國際海洋資訊
International Ocean Information

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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 發行

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懷抱開放的心胸 打造優質的海洋國家！

主任委員：李仲威

自1998「國際海洋年」公布《澳洲海洋政策》（Australia's Oceans Policy）以來，澳洲推動海洋政策已20餘年，老牌海洋國家的經驗分享，是本期《國際海洋資訊》的焦點精選。海洋的豐沛資源與生態環境值得我們愛護維持，人們在從事海域遊憩活動時，也應該謹慎認識海洋，才能安全地與海為伍，澳洲每年有1億人次造訪海灘，如何避免並減少安全風險，「國際議題」介紹澳洲對海灘的危險評估、分級以及安全資訊網站，可供參考；而如何使用豐沛的海洋能資源，「資訊新知」介紹澳洲潮汐發電和波浪發電示範計畫的最新發展；在全球化的現在，澳洲如何保護自己獨有的海洋生態，並因應國際海事組織（IMO）《船舶壓艙水及沉積物管理國際公約》，則是本期「法規制度」的重點；在全球郵輪產業皆面臨疫情影響的現在，2018年產值52億澳元的澳洲郵輪產業亦大受影響，本期「產業動態」關注郵輪產業在社交距離維持不易、觀光業低迷的現況與策略。

多山、又四面環海的臺灣，坐擁豐富自然資源，以開放的態度向海致敬，可以豐富我們的文化、拓展我們的視野。本期專文介紹今年（2020）國家海洋日發布的《國家海洋政策白皮書》，從海洋權益、治安、保育等層面，呈現我國在海洋治理上之政策規劃與企圖，也期望與讀者共勉，認識海洋、向海學習，共同打造一個優質的海洋國家！

圖片來源／Des Kerrigan from Pixabay
https://pixabay.com/photos/shark-great-barrier-reef-underwater-2683184/

《國家海洋政策白皮書》——擘劃我國海洋政策的藍圖

撰文／沈建中（海洋委員會綜合規劃處處長、國立臺灣大學法學博士、美國德州大學奧斯汀校區政府學研究所訪問學者）

關鍵字／海洋基本法、國家海洋政策白皮書、海洋國家、海洋政策、海洋事務、生態、安全、繁榮

〈海洋基本法〉作為我國海洋國家總體政策的基本大法，以營造生態、安全、繁榮的永續海洋國家，樹立海洋法制基礎。依〈海洋基本法〉第15條第1項，政府應於〈海洋基本法〉施行後一年內發布《國家海洋政策白皮書》，並依其績效及國內外情勢發展定期檢討修正。《國家海洋政策白皮書》的發布施行，是向全體國民呈現國家在海洋治理上之政策企圖與規劃。所以，《國家海洋政策白皮書》，即是策定海洋事務的政策方向，並宣示政府深耕海洋的決心，作為擘劃國家海洋發展策略的藍圖。

圖說／《國家海洋政策白皮書》封面
圖片來源／海洋委員會

圖說／《國家海洋政策白皮書》封底
圖片來源／海洋委員會

前言

民國108年（2019）11月20日總統公布實施〈海洋基本法〉。這是我國第8部基本法（註一）。〈海洋基本法〉的制定，即是宣示海洋總體政策，並統合海洋事務；我國海洋總體政策為打造生態、安全、繁榮之優質海洋國家，維護國家海洋權益，提升國民海洋科學知識，深化多元海洋文化，創造健康海洋環境與促進資源永續，健全海洋產業發展，推動區域及國際海洋事務合作（註二）。茲為落實我國海洋政策，爰〈海洋基本法〉施行後一年內發布《國家海洋政策白皮書》，各級政府應配合檢討所主管之政策及行政措施。依該法的規定，於今年（109）6月發布《國家海洋政策白皮書》，提出我國海洋政策為：一、建構區域戰略思維，保衛海域主權權益；二、落實海域執法作為，促進區域安全合作；三、維護海洋生態健康，優化海洋環境品質；四、確立產業發展目標，促進藍色產業升級；五、形塑全民親海風氣，培養海洋國家思維；六、孕育科學發展動能，厚植學術研究能量。

《國家海洋政策白皮書》

一、《國家海洋政策白皮書》簡介

臺灣四面環海，海洋治理攸關臺灣整體發展及競爭優勢。我國憲法對於海洋事務即有規範，歷年政府亦宣示海洋政策。但以白皮書方式公布海洋政策，首為民國90年發布「海洋白皮書」，93年發布「國家海洋政策綱領」，95年再提出「海洋政策白皮書」。

海洋委員會成立後，即依〈海洋基本法〉立法精神，邀集與海洋事務相關部會及海洋事務專家學者，共同編纂《國家海洋政策白皮書》。《國家海洋政策白皮書》係依據〈海洋基本法〉發布之文件，為我國首部依據法律編纂之海洋政策專書，具引導政府海洋施政的功能，將作為政府海洋政策藍圖，促進各部會及地方政府共同推動海洋事務。

《國家海洋政策白皮書》全書包含第1章「導論」、第2章「海洋權益維護與治理」、第3章「海上安全與海域治安」、第4章「海洋保育與環境保護」、第5章「海洋產業發展與創新」、第6章「海洋文教與人才培訓」、第7章「海洋科研與技術發展」及第8章「未來展望」等8章及附錄一「我國海洋管理體制分工表」與附錄二「海洋基本法與國家海洋政策白皮書章節對應表」。

《國家海洋政策白皮書》發布後，期許政府與個人，充分體會發揮臺灣四面環海之優勢，以前瞻、創新的思維，拓展海洋新局，讓臺灣不受海所限，因海而無限遠大。

二、《國家海洋政策白皮書》章節內容

現謹說明《國家海洋政策白皮書》各章節。《國家海洋政策白皮書》第1章「導論」未分節，說明臺灣是海洋國家，海洋是臺灣最重要的出路；第2章「海洋權益維護與治理」，說明海洋權益之維護，關乎國家的生存發展；第8章「未來展望」，提出說明海洋是國家發展的重要利基；這兩章無策略方針及具體措施。至第3章至第7章各章節，本文中提出說明各面向海洋事務之現況與重要課題，並提出策略方針及具體措施。現謹摘述如下。

（一）第1章「導論」，提出海洋發展之願景及政策目標。

（二）第2章「海洋權益維護與治理」，計有4節。第1節：海域情勢與國際參與；第2節：海洋權益與國土安全；第3節：海洋行政組織與法制；第4節：國際治理趨勢與實踐。

（三）第3章「海上安全與海域治安」，計有3節。第1節：維護我國海事安全；第2節：強化海域治安作為；第3節：提升災防救難能量。

第1節「維護我國海事安全」的策略方針為：維護海域航行安全，降低危害損失。具體措施有：建構我國海域意識（Maritime Domain Awareness, MDA）體制等6項措施。

第2節「強化海域治安作為」的策略方針為：杜絕不法於境外，以維持社會安定。具體措施有：檢討修正相關法規等6項措施。

第3節「提升災防救難能量」的策略方針為：提升海上救生救難能量。具體措施有：運用先進科技，提升災防技術等3項措施。

（四）第4章「海洋保育與環境保護」，計有3節。第1節：強化海洋污染防治；第2節：永續經營海洋資源；第3節：加速生態保育工作。

第1節「強化海洋污染防治」的策略方針為：1.提升海污防治量能，減少海洋廢棄物。2.維護海洋環境，確保潔淨海水。具體措施有：精進《海洋污染防治法》並與國際接軌等7項措施。

第2節「永續經營海洋資源」的策略方針為：1.維護海洋生態環境，達成海洋永續發展。2.促進漁業共同養護管理與合理利用資源。3.兼顧海洋資源開發利用與生態保育。具體措施有：訂定符合永續的漁業政策等8項措施。

第3節「加速生態保育工作」的策略方針為：1.保護海洋生態系統，建構健康棲地。2.維持海洋生物多樣性，永續海洋資源。具體措施有：建構我國海洋生物多樣性基礎資料等7項措施。

（五）第5章「海洋產業發展與創新」，計有4節。第1節：優化產業策略布局；第2節：營造產業發展環境；第3節：建構產業價值鏈結；第4節：強化產業輔導政策。

第1節「優化產業策略布局」的策略方針為：指引我國海洋產業重要方向，奠定海洋產業發展之格局，提升海洋產業競爭力。具體措施有：推動藍色經濟創新等2項措施。

第2節「營造產業發展環境」的策略方針為：營造產業發展所需地理空間、財務資金、法規制度、人力人才、產業技術、行銷市場等環境。具體措施有：完成海洋空間規劃及用海規則依據〈海洋基本法〉及本政策白皮書等4項措施。

第3節「建構產業價值鏈結」的策略方針為：建構海洋產業價值鏈、公私夥伴及國際連結，以壯大產業實力及提升國際競爭力。具體措施有：盤點及建構各海洋產業價值鏈等3項措施。

第4節「強化產業輔導政策」的策略方針為：研訂周延的產業輔導政策，以協助海洋產業順利發展。具體措施有：異業互助合作、拓展國際市場，建立自有品牌，促進投資招商等6項措施。

（六）第6章「海洋文教與人才培訓」，計有4節。第1節：保存傳統海洋文化；第2節：發展多元海洋文化；第3節：提升全民海洋素養；第4節：培育海洋人力資源。

第1節「保存傳統海洋文化」的策略方針為：1.重視原住民族傳統海洋文化智慧，及船筏器具製作技能傳承，尊重海洋資源利用方式，推廣臺灣在地海洋文化。2.發展海洋文化知識體系，致力海洋文化保存。具體措施有：尊重原住民族用海智慧與哲學等4項措施。

第2節「發展多元海洋文化」的策略方針為：多元發展海洋文化，建構國人海洋意識。具體措施有：建構國人海洋文化意識等4項措施。

第3節「提升全民海洋素養」的策略方針為：1.多元管道推廣，普及海洋知識。2.結合教育資源，建構海洋思維。具體措施有：落實海洋國民教育等5項措施。

第4節「培育海洋人力資源」的策略方針為：1.健全人才培育制度，厚植海洋產業基礎。2.配合國家發展需求，培育海洋專業人才。3.加強原住民族傳統航海知識體系建構，培育當代原住民族對海洋知識之認識，進而保存原住民族傳統航海知識。具體措施有：完善教育體系，加強專業培訓等4項措施。

（七）第7章「海洋科研與技術發展」，計有3節。第1節：整合海洋科研資訊；第2節：完善海洋基礎調查；第3節：引領海洋產業升級。

第1節「整合海洋科研資訊」的策略方針為：1.深耕海洋科研，強化國際交流。2.整合科研資訊，加值應用服務。具體措施有：有效規劃資料庫，促進海洋資訊之整合與交流等4項措施。

第2節「完善海洋基礎調查」的策略方針為：1.強化基礎調查量能，跨國跨域合作交流。2.導入最新科學技術，升級資料使用效益。具體措施有：增加科學研究船之研究能量等5項措施。

第3節「引領海洋產業升級」的策略方針為：1.結合國內科技優勢，創新海洋產業技術。2.培育海洋產業人才，推動產業開發科技升級。具體措施有：海洋技術與科技接軌等3項措施。

（八）第8章「未來展望」，計有4節。第1節：形塑親海、識海、愛海的海洋公民意識；第2節：建構明智用海、治海的海洋使用秩序；第3節：實踐海洋思維的海洋國家願景；第4節：經營海洋、航向世界。

結論

現今世界各沿海國家對海洋的重視日益增加，積極向海發展，面對海洋新世紀的挑戰，我們必須從體制上、政策上及運作上長期培養國力，走向海洋與發展海洋。

臺灣的歷史發展與海密不可分，臺灣要強健國力就必須向海發展；且我們面向海洋，視野就會無限寬廣。因此，我們應該知海、敬海，善用海洋資源。政府現正研訂「向海致敬」政策，將以「開放」、「透明」、「服務」、「教育」、「責任」5大原則，從法規調適、布置友善環境，建構友善措施，鼓勵國人「知海」、「近海」、「進海」、「淨海」；我們要面向海洋，向海學習，更鼓勵國人勇於親近並進入海洋，去見識海天壯闊，拓展視野，恢宏胸襟。

《國家海洋政策白皮書》，就是落實與發展我國海洋新世紀的具體體現。《國家海洋政策白皮書》的發布與施行，代表政府對海洋事務發展的旺盛企圖心與海洋拓展性格，也代表全體國人經營海洋，航向海洋的決心。《國家海洋政策白皮書》將使我國海洋事務蒸蒸日上，並且實踐生態，安全與繁榮之永續海洋國家。

《國家海洋政策白皮書》電子版連結

註一：另外7部基本法分別為：〈環境基本法〉（民國91年12月11日）、〈教育基本法〉（民國102年12月11日）、〈通訊傳播基本法〉（民國105年11月9日）、〈科學技術基本法〉（民國106年6月14日）、〈客家基本法〉（民國107年1月31日）、〈原住民族基本法〉（民國107年6月20日）與〈文化基本法〉（民國108年6月5日）。

註二：〈海洋基本法〉第1條。

參考資料

[1] 海洋委員會，《國家海洋政策白皮書》（高雄：海洋委員會，2020 ），頁1-100
[2]〈海洋基本法〉，民國108年11月20日總統華總一義字第10800126571號令制定公布全文19條；並自公布日施行

澳洲海灘危險分級與海灘安全資訊網

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關鍵字／澳洲、海灘安全、海灘危險分級

澳洲海岸線長達35,877公里，擁有約12,000處海灘，每年有1億人次造訪。然而海灘水域環境存有安全風險，此風險和海灘的危險因子（如大浪、強勁海流、暗礁、裂流等）、活動者的海洋水域知識、游泳能力和經驗等有關。為避免和減少安全風險，澳洲針對全國所有海灘進行危險評估和予以危險分級，同時建置海灘安全資訊網站，作為國內外海灘遊客的安全指引。

圖1／海灘提供人們從事海域遊憩機會但也存有安全風險
圖片提供／陳璋玲

澳洲海岸線長達35,877公里，將離島海岸線計入，則海岸線長達59,736公里，擁有約12,000處海灘[1][2]。海灘提供人們從事海域遊憩的機會，包括游泳、衝浪和釣魚等，每年約有1億人次造訪。尤其位於布里斯本東南66公里處的黃金海岸（Gold Coast）和雪梨以東7公里的邦迪海灘（Bondi），更是熱門景點，吸引大量遊客前來，帶來龐大經濟效益。

然而海灘水域環境存有安全風險，浪大、水深、強勁海流、暗礁、裂流（rip current，又稱離岸流）等都是潛在危險因子。尤其對於不會游泳者或游泳能力不佳者，若遇到上述危險，則容易發生溺水。常見溺水的原因包括缺乏海洋水域知識；不注意、不知道或誤判水域的危險情況；未禁止接近

危險區域或設施；海灘沒有救生員巡邏；陷入危險時沒有應變的能力；以及缺乏水域安全、個人求生和救人的教育與訓練[1]。陷入裂流是造成溺水的主要原因。除溺水外，亦可能發生被海洋生物叮咬、被垃圾割傷等事件，各種可能的傷亡樣態如表1所示[3]。

為提升海灘水域遊憩安全，減少傷亡事故，澳洲衝浪協會（Surf Life Saving Australia, SLSA）和雪梨大學及政府相關單位合作，於2007年發行第一版澳洲海岸公共安全指引（Australian Coastal Public Safety Guidelines, 1st edition），完整地呈現海岸安全相關的資訊與指引，涵蓋的面向包括海岸安全環境的提供、海岸安全標誌、海灘經營等[1]。該協會並進行澳洲所有海灘的危險評估，並予以危險分級，同時將危險分級資訊納入海灘安全資訊網「Beachsafe」（https://beachsafe.org.au/）（圖2）。此網站提供個別海灘的資訊和海域安全資訊。本文即在介紹海灘危險分級和海灘安全資訊網。這兩者對於水域安全非常重要，其可增進遊客的海域安全知識，同時有助其因應可能的海灘危險。

表1／海灘環境存在的危險和可能的受傷樣態

危險的類型	可能受傷樣態	發生情形的例子
水	浸入水中	溺水
海洋動物	咬或叮	藍環章魚
垃圾	傷口	破玻璃
波浪	骨折	突然跌倒造成鎖骨骨折
設備	頭部受傷	被衝浪板撞到
峭壁	跌落	在峭壁邊緣失足
水污染	感染	糞便污染造成腸胃炎
水底下物體	脊椎受傷	潛水至海底沙脊
犯罪活動	攻擊	搶劫

資料來源／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

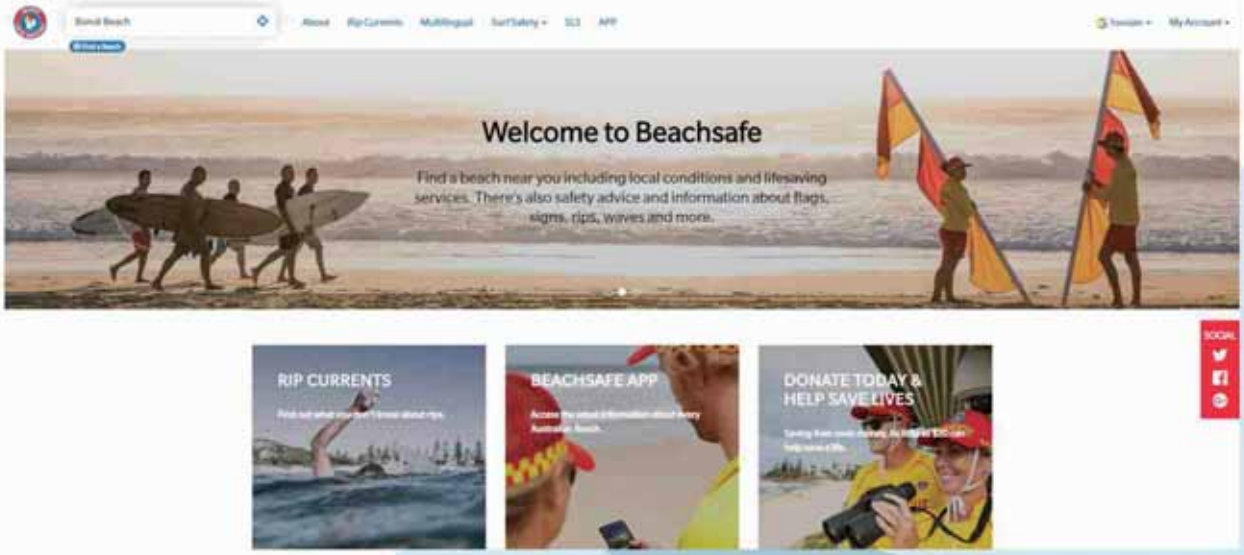

圖2／澳洲海灘安全資訊網站「Beachsafe」
圖片來源／https://beachsafe.org.au/

海灘危險分級

來自雪梨大學海岸研究室的學者Andrew Short和澳洲衝浪協會於1990年合作執行「澳洲海灘安全和管理計畫（Australian Beach Safety and Management Program, ABSAMP）」。此計畫確認影響泳客（bathers）的危險因子，以波高和海灘類型進行危險分級評估，並計算分級分數，如表2所示。危險分級從最不危險的分級1，到最高危險的分級10。分級1～3者，為低度危險；分級4～6者，為中度危險；分級7～8者，為高度危險；分級9～10者，為極度危險。海灘危險分級和意涵如表3所示[4]。

由表2可看出，波高愈高，海灘愈危險，另在相同浪況條件下，消散型海灘一般較反射型海灘危險。值得注意的是，海灘危險分級評估係根據海灘當地主要的浪況條件和海灘類型。因此若海氣象有大變化，如波高和風勢增加，則危險分級可能增加。另若經過一段長時間，海灘改變成其他類型，則危險分級亦可能需要修正。此外，此危險分級是適用於一般人，因此個人本身的水域技能和對某特定區域的瞭解和應變能力，也會使危險分級增加或減少。

表2／海灘危險評估計算矩陣

波高 / 海灘類型	<0.5(m)	0.5(m)	1.0(m)	1.5(m)	2.0(m)	2.5(m)	3.0(m)	>3.0(m)
消散型（DIS）	4	5	6	7	8	9	10	10
沿岸沙洲槽型（LBT）	4	5	6	7	7	8	9	10
規律沙洲與海灘型（RBB）	4	5	6	6	7	8	9	10
橫向沙洲與裂流型（TBR）	4	4	5	6	7	8	9	10
低潮位階地型（LTT）	3	3	4	5	6	7	8	10
反射型（REF）	2	3	4	5	6	7	8	10

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

表3／海灘危險分級

危險分級	意涵
1-3	低度危險：海流弱，但對小孩或游泳能力不佳者，仍需有人陪同
4-6	中度危險：危險程度取決於當時海氣象條件，有潛在的強裂流和強海流
7-8	高度危險：曾有發生強裂流和強海流
9-10	極度危險：有強勁裂流和強海流，以及大碎波

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

表2有關海灘類型部分，Wright and Short（1984）依據碎波高度、入射波頻率和海灘坡度等因素，提出6種類型沙灘。分屬極端的兩者為消散型（dissipative, DIS）和反射型（reflective, REF）。前者灘面平坦、淺、有水下砂粒堆積、衝浪區大，第一道碎波離岸邊遠；後者灘面陡峭、少有砂粒堆積、沒有衝浪區，波浪到岸邊才破碎。介於上述兩者之間的4種海灘類型，都擁有消散型和反射型的元素，分別為沿岸沙洲槽型（longshore bar and trough, LBT）、規律沙洲與海灘型（rhythmic bar and beach, RBB）、橫向沙洲與裂流型（transverse bar and rip, TBR），以及低潮位階地型（low tide terrace, LTT）。中間4種類型的海灘通常有裂流存在[5][6]。

海灘危險分級容易使用與理解，其可供海灘管理，單就某特定海灘，訂定管理措施。此外，藉由此海灘危險分級資訊，海灘遊客可依據自身游泳能力與準備來評估安全風險。但值得注意的是，該危險分級係針對泳客，且僅考量波高和海灘類型2項因子。但在相同的浪況條件下，不同的水域遊憩活動者可能有不同的危險分級。例如，某波浪條件下對泳客是中度或高度危險，但對衝浪客可能是低度危險。此外，除了波高和海灘類型因子外，尚有其他危險因子，如突堤、暗礁、快閃出現的裂流、有毒生物、鯊魚、糞便污染、油污等。這些因子應於個別海灘資訊中予以揭露。在下段介紹的海灘安全資料中，即呈現個別海灘的危險分級資訊外，亦包括危險因子。

海灘安全資訊網

澳洲衝浪協會設立海灘安全資訊網（圖2），全方位提供澳洲1萬多處的海灘資料和海灘安全資訊[7]。該網站有APP軟體（Beachsafe），供免費下載。網站亦提供多語言服務，包括提供韓文、日文、印度文、阿拉伯文、中文等，以服務非英語系的旅客客群。

一、海灘資料庫

此資料庫收納澳洲所有海灘的資訊，可透過搜索功能，查詢鄰近海灘，或者查詢有提供救生員巡邏、公共運輸、停車場、廁所、野餐等服務設施的海灘。個別海灘的資訊（若有的話）包括如下：

- 空照圖和Google位置圖；
- 海灘簡介；
- 危險分級；
- 當日的氣溫、水溫和紫外線指數；
- 當日、明天和7天預報的氣溫、湧浪、風、潮汐和紫外線指數；
- 海灘附近區域的雷達圖；
- 有或沒有救生人員巡邏，以及巡邏時間表；
- 危險，例如大浪、強勁海流、淺水沙洲、快閃出現的裂流、水下物體、水污染、鯊魚、藍瓶水母等；
- 海灘提供的服務設施，如停車場、廁所、無障礙廁所、更衣室、淋浴室、電話、餐飲、公車、船艇斜坡道等；
- 法規禁止的活動，如禁止水上摩托車、禁止釣魚、禁止遛狗等。

二、海灘安全資訊

海灘安全資訊非常多元，包括裂流、救生員提示、旗幟及標示、正確的裝備、天氣、潮流、礁岩、海嘯、海螫（marine stingers）、熱帶水母、海洋生物、衝浪技巧，以及急救措施等。以裂流為例，網站以文字和／或影片介紹裂流的基本知識，如何辨識裂流，陷入裂流的自救技巧，以及裂流倖存者故事。

裂流是一道小範圍的、狹窄的、向外海快速移動的強勁海流。速度通常在每秒30～60公分，但有些可達每秒2公尺。其通常在沿岸海底的低處或水下沙洲的破口，人造物如防波堤或碼頭附近形成[8]。裂流不容易辨識，但有項特徵可資辨識：1.有一道較混濁水流，帶有水花攪動現象；2.向外海流動的水流，表水面上有海水泡沫、海草或垃圾；3.入射波有不連續中斷的現象[9]。若觀測到這些上述特徵，必須警覺這可能是裂流，應避開此水域，並在紅白旗之間的水域游泳。一旦遇到裂流時，記得下列幾點原則：

- 不要驚慌，不要抵抗水流。
- 和海岸平行，往兩側方向游泳，離開裂流，再游回岸邊。
- 若無法如此做，則順著裂流帶離海岸，直至過了碎波線後，裂流力道變弱，再以斜角方向，避開裂流，游回岸邊。
- 如果在任何時候都無法游回岸邊，則要有動作引起注意，包括面向岸邊、揮動手臂，以及大聲求救喊叫。

圖3／裂流教育標誌
圖片來源／https://beachsafe.org.au/

圖4／裂流（拍攝地點：宜蘭海岸）
圖片提供／陳璋玲

結論

行政院近來推動向海致敬政策，提出開放、透明、服務、教育及責任5大原則，鼓勵人民知海、近海及進海。澳洲建置的海灘危險分級和海灘安全資訊網，即是向海致敬政策的透明、教育與責任等3項原則。為提升我國海灘遊憩安全，政府相關部門可參考澳洲作法，整合我國所有海灘資訊，建立危險分級，並建置海灘安全資訊網。此可增進遊客瞭解海域安全和潛在風險，同時有助其遇到危險情況時，採取適當措施。

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全球及澳洲郵輪產業發展趨勢與嚴重特殊傳染性肺炎（COVID-19）帶來的挑戰

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關鍵字／郵輪產業、郵輪觀光、海洋觀光產業、嚴重特殊傳染性肺炎（COVID-19）

近年來國際郵輪觀光深受歐美及亞太地區旅客所熱愛，旅客人數及經濟產值逐年創新高，產業前景欣欣向榮，然而2020年嚴重特殊傳染性肺炎（COVID-19）疫情，讓全球郵輪產業面臨前所未有的挑戰及衝擊。

前言

國際郵輪觀光產業最早始於歐美國家，之後拓展至亞太國家，近年呈現蓬勃發展趨勢，越來越多熱愛海洋休閒觀光旅遊人士，選擇郵輪觀光，作為休閒渡假的首選。海洋觀光產業為各國帶來可觀的經濟產值及就業機會，也造就當地的繁榮進步，尤其是澳洲的郵輪產業發展，2018年澳洲的郵輪旅客高達134.5萬人次，名列太平洋地區第1位、全球第5位郵輪觀光國家，然而2020年嚴重特殊傳染性肺炎（COVID-19）疫情，對全球郵輪產業發展帶來嚴重的衝擊與前所未有的挑戰。

全球郵輪產業發展趨勢

一、全球郵輪旅客人數增加趨勢

根據國際郵輪協會（Cruise Lines International Association, CLIA）統計資料[1]，2018年全球郵輪產業直接支出達679億美元，產值1,501億美元，從業人數達117萬7,000人，全球搭乘郵輪旅客人數自2010年1,910萬人次，成長至2018年2,850萬人次（圖1），增加940萬人次，增加率超過49%，郵輪旅客人數逐年呈穩定成長，顯示郵輪觀光已成為全球重要的海洋休閒活動之一。

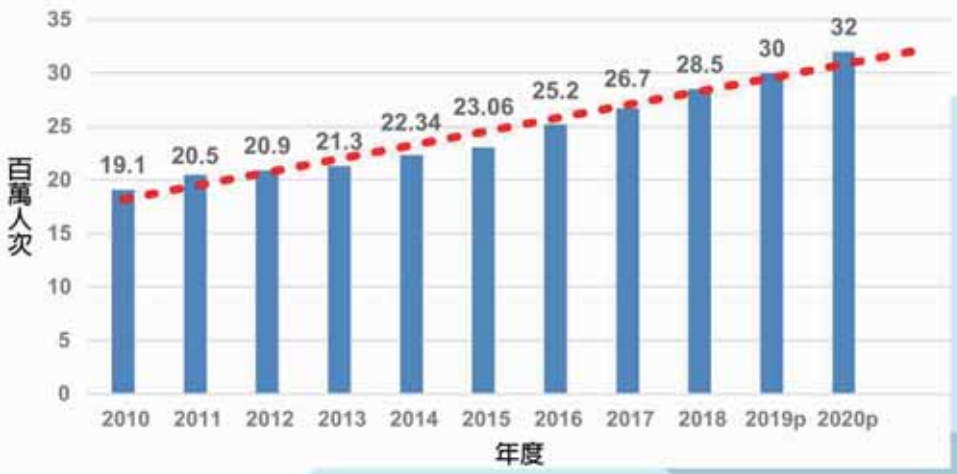

圖1／全球郵輪旅客人次增加趨勢圖（單位：百萬人次）
備註／2019年、2020年全球郵輪旅客人次為預估數量
資料來源／CLIA(2020)
[1]：本研究整理

二、全球郵輪旅客來源前10大國家

2018年全球郵輪旅客來源排行前10大國家[2]，第1名為美國，旅客1,309萬人次，占比45.9%；第2名為中國，旅客236萬人次，占比8.3%；第3名為德國，旅客223萬人次，占比7.8%；第4名為英國，旅客201萬人次，占比7%；第5名為澳洲，旅客134.5萬人次，占比4.7%；第6名為加拿大，旅客97萬人次，占比3.4%（圖2）。澳洲郵輪旅客人數為大洋洲第1名、全球第5名國家，僅次於美國、中國、德國、英國等國家；澳洲郵輪旅客人口滲透率高達5.4%，為全球第1名，澳洲每18人就有1位搭乘過郵輪觀光，顯示澳洲人熱愛郵輪觀光的程度，超越歐美國家。

三、全球郵輪接待能量區域配置趨勢

2013～2018年全球郵輪接待能量區域配置趨勢[3]（圖3），以加勒比海地區為最多，從2013年4,466萬床日次增加至2018年6,292萬床日次，增加率達40.9%；地中海地區次之；再次之為地中海除外的歐洲；接著為亞洲，從2013年472萬床日次增加至2018年1,779萬床日次，增加率達277%，增加速率遠超過同期其他區域，顯示最近5年亞洲郵輪產業蓬勃發展；再接著為澳洲、紐西蘭及大洋洲等區域，從2013年651萬床日次增加至2018年1,006萬床日次，增加率達54.5%，增加速率為同期其他區域之第2名，僅次於亞洲地區。

圖2／2018年全球郵輪旅客來源排行前10大國家（單位：百萬人次）

資料來源／CLIA (2019)[2]；本研究整理

圖3／2013～2018年全球郵輪接待能量區域配置趨勢圖（單位：百萬床日次）

資料來源／CLIA (2019)[3]；本研究整理

澳洲郵輪產業發展趨勢

2018年澳洲郵輪觀光產值52億澳元（37.18億美元），旅客人數134.5萬人次，從業人數1萬8,135人，澳洲吸引不少郵輪停靠及轉運，遊輪停靠澳洲47個港口，1,240艘遊輪航次造訪澳洲，郵輪產業帶動其他產業發展，近年來澳洲郵輪觀光經濟收益持續成長[4]。

2018年澳洲郵輪旅客上岸旅遊總支出近14億澳元（10.01億美元），遊輪乘客每一天在澳洲平均花費約387澳元（約276.71美元），以住宿4.5億澳元（約3.22億美元）為最大宗，其次為食品及飲料2.74億澳元（約1.96億美元），再其次為交通1.96億澳元（約1.40億美元），接著為零售支出1.59億澳元（約1.14億美元）、海岸觀光1.33億澳元（約0.95億美元），休閒娛樂0.59億澳元（約0.42億美元）。

全球及澳洲郵輪觀光發展趨勢比較

2016～2018年全球郵輪觀光產值分別為1,259.6億美元、1,339.6億美元及1,501.3億美元；澳洲郵輪觀光產值分別為47億澳元、48億澳元及52億澳元[5][6]，雖然全球及澳洲郵輪觀光產值均逐年成長，而且澳洲郵輪旅客人數占全球將近5%比率，但是這3年澳洲的經濟產值僅分別占全球2.67%、2.56%及2.48%，且呈現逐年衰退趨勢。

2016～2018年全球郵輪產業從業人數分別為102萬1,681人、110萬8,676人及117萬7,000人；澳洲從業人數分別為1萬7,786人、1萬7,381人及1萬8,135人。全球郵輪產業從業人數呈逐年成長趨勢，澳洲郵輪產業從業人數成長幅度落後全球比率。

2016～2018年全球郵輪觀光旅客人數分別為2,515萬人次、2,672萬人次及2,852萬人次，每年旅客成長率超過6%；澳洲旅客人數分別為128.1萬人次、133.3萬人次及134.5萬人次，2017年成長率4.06%，2018年成長率僅0.9%，澳洲近年郵輪旅客人數雖成長，惟成長幅度不及全球比率。全球及澳洲郵輪觀光發展各項指標趨勢比較，如表1所示。

表1／全球及澳洲郵輪觀光發展趨勢比較表

項目	全球			澳洲			全球		澳洲	
	2016	2017	2018	2016	2017	2018	2017成長率	2018成長率	2017成長率	2018成長率
產值（10億）	U$125.96	U$133.96	U$150.13	A$4.7 (U$3.361)	A$4.8 (U$3.432)	A$5.2 (U$3.718)	6.35%	12.07%	2.13%	8.33%
全球占比				2.67%	2.56%	2.48%			-4.80%	-3.13%
從業人數（人）	1,021,681	1,108,676	1,177,000	17,786	17,381	18,135	8.51%	6.16%	-2.28%	4.34%
全球占比				1.74%	1.57%	1.54%			-9.77%	-1.91%
旅客人數（百萬人）	25.15	26.72	28.52	1.281	1.333	1.345	6.24%	6.73%	4.06%	0.90%
全球占比				5.09%	4.99%	4.72%			-1.96%	-5.41%

資料來源／Australian Cruise Association (2018、2019) [5][6]；本研究整理
備註／匯率：1澳元=0.715美元

COVID-19對國際經濟及郵輪產業發展的影響

一、全球及澳洲COVID-19疫情發展

COVID-19疫情截至2020年8月10日止，確診病例1,990萬9,065人，死亡人數超過73萬2,128人；澳洲確診病例2萬1,397人，死亡人數超過313人，自3月中旬起許多國家對來自疫情嚴重地區的公民或遊客實施了隔離或入境禁令，部分國家甚至實施全球旅行禁令。

澳洲政府因應COVID-19對入境旅客公布最新入境限制措施，對7月18日以後返回澳洲航班的國際入境者，收取3,000澳元，作為兩週隔離旅館食宿費用，每多1位成人或3歲以上兒童，加收1,000澳元，未達3歲兒童加收500澳元，7月13日開始，澳洲政府限制每天國際入境人數。

二、COVID-19疫情對國際經濟之影響

COVID-19疫情自亞洲擴散世界各地，金融市場劇烈震盪，重創國際油價，航空交通、郵輪公司股價重挫，對全球經濟造成衝擊，各國際預測機構下修全球經濟成長率。國際貨幣基金（IMF）6月24日[7]表示：「COVID-19疫情為全球2020年上半年經濟帶來負面影響超過預期，且復甦腳步較原先預期緩慢」，IMF再度下修全球經濟成長率，由-3%再度修正為-4.9%。根據經濟合作發展組織（OECD）2020年6月發布預測報告[8]，預測2020年全球經濟成長率將萎縮6%，失業率從2019年5.4%上升至9.2%；OECD另表示，若無法研發出疫苗控制疫情，年底前若爆發第二波感染疫情，則全球經濟成長率將萎縮7.6%，失業率將上升至10%。

三、COVID-19疫情對郵輪產業之衝擊及挑戰

全球前3大國際郵輪公司，依船隊規模分別為嘉年華郵輪公司、皇家加勒比海國際郵輪公司及挪威郵輪公司，該3大公司收入約占全球郵輪產業70%，亞太市場以麗星郵輪公司為主。

2020年2月至3月中旬COVID-19疫情爆發後，國際郵輪持續在世界各國營運，致陸續發生國際郵輪疫情感染情形，較知名感染事件包括：

圖4／紅寶石公主號郵輪
圖片來源／
Princess Cruises image library

（一）鑽石公主號自2020年2月4日起在日本橫濱隔離約1個月，確診人數712人，死亡人數13人[9]。

（二）紅寶石公主號2020年3月8日出發前往紐西蘭，19日返回澳洲雪梨，2,700多名旅客未經檢疫獲准下船入境澳洲，導致病毒個案傳染，確診人數超過600人，死亡人數18人。

四、COVID-19疫情對郵輪產業經濟影響

全球郵輪產業自2020年2～3月發生日本鑽石公主號事件及澳洲紅寶石公主號事件之後，於3月中旬陸續公告暫停營運，恢復營運時間數度延期，嘉年華郵輪公司目前預定恢復營運時間為10月1日，惟全球疫情未有效控制前，屆時能否順利恢復營運仍有待觀察。

世界前3大國際郵輪公司嘉年華郵輪公司、皇家加勒比海國際郵輪公司及挪威郵輪公司股價由2020年2月24日收盤價33.46美元／股、80.41美元／股、37.26美元／股，下挫至7月24日分別為14.80美元／股、50.79美元／股、14.38美元／股，下跌幅度分別達56%、37%、61%。另根據嘉年華郵輪公司2020年6月公布第2季財務報告，年度累計虧損44億美元，下半年每月仍須支出6.5億美元。

營運中郵輪公司則採無薪假、減薪、裁員方式，嘉年華郵輪公司7月決定出售或報廢13艘老舊、使用效益較低之郵輪，以降低營運資金支出，或以發行公司債、發行股票等方式籌募營運資金。

結論

雖然過去全球或澳洲的郵輪觀光遊客人數、產值及就業人數均逐年成長，然而郵輪觀光是旅客高度密集，近距離接觸，不易維持社交距離的產業，COVID-19疫情嚴重影響國際郵輪產業發展，原本蓬勃發展的產業前景，瞬間停滯不前，致各郵輪公司營運虧損，苦撐經營，恢復營運期程更因國際疫情尚未獲有效控制，數度延期。此時各郵輪公司需積極檢討，研議因應策略，精進防疫措施，相信疫情過後各郵輪公司將會提供各國愛好郵輪觀光旅客及郵輪上工作人員們更衛生、安全、健康的旅遊品質及環境。

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澳洲海洋政策及相關組織

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關鍵字／海洋政策、政治意願、澳洲

澳洲是重要的海洋國家之一。1998年公布的《澳洲海洋政策》，圖文並茂，受到國際關注（圖1）。20餘年過去，施行成效如何，有諸多討論。本文簡介澳洲海洋政策，要述其主旨、成就與挑戰，並介紹海洋相關組織，供我國海洋事務與相關機關參考。

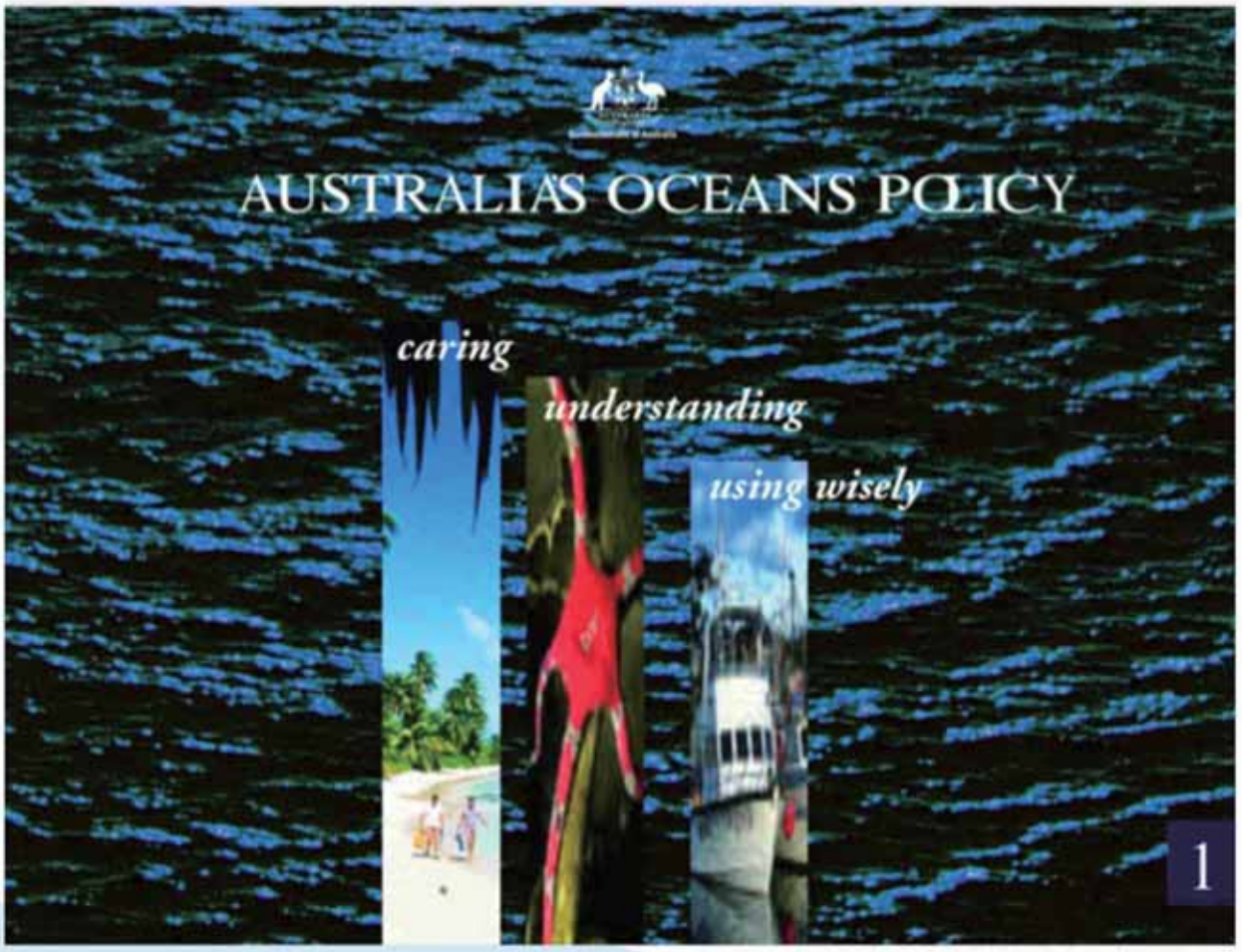

圖1／1998年《澳洲海洋政策》
圖片來源／Commonwealth of Australia (1998)
http://www.environment.gov.au/archive/coasts/oceans-policy/publications/pubs/policyv1.pdf

前言

我國〈海洋基本法〉於民國108年（2019）11月20日公布施行，本法第15條第1項規定：「政府應於本法施行後一年內發布國家海洋政策白皮書，並依其績效及國內外情勢發展定期檢討修正之。」因此，海洋委員會依法於109年6月8日首次「國家海洋日」公布《國家海洋政策白皮書》（圖2）。鑑於政策白皮書必須定期檢討修正，因此除檢視其績效外，對於國內外情勢自應關注，此為本文目的。

澳洲海洋政策的要旨

為呼應1998「國際海洋年」（The International Year of the Ocean），澳洲政府公布了《澳洲海洋政策》（Australia's Oceans Policy）。該政策標舉了3大願景：為現在和將來的利益，而關心、瞭解和明智利用海洋；基於科學和生態的規劃管理，維護健康的海洋；及通過綜合規劃和管理，實現永續發展。本政策的目的，是將澳洲所有海洋相關部門、用途與活動納入通盤考量，期以整合機制（Integration），強化協調管理。同時，強調採取生態系統為基礎的方法（Ecosystem-based approach）和最佳可行科技與資訊（the best available scientific and other information），追求海洋的永續管理。有鑑於此，《澳洲海洋政策》明定下列目標：1.行使和保護澳洲對近海地區，包括近海資源的權利和管轄權；2.履行澳洲根據《聯合國海洋法公約》和其他國際條約承擔的國際義務；3.瞭解和保護澳洲的海洋生物多樣性、海洋環境及其資源，確保海洋利用在生態上具有可持續性；4.促進生態上可持續的經濟發展和創造就業機會；5.建立整合性海洋規劃和管理機制；6.滿足社區的需要和願望；7.提高在海洋管理、科學、技術和工程方面的專門知識和能力；8.界定和保護自然和文化遺產；9.提高公衆意識和瞭解[1]。

圖2／我國《國家海洋政策白皮書》
圖片來源／海洋委員會

澳洲海洋相關組織

為統籌事務，強調各部會權責、協商和利害關係方的參與，1998《澳洲海洋政策》擬建構的海洋規劃與管理的「關鍵性國家組織」（Key National Elements），包括國家海洋相關部長理事會（National Oceans Ministerial Board）、國家海洋諮詢小組（National Oceans Advisory Group）、國家海洋辦公室（National Oceans Office）及區域海洋計畫指導委員會（Regional Marine Plan Steering Committees）（圖3），茲要述如下[1]：

圖3／澳洲擬建構的海洋組織
圖片來源／Commonwealth of Australia (1998), Australia's Oceans Policy
http://www.environment.gov.au/archive/coasts/oceans-policy/publications/pubs/policyv1.pdf

一、**國家海洋相關部長理事會：**成員包括負責環境（主席）、工業、資源、漁業、科學、旅遊和航運的聯邦部會首長，必要時選擇納入其他部會如國防和外交首長。主要職責，包括：監督區域海洋計畫之進程，擬定其範圍和時程表；執行和進一步發展澳洲海洋政策；協商跨部會海洋相關政策、方案與經費支出的優先事項；指導國家海洋辦公室；以及考慮、制定和執行澳洲海洋政策有關的海洋研究優先事項等。

二、**國家海洋諮詢小組：**國家海洋辦公室支援，由產業、科學和保育等非政府組織成員所組成，依據其海洋專業知識，就跨部會議題、生態規劃與管理、區域海洋計畫實務等向理事會提供建言，是各部會與私人部門資訊和意見交流的平臺。

三、**國家海洋辦公室：**設於農業、水及環境部（Department of Agriculture, Water and the Environment），主要與其他聯邦機關協商，提供秘書處和技術支援，執行相關方案，並協助理事會執行和進一步發展澳洲海洋政策。

四、**區域海洋計畫指導委員會：**成員包括主要非政府和政府利益攸關方，由國家海洋部長理事會設立。指導委員會職責在監督區域海洋計畫的制定，並與國家海洋辦公室密切合作，向理事會報告。

此外，澳洲政府透過澳洲及紐西蘭環境與保育委員會（Australian and New Zealand Environment and Conservation Council, ANZECC），作為聯邦與各州執行海洋政策的協調論壇或平臺，以關照各部門的利益，俾在擬定區域海洋計畫架構時，跨州和聯邦水域的相關規劃能夠整合協調。

除了澳洲「農業、水及環境部」外，依據聯合國網頁，目前澳洲國家級的主要海洋科研機關是「聯邦科學及產業研究組織」（Commonwealth Scientific and Industrial Research Organisation, CSIRO），其主要職能是研究澳洲海洋資源的永續利用、海洋對於氣候扮演的角色，以及有效保育海洋生態系統的完整性。CSIRO下設海洋及大氣局，局下轄一「資訊及資料中心」（Information and Data Center, IDC），觀測與蒐集海洋資料已逾30年[2]。

澳洲民間部門對於海洋保護或產業發展，也發揮重要功能。例如，「澳洲海洋保育學會」（The Australian Marine Conservation Society），係50多年前，由科學家和海洋保護主義者所組成的社群，基於最佳科學證據的解決方案，並與全球的研究中心密切合作，齊心協力採取行動保護澳洲的海洋生物[3]。「澳洲海洋觀察」（OceanWatch Australia）則為官方認定與支持的非營利、全國性環境公司，與澳洲海鮮產業、聯邦和州政府、自然資源經理者、私營企業及在地社區合作，以提升澳洲海鮮產業的永續性[4]。

澳洲海洋政策及其成就與挑戰

《澳洲海洋政策》施行20餘年後，各方對於其成效如何，有許多討論。最具代表性的為塔斯瑪亞大學的Joanna Vince等之論述，總結其成就與挑戰如下[5][6][7]：

一、成就（Achievements）

澳洲海洋政策是首批嘗試採取生態系統為基礎的全面性政策，受到國際社會高度的評價，成為海洋政策典範轉移和學習的範例。政策研擬過程中，許多諮商促進了權益各方的參與率，卻也發現澳洲公衆對擬議的海洋政策興趣不大或瞭解有限。在國家代表性的海洋保護區和南太平鯨魚庇護區方面，提出了國際承諾，是海洋治理重要一環。海洋治理整合體制的建構，雖然執行緩慢，但充滿熱情。由區域海洋計畫（Regional Marine Plans）轉為海洋生態區域規劃（Bioregional Marine Planning），採取基於生態系統的管理，堪稱是創新的方法，且讓利益攸關各方廣泛參與，開啓了海洋空間規劃的嘗試。嗣後，澳洲公布《環境保護及生物性保育法》（Environment Protection and Biodiversity Conservation Act）及《海洋科技計畫》（Marine Science and Technology Plan），對於發展海洋科學和藍色經濟，十分重要，必然是未來海洋政策的重要內涵。

二、挑戰（Challenges）

上述成就也呈現海洋政策的挑戰。1997年，海洋政策部長級諮詢小組起草了一份報告，提出了近一百項建議，包括透過不同的體制架構促成多目標使用和整合性的海洋政策，包括大堡礁海洋公園的成功模型，但政府在最後政策設計中並沒有採用這些建議的體制模式，海洋政策的主要目標——「全面整合」（Full Integration）至今尚未實現。例如，國家海洋諮詢小組不清楚其作用，是作為一個部門代表的小組，還是作為部長級理事會的顧問？國家海洋辦公室被其執行機構地位所限，缺乏秘書處能力。今天，除國家海洋科學委員會（National Marine Science Committee）外，海洋政策原擬建構的組織無一存在。最大的挑戰是，海洋政策僅是一項「政策」，架構在現有立法上層，與各部門執行方向不一，現有行政機制未能有效統合，海洋與海岸管理分立，各州政府也不盡支持。另一個重要挑戰是缺乏財政支援，經費遞減，海洋規劃資料尚未到位。總的說來，缺乏政策制定與執行的資源，將導致政策消亡。NGO和專家學者認為，海洋政策的唯一出路是制定海洋立法，政法合一；當前主要政黨僅關注單一的海洋問題（如捕鯨），但海洋政策如失去熱情，如何重燃政治意願（Political Will），將是最大的挑戰。

專家也發現，澳洲公衆對海洋、海洋資源和海洋問題瞭解或聯繫很少，解決辦法是將當前問題，如海洋污染；海洋保護區管理；非法、未報告及不受規範的漁撈（IUU Fishing）；氣候變遷的衝擊；漁業和養殖產業面臨的挑戰等，納入新的海洋治理整合機制內。尤其，海洋塑膠污染問題最近引起了公衆和媒體的關注，並挑戰各國政府的應對措施，需要全面的解決辦法，因此應停止單一思維的邏，全面檢視當前問題，納為大海洋議程的一部分，並在科技支援下，制定新的海洋政策或立法，從而建立人與海洋的文化聯繫（Cultural Connection）。Vince特別指出，科學和技術方面的最新進展，以及海洋空間規劃（Marine Spatial Planning）將有助於當前海洋治理的新發展，並緩解20餘年前初版海洋政策遇到的困難[5]。

結論

澳洲曾在海洋政策進程中，扮演一個世界領導者的角色。如果累積20餘年的經驗，有了新的變革動力或經修訂的海洋政策，可望再次成為海洋治理的世界領導者。相信澳洲的經驗，可供我國施行《國家海洋政策白皮書》和後續定期檢討修正之參考：強化政策可操作性、定期檢討修正、提升部會統合能力和爭取政治支持，無疑也是我國海洋政策的挑戰。

圖片來源／Pride Advertising Agency Ltd.

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澳洲潮汐與波浪能源最新發展

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關鍵字／澳洲潮汐與波浪發展現況、海洋能源

根據IEA-OES（International Energy Agency，Ocean Energy Systems）定義，海洋能源包含波浪、潮汐、海流、溫差與鹽差。在全球化石能源逐漸枯竭與再生能源需求增長之際，海洋能源已引起各國投入開發與測試，多數測試機組已進入示範電廠階段。此外，海洋能發電系統可裝置於岸邊或離岸，避免排擠陸域空間以及遮蔽視野，大幅降低推動與設置阻力。本文章主要參考IEA-OES 2019年度報告[1]，針對澳洲2019年在潮汐與波浪的最新發展情況，從國家政策、補助計畫、研究機構與示範機組等面向進行說明。

國家政策

據估計，澳洲擁有1,800TWh（兆瓦小時）的海洋能資源，足以供應全國7年用電需求。澳洲政府再生能源目標訂定於2020年達到33億度發電量，2019年澳洲潔能監管局（Australian Clean Energy Regulator）宣布該目標已提前達成。在此基礎下，各州陸續制定了再生能源占比目標。例如，澳洲首都特區坎培拉2020年再生能源目標為100%，其他各州則以2030年為目標，如新南威爾士州再生能源目標為46%，維多利亞州為50%，昆士蘭州為50%，北領地為50%，南澳大利亞州為50%和塔斯馬尼亞州為100%。西澳大利亞州是唯一尚未承諾實現再生能源目標的地區。

澳洲目前雖尚無聯邦層級的海洋能源政策，但地方州開始規劃相關法案。例如，維多利亞州正擬定新的海洋政策。該政策源自2018年海洋法令（Marine and Coastal Act 2018）的要求。並於2019年7月發布了公共諮詢草案，並於同年8月結束諮詢，2020年初定案。該政策將離岸再生能源定義為新興的離岸產業，其中包括海洋能源的項目如下：

一、將全州納入海洋空間規劃框架

二、推動海洋能源相關政策

三、定義與界定海洋和近岸結構

四、海洋能源聯盟與合作管理的實踐

此外，維多利亞州2020年制定的《海洋和沿海戰略》，將優先實現該海洋能源政策目標。

政府補助計畫

澳洲再生能源署（Australian Renewable Energy Agency, ARENA）為政府資助海洋能源的主要機構，截至2019年共補助澳洲14個海洋能源項目，仍有兩案進行中，包括：

一、澳洲金島（King Island）的Wave Swell計畫（總計畫額度1,230萬澳元，ARENA補助403萬澳元）。

二、澳洲的AUSTEn（Australian Tidal Energy）潮汐能—潮汐能源潛力場址地圖（總計畫額度585萬澳元，ARENA補助249萬澳元），由塔斯馬尼亞大學主導，並與聯邦科學及產業研究組織（CSIRO）和昆士蘭大學合作。

海洋能源研究機構

新藍色經濟合作研發中心（New Blue Economy Cooperative Research Centre），成立於2019年4月，預計未來10年投資3.3億澳元。透過產業、政府與研究部門的合作關係，支持澳洲藍色經濟永續發展，共規劃5大研究領域，分別為離岸工程與技術（Program 1）、海鮮和海產品（Program 2）、離岸再生能源系統（Program 3）、環境與生態系統（Program 4）以及永續海洋發展（Program 5）。其中，離岸再生能源系統為5大研究方向之一，預計將投入6,600萬澳元。

Program 3成立的目標為篩選與研發合適的海洋能示範系統，優化離網（off-grid）再生能源系統的擷能效率、儲能與控制策略。研究項目包含：

一、能源需求（市場評估和經濟模型）

二、可用能源分析（資源特性與潛能分析）

三、能源轉換技術（設計和測試）

四、控制系統（開發整合型氫氣微電網系統）

目前AUSTEn潮汐能可行性研究已於2020年6月完成。該計畫由塔斯馬尼亞大學及昆士蘭大學共同合作，評估澳洲潮汐潛能與經濟可行性。該計畫在2019年5月、10月和12月不同季節完成短期現場資料調查，針對塔斯馬尼亞州的班克斯海峽（Banks Strait），以及達爾文城市外的克拉倫斯海峽（Clarence Strait），評估該處潮汐潛能與環境適用性。調查項目包括潮汐速度、水深地形、溫度、海底地質組成和魚類生態。根據現地調查、模式分析與多項標準評估，班克斯海峽與克拉倫斯海峽被列為高潛力潮汐場域，其主要優勢來自強勁潮汐、靠近電網併接點以及周遭能源需求等。此外，CSIRO為計畫合作機構，正評估全澳洲潮汐潛能以及分析未來可貢獻再生能源占比，預計在2020年將公告全澳洲海洋能潛能地圖。

西澳洲大學（University of Western Australia）波能研究中心（WERC）近年展開多項研究，旨為降低商轉規模波浪發電的成本。WERC的3個主要研究計畫為：

一、場址評估：篩選合適開發波浪和潮流的場址，提高安裝波能轉換器的成功機率。

二、流體動力分析：與西澳大利亞州奧爾巴尼（Albany）波能計畫合作，研究流體與機組互制等水動力特性，設計開發創新的波能轉換器。

三、基礎工程：設計開發適用於不同海域環境的海洋能源系統支撐結構。

詹姆斯庫克大學（James Cook University）針對澳大利亞潮汐能MAKO公司在昆士蘭州格拉德斯通（Gladstone）進行長達6個月的試驗，評估安裝潮汐渦輪機對環境的影響，該單位採用AI人工智慧分析水下監測資料，評估MAKO公司的潮汐渦輪機計畫的環境影響。該研究指出MAKO計畫未造成環境不利，且AI監測系統證明可提供低成本高效與精準資料予監管機構。

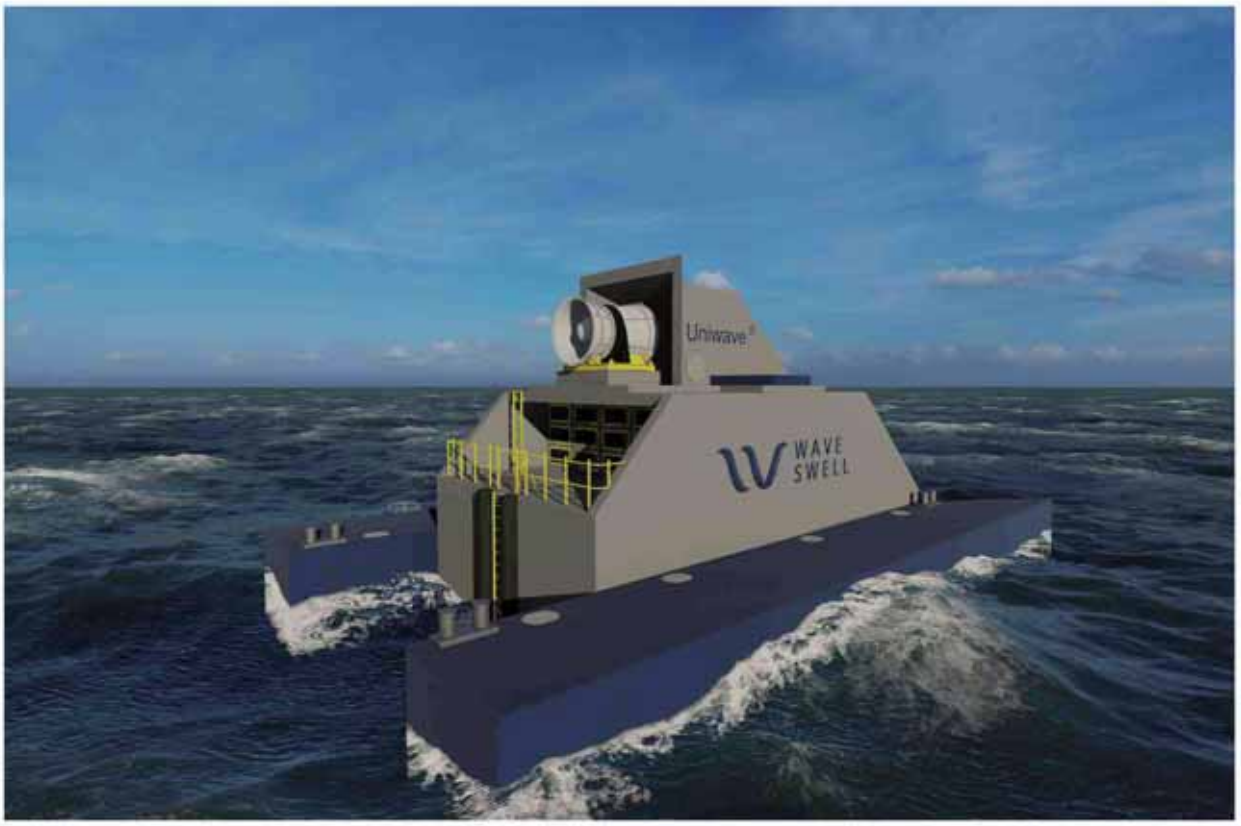
圖1／MAKO潮汐發電系統
圖片來源／https://www.mako.energy/technology

示範機組

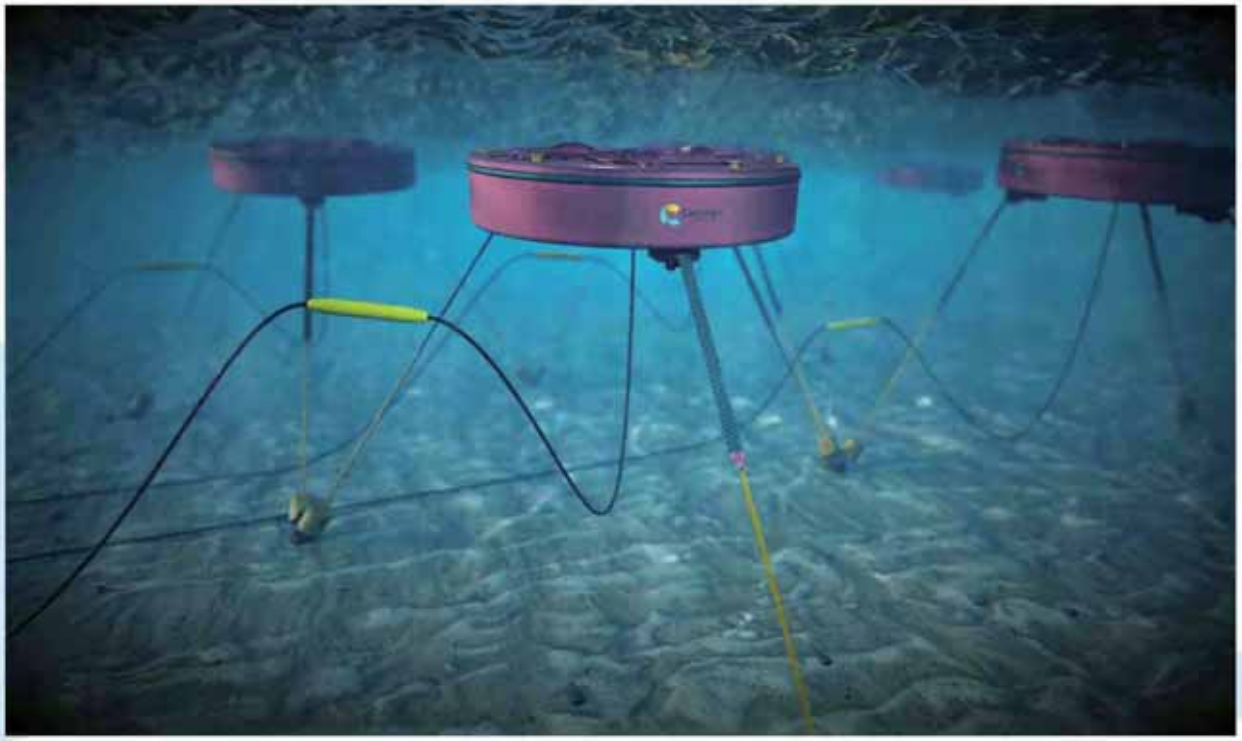
MAKO潮汐渦輪機正持續精進其發電次系統，開發高擴展性與模組化的渦輪機系統，可安裝於既有結構基礎與不同水深條件。目前已完成在澳洲東部格拉德斯通的港口碼頭，結合既有基礎設施進行6個月以上測試，測試數據收集與分析則由MAKO與詹姆斯庫克大學合作進行。此外，MAKO亦積極推廣國際合作，已於新加坡聖淘沙島（Sentosa Island）以及日本鹿兒島海域，建立潮汐發電展示系統。

UniWave200為2019年啓動的波浪發電示範計畫，預計於2020年中開始測試運轉。機組裝置容量為200kW，該計畫包含設計、製造、組裝布放與運轉。測試場址位於澳洲金島，位於巴斯海峽（Bass Strait）西端，塔斯馬尼亞島（Tasmania）西北方。計畫總額度為1,230萬澳元，其中403萬澳元由ARENA補助。UniWave200採用震盪水柱式發電（oscillating water column, OWC）技術。值得注意的地方是，一般OWC採用雙向渦輪發電機。然而，UniWave200採用單向渦輪發電機，因此動件僅有水面以上的閥門與渦輪機，此設計可簡化發電機組零件、提供更堅固、可靠與高效率的發電系統，可以降低建造與維護成本。基座設計採用底碇式鋼構。

卡內基潔淨能源公司（Carnegie Clean Energy）成功克服了2019年的重大業務重組，建造CETO 6波浪發電系統設備並準備進行安裝，預計於2020年第3季在西澳大利亞海岸離岸約5公里處的花園島進行測試。CETO 6是採用完全潛沒點吸收器式（Point Absorber）波能轉換技術。擷能浮筒位於海面以下幾公尺處，並隨著海浪而運動，進而驅動傳動系統與電機設備，將運動轉化為電能。



■2／UniWave200波浪發電系統
■片來源／https://arena.gov.au/projects/uniwave200-king-island-project-wave-swell/



■3／CETO 6點吸收式波浪發電系統
■片來源／https://www.carnegiece.com/technology/

結論

澳洲政府持續支持海洋能源發展，各州已陸續訂定再生能源目標與相關法規，未來10年將投入3.3億澳元發展藍色經濟，並將海洋能源納入主要發展項目。在國家政策與再生能源目標明確下，海洋能源研究機構已展開全國海洋能源潛力地圖分析、場址篩選、環境影響評估、關鍵技術研發與測試等研究計畫。此外，研究機構與產業界亦積極合作，組成合作聯盟，進行現地測試與國際合作，持續推動海洋能源開發，期能透過長期的海上測試與驗證，改良機組性能與降低發電成本，評析其經濟運轉之可行性，以邁向實用階段發展與大型商業運轉開發。

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圖片來源／Pride Advertising Agency Ltd.

澳洲對《船舶壓艙水及沉積物管理國際公約》之因應

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關鍵字／國際海事組織、壓艙水管理公約、澳洲壓艙水管理要求

澳洲擁有獨特的海洋環境，為了保護海洋生態，並因應2017年國際海事組織（International Maritime Organization, IMO）生效之《船舶壓艙水及沉積物管理國際公約》，澳洲提出《澳洲壓艙水管理要求》，以減少海洋有害生物在澳洲海域擴散之風險。

國際海事組織（IMO）為聯合國所屬機構，負責制定全球有關船舶安全及保安標準，及對海洋環境及大氣層之保護，以避免受航運活動帶來之有害影響。2004年船舶壓艙水及沉積物管理國際公約（International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004），簡稱《壓艙水管理公約》（BWM Convention），乃由IMO制定通過之國際公約，旨在防止潛在船舶壓艙水中的水生生物及病原體等有害物質之擴散。自2017年9月8日起生效，全球船舶必須管理壓艙水，以便將壓艙水卸載至新位置之前，去除水生生物及病原體，或使之無害；此將有助防止入侵物種，以及潛在有害病原體之擴散；有關壓艙水裝載及卸載示意圖，如圖1所示[1]。

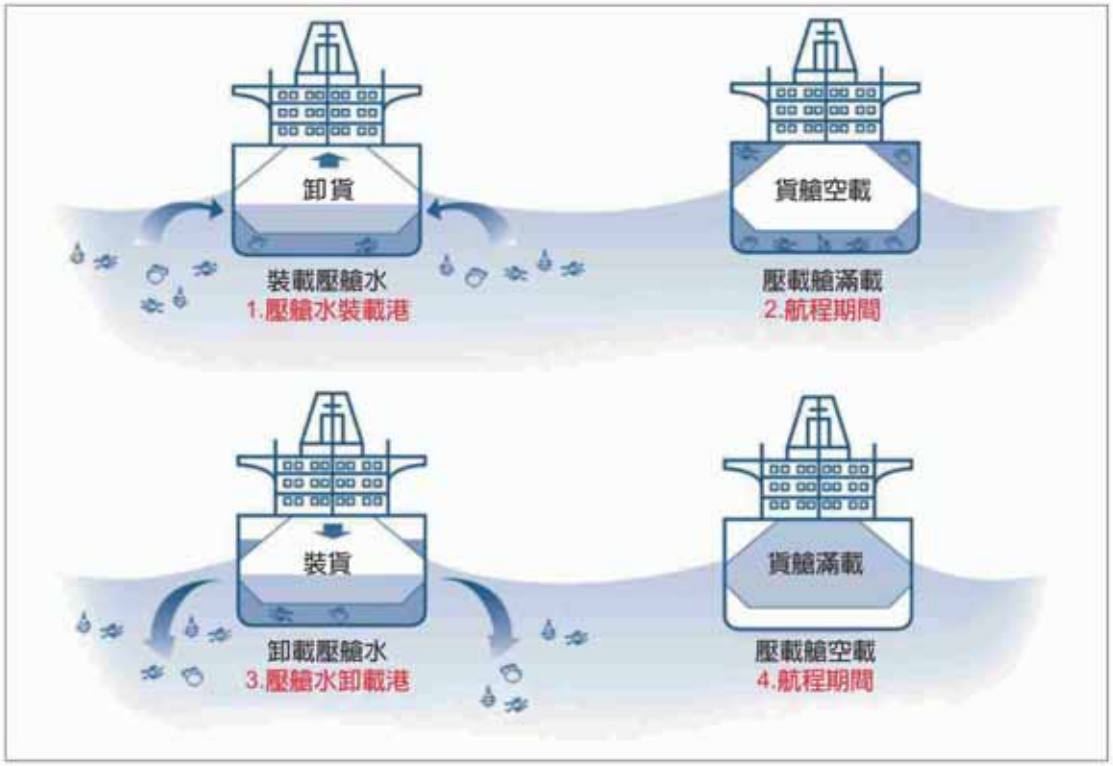

圖1／壓艙水裝載及卸載示意圖
圖片來源／本文修改自IMO (2020).
http://www.imo.org/en/mediacentre/hottopics/bwm/pages/default.aspx

有關壓艙水管理標準，有D-1及D-2兩種排放標準。D-1排放標準要求船舶在遠離沿海區域的公海上交換壓艙水；於理想情況下，距離陸地至少200海浬，且水深至少200公尺；此舉可減少生物存活，因此當船舶卸載壓艙水時，將不致引入潛在有害之物種。D-2排放標準規定活體生物之最大排放數量，包括對人體健康有害的特定指標微生物。從《壓艙水管理公約》生效之日起，所有船舶至少須符合D-1排放標準；新造船則須同時符合D-2排放標準；最終所有船舶皆須符合D-2排放標準。對於大多數船舶而言，將涉及安裝專用設備以處理壓艙水；澳洲基於保護海洋生態，對於船舶航行進入該國水域，採取因應的法規及行政措施，茲介紹如下。

澳洲對《壓艙水管理公約》之因應[2]

根據《澳洲壓艙水管理要求》規定，為船舶營運人在澳洲海域作業時，有關壓艙水及沉積物管理之義務，提供最佳實踐政策之指導，並適用於澳洲進行國際及國內營運之所有船舶。壓艙水可能含有多種侵入性海洋物種，若不善加管理，或對澳洲獨特的海洋環境造成無法挽回的經濟及環境影響。因此《澳洲壓艙水管理要求》反映《壓艙水管理公約》執行情況，以減少在澳洲海域傳播的海洋有害生物擴散之風險。

一、所需文件

（一）**壓艙水管理計畫：**所有載運壓艙水之船舶，皆須攜帶有效的壓艙水管理計畫（Ballast water management plans, BWMP）。有效的壓艙水管理計畫須經檢驗機構、驗船協會或船舶主管部門批准。對於懸掛澳洲國旗之船舶，此管理計畫須獲得生物安全主任，或經認證的檢驗機構批准。壓艙水管理計畫（BWMP）應符合《壓艙水管理公約》的G4指南：壓艙水管理指南及制定壓艙水管理計畫[3]。

（二）**壓艙水管理證書：**適用《壓艙水管理公約》之所有船舶，皆須取得壓艙水管理證書（Ballast water management certificates, BWMC）。壓艙水管理證書（BWMC）係確認船舶是否符合壓艙水管理公約之標準，並須與壓艙水管理公約附錄I所述格式一致。有效的壓艙水管理證書須由檢驗機構、驗船協會或船舶管理部門簽發，並符合《壓艙水管理公約》第E-1條有關壓艙水管理調查之規定。對於懸掛澳洲國旗之船舶，必須由生物安全主任，或經認證的檢驗機構，簽發管理證書。

（三）**壓艙水記錄系統：**採行壓艙水管理之船舶，必須維護完整且正確的壓艙水記錄系統（Ballast water record system）。此系統可以電子版本或紙質版本，且應符合《壓艙水管理公約》附則B-2有關壓艙水記錄之規範：記錄系統應包含所有壓艙水運作的完整且最新記錄。

（四）**系統認可證書：**對於帶有壓艙水管理系統（Ballast water management system, BWMS）之船舶，必須在船舶上保留「系統認可證書（Type approval certificate）」，系統認可證書係針對壓艙水管理系統，而非特定船舶。

二、壓艙水報告

有關壓艙水報告義務（Ballast water reporting），依船舶在澳洲國內交易，或進行國際航行有所不同。若有特殊情況，使船舶無法進行壓艙水之管理，則應在可行情況下，最速通知主管部門。

若壓艙水管理系統發生故障，船舶營運人必須在意識到故障後，立即通知海事國家協調中心（Maritime National Coordination Centre, MNCC），以尋求有關應變措施（Emergency measures）的主管部門建議。

（一）**國際船舶之報告義務：**來自國際且打算卸載壓艙水之船舶，有提交報告之義務。若船舶打算卸載源自外國之壓艙水，必須在抵達至少12小時前，透過海上到達報告系統（Maritime Arrivals Reporting System, MARS）提交壓艙水報告。然為防止船舶卸載高風險壓艙水，澳洲建議，不打算卸載壓艙水之船舶，也要管理壓艙水，並提交壓艙水報告。若船舶行程變更，此作業方式可幫助避免延誤。壓艙水報告將由主管部門通過MARS進行評估，並將透過生物安全狀態文件（Biosecurity status document）發布回應。若船上壓艙水狀況發生變化，應更新壓艙水報告，且應於可行情況下最速完成。

（二）**國內船舶之報告義務：**已從生物安全控制部門放行之船舶，仍需管理來自澳洲壓艙水之流動。船舶卸載壓艙水之前，必須對所有壓艙水進行管理，或根據壓艙水裝載及卸載日期與港口，獲得主管部門的低風險豁免，所有申請必須透過海上到達報告系統（MARS）提交。船舶營運人須在船上保留豁免通知之證，並須於檢查期間依要求提示。

三、逐步淘汰壓艙水交換

澳洲正在執行IMO《壓艙水管理公約》所議定實施之時間，要求船舶逐步淘汰壓艙水交換，採用符合D-2排放標準之方法。為了實現此一目標，要求船舶安裝IMO批准的壓艙水管理系統，或使用其它已批准的管理方法進行管理。有關壓艙水管理公約所議定實施之時間，如圖2所示[4]。

圖2／《壓艙水管理公約》所議定實施之時間
圖片來源／IMO (2020).
http://www.imo.org/en/MediaCentre/HotTopics/Pages/Implementing-the-BWM-Convention.aspx

由圖2可知，2017年9月8日或其後之新造船舶，自投入使用之日起，皆須符合D-2之排放標準；2017年9月8日前建造之船舶，在第1次或第2次5年換證檢驗，必須符合《國際防止船舶油污公約》（MARPOL）附則I國際油污預防證書（IOPP）規定之D-2排放標準；2019年9月8日或其後進行首次換證檢驗時，船舶須在第1次換證檢驗日期前達到D-2之排放標準；最終在2024年9月8日前，所有船舶皆須符合D-2之排放標準。

四、壓艙水交換的可接受區域

有關壓艙水交換，應在距離最近陸地至少200海浬，及水深200公尺之水中進行。對於實際上未能滿足此要求之航行，壓艙水交換須在距離最近陸地至少12海浬，及水深至少50公尺之水中進行。

五、離岸設施服務船舶之壓艙水管理

進入澳洲專屬經濟區（Exclusive Economic Zone, EEZ）內之船舶，在抵達海上石油及天然氣設施之前，必須根據可接受的壓艙水管理方法管理壓艙水。在離岸石油及天然氣設施、以及澳洲港口間運行之船舶，亦須在到達設施及澳洲港口前管理壓艙水。設施與澳洲港口間的壓艙水交換，可接受的區域為距離岸設施不小於500公尺，距離最近陸地不少於12海浬之海域。

六、壓載艙沉積物之處置

在澳洲的專屬經濟區，禁止處置沉積物。沉積物必須在距最近陸地200海浬外，深度至少200公尺處，或經批准的陸上接收設施中處置。除非船舶尋求許可將沉積物卸載到接收設施，否則不允許在澳洲海洋中卸載壓載艙沉積物。

在下列情況下允許卸載沉積物：1.在緊急情況下，為了確保船舶安全或挽救海上生命。2.由於船舶或其設備損壞造成意外卸載。3.已採取所有合理的預防措施來防止或最小化卸載。4.為了減少污染。

結論

壓艙水裝置為船舶之必要設備，以確保船舶航行之穩定性；惟其帶來之外來物種，可能對國家的水域環境及海洋生態造成危害，因此政府確實應重視此一問題，並有制定管理辦法之必要，對來自外來水域之船舶進行壓艙水管理。本文探討澳洲對《壓艙水管理公約》之因應方式，俾使政府相關部門以之為借鏡，針對船舶壓艙水及沉積物制定管理辦法，共同維護海洋環境。

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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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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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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.

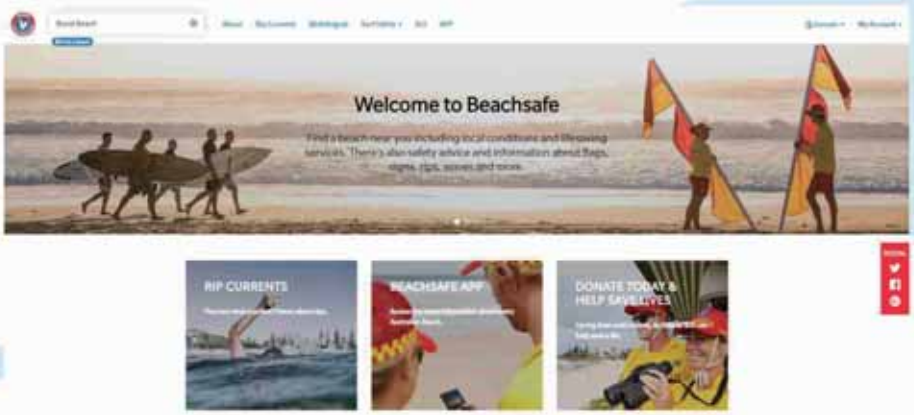
However, safety risks exist in beach environments. Illustratively, big waves, water depth, strong currents, submerged rocks, rip currents etc. are all potential hazards. In particular, those who do not have or have poor swimming skills are likely to drown if they are in any of these hazards. Common factors 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

Beach type \ Wave height	<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
1-3	Least hazardous: weak currents; however, supervision still required, in particular for children and poor swimmer
4-6	Moderately hazardous: The level of hazard depends on wave and weather conditions, with the possibility of strong rips and currents
7-8	Highly hazardous: Experience in strong rips and currents required
9-10	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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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.

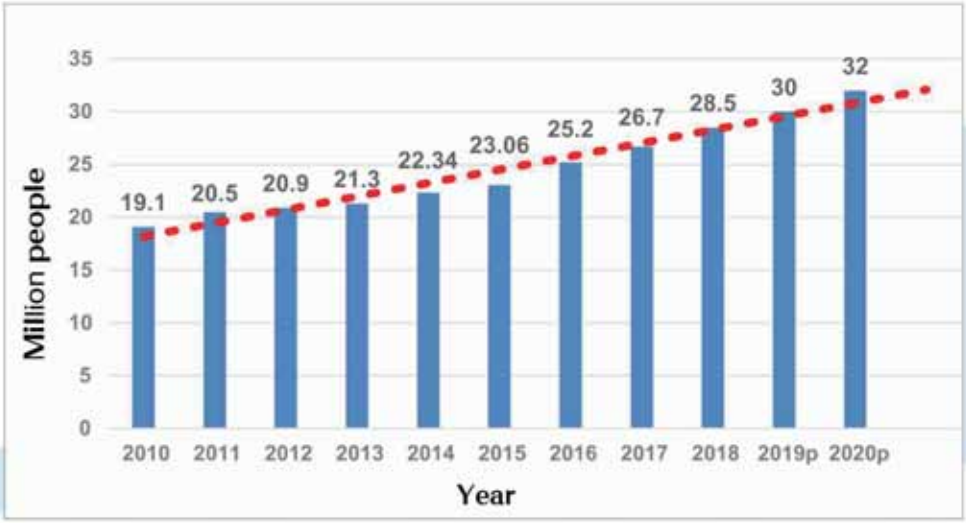

Figure 1/ Trend chart showing the increasing number of global cruise passengers (Unit: million people)
Remarks/ Number of global cruise passengers for 2019 and 2020 are projected
Source/ CLIA (2020) [1]; This Study

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.

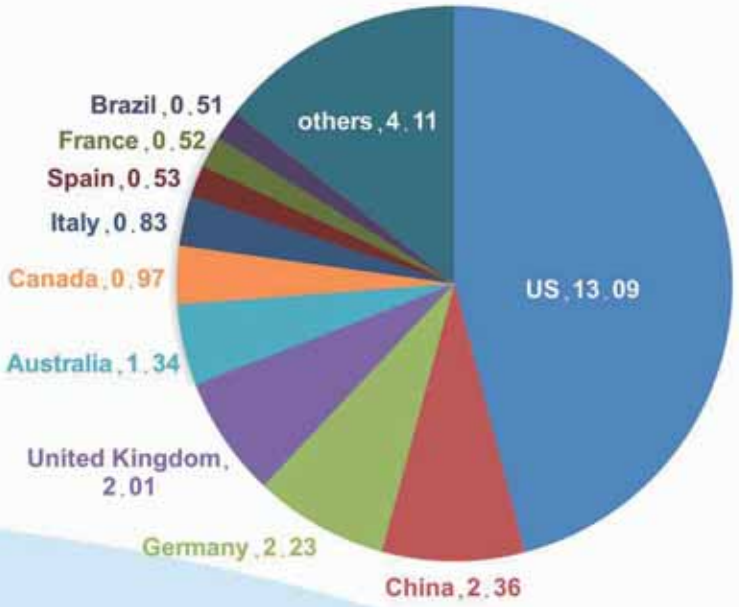

Figure 2/ Top 10 source countries of global cruise passengers in 2018 (Unit: million people)
Source/ CLIA (2019) [2]; This Study

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)	U$125.96	U$133.96	U$150.13	A$4.7 (U$3.361)	A$4.8 (U$3.432)	A$5.2 (U$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.

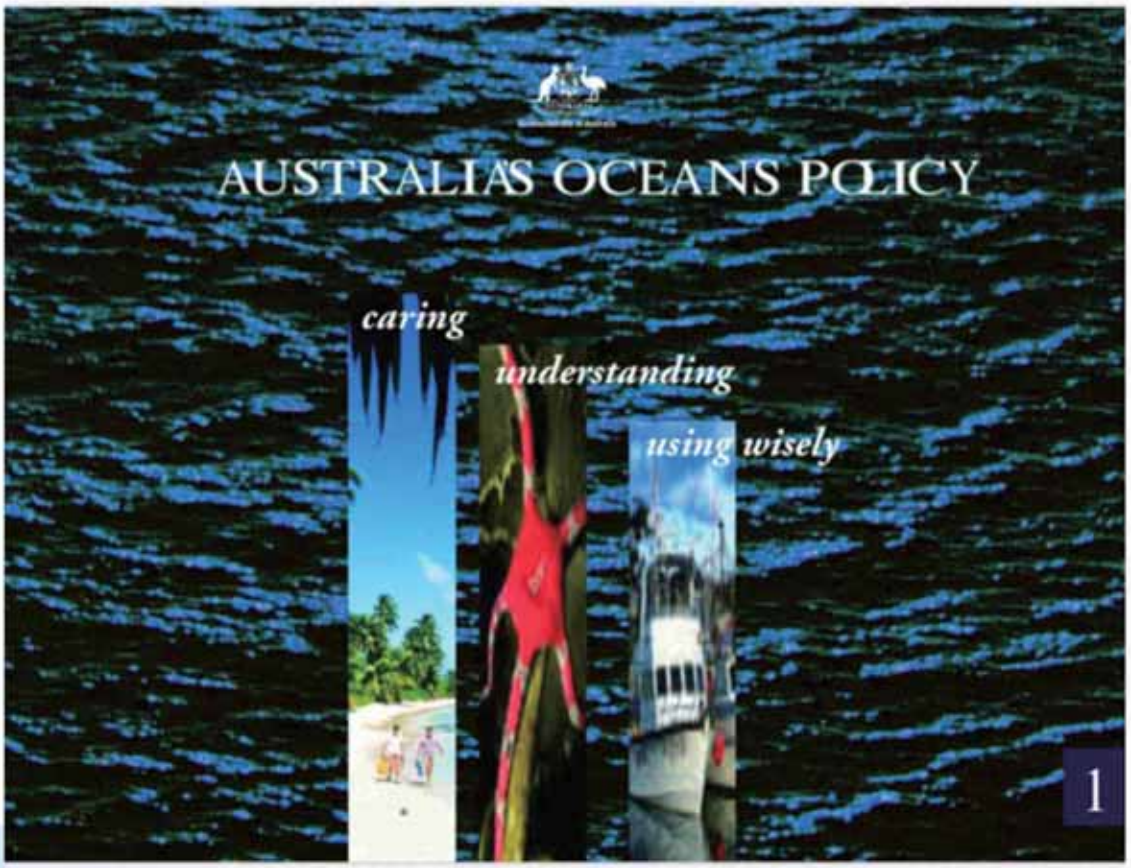

Figure 1/ Australia's Oceans Policy (1998)
Image by Commonwealth of Australia (1998)
http://www.environment.gov.au/archive/coasts/oceans-policy/publications/pubs/policyv1.pdf

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]:

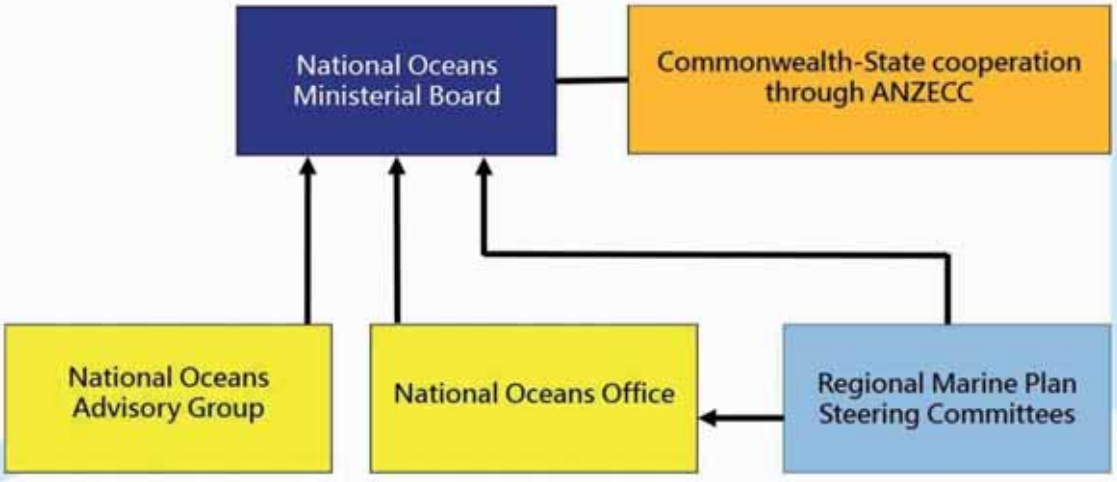

Figure 3/ The key national elements for Ocean Planning and Management
Image by Commonwealth of Australia (1998), Australia's Oceans Policy
http://www.environment.gov.au/archive/coasts/oceans-policy/publications/pubs/policyv1.pdf

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.

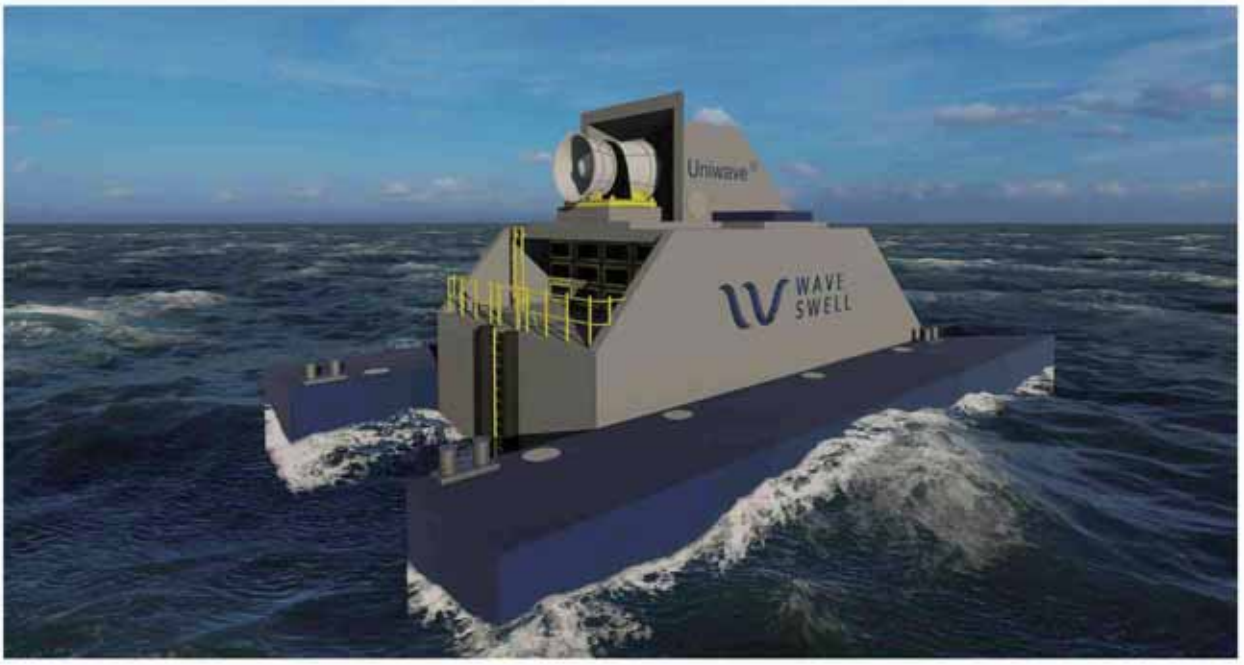

Figure 2/ UniWave200
Source/ https://arena.gov.au/projects/uniwave200-king-island-project-wave-swell/

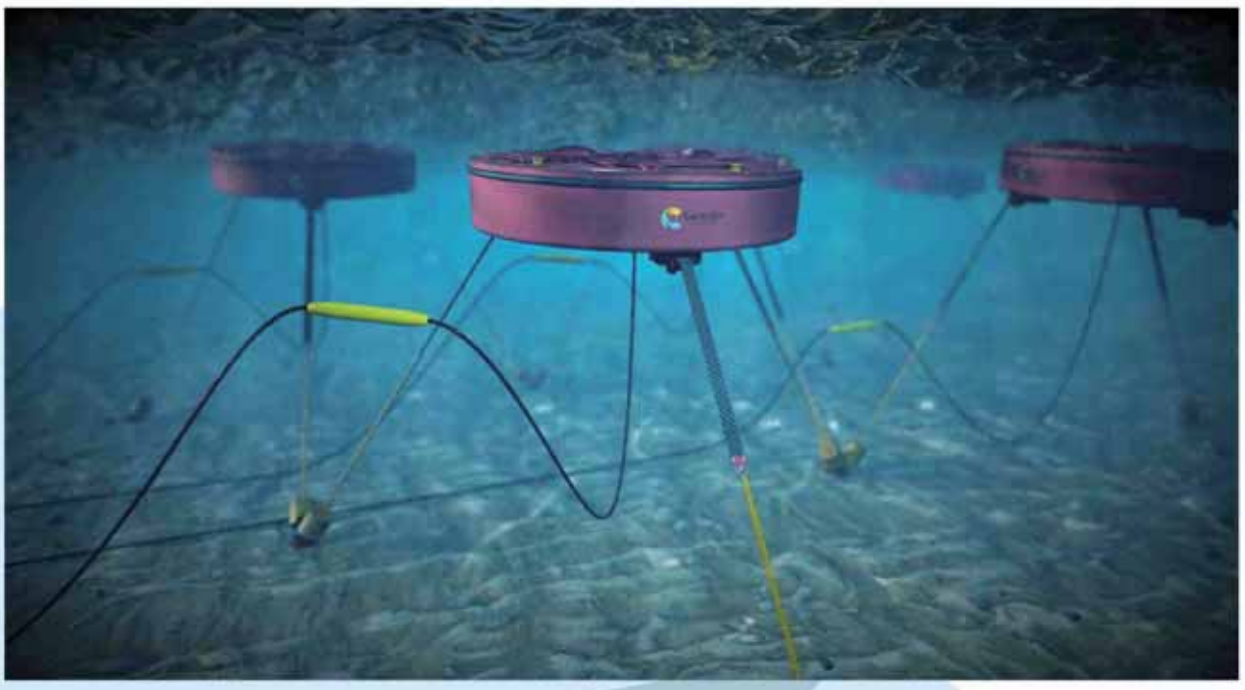

Figure 3/ CETO 6 wave power generation system
Source/ https://www.carnegiece.com/technology/

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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Image by Pride Advertising Agency Ltd.

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.

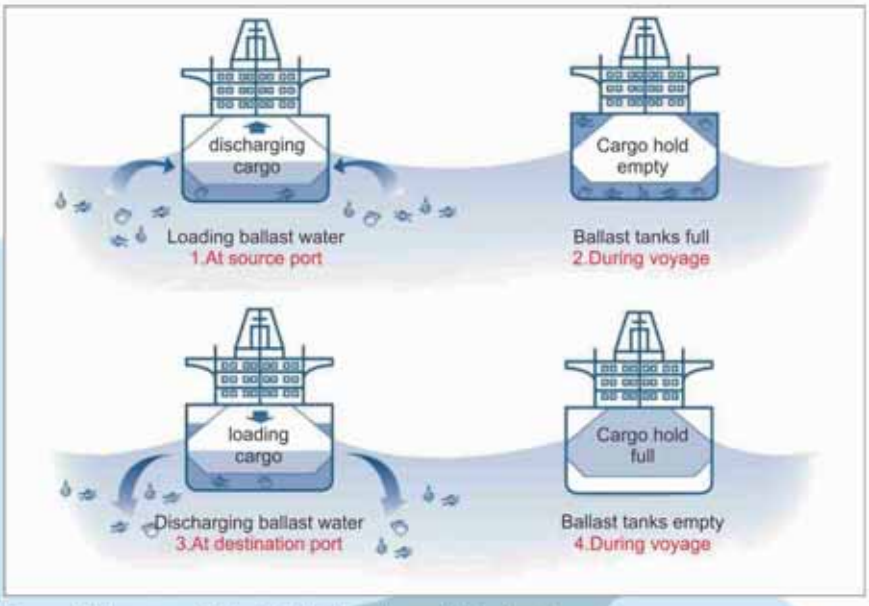

Figure 1/ Diagram of Ballast Water Loading and Discharging
Source/ IMO (2020)
http://www.imo.org/en/mediacentre/hottopics/bwm/pages/default.aspx

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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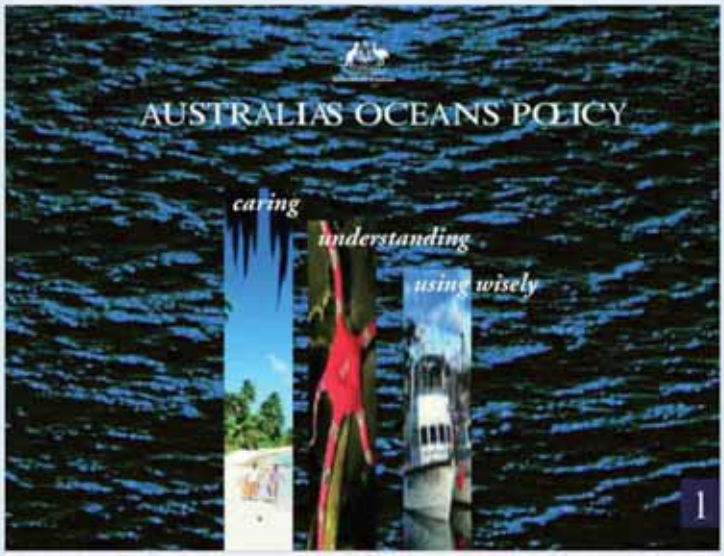

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