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打造更平等而永續的未來——「亞太經濟合作提倡女性參與海洋科學以促進永續及包容的海洋治理」工作坊

Build a More Equal and Sustainable Future – The "APEC Workshop on Promoting Women's Role in Ocean Science towards Sustainable and Inclusive Ocean Governance"

巴拿馬海洋資訊

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Promoting the Blue Economy The Marine Environment Conservation and Sustainability Governance Development

Minister of the Ocean Affairs Council: Bi-Ling Kuan
Translated by Chung Hua Translation Service

For this issue of International Ocean Information, the "Special Report" shares details of the "APEC Workshop on Promoting Women's Role in Ocean Science towards Sustainable and Inclusive Ocean Governance" held by the Ocean Affairs Council in Kaohsiung from March 16 to 17, 2023. By exchanging views on promoting regional gender awareness and pursuing equality and inclusiveness in ocean science, the workshop aims to promote and enhance women's participation in ocean science industry.

The threats and impacts faced by the marine environment are one of the important factors that hinder the development of blue economy. Moreover, the influence of the ocean on human life and economic development is also a challenge presently faced by people around the world. It is therefore essential to proactively discuss on related issue and deliberate on solutions to facilitate the implementation of strategies. Organized since 2014, the Our Ocean Conference (OOC) has been a notable international event. It has created a partnership among nations to collaboratively address oceanic challenges and promote the equitable sharing and sustainable development of marine resources.

"International Issues" focuses on the introduction to OOC in 2023 and report on the highlights of the 8th OOC held on March 2 and 3, 2023 in Panama and our nation's observation results as a participant. As the host country of the OOC this year, Panama's practices in various ocean-related fields are also worth learning from. "Industry Dynamics" illustrates about Panama Canal's contribution to the shipping industry and its single-lane system. By viewing this important international shipping route and its single-lane system, readers will see the possibility of balancing the development of ocean industry while protecting marine resources and organisms. With a focus on the Ministry of Environment (Ministerio De Ambiente, MiAMBIENTE) of Panama and its action plan to achieve the 30X30 Target, "Organization Focus" examines Panamanian government's emphasis on ocean strategy, governance and development. This includes Panama's marine resources protection plan; regulations governing to the uses, management and protection of marine and coastal resources; and its current development in marine sustainability issues. "Latest News" presents the "G20 Report on Actions against Marine Plastic Litter" in which the government of Panama participated. This section provides a brief overview of this G20 initiated anti-marine plastic litter action and Panama's involvement, including the policy framework, measures, effectiveness, future implementation methods, national action plan, respective index, strategies for preventing and reducing marine plastic litters, and so on. "Regulatory Systems" introduces the Eastern Tropical Pacific Marine Corridor (CMAR), an intergovernmental initiative committed to regional cooperation mechanisms for ocean governance. This involves managing the ecological system and establishing intergovernmental strategies to properly manage biodiversity and marine and coastal resources. This section also provides an overview of the background, binding force, organizational structure, international participation, funding, operations and challenges of this multi-lateral cooperation initiative.

Figure/ The Amador Causeway located at the entrance of Panama Canal
Source/ https://reurl.cc/9VjWLx

Build a More Equal and Sustainable Future – The "APEC Workshop on Promoting Women's Role in Ocean Science towards Sustainable and Inclusive Ocean Governance"

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Translated by Chung Hua Translation Service
Keywords: Gender equality, women's empowerment, sustainable oceans

As part of its efforts to promote and enhance women's participation in ocean science, the Ocean Affairs Council (OAC) organized the "APEC Workshop on Promoting Women's Role in Ocean Science towards Sustainable and Inclusive Ocean Governance" on March 16 and 17, 2023 in Kaohsiung to exchange views on promoting regional gender awareness and pursuing equality and inclusiveness in ocean science.

Figure 1/ A group photo of guests participated in the APEC Workshop on Promoting Women's Role in Ocean Science
Image by OAC

Different Voices: Women Leaders Practicing Sustainable Ocean Governance

The workshop was opened with a welcome address by the Deputy Minister of Ocean Affairs Council Wen-Ling Hong. Deputy Minister Hong pointed out that women's expertise and knowledge contribute greatly to the ocean challenges that we face. Female leaders bring diversity and inclusiveness to the environment, and "promoting gender equality" and "women's empowerment" are key success factors for implementing sustainable ocean governance. Nevertheless, affected by structural factors such as social, cultural and economic conditions, women's participation in ocean science and ocean governance is still limited relatively. As life has entered a new normal in the post-pandemic era, face-to-face experience sharing has become even more precious. Deputy Minister Hong expressed her wish that, through the exchange and conversation of this workshop, our country will become a joined force that promotes gender equality in the APEC region and realizes the vision of sustainable and inclusive ocean governance.

Deputy Director of OAC's Department of International Development Li-Ying Lin subsequently published the results of "Preliminary Research on Women in Ocean". The "Global Ocean Science Report 2020 (GOSR2020)" [1] survey conducted by the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization (IOC-UNESCO) points out that only 39% of the field of ocean science research is occupied by women. This gender gap has resulted in a loss of 15% of GDP among countries of Organisation for Economic Co-operation and Development (OECD).

