in hazardous conditions.

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## Development Trends in the Global and Australian Cruise Industries and Challenges Brought by Coronavirus Disease 2019 (COVID-19)

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Translated by Linguitronics

Keywords: cruise industry, cruise tourism, marine tourism industry, Coronavirus Disease 2019 (COVID-19)

In recent years, global cruise tourism has been very popular among European, American, and Asian tourists. The prospects for the industry were promising, with the number of tourists and economic value reaching new highs every year. However, the Coronavirus Disease 2019 (COVID-19) pandemic in 2020 brought unprecedented challenges and impacted the global cruise industry.

### Introduction

The global cruise tourism industry originated in the European countries and the United States, and later expanded to countries in the Asia Pacific. The industry has been booming in recent years and more and more people who love marine recreation and tourism have made cruise tours their top choice for leisure and vacation. The marine tourism industry has provided considerable economic value and employment opportunities for many countries, building prosperity and bringing progress to the community, especially the development of Australia's cruise industry. In 2018, Australia's cruise passenger volume hit 1.345 million people, the highest in the Pacific region, and 5th highest in the world for cruise tourism. However in 2020, COVID-19 brought serious impacts and unprecedented challenges to the development of the world's cruise industry.

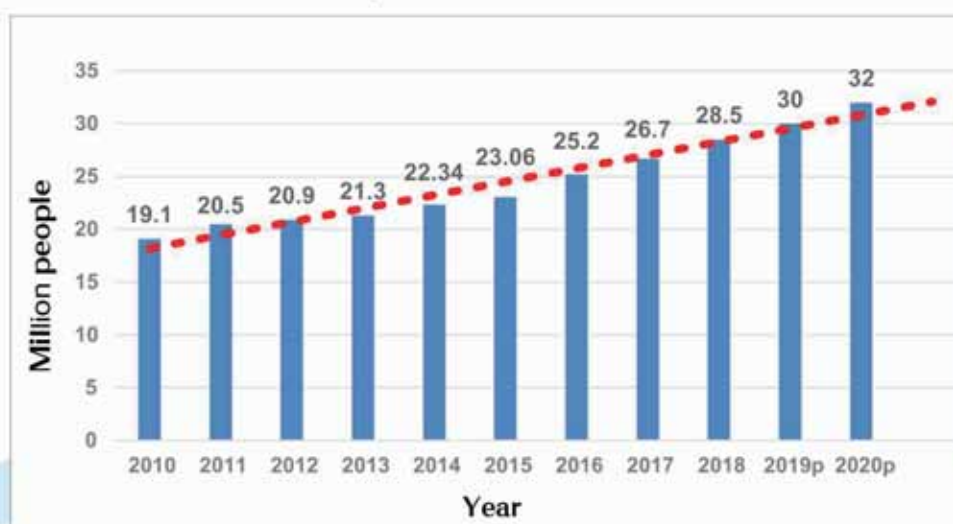


Figure 1/ Trend chart showing the increasing number of global cruise passengers (Unit: million people)

Remarks/ Number of global cruise passengers for 2019 and 2020 are projected

Source/ CLIA (2020) [1]; This Study



## Development trends in the global cruise industry

### I. Increasing global cruise passenger volume

According to the statistics [1] of Cruise Lines International Association (CLIA), the global cruise industry's direct expenditure in 2018 amounted to USD67.9 billion, generating an output of USD150.1 billion and jobs for 1,177,000 people. The number of cruise passengers worldwide increased from 19.1 million in 2010 to 28.5 million in 2018 (Figure 1), a more than 49% increase of 9.4 million people. The stable growth of cruise passengers over the years shows that cruise tourism has become one of the world's important marine leisure activities.

### II. Top 10 source countries of global cruise passengers

Among the top 10 source countries of global cruise passengers in 2018 [2], the United States ranked first, with a ratio of 45.9% at 13.09 million people; China came in second, with a ratio of 8.3% at 2.36 million people; Germany came in third, with a ratio of 7.8% at 2.23 million people; The United Kingdom came in fourth, with a ratio of 7% at 2.01 million people; Australia came in fifth, with a ratio of 4.7% at 1.345 million people; and Canada came in sixth, with a ratio of 3.4% at 970,000 people (Figure 2). The number of Australian cruise passengers ranks top in the Oceania region and is the world's fifth highest, only after the United States, China, Germany, and the United Kingdom. Australia has the highest cruise penetration rate in the world, with a percentage of 5.4%. For every 18 Australians, 1 person has taken a cruise, which shows that Australians love cruises more than the Europeans and Americans.

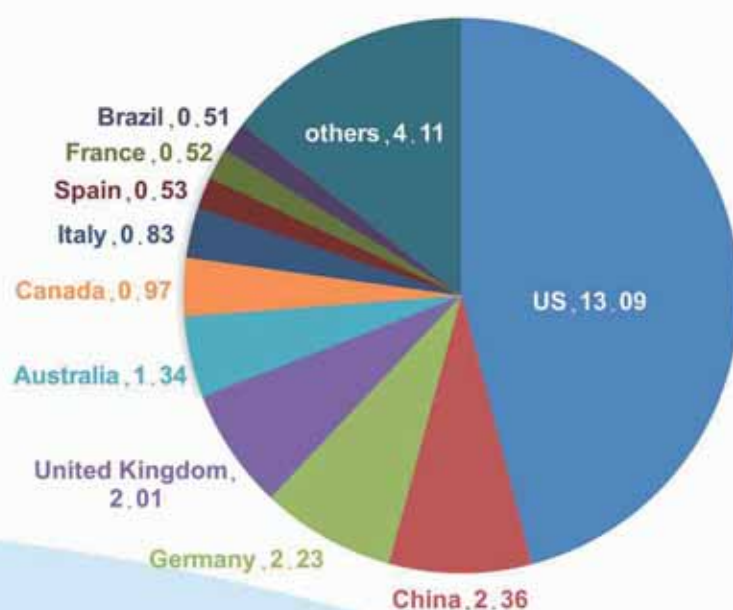


Figure 2/ Top 10 source countries of global cruise passengers in 2018 (Unit: million people)  
Source/ CLIA (2019) [2]; This Study

### III. Trend in the global deployment of cruise capacity

The trend in the global deployment of cruise capacity from 2013 to 2018 [3] (Figure 3) shows that the Caribbean region has the highest number, with a 40.9% increase from 44.66 million bed days in 2013 to 62.92 million bed days in 2018; the Mediterranean region came in second; non-Mediterranean Europe came in third; Asia came in fourth, with a 277% increase from 4.72 million bed days in 2013 to 17.79 million bed days in 2018, a far higher rate of increase compared to other regions in the same period, which makes it clear that Asia's cruise industry over the past 5 years has flourished; and followed by Australia, New Zealand, and the Pacific region, which saw a 54.5% increase in bed days from 6.51 million in 2013 to 10.06 million in 2018, with a rate of increase second only to the Asia region, compared to other regions for the same period.



Figure 3/ Trend chart showing the global deployment of cruise capacity from 2013 to 2018 (Unit: million bed days)  
Source/ CLIA (2019) [3]; This Study

### Development trends in the Australian cruise industry

In 2018, Australian cruise tourism generated an output of AUD5.2 billion (USD3.718 billion), served 1.345 million passengers, and employed 18,135 people. Australia has been attracting many cruise ships to dock and transit, and in 2018, 1,240 cruise ships visited Australia's 47 ports, driving the development of other industries. In recent years, the economic benefits of Australian cruise tourism have continued to grow [4].

In 2018, Australian cruise passengers spent nearly AUD1.4 billion (USD1.001 billion) on shore, with an average daily spending of about AUD387 (about USD276.71). The bulk of the expenses were on accommodations, which amounts to AUD450 million (about USD322 million), followed by AUD274 million (about USD196 million) on food and beverages, AUD196 million (about USD140 million) on transportation, AUD159 million (about USD114 million) on retail, AUD133 million (about USD95 million) on shore tourism, and AUD59 million (about USD42 million) on entertainment.

### Comparison of development trends between global and Australian cruise tourism

The output for global cruise tourism from 2016 to 2018 was USD125.96 billion, USD133.96 billion, and USD150.13 billion, respectively; while the output for Australian cruise tourism was AUD4.7 billion, AUD4.8 billion, and AUD5.2 billion, respectively [5][6]. In spite of the yearly growth of global and Australian cruise tourism, and Australians accounting for nearly 5% of the world's cruise passengers, Australia's economic output in these three years compared to the world's output was only 2.67%, 2.56%, and 2.48%, respectively, and is showing a trend of yearly decline.

From 2016 to 2018, the number of people employed in the world's cruise industry was 1,021,681, 1,108,676, and 1,177,000, respectively; while the number employed in Australia was 17,786, 17,381, and 18,135, respectively. Employment in the world's cruise industry saw a growing trend, while the growth rate in the number employed in the Australian cruise industry lags behind the world's ratio.

From 2016 to 2018, the number of tourists in the world's cruise tourism industry was 25.15 million, 26.72 million, and 28.52 million, respectively, a growth of more than 6% each year; while the number of Australian tourists was 1.281 million, 1.333 million, and 1.345 million, respectively, with a 4.06% growth in 2017, and a mere 0.9% growth in 2018. Though the number of Australian cruise passengers has increased in recent years, its growth rate is less than the global rate. A comparison of the various indicators of global and Australian cruise tourism development is shown in Table 1.



Table 1/ Comparison table showing development trends between global and Australian cruise tourism

| Item                      | Global     |            |            | Australia          |                    |                    | Global           |                  | Australia        |                  |  |
|---------------------------|------------|------------|------------|--------------------|--------------------|--------------------|------------------|------------------|------------------|------------------|--|
|                           | 2016       | 2017       | 2018       | 2016               | 2017               | 2018               | 2017 Growth rate | 2018 Growth rate | 2017 Growth rate | 2018 Growth rate |  |
| Output value (1 billion)  | US\$125.96 | US\$133.96 | US\$150.13 | A\$4.7 (US\$3.361) | A\$4.8 (US\$3.432) | A\$5.2 (US\$3.718) | 6.35%            | 12.07%           | 2.13%            | 8.33%            |  |
| Global share              |            |            |            | 2.67%              | 2.56%              | 2.48%              |                  |                  | -4.80%           | -3.13%           |  |
| Employed (People)         | 1,021,681  | 1,108,676  | 1,177,000  | 17,786             | 17,381             | 18,135             | 8.51%            | 6.16%            | -2.28%           | 4.34%            |  |
| Global share              |            |            |            | 1.74%              | 1.57%              | 1.54%              |                  |                  | -9.77%           | -1.91%           |  |
| Tourists (Million people) | 25.15      | 26.72      | 28.52      | 1.281              | 1.333              | 1.345              | 6.24%            | 6.73%            | 4.06%            | 0.90%            |  |
| Global share              |            |            |            | 5.09%              | 4.99%              | 4.72%              |                  |                  | -1.96%           | -5.41%           |  |

Source/ Australian Cruise Association (2018 + 2019) [5][6]; This Study Remarks/ Exchange rate: AUD1=USD0.715

## Impact of COVID-19 on the global economy and cruise industry development

### I. Development of COVID-19 pandemic worldwide and in Australia

As of August 10, 2020, COVID-19 has infected 19,909,065 people, and resulted in more than 732,128 deaths; 21,397 Australians have been infected, and more than 313 Australians have died. Since mid-March, many countries have implemented quarantine or entry restrictions on citizens or tourists from severely affected regions, and some countries have even implemented global travel bans.

In response to COVID-19, the Australian government has announced the latest entry restrictions for inbound passengers. International travelers arriving in Australia by flight after July 18 will be charged AUD3,000 for meals and accommodation for the two-week quarantine, as well as an additional AUD1,000 for each additional adult or child above 3 years of age, and an additional AUD500 for each child of less than 3 years of age. From July 13 onwards, the Australian government has limited the number of daily international arrivals.

### II. The impact of COVID-19 pandemic on the global economy

The COVID-19 pandemic has spread from Asia to the rest of the world, causing violent shocks to the financial market, cutting deep into international oil prices, plummeting stock prices of air transportation and cruise companies, and impacting the global economy. Various international forecast institutions have made a downward revision on global economic growth. The International Monetary Fund (IMF) announced on June 24 [7]: "The COVID-19 pandemic has had a more negative impact on activity in the first half of 2020 than anticipated, and the recovery is projected to be more gradual than previously forecast." The IMF once again made a downward revision of the global economic growth from -3% to -4.9%. According to the forecast [8] published in June 2020 by the Organization for Economic Co-operation and Development (OECD), global economic growth will fall 6% in 2020 and unemployment will climb to 9.2% from 5.4% in 2019. OECD also said that if there is no vaccine to control the pandemic, and if there is a second outbreak before the end of the year, global economic growth will shrink by 7.6% and the unemployment rate will increase to 10%.

### III. The impacts and challenges of COVID-19 pandemic on the cruise industry

The world's top 3 international cruise companies, based on fleet capacity, are Carnival Cruise Line, Royal Caribbean International, and Norwegian Cruise Line. The revenue of these 3 companies accounts for 70% of the global cruise industry. The main operator in the Asian market is Star Cruises.

From February to mid-March, 2020, after the outbreak of the COVID-19 pandemic, international cruises continued to operate around the world, resulting in several incidents of infections in international cruises, and the more well-known infection incidents are:



[I] Diamond Princess was quarantined for roughly a month in Yokohama, Japan, beginning February 4, 2020; there were 712 people infected and 13 deaths [9].

[II] Ruby Princess began its journey to New Zealand on March 8, 2020, and returned to Sydney, Australia, on March 19. Its 2,700 passengers were allowed to disembark and enter Australia without quarantine, resulting in the spread of the virus and leading to more than 600 people infected and 18 dead.



Figure 4/ Ruby Princess Cruise  
Image by Princess Cruises image library

#### IV. The economic impact of COVID-19 on the cruise industry

After the Japanese Diamond Princess incident and Australian Ruby Princess incident from February to March 2020, the global cruise industry successively announced in the middle of March the suspension of operation. The resumption of operation has been delayed several times, and Carnival Cruise Lines is currently scheduled to resume its operations on October 1. However, as the global pandemic is yet to be effectively controlled, it remains to be seen whether operations can be smoothly resumed.

The respective share prices of the world's top 3 international cruise companies, Carnival Cruise Line, Royal Caribbean International, and Norwegian Cruise Line fell from the closing prices of USD33.46/share, USD80.41/share, and USD37.26/share on February 24, 2020, to USD14.80/share, USD50.79/share and USD14.38/share on July 24 of the same year, a drop of 56%, 37%, and 61%, respectively. In addition, according to the Q2 financial report of Carnival Cruise Line published in June 2020, the company posted a loss of USD4.4 billion. However, it still needs to incur a monthly expenditure of USD650 million in the second half of the year.

Cruise companies who are in operation are adopting no-pay leave, pay cuts, and lay-off measures. In July, Carnival Cruise Line decided to sell or scrap 13 old or less efficient cruise ships to reduce operating expenditure, or issue of corporate bonds or shares to raise working capital.

#### Conclusion

In spite of the yearly increase in number of passengers, output, and number of people employed in the global and Australian cruise tourism industries in the past, cruise tourism is an industry with high passenger density and close contact, making it difficult to maintain social distancing. The COVID-19 pandemic has heavily impacted the development of the international cruise industry, halting the original boom. Cruise companies suffered losses and are struggling to operate. The resumption of operation has been repeatedly delayed, as the global pandemic is yet to be effectively controlled. During this period, cruise companies need to actively review, develop response strategies, and improve their preventive measures, so as to be able to provide cruise fans and crew members a more hygienic, safe, and healthy travel quality and environment after the pandemic.

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# Australia's Oceans Policy and Related Organizations

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Translated by Linguitronics

Keywords: Oceans policy, political will, Australia

Australia is one of the major maritime nations. Australia's Oceans Policy, issued in 1998, drew international attention with its high-quality text combined with pictures (Figure 1). Over 20 years since its issuance, its performance has garnered wide discussion. This article provides a brief overview of Australia's Oceans Policy, outlining its topics, achievements, and challenges, and introduces Australia's ocean-related organizations as references for ocean and related agencies in Taiwan.

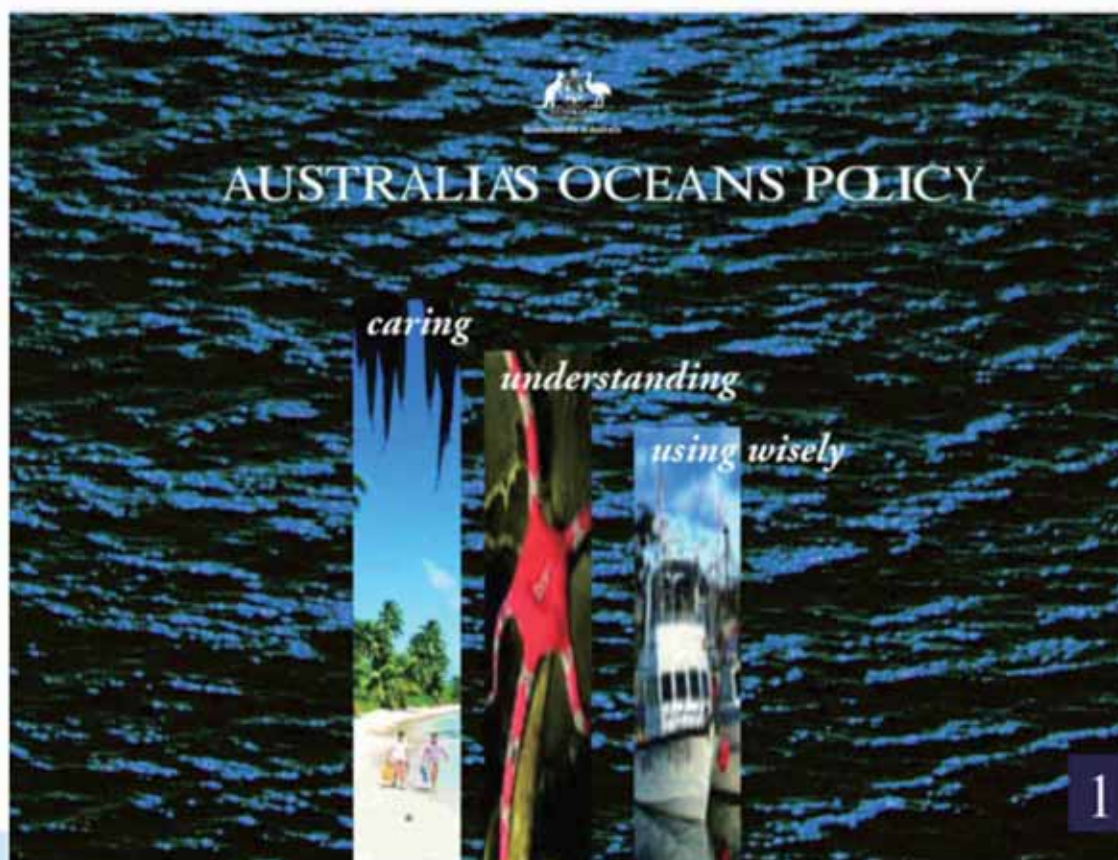


Figure 1/ Australia's Oceans Policy (1998)

Image by Commonwealth of Australia (1998)

<http://www.environment.gov.au/archive/coasts/oceans-policy/publications/pubs/policyv1.pdf>

## Introduction

Taiwan's Ocean Basic Act, issued and executed on November 20, 2019, decrees in Article 15, Paragraph 1: "The government shall release a white paper on national marine policy within one year after the implementation of the Act, and shall periodically review and amend it in accordance with its performance and developments at home and abroad." Therefore, the Ocean Affairs Council accordingly published the National Ocean Policy White Paper (Figure 2) on the first National Oceans Day on June 8, 2020. As the policy white paper must be routinely reviewed and revised, developments at home and abroad should be followed, in addition to checking policy performance. That is the point of this article.



## Themes of Australia's Oceans Policy

In 1998, acknowledging and addressing the International Year of the Ocean, the Australian government published the Australia's Oceans Policy. The policy identifies 3 main visions: to care for, understand, and wisely use oceans for the benefit of all, now and in the future; to preserve healthy oceans based on scientific and ecological planning and management; and to achieve sustainable development through integrated planning and management. The policy's goal is to take all of Australia's ocean-related organizations, uses, and activities into consideration, in hopes of integrating systems and strengthening collaboration in management. Meanwhile, it highlights the use of ecosystem-based approaches and the best available scientific and other information to seek sustainable ocean management. Thus, Australia's Oceans Policy states the following goals: 1. to exercise and protect Australia's rights and jurisdiction over offshore areas, including offshore resources; 2. to meet Australia's international obligations under the United Nations Convention on the Law of the Sea (UNCLOS) and other international treaties; 3. to understand and protect Australia's marine biological diversity, the ocean environment and its resources, and ensure that the use

of the ocean is ecologically sustainable; 4. to promote ecologically sustainable economic development and job creation; 5. to establish integrated oceans planning and management arrangement; 6. to accommodate community needs and aspirations; 7. to improve expertise and capabilities in ocean-related management, science, technology, and engineering; 8. to identify and protect natural and cultural marine heritage; and 9. to promote public awareness and understanding [1].



Figure 2/ National Ocean Policy White Paper (2020)  
Image by Ocean Affairs Council

## Ocean-related organizations in Australia

In order to oversee general issues while emphasizing ministerial responsibilities, consultation, and stake-holder participation, the 1998 Australia's Oceans Policy proposed establishing key national elements for ocean planning and management, including the National Oceans Ministerial Board, National Oceans Advisory Group, National Oceans Office, and Regional Marine Plan Steering Committees (Figure 3). These are described as below [1]:

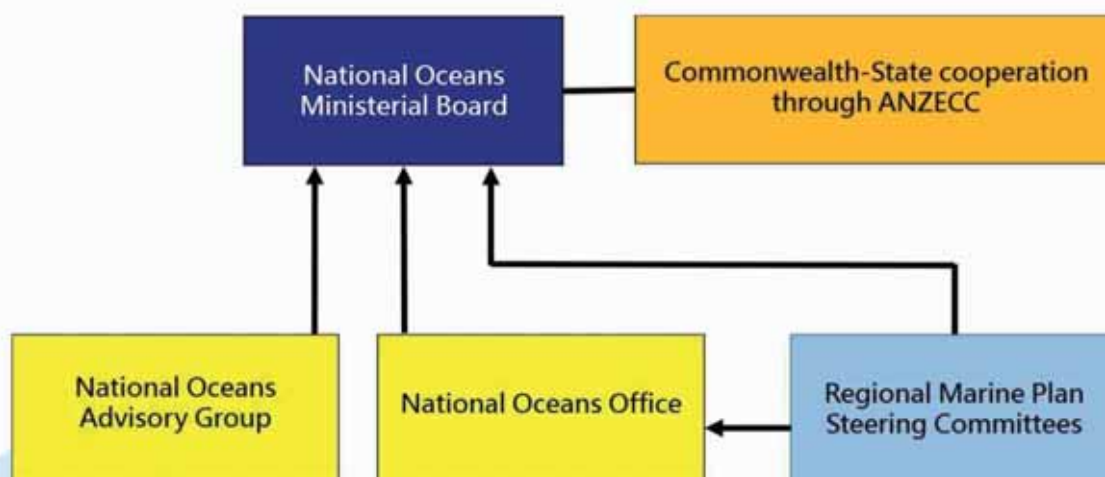


Figure 3/ The key national elements for Ocean Planning and Management  
Image by Commonwealth of Australia (1998), Australia's Oceans Policy  
<http://www.environment.gov.au/archive/coasts/oceans-policy/publications/pubs/policyv1.pdf>



**I. National Oceans Ministerial Board:** Members include the Commonwealth Ministers responsible for the environment (Chair), industry, resources, fisheries, science, tourism, and shipping. Other ministers are incorporated as necessary, including for example defense and foreign affairs ministers. The board's primary responsibilities include: overseeing the Regional Marine Planning process and developing process scopes and timetables; implementing and further developing of Australia's Oceans Policy; coordinating cross-sectoral oceans policy, programs, and priorities for expenditure; guiding the actions of the National Oceans Office; considering, developing, and implementing marine research priorities related to Australia's Oceans Policy, among others.

**II. National Oceans Advisory Group:** Supported by the National Oceans Office, the National Oceans Advisory Group is comprised of non-governmental members, such as those from the fields of industry, science, and conservation. Based on their expertise in oceans issues, the members advise the National Oceans Ministerial Board on cross-ministerial issues, ecosystem-based planning and management, and the regional marine planning process, creating a forum for exchanging information and views between the various sectors and private organizations.

**III. National Oceans Office:** The National Oceans Office is housed in the Department of Agriculture, Water and the Environment and mainly provides secretariat and technical support and program delivery in consultation with other Commonwealth agencies. It also assists the Board in the implementation and further development of Australia's Oceans Policy.

**IV. Regional Marine Plan Steering Committees:** Established by the National Oceans Ministerial Board; its members include key non-government and government stakeholders. The Steering Committees oversee development of Regional Marine Plans, work closely with the National Oceans Office, and report to the board.

In addition, with the Australian and New Zealand Environment and Conservation Council (ANZECC) as the coordination forum or platform for Commonwealth-State consultations on the implementation of Australia's Oceans Policy, the Australian government accommodates the interests of all sectors, ensuring the integration of planning across state and commonwealth waters when developing the framework for Regional Marine Plans.

According to the United Nations web page, currently Australia's main national marine science and technology research agency other than the Department of Agriculture, Water and the Environment is the Commonwealth Scientific and Industrial Research Organisation (CSIRO). Its primary occupation is to study the sustainable use of Australia's marine resources, the role of oceans in climate, and effective protection of the marine ecosystem integrity. The Information and Data Centre (IDC) at CSIRO Oceans and Atmosphere has been observing and collecting ocean data for more than 30 years [2].

Private organizations in Australia have also played major roles in ocean preservation or industrial development. For example, the Australian Marine Conservation Society, founded more than 50 years ago, is a community made up of scientists and ocean conversationalists. It collaborates with research centers around the world to protect Australia's marine life through best scientific evidence-based solutions [3]. OceanWatch Australia, on the other hand, is an officially recognized and supported non-profit, national environmental company. It works with the Australian seafood industry, federal and state governments, natural resource managers, private enterprises, and local communities to advance sustainability in the Australian seafood industry [4].



## Achievements and challenges of Australia's Oceans Policy

In the more than 20 years since the implementation of Australia's Oceans Policy, people from many sectors have debated its performance. Most notably are the views of Joanna Vince, from the University of Tasmania, who summarizes the policy's achievements and challenges as below [5][6][7]:

### I. Achievements

Australia's Ocean Policy was one of the first holistic, ecosystem-based approach to policy implementation, and was initially highly regarded by the international community, and subsequently became a focus for policy transfer and learning. During policy development, large amounts of consultation facilitated stakeholders' participation, but it was found that the Australian public had little or limited interest in the oceans policy to be planned. On the National Representative System of Marine Protected Areas (NRSMPAs) and South Pacific Whale Sanctuary, the proposed international commitments were an important part of ocean governance. Establishment of the ocean governance institutional framework was slow in implementation but filled with enthusiasm. The conversion of Regional Marine Plans to Bioregional Marine Planning with ecosystem-based management was a novel approach which allowed wide participation from all stakeholders, initiating attempts in marine spatial planning. The release of the Environment Protection and Biodiversity Conservation Act and Marine Science and Technology Plan afterwards were essential for the development of marine science and blue economy, and are certain to be important components in future oceans policies.

### II. Challenges

The above achievements also show the challenges of the oceans policy. In 1997, the ministerial advisory group for oceans policies drafted a report with nearly one hundred recommendations, including how a multiple objective use and integrated oceans policy could be supported by different institutional frameworks, such as the successful Great Barrier Reef Marine Park model. Yet the government did not adopt these recommended institutional frameworks, and full integration, the main aim of the oceans policy, has not been achieved. For instance, it was unclear whether the role of the National Oceans Advisory Group was a sector-based representative group or an advisor to the Ministerial Board. The National Oceans Office was confined by its executive agency status and lack of secretariat capabilities. Except for the National Marine Science Committee, none of the oceans policy's original institutions remain today. The greatest regulatory challenge was that the oceans policy was only a "policy" layered on top of existing legislation. Its execution was not in line with government sectors, and integration of existing executive systems were ineffective. Management of the oceans and of the coasts were differentiated, and state governments did not give full support. Another important challenge was the lack of financial support. Funding dwindled, and ocean planning information was insufficient. Overall the lack of resources underpinning the development and implementation of the policy contributed to its demise. NGOs and experts saw the establishment of oceans legislation combining policy and legislation as the only way forward for the oceans policy. Major political parties focus on singular ocean issues (such as whaling), but when enthusiasm is lacking for oceans policies, the reviving of political will can be the biggest challenge.

Experts also found that the Australian public has little understanding of, or connections with, the ocean, ocean resources, and ocean issues. The solution is to incorporate current issues, such as marine pollution, marine protected area management, illegal, unreported, and unregulated (IUU) fishing, impacts due to climate change, and fishery and aquaculture challenges into the new integrated ocean governance system. Marine plastic pollution, in particular, has recently gained the attention of the public and media, challenging government responses and requiring a holistic solution. Therefore we need to stop thinking in terms of singular issues and recognize current issues comprehensively as part of the greater oceans agenda. Supported by science, a cultural connection to the ocean can be created



through the development of a new oceans policy or legislation. Vince points out that with recent advances in science and technology, marine spatial planning will assist any new developments in oceans governance pursued today and alleviate some of the difficulties that the original oceans policy process encountered more than 20 years ago [5].

## Conclusion

Australia has been a world leader in the oceans policy process. With new motivation for changes or a revised oceans policy, the accumulated experience of over 20 years may well help them regain leadership in ocean governance. The Australian experience can provide reference for Taiwan's execution of the National Ocean Policy White Paper (2020), as well as for its regular review. Enhancement of policy implement ability, regular reviews and adjustments, improvement of sector integration, and obtaining of political support are also undoubtedly challenges for our ocean policy.



Image by Pride Advertising Agency Ltd.

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## Latest Development of Australian Tidal and Wave Energy

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Translated by Linguitronics

Keywords: Development status of Australian tidal and wave energy, ocean energy

According to the definition of IEA-OES (International Energy Agency, Ocean Energy Systems), ocean energy comprises wave, tide, current, ocean thermal energy and osmotic power. The gradual decline of the world's fossil energy and the increase in demand of renewable energy have triggered many countries to invest in the development and test of ocean energy, and most test units have since entered the demonstration power plant stage. In addition, ocean energy power systems can be installed in coastal areas or offshore, which prevents crowding land space and obscuring the view, and significantly reduces the obstacles in the promotion and installation. The study mainly references IEA-OES 2019 annual report [1], targeting on the latest development of Australia's tidal and wave energy in 2019, from the aspects of national policy, grant funding, research and development institutions and demonstration units.

### Nation Policy

It is estimated that Australia has 1,800TWh of ocean energy resources, enough to supply the country's electricity demand for 7 years. The Australian government's Renewable Energy Target for 2020 is a generation of 33,000 gigawatt hours of electricity. In 2019, the Australian Clean Energy Regulator announced that the target has been achieved ahead of schedule. Based on this, various states have successively set their renewable energy proportion targets. For example, Australian Capital Territory, Canberra, sets its 2020 renewable energy target as 100%, while other states set targets for 2030, including New South Wales who sets its renewable energy target as 46%, Victoria as 50%, Queensland as 50%, Northern Territory as 50%, South Australia as 50% and Tasmania as 100%. Western Australia is the only region that is yet to make its commitment to renewable energy.

Though Australia does not have federal level ocean energy policies at present, the states have started to establish relevant laws and regulations. For example, Victoria is currently establishing a new ocean policy. This policy originates from the requirements of Marine and Coastal Act 2018. The public consultation on the draft was published in July 2019, and ended in August, and the policy was finalized in early 2020. This policy defines offshore renewable energy as emerging offshore industry, and the ocean energy items include:

- I. Incorporate the entire state into the marine spatial planning framework
- II. Promote ocean energy related policies
- III. Set and define marine and coastal structures
- IV. Implement ocean energy alliances and cooperative management

In addition, the priority of the Marine and Coastal Policy established by Victoria in 2020 is to realize its ocean energy policy target.



## Government grant program

The Australian Renewable Energy Agency (ARENA) is the main government agency that supports ocean energy. As of 2019, it has subsidized 14 Australian ocean energy projects, including two ongoing projects, which are:

- I. King Island's Wave Swell project (total project amount of AUD12.3 million, with AUD4.03 million grant funding from ARENA);
- II. Australia's AUSTEn (Australian Tidal Energy) - tidal energy mapping of potential sites (total project amount of AUD5.85 million, with AUD2.49 million grant funding from ARENA) is led by the University of Tasmania, and with the cooperation of the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and The University of Queensland.

## Ocean energy research institutions

New Blue Economy Cooperative Research Centre was established in April 2019, and is expected to invest AUD330 million in the next 10 years. With the cooperation of the industry, government and research departments, it supports the sustainable development of Australia's blue economy. A total of 5 large research areas are planned; these include Offshore Engineering & Technology (Program 1), Seafood and Marine Products (Program 2), Offshore Renewable Energy Systems (Program 3), Environment and Ecosystems (Program 4), and Sustainable Offshore Developments (Program 5). Among them, offshore renewable energy system is one of the five major research directions, and is estimated that AUD66 million will be invested in the future.

The objective of Program 3 is to select and research suitable ocean energy demonstration systems, optimize the off-grid energy extraction efficiency, energy storage and control strategies of off-grid renewable energy systems. The research items include:

- I. Energy demand (market assessment and economic model)
- II. Available energy analysis (resource characteristics and potential analysis)
- III. Energy conversion technology (design and test)
- IV. Control system (develop an integrated hydrogen microgrid system)

The feasibility study of AUSTEn tidal energy was completed in June 2020. The University of Tasmania and The University of Queensland cooperate in the project to assess Australia's tidal energy potential and its economic feasibility. The project's short-term field surveys were completed in different seasons in May, October and December 2019, where assessments on the tidal potential and environmental suitability of the Banks Strait of Tasmania and the Clarence Strait outside Darwin City were conducted. The survey items include tidal velocity, water depth terrain, temperature, seabed geological composition and fish ecology. According to site surveys, pattern analysis and various standard assessments, Banks Strait and Clarence Strait are listed as places with high potential in tidal energy. Their main advantages are their powerful tides, proximity to electricity grids and nearby energy demand. In addition, CSIRO, a partner of the project, is currently assessing Australia's tidal energy potential and analyzing its possible contribution to the proportion of renewable energy. The potential map of Australia's ocean energy is expected to be published in 2020.

The Wave Energy Research Centre (WERC) of the University of Western Australia has been conducting various researches in recent years, in the aim to reduce the cost of commercial operation of wave power. The three main research projects of WERC are:

- I. Site assessment: Select suitable places for developing wave and tidal energy, and increase the success rate of installing wave energy converters.
- II. Hydrodynamic analysis: Cooperate with Albany Wave Energy Project on the study of hydrodynamic characteristics such as fluid-structure interaction, and the design and development of innovative wave energy converters.
- III. Foundation work: Design and develop ocean energy system's support structure suitable for different marine environments.



James Cook University performed a six-month test on the Australian tidal energy company MAKO in Gladstone, Queensland, and assessed the environmental impact of installing tidal turbines. The unit used artificial intelligence (AI) to analyze underwater observation data and thereby assess the impact to the environment from the MAKO tidal turbine project. It found that the MAKO project had not caused negative impact to the environment, and the AI monitoring system proves that it can provide low-cost, highly efficient, and precise data for the regulatory authority.

### Demonstration units

MAKO is continuously improving the power generation sub-systems of its tidal turbines, and develops highly scalable and modular turbine systems that can be installed in existing structural base and different water depth conditions. More than 6 months of testing has been completed in Gladstone port in eastern Australia, attachment to an existing bridge structure. Test data collection and analysis are conducted by both MAKO and James Cook University. MAKO has also set up tidal power demonstration systems in the existing bridge structure in Singapore's Sentosa Island and waters of Japan's Kagoshima.



Figure 1/ MAKO Energy Technology  
Source/ <https://www.mako.energy/technology>

UniWave200 is a wave power demonstration project launched in 2019, and is expected to begin test run in mid-2020. The machine has a capacity of 200kW, and the project includes design, manufacturing, assembly and deployment and operation. The test site is located in Australia's King Island, west end of Bass Strait and northern west of Tasmania. The total project amount is AUD12.3 million, including AUD4.03 million of grant funding from ARENA. UniWave200 uses oscillating water column (OWC) technologies. While normal OWC uses bi-directional turbines, UniWave200 uses unidirectional turbines. Hence, its only moving parts are valves and turbines, which are above the waterline. Such design is able to simplify the power generation components, provide more sturdy, reliable and highly efficient power generation system, and reduce construction and maintenance cost. The foundation design uses bottom-mounted steel structure.



Carnegie Clean Energy has successfully overcome the major business restructuring in 2019 and constructed the CETO 6 wave power generation system, and is preparing for installation. Testing is expected to be conducted in the third quarter of 2020 in Garden Island. CETO 6 adopts the fully submerged point absorber wave energy converter technologies. A submerged buoy is placed a few meters below the ocean surface and moves with the ocean's waves, which drives the transmission system and electric equipment, converting this motion into electricity.

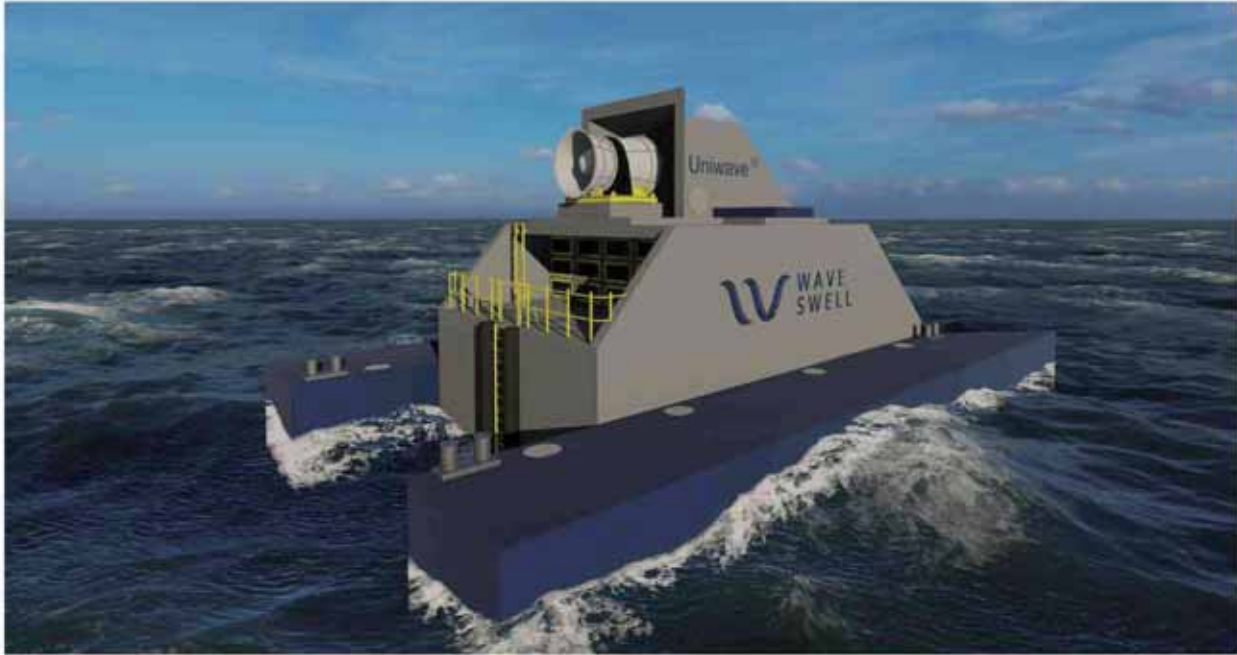


Figure 2/ UniWave200

Source/ <https://arena.gov.au/projects/uniwave200-king-island-project-wave-swell/>

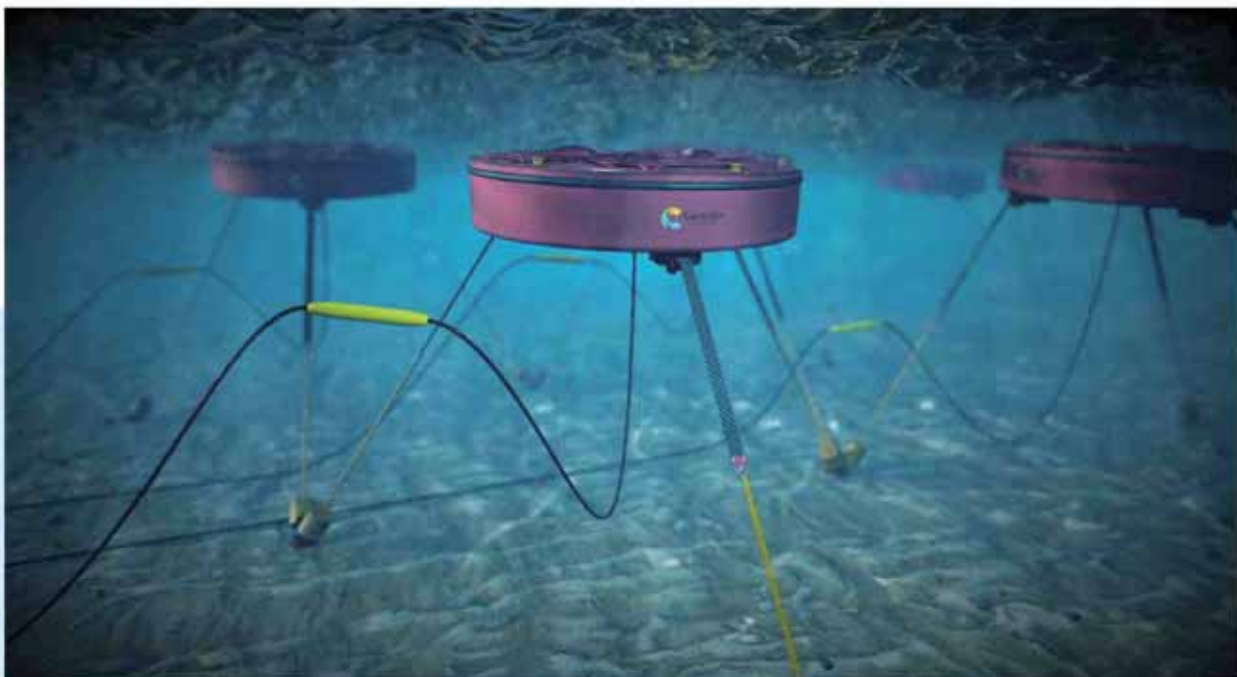


Figure 3/ CETO 6 wave power generation system

Source/ <https://www.carnegiecleanenergy.com/technology/>



## Conclusion

The Australian government continues to support the development of ocean energy, and the various states have successively set renewable energy targets and relevant laws and regulations. It will be investing AUD330 million in the next 10 years for the development of the blue economy, and incorporate ocean energy into its key development items. With clear nation policy and renewable energy targets, ocean energy research institutions have launched research projects such as nationwide potential mapping analysis for ocean energy, site selection, environmental impact assessment, key technological research and development and testing. In addition, research institutions and the industry are actively cooperating to form cooperative alliances for on-site testing and international cooperation, and continue to promote ocean energy development. Through long-term sea trial and verification, it aims to improve the performance of the unit, reduce power generation cost, and assess the feasibility of its economic operation, to move towards practical phase and large-scale commercial power plant.

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# Australia's Response to International Convention for the Control and Management of Ships' Ballast Water and Sediments

Compiled by Cheng-Chi Chung (Distinguished Professor, Dept. of Shipping and Transportation Management, National Taiwan Ocean University), Hsuan-Shih Lee (Professor, Dept. of Shipping and Transportation Management, National Taiwan Ocean University), Po-Yuan Huang, Chi-Han Huang, and Meng-Chieh Liu (Master Degree Student, Dept. of Shipping and Transportation Management, National Taiwan Ocean University)

Keywords: International Maritime Organization, Ballast Water Management Convention, Australian Ballast Water Management Requirements

Since ballast water can contain a range of invasive marine species, if managed improperly, it may cause unacceptable economic and environmental impacts on Australia's unique maritime environment. This version of requirements therefore reflects the implementation of the BWM Convention to reduce the risk of spreading marine pests transmitted in Australian seas.

The International Maritime Organization (IMO), a United Nations specialized agency, is responsible for developing global standards for ship safety and security, and for the protection of the marine environment as well as atmosphere from any harmful impacts of shipping. The International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (Ballast Water Management Convention or BWM Convention) is a treaty adopted by the IMO in order to help prevent the spread of potentially harmful aquatic organisms and pathogens in ships' ballast water. Effective September 8, 2017, ships must manage their ballast water to remove or render harmless aquatic organisms and pathogens before releasing the ballast water into a new location. This will help prevent the spread of invasive species as well as potentially harmful pathogens. A diagram of ballast water loading and discharging is shown in Figure 1.

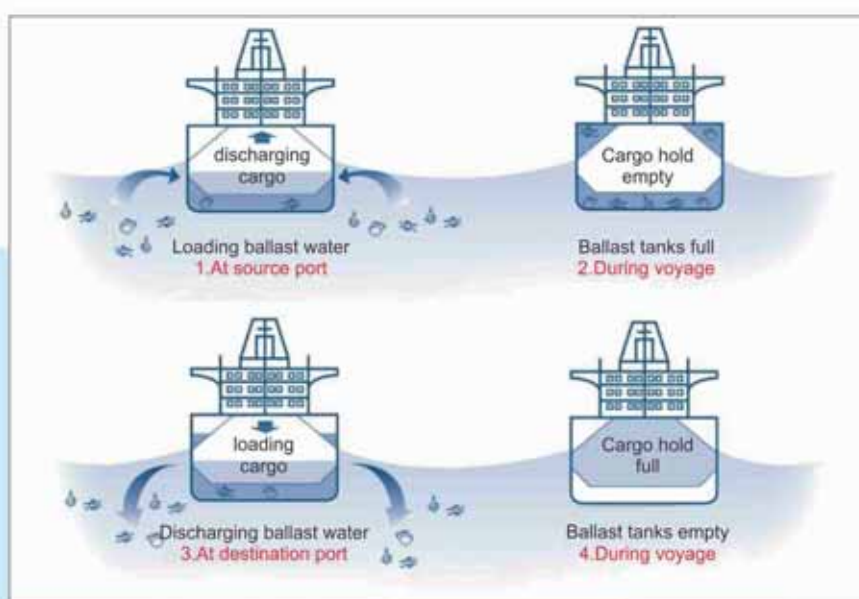


Figure 1/ Diagram of Ballast Water Loading and Discharging  
Source/ IMO (2020)

<http://www.imo.org/en/mediacentre/hottopics/bwm/pages/default.aspx>



There are two ballast water management standards: D-1 and D-2. The D-1 standard requires ships to exchange their ballast water in open seas, far from the coastal areas. Ideally, the ship should be at least 200 nautical miles from land and in water at least 200 meters deep. This can make fewer organisms survive. As a result, potentially harmful species are less likely introduced when the ship discharges the ballast water. The D-2 standard specifies the maximum amount of viable organisms allowed to be discharged, including specific indicator microbes harmful to human health. From the date of entry into force of the BWM Convention, all ships must conform to at least the D-1 standard, and all newbuilding ships to the D-2 standard. Eventually, all ships will have to conform to the D-2 standard. For most ships, this involves installing special equipment to treat the ballast water. In order to protect the marine ecology, Australia adopts the following regulations and administrative measures for ships sailing into its waters.

### Australia's Response to the BWM Convention

The Australian Ballast Water Management Requirements provide guidance for ship operators on best practice policies regarding the management of ballast water and ballast tank sediments, when operating within Australian seas and apply to all ships operating internationally and domestically in Australia. Since ballast water can contain a range of invasive marine species, if managed improperly, it may cause unacceptable economic and environmental impacts on Australia's unique maritime environment. This version of requirements therefore reflects the implementation of the BWM Convention to reduce the risk of spreading marine pests transmitted in Australian seas.

#### I. Required documentation

##### [I] Ballast Water Management Plans

All ships designed to carry ballast water are required to carry a valid Ballast Water Management Plan (BWMP). A valid BWMP must be approved by either a survey authority, classification society, or the Administration of the ship. For Australian flagged ships, it must be approved by the Director of Biosecurity, or a certified survey authority. In addition, BWMPs should comply with the Ballast Water Convention's Guidelines for Ballast Water Management and Development of Ballast Water Management Plans (G4 Guidelines).

##### [II] Ballast Water Management Certificates

A Ballast Water Management Certificate (BWMC) is required for all ships to which the BWM Convention applies. A BWMC verifies whether the ship has been surveyed to a standard compliant with the BWM Convention, and must be consistent with the format described in Appendix I of the Convention. A valid BWMC must be issued by either a survey authority, classification society, or the Administration of the ship, and be in accordance with Regulation E-1 of the BWM Convention. For Australian flagged ships, a management certificate must be issued by the Director of Biosecurity, or an approved survey authority.

##### [III] Ballast Water Record System

All ships utilizing ballast water management must maintain an accurate Ballast Water Record System. The system may be electronic or in hard copy and should comply with Regulation B-2 of the Annex to the BWM Convention. The Record System should contain a complete and current record of all ballast water movements.

##### [IV] Type Approval Certificate

For ships with a Ballast water management system (BWMS), a Type Approval Certificate must be retained on board, relating specifically to the BWMS, not to specific ship.

## II. Ballast Water Reporting

Ballast water reporting differs depending on whether a ship is trading within Australia domestically or on an international voyage. In the event of exceptional circumstances that prevent a ship from the management of ballast water, the department should be notified as soon as practicable. Besides, in case of a failure of BWMS, the ship operator must notify the Maritime National Coordination Centre (MNCC) once he becomes aware of the malfunction, in order to seek advice from the appropriate department on emergency measures.

### [I] Reporting obligations for international ships

Ships of international origin that plan to discharge ballast water have a reporting obligation. If a ship intends to discharge internationally sourced ballast water, it must submit a ballast water report through Maritime Arrivals Reporting System (MARS) at least 12 hours prior to arrival. However, in order to prevent the discharge of high risk ballast water, ships not intending to discharge ballast water are strongly recommended to manage their ballast water and submit a ballast water report. This action may assist in avoiding delays should the ship have an itinerary change. The ballast water report will be assessed by the department through MARS and a response will be issued through the biosecurity status document. The ballast water report should be updated and completed as soon as practicable if the situation of ballast water on board changes.

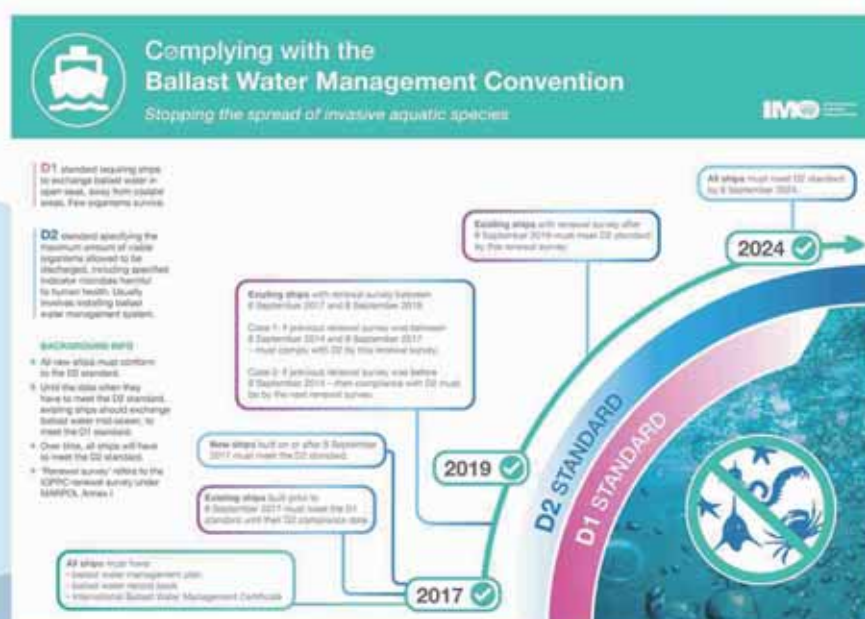
### [II] Reporting obligations for domestic ships

Ships that have been discharged from biosecurity control are still required to manage the movement of Australian sourced ballast water. Prior to the discharge, all ballast water must be managed, or receive a low risk exemption from the department based on the date and port of uptake and discharge, with all applications submitted through MARS. Ship operators must retain evidence of the exemption notification on board, and are required to present it during inspection as required.

## III. Phase out of ballast water exchange

Australia is in the process of implementing the BWM Convention, which requires ships to phase out ballast water exchange in favor of methods that comply with the D-2 standard. To achieve this, ships will be required to install an IMO approved BWMS, or use other approved management methods. The agreed implementation time of the BWM Convention is demonstrated in Figure 2.

Figure 2/ Implementation Time as Agreed under the BWM Convention  
Source/ IMO (2020)  
<http://www.imo.org/en/MediaCentre/HotTopics/Pages/Implementing-the-BWM-Convention.aspx>





New ships constructed on or after September 8, 2017, will be required to meet the D-2 standard from the date of entry into service. Ships constructed before September 8, 2017 shall obey the D-2 standard by either the first or second five-year renewal survey of the ship associated with the International Oil Pollution Prevention Certificate (IOPP) under the International Convention for the Prevention of Pollution from Ships (MARPOL) Annex I. For the first renewal survey on or after September 8, 2019, ships shall abide by the D-2 standard by their first renewal survey date. Ultimately, all ships must comply with the D-2 standard by September 8, 2024.

#### IV. Acceptable Areas for Ballast Water Exchange

Ballast water exchange should be conducted in at least 200 nautical miles from the nearest land and in waters 200 meters deep. For voyages that cannot practically meet these requirements, ballast water exchange shall take place at least 12 nautical miles from the nearest land and in water at least 50 meters deep.

#### V. Ballast Water Management for Ships Servicing Offshore Installations

Ships entering Australia's Exclusive Economic Zone (EEZ) must manage their ballast water in accordance with acceptable ballast water management practices prior to arrival at an offshore oil and gas installation. Ships operating between offshore oil and gas installations and Australian ports are also required to manage their ballast water before arrival at the installations and Australian ports. The acceptable area for ballast water exchange between an installation and an Australian port is in sea areas that are no closer than 500 meters from the offshore installation, and not less than 12 nautical miles from the nearest land.

#### VI. Disposal of Ballast Tank Sediments

Disposal of tank sediments is prohibited in Australia's EEZ. Sediments must be disposed of in an area outside 200 nautical miles from the nearest land, and in at least a depth of 200 meters, or at an approved land-based reception facility. Stripping of ballast tank sediments in Australian seas is not permitted, unless a ship seeks permission to discharge them into a reception facility.

The discharge of sediments is permitted under the following conditions: (i) In an emergency to ensure the safety of the ship or to save life at sea. (ii) An accidental discharge is caused by damage to the ship or its equipment. (iii) All reasonable precautions have been taken to prevent or minimize the discharge. (iv) For the purpose of reducing pollution.

### Concluding Remarks

Ballast water devices are essential equipments for ships to ensure the stability of their navigation. However, the introduction of exotic species from the ballast water may cause harm to the water environment and marine ecology of the country. Therefore, governments should indeed take this issue seriously. There is a need to establish ballast water management regulations for ships coming from foreign waters. This article discusses Australia's response to the BWM Convention, expecting that the relevant government authorities may use it as a reference for formulating regulations on the management of ballast water and sediments from ships to jointly protect the marine environment.

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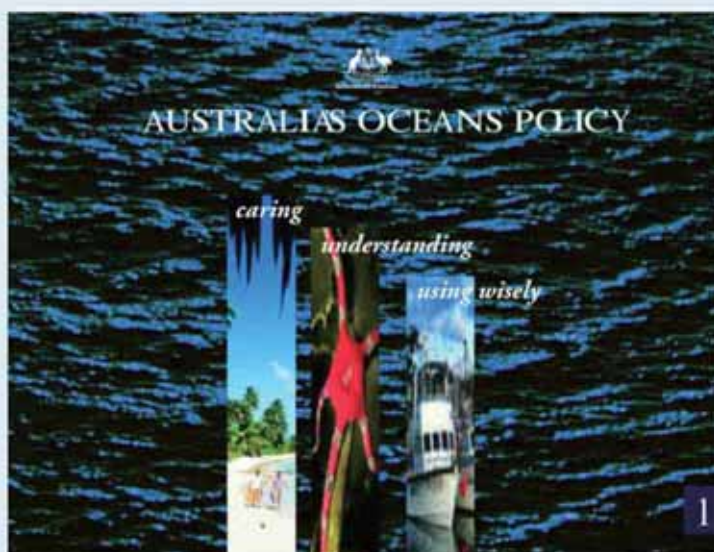
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