The 132 questionnaires collected in the survey mostly come from ocean science experts in APEC region. Among them, 93% are women and most of them are aged between 25 and 54 with children. According to the survey, 72% of interviewees believe that females suffer more obstacles in terms of promotion compared with males. Moreover, more than half of the interviewees stated that the organization does not respond to gender discrimination adequately, resulting in women being limited to current positions or hindered in career advancement or having less opportunity to find a peer or instructor. Moreover, women are often required to reduce their counseling, training or business trips due to family caregiving responsibilities, creating a vicious cycle.

During interviews with experts from relevant fields in Taiwan, Indonesia and the United States, they pointed out common challenges faced by women including gender pay gap, prejudice against women in male-dominated fields, and dilemma of giving up family or childcare in order to focus on research, respectively. The study reveals that the high turnover rate of women in the field of ocean science can be reduced if obstacles in their career are removed and if they are provided with support for childcare. This would also enable them to stay in the same position after childbirth. Improving gender equality in the field of ocean science is essential. To achieve this, not only should gender equality and diversity policies be promoted, but also gender stereotypes and biases must be eliminated in order to provide women with more opportunities to contribute to ocean science. Deputy Director Lin expressed her wish that all APEC economies would have substantial exchanges through workshops, enabling experts to assist women in increasing their participation in APEC region.

The first keynote speech, "Big Picture of Women Led Ocean Science Industry", in the morning session was presented by Chole Nunn, the former officer for "The United Nations Decade of Ocean Science for Sustainable Development" (also known as the UN Ocean Decade) at IOC-UNESCO. Chole Nunn explained that providing women with the opportunity to participate in ocean conversation complies with the Sustainable Development Goals (SDGs) of the United Nations (UN); and, to achieve the said SDGs, it is a must to provide related knowledge. The UN Ocean Decade therefore launched the "women's empowerment" Ocean Decade activity [2] with the commitment to bridge gender gap in the ocean research and science governance system, ensuring the sustainable management of global oceans.

Chloe Nunn currently serves as the Communications Lead at the Society for Women in Marine Science (SWMS). During her presentation, she briefly shared her personal experiences in the field of ocean science; and invited female members of the SWMS to share how the organization's diverse and inclusive space made them feel a sense of belonging, allowing them to focus on contribute their expertise rather than simply surviving. Some members also shared their experiences of success and failure, including participation in the Antarctic research project, serving as an internship program manager, and studying sharks in protected areas of South Africa. Chloe Nunn believes that promoting inclusivity by allowing people of different genders, sexual orientation and ethnicities to participate in the conversation and addressing discriminatory systems will provide women with more opportunities to contribute their talents and help to create a more equal world. The sharing of the diverse experiences from female experts in the ocean science industry allowed participants to hear different voices.

The second keynote speech, "Best Practice on Women Led Ocean Science Industry", was presented by the Deputy Minister of OAC Wen-Ling Hong. Deputy Minister Hong firstly shared the current status of Taiwan's ocean science industry. Although Taiwan ranks seventh in the gender equality index in the Asia Pacific region in 2021, women are still considered a minority in the fields of science, technology, engineering, and math (STEM). To achieve gender equality in the ocean science industry, organizations should well use the 3R strategy of "Recruit", "Retain" and "Recognize". This includes recruiting more women and encouraging their participation, creating a safe environment that supports their development, and empowering them with autonomy and mobility.

Deputy Minister Hong also shared the promotional strategy of the "Taiwan Women e Press" [3], which includes introducing the career development and life challenges of women in the technology field. It also has a "one-day column" that introduces female research scholars' work life in one day, allowing more people to learn about female research scholars. Furthermore, organizations such as the Society of Taiwan Women in Science and Technology (TWiST), the Society of Women Engineers (SWE) in the United States, and the IEEE Women in Engineering (IEEE WIE) committee that are dedicated to encouraging women in science and technology to exchange ideas, collaborate, and to pass on their experiences also provide various resources that highlight the life and professions of different female research scholars. Female participants in the ocean community in Taiwan, on the other hand, have created communities or enterprises such as TurtleSpot Taiwan, Ocean Says, FISH BAR etc. to present various and unique forms of ocean participation. For example, taking underwater photos; writing blog articles or reviews; selling sustainable fishing products while providing education on fish consumption; and preserving the unique lifestyle of female divers in the Magang community. By taking this opportunity, Deputy Minister Hong also encourages participants to be even more proactive in involving themselves in ocean-related issues and engaging with society through collaboration.

The Power of Change: Promoting Women's Participation in the Field of Ocean Science

Two panel discussion sessions were arranged in the afternoon on the 16th. The first panel discussion, "Policy Promoting toward Women in Ocean Science", was hosted by Chia-Ying Ko, Associate Professor of Institute of Fisheries Science, National Taiwan University. The panelists include Dr. Laura T. David, Director of Marine Science Institute at the University of the Philippines; Dr. Sara Purca Cuicapusa, researcher of the Peruvian Marine Research Institute; and Susana Giglio Muñoz, Deputy Director of The Undersecretariat for Fisheries and Aquaculture (SUBPESCA) of Chile.

In the beginning, Associate Professor Ko briefly analyzed the women's roles from academic perspectives in Taiwan. As the Taiwanese government has domesticated the Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW) of the UN and inspects its implementation every four years since 2012, Taiwan is ranked among the top ten globally based on the data used to compile the latest U.N. Gender Inequality Index (GII) with notable efforts. For example, the numbers of women winning the Outstanding Research Award and female graduates from higher education have increased; and the proportion of males and females in the ocean science industry has been stably maintained at 65:35 in recent years. Meanwhile, in terms of interests, males tend to prefer agriculture, forestry, fishery, and animal husbandry disciplines, while women tend to prefer art and humanities. Nevertheless, whether a fair system can be provided to enable women's participation in more diverse fields to achieve SDGs still requires more thinking and encouragement.

Director David also shared the experiences of the Philippines, including the fact that women make up 49% of the country's scientific workforce and nearly half of senior positions are held by women. Nevertheless, Director David also reminded that sexual harassment in the workplace and women's sufferings of gender discrimination and ignorance when making a speech are still common issues. Besides, the general belief that women should be the primary family caregiver often leads to interruption or termination of women's career life. Therefore, the Philippines has enacted the Magna Carta of Women 2009 (MCW) and launched the Gender and Development budget policy, which requires government departments to allocate at least 50% of their budget to support women's empowerment activities and to provide childcare centers and breastfeeding rooms. Director David thinks that it is important not only to ensure women's opportunity of entering the world of ocean science, but also to consider the needs of LGBT (Lesbian, Gay, Bisexual and Transgender) individuals. Therefore, gender equality must be taken into consideration when recruiting personnel.

On the other hand, Dr. Sara Purca Cuicapusa introduced the gender equality measures adopted by the Women's Science Committee of Peru with a roadmap for promoting women's participation in the field

of science and technology. The measures include sponsorships for 11 students and graduates to complete their degree; and amendments to research regulations to enable female researchers to apply for maternity and parental leaves. Dr. Cuicapusa also presented the gender distribution in the STEM fields. In the field of ocean science, the proportion of female researchers at the Peruvian Marine Research Institute is 32%, while 21% are involved in ocean science. Promoting the participation of young females is also important. This can be achieved, for example, by allowing students to visit laboratories and learn about research-related matters, promoting ocean science, and design a mentorship program for training females of higher education. Dr. Cuicapusa believes that the apprenticeship system will help students even more effectively in the field of ocean science.

During the panel discussion, Deputy Director Muñoz also presented the roles of women in ocean science, particularly in the areas of fisheries and aquaculture, in Chile. Although the gender ratio of students (including undergraduate and postgraduate students) is fairly equal in Chile, there is a significant disparity above the levels of assistant professors, where the proportion of female-led research products and research proposals is relatively lower at 15% to 16%. Deputy Director Muñoz stated that gender bias and gender discrimination have been evidenced to limit women's opportunities for development. Consequently, in 2020, the National Commission for Scientific and Technological Research in Chile launched the roadmap of "National Science, Technology, Knowledge and Innovation Policy", which includes strategies such as establishing a data science observatory and better mechanisms to increase women's employment opportunities and participation. As for fisheries and aquaculture, Chile enacted the "Gender Equity in the Fisheries and Aquaculture Law" in 2021. Women from the industry also initiated that all fisheries and aquaculture committees should involve female members, and other committees should guarantee at least one-third of female members by amending the regulations.

The second panel discussion, "Case Study and the Innovation Strategy to Women Participation" was hosted by Jen-Shan Kao, Associate Professor of Yuan Ze University. The panelists include Iven Lo, Section Chief of the Ship and Ocean Industries Research and Development Center (SOIC); Intan Suci Nurhati, Director of Research Center for Deep Sea, National Research and Innovation Agency (BRIN); and Nguyen Thanh Thao, Deputy Director of the Department of Science, Technology and International Cooperation under the General Department of Geology and Minerals of Vietnam, the Ministry of Natural Resources and Environment.

First, Section Chief Lo from the SOIC shared that Taiwan has a complete ship supply industry, ranging from the OEM (Original Equipment Manufacturing) production model to the OBM (Original Brand Manufacturing) model with self-developed brands. This not only facilitated the development of well-known yacht brands such as Horizon Yachts, but also strengthened Taiwan's capabilities in yacht production processes, after-sales support and customization services. Section Chief Luo, who transitioned from the field of architectural design to ocean science industry, views oceans and vessels from an architectural perspective. Section Chief Lo thinks that promoting labor of division and teamwork is essential in the yacht industry; and that women can serve as effective communication bridges while bringing innovative concepts and ideas to the industry.

Director Nurhati also shared how Indonesia breaks the glass ceiling in the ocean science industry. As Indonesia has the lowest proportion of female researchers in the Pacific region, Director Nurhati explained how BRIN ensures that its recruitment, daily operations and promotion channels are more aligned with the principle of fairness. First, BRIN has adjusted its recruitment process from a restrictive "expertise-based recruitment" to "expertise-based appointments after the recruitment", allowing overseas scholars, people with disabilities and people of other ethnic groups (ex., Papuans) to be admitted. The outcome is presented in the latest two rounds of recruitment, where half of the new recruits are women. Second, BRIN has implemented a digital clock-in and clock-out system that allows

women to work in flexible hours and better balance their work and family responsibilities. Director Nurhati mentioned that experiences gained from studying abroad or international collaborations can serve as references for domestic practices and provide opportunities to gradually change traditional concepts, enabling women to enjoy more equal rights and promote their career development.

Deputy Director Thao made a presentation on Vietnamese women's participations in coastal governance projects: Due to the severe contamination of and damage to Vietnam's marine environment, women's groups proposed more than 100 projects to support the marine conservation over the last few years. Women have also been involved in wetland conservation work; and their participation has been increasingly seen in fishing, sea transportation, ocean science, and coastal and offshore engineering projects in recent years. This indicates their great contribution to Vietnam's ocean governance and industrial development.

During the Q&A session, participants discussed Chile's "50/50 by 2030" action plan. This plan encourages women's participation, increases the involvement of citizen scientists, and counsels more young scientists to participate, which are workable and specific actions. Furthermore, the entry of women into the yacht industry and other ocean affairs departments will drive the transformation of relevant industries and change the mindset of the entire society, helping to create an even more open and diverse society.

Dancing with the Sea: A Visit to the Oceanographic Research Vessel "POLARIS III" and a Cultural Cruise Tour

On the second day of the workshop, the OAC arranged a visit to the Dragon Survey Co., Ltd. for workshop participants. The group to which the Dragon Survey Co., Ltd. belongs engages in marine survey, offshore geological drilling, satellite and maritime equipment sales services. Its main businesses include offshore wind power, marine cable and pipeline route survey, external inspection of pipelines, salvage and rescue works. The Group has many female leaders in the group, such as the on-site leader, director of the permit department; or second officer on board. Female surveyors engage in on-site marine surveys and underwater technical services shared their career experiences, including their work content, challenges, career development and family's support. Next, participants got on board of the oceanographic research vessel "POLARIS III" to learn about the actual working conditions of onboard facilities and personnel. A cultural cruise tour in Kaohsiung Port was also arranged in the afternoon. Departed from Pier-2, participants enjoyed the beautiful scenery of Kaohsiung Port, and viewed yachts, fishing vessels, sea transportation vessels, containers and some other facilities in the port.

Conclusion

During this workshop, participants discussed on how to promote women's participation in ocean science and how the sustainable ocean governance is therefore promoted. During the closing remarks, Director of OAC's Department of International Development Ya-Chieh Hsieh highlighted that speeches and discussions not only shared the best practices and strategies for promoting women's participation, but also identified challenges faced by women in the field of ocean science and solutions therefore. All discussions have demonstrated the potential for collective cooperation among economies. Our country is devoted to promoting women's empowerment and participation. We will collaborate with our partners and stakeholders to provide related support in order to build a more equal and sustainable future.

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8th "Our Ocean Conference" in Panama: Observation and Participation from Taiwan

Jian-Wu Lai (Research Fellow of the Marine Industry and Engineering Research Center, National Academy of Marine Research)

Keywords: Our Ocean Conference, Sustainable Ocean, Panama

Our lives are inextricably connected with the ocean. It regulates our climate and weather, provides about half of our oxygen, and sustains the food and livelihoods of billions of people around the world. Yet the health of the ocean is under threat, with warming and acidification caused by greenhouse gas emissions, combined with the impact of human activities such as overfishing and plastic pollution, endangering marine ecosystems and communities around the world. To arouse global attention to the profound impact of oceans on human development and environmental sustainability, countries around the world have responded to the initiative of the United States since 2014 and regularly hold "Our Ocean Conferences (OOC)" to build partnerships between government, industry, science and the civil community. A partnership among communities to jointly solve the problems facing the oceans, to ensure simultaneous production and sustainable use, and to enable future generations to enjoy the resources of the oceans.

Since its establishment, the Ocean Affairs Council (OAC) has actively integrated the promotion of my country's ocean affairs, and has continued to pay attention to the international community's initiatives and norms for ocean sustainability, and has declared to countries all over the world my country's determination and contribution. Following the report in the 18th issue of this magazine that in 2022, the former Deputy Minister Ching-Piao Tsai, led the delegation to attend the seventh OOC held in Palau, a friendly state of my country. This issue reports on the observations and achievements of the 8th OOC hosted by Panama between March 2 to 3, 2023 led by Julia Hsiang-Wen Huang, Minister of the Ocean Conservation Administration (OAC).

Figure 1/ Group photo of leaders and representatives
Source/ Official photo section on the website of the OOC2023

"Our Ocean Conference" Panama

The purpose of OOC is to encourage voluntary commitments by governments, organizations and businesses to take practical, meaningful action to keep oceans clean, healthy and productive. Past meetings have accumulated close to two thousand commitments. Host countries expect this year's meeting to encourage more governments, organizations and businesses to announce new commitments to protect our oceans. These commitments should be high-impact, measurable and have a clear timeline.

Table 1/ Meeting Agenda and Attendance Observation Minutes

Agenda	Minutes
OPENING PERFORMANCE, VIDEO AND KEYNOTE ADDRESSES	The president of Panama, Laurentino Cortizo Cohen, visited the conference and announced the importance of Panama's attention to the ocean and the protection measures taken by Panama, including a substantial increase in the area of marine protected areas to more than 50%. It is also expected to promote dialogue and cooperation between governments and non-state actors through this dialogue platform, and jointly create creative solutions for the protection and sustainable use of marine resources and the public's awareness of the ocean.
HIGH-LEVEL OPENING PANEL EFFECTIVE RESPONSE TO GLOBAL ACTION	U.S. special envoy for climate change John Kerry emphasized that the oceans are facing increasingly serious problems such as climate change and plastic waste, and also emphasized that the United States has invested a lot of budgets in promoting ocean observation and improving coastal resilience. His Excellency Hui Shuren, President of Palau, the former host country, mentioned that the most important lesson he learned during the preparation of the 7th OOC was the partnership, especially the cooperation between Taiwan, Japan, Australia, New Zealand and the United States. With the help, Palau, a small country with a population of only 20,000 people, was able to successfully host the last conference. President Hui further pointed out that maintaining inclusiveness is the key to facing the challenge of climate change, emphasizing that the whole world has made a commitment to jointly take "solution oriented" actions.
PANEL 1 MARINE PROTECTED AREAS: EXPANDING THE PROTECTION OF OUR OCEAN	The science-based session discussed how well designed and implemented marine protected areas (MPAs) are effective tools for protecting marine biodiversity and managing marine resources. Marine protected areas provide safe habitat for endemic and endangered species and provide protection for entire marine ecosystems and the communities that depend on them for sustainable development. The success of MPAs requires effective and efficient governance strategies to promote the ecological connectivity and integrity of the social and economic activities directly associated with these marine areas.
PANEL 2 MARINE POLLUTION: RIDDING THE WORLD OF OCEAN CONTAMINATION	The inappropriate disposal of waste has caused pollution and degradation of the ocean, progressive deterioration of water quality, affecting environmental balance and negatively impacting human health, biodiversity, and seafood production. The panel discussed how to work together to find effective solutions through effective public policy and technological and scientific innovation.
PANEL 3 CLIMATE CHANGE: FACING CLIMATIC CONSEQUENCES	We are currently facing a critical situation where human activities are causing imbalances in the global climate process. Marine and coastal ecosystems have enormous potential as carbon sinks, biodiversity hotspots and climate risk buffers. Thus, discussions were held on how to promote science- and ecosystem-based management approaches, supported by regional and global assessments, to develop better practices and conservation strategies, and to implement restoration projects globally, as they are essential for the well-being of coastal communities around the world.
PANEL 4 SUSTAINABLE FISHERIES: FINDING ANSWERS	To reap the benefits of a resilient ocean, we must prioritize conservation of biodiversity and the long-term sustainability of the world's fish stocks. In this sense, we must face the challenge of protecting our oceans and ensuring food, sustainable fishing and the reproduction of marine species for coastal communities. To achieve this, the meeting discussed how to facilitate the fishery certification process and apply innovative technologies to ensure the sustainability and transparency of our fisheries.
PANEL 5 BLUE ECONOMY: BUILDING BETTER OPPORTUNITIES	The ocean is the main source of nutrition, jobs and income for approximately 40% of the world's population. The ocean's continued contribution to the global economy requires a balance between economic and social activities and needs, and the sustainable use of ocean resources and services. The meeting discussed the urgent need to adapt economic activities related to the oceans and other economic activities that affect them, such as tourism, and steer them toward patterns that are appropriate to current environmental and social needs, for the benefit of present and future generations.
PANEL 6 MARITIME SECURITY: ACTIONS FOR INNOVATIVE, SUSTAINABLE, SAFE AND SECURE MARITIME TRANSPORT	More than 90% of global trade takes place on the oceans. Although sea transport has less environmental impact than air or land transport, it is still a source of greenhouse gas emissions and other pollutants. This panel discussed and highlights how science and new technologies can be integrated to improve safety and marine transportation procedures and contribute to the protection of the marine environment. Likewise, there was greater emphasis on strengthening capacity building and alliances, and stakeholder engagement between the public and private sectors to achieve adequate oversight and control of activities taking place on the oceans.
PANEL 7 YOUTH PANEL – TRANSFORMATION FOR A SUSTAINABLE FUTURE	The world is changing at an alarming rate, but technology is changing even faster. Youth engagement provides us with powerful tools to tackle ocean challenges and is key to our continued search for effective solutions. In the panel, we saw the combination of new technologies from a fresh perspective and ensured the inheritance of the concept of ocean sustainability from generation to generation.

Source/ made by Jian-Wu Lai

The eighth OOC focuses on six areas of action: climate change, sustainable fisheries, sustainable blue economies, marine protected areas, maritime security, and marine pollution. As with previous conferences, the goal of this meeting is to call for additional commitments from global leaders to protect the oceans, including financial and legal protections, technological and scientific commitments, and commitments to sustainable development for those who depend on the ocean. The agenda and minutes of the meeting are summarized in Table 1.

The conference, held for the first time in Central America, aims to explore the success of past commitments, bring transparency and accountability to commitments made, understand and share models of best practice, and across our ocean communities Lessons learned. Governments and non-state actors have made specific commitments to protect the health and safety of the oceans. Across the session's six issue areas, more than 360 commitments worth more than US$22 billion in future investments have been committed. Among them, the U.S. government, businesses and non-governmental organizations pledged to spend nearly US$6 billion on 77 commitments in 6 major action areas to protect the oceans and assist developing countries. On the EU side, it reaffirmed its strong support for global ocean governance with 39 commitments and an investment of 816.5 million euros, which is the largest amount committed by the EU in previous OOC meetings. In addition, the EU has joined the Illegal, Unreported and Unregulated (IUU) Fishing Action Alliance.

According to statistics, since the first meeting in 2014, more than 2,160 commitments have been made in the OOC, worth about US$130 billion in investment in ocean sustainability issues. According to statistics, governments and non-state actors in the Asia-Pacific region have continued to increase their attention and commitment to sustainable ocean issues, and Taiwan has also played an indispensable role in it.

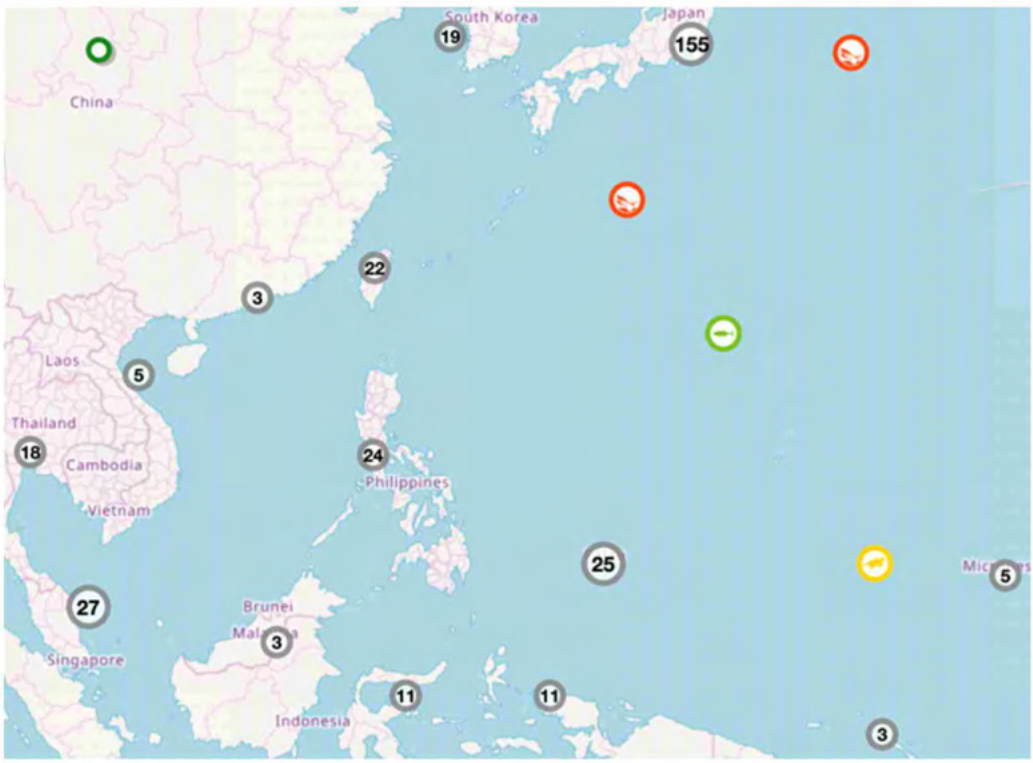

Figure 2/ Statistical distribution map of the number of commitments from the Asia-Pacific region in previous "Our Ocean Conferences"
Source/ Official commitments section on the website of the OOC2023

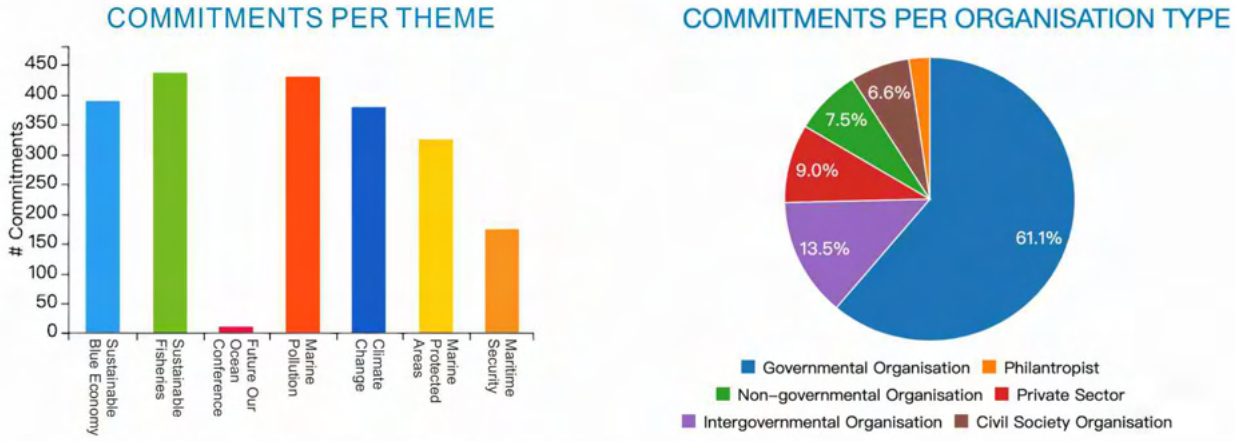

Figure 3/ Statistical chart of commitments by action area and organizational category
Source/ Official commitments section on the website of the OOC2023

Taiwan's participation and contribution

The head of the Taiwanese delegation at this meeting is Julia Hsiang-Wen Huang, Minister of the OCA, and it is composed of members from the OAC, the Ministry of Foreign Affairs and the Taiwan International Cooperation and Development Fund (ICDF). During the 2-day meeting, in addition to attending the main topic panels in the 6 major areas of the conference, with the assistance of the Ministry of Foreign Affairs of Taiwan, as many as 14 bilateral or multilateral dialogues with government officials or important non-governmental organizations were facilitated. Extensive exchanges on issues such as climate change adaptation and mitigation, net-zero carbon emission policies, environmental protection zones, green shipping and tourism, blue economy, circular economy, IUU fishing actions, and marine technology development, and seek possible future cooperation.

Figure 4/ Taiwan delegation meeting minutes
Image by members of Taiwanese delegation

In addition, the OAC and the TaiwanICDF attended an official side event to "Strengthening Climate Resilience in Small Island Developing States (SIDS) and Coastal Least Developed Countries (LDCs)", at the meeting, President Jiahn-Horng Chen of the National Academy of Marine Research and Alex L. J. Shyy, Deputy Secretary General of the TaiwanICDF respectively shared the decision-making aids tools developed by Taiwan based on marine technology that can assist policy makers, and help developing islands respond to the possible threats of climate change early through foreign aid practical work experience.

During the 2 days of intensive exchanges, the Taiwan delegation continued to convey that Taiwan will realize the integration of ocean affairs through the establishment of a special council for ocean affairs, and strengthen efforts and contributions to marine sustainability in the fields of ocean conservation, marine security, marine science and technology development, marine industry and circular economy.

Epilogue

Around 71% of the surface of the Earth is comprised of oceans, which are critical to maintaining a stable climate, supporting a blue economy, keeping temperatures down, absorbing carbon dioxide and producing oxygen. Yet these issues underscore the disturbing pressure the oceans are under due to global warming, unsustainable practices, illegal fishing, pollution and loss of marine habitats. Since the OOC in 2014, calling on the villagers of the planet to pay attention to and find solutions for sustainable oceans, more than 1,800 commitments have been made to date, totaling approximately US$130 billion, and protecting more than 5 million square miles of oceans. Looking around the world, there are still many problems to be solved, so countries must take "solution oriented" joint action to cooperate to protect the ocean by enforcing regulations and developing policies and strategies that support ocean sustainability and health.

The Taiwan delegation of OOC2023 set the tone for ocean professional exchanges, and with the cooperation of various ministries, they were able to break through diplomatic difficulties and continue to participate in the meeting. The Taiwan delegation shared our scientific and technological development and practical experience with its expertise, achievements and contributions in the marine field, and gained international recognition and the possibility of promoting international cooperation during the event. Judging from the number of topics and the depth and breadth of the exchanges at this conference, they have achieved fruitful results in the fields of diplomacy, politics, or oceanography. We look forward to the continuous to be announced Taiwanese efforts and contributions to ocean sustainability to the world in the 9th OOC to be held in Greece in 2024 and the 10th OOC hosted by Republic of Korea in 2025.

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Panama Canal's Contributions and Traffic Separation Scheme

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Keywords: Panama Canal, shipping industry, Traffic Separation Scheme (TSS)

Nowadays, the world is concerned about marine resources and environments. Nevertheless, due to a large number of traversing transoceanic vessels, vulnerable marine ecosystems of the Panama Canal and its surrounding areas are under serious threat. In 2014, the International Maritime Organization recommended the adoption of a traffic separation scheme in high traffic areas and speed limits during the breeding season of humpback whales to ensure navigation safety and protect marine ecosystems and resources. In response to the developing trend of larger ships in the shipping industry, Panama began an expansion project in 2007, which was completed and began commercial operation in 2016 [1]. The expanded Panama Canal has had a major impact on saving navigation time, allowing direct transit of Neo Panamax vessels through the canal. These vessels no longer need to make a much longer journey around South America's Cape Horn. The purpose of this paper is to give an overview on the contributions of the Panama Canal to the shipping industry, the transit procedure for crossing the Panama Canal, and the Traffic Separation Scheme (TSS), with an aim of giving readers a better understanding of issues related to the Panama Canal.

Contributions of the Panama Canal to the Shipping Industry

Ever since the successful opening of the Panama Canal in 1914, the voyage between the east and west coasts of the Americas has been significantly shortened, from over ten days to only 10 hours. Not only has the Panama Canal made significant contributions to the global economy and trade, it has also benefited the entire country of Panama by contributing to Panama's economy and providing countless jobs. Since late 1999, Panama took over control of the Panama Canal from the United States, in which approximately 35 to 40 vessels transit through the canal each day. Transit tolls (roughly US$200,000 to US$300,000 per vessel) generate US$10 billion in direct revenue for this Central American country, contributing to 40% of its GDP. This is enough to support Panama's entire national expenditure for one whole year. The Panama Canal accounts for around 6% of the global maritime trade. Its geographical location has ample logistic opportunities, which is able to create related economic activities. With a population of only four million people, Panama has a per capital income of US$13,000, the majority of which comes from revenues from the canal and its related industries, contributing up to 60% of Panama's national income [1].

In terms of the shipping market of the Americas, approximately 37% of freight logistics occur between the east coast of the United States and Asia (mainly China, Japan, and Republic of Korea), 13% between the east coast of the United States and the west coast of South America (including Colombia, Ecuador, Peru, Chile, etc.) and 7% between Europe and the west coast of South America, all of which are closely linked to the Panama Canal. Therefore, the expansion of the Panama Canal has a significant impact on the ocean freight markets for between the East Coast of the Americas and the Far East, Europe and the West Coast of the Americas, and the East Coast and West Coast of the Americas.

The opening of the Panama Canal substantially curtailed transit times and transportation costs from Europe to the U.S. West Coast and from eastern Asia to the U.S. East Coast, dramatically altering the

patterns of global maritime trade. The Panama Canal connects 1,700 ports in 160 countries and territories through more than 140 maritime routes. About 6% of the world's maritime trade passes through the canal each year. The Panama Canal has two locks on the Pacific side and a three-step set of locks on the Atlantic side. The set of locks on the Atlantic side has three steps and is 21 meters high, with gates weighing up to 745 metric tons each that open and close with the use of electric motors. Within the locks, a ship is lifted 26 meters before entering Gatun Lake, which was created artificially by damming the Chagres River. After passing through the canal and being lowered in a single-step lock to an elevation of 16.5 meters, the ship enters Miraflores Lake, before descending once again, this time through a two-step lock down to sea level before entering the Pacific Ocean. The original Panama Canal had a relatively small shipping capacity, with the widest part of the canal being about 300 meters wide, allowing only one large vessel to pass through at a time. Before the expansion, the Panama Canal was 81.3 kilometers long, 150 to 304 meters wide, and 13.5 to 26.5 meters deep. The surface of the canal water, for the most part, is 26 meters above sea level. Six sets of locks were built. Ships that could transit the canal had a maximum width, draft, and length of 32.31 meters, 12 meters, and 294.1 meters respectively. Most of the ships had a deadweight tonnage (DWT) of 45,000 metric tons, while the largest Panamax vessels had a DWT of 65,000 metric tons.

In the 1980s, 80% of container cargos between the Far East and the East Coast of the United States went through the Panama Canal, while the remaining 20% were mostly transported to the East Coast by North American railways or by road. After the 1990s, however, the situation was completely reversed, with only 20% being transported by canal and 80% by rail and road. An important reason for this change in shipping patterns was the size restrictions on vessels traversing the canal, leading to the emergence of the so-called "Neo-Panamax" ships, i.e., super large class of container vessels, which have been put on the U.S. West Coast trade route. As a major shipping route between the Pacific and Atlantic Oceans, the Panama Canal connects the maritime trade between Asia and the Americas directly. According to statistics, out of nearly 5% of the global trade that passed through the Panama Canal, 88% was trade in goods between the U.S. and Asia, and 38% was related to Mainland China. Meanwhile, shipping through the Panama Canal could lower costs by 20% to 30% [2]. Therefore, the expansion of the Panama Canal to accommodate the passage of Neo-Panamax ships is necessary.

With the continuing development of the global economy and shipping industry, vessel tonnage and size have also increased, leading to a rapidly growing number of Post-Panamax vessels, which far exceed the maximum number of vessels being able to transit through the canal. Thus, in order to keep up with the times and meet the latest navigation needs, the Panama Canal made corresponding changes. In 2007, the expansion of the Panama Canal official began with the construction of a three-lift lock at each end of the canal, which is the third set of locks, to meet the navigational needs of Post-Panamax vessels. The expanded Panama Canal has more than three times the capacity than it did previously, and more than twice the annual volume and weight of cargo [3]. The expansion of the Panama Canal is not only an improvement to the canal itself, but a substantial upgrade to the global maritime infrastructure.

The canal expansion project had three main components. The first is the construction of a third set of locks, one at the Pacific end and one at the Atlantic end, each with 3 flights and a maximum draft of 15.2 meters for ships. Second, a 3.2 km-long channel was excavated, connecting the new Atlantic locks with the existing sea entrance of the canal. Additionally, two access channels, 6 km and 1.8 km long respectively, were constructed to connect the new Pacific locks with the existing channels. Third, the existing canal channels were widened and deepened, while the water level of Gatun Lake was raised to allow the passage of ships with a draft of 15.2 meters. The new locks allow the passage of the "Neo-Panamax" class of vessels, with an overall length of 366 meters, a beam of 49 meters, and a draft of 15.2 meters. The total lifts, i.e., the capacities to raise or lower a vessel, of the locks at extreme tides are as follows: 25.9 meters at Gatun Locks, 16.5 meters at Pedro Miguel Locks, and between 19.7 and 13.1 meters at Miraflores Locks.

The canal expansion project, described as a "major upgrade to the global maritime infrastructure" was completed in 2016, increasing the annual volume of cargo passing through the Panama Canal from 300 million tons to 600 million tons. Since then, the canal has been able to accommodate Neo Panamax container vessels, which have an increased capacity of approximately 15,000 TEUs (Twenty-foot Equivalent Unit), more than three times the previous capacity, thus giving prominence to the effect of scale of a single ship on reducing shipping costs, increasing appeal, and impacting the layout of global shipping routes. Recently, the expansion of the Panama Canal has led shipping companies to open new routes or increase the number of voyages through the Panama Canal to the U.S. East Coast, significantly changing the existing ratio of sea to land container cargo between the Far East and the U.S. East Coast from 20 : 80, to nearly 50 : 50. In the medium to long-term, there are four benefits: First, it will help shipping carriers establish a two-way circumnavigation of the equator with 15,000 TEU container vessels and construct an east-west corridor for global containers at low cost. Second, a north-south feeder route is needed to increase intra-regional and circum-equatorial transshipment opportunities through high frequency and low volume. Third, it will make the convergence of trans-oceanic routes more efficient and flexible by connecting the three oceans through a pendulum route. Finally, it will help establish regional feeder networks within South Asia, the Mediterranean and the Caribbean, connecting regional port systems, transoceanic shipping routes, thereby forming a global container shipping network.

With the completion of the Panama Canal expansion in 2016, the new locks are designed to accommodate the passage of 99.4% of existing container vessels, as well as those still under-construction, offering larger vessels with greater carrying capacities more opportunities for route optimization. Following the expansion of the Panama Canal, there has been a major boost in the development of the container shipping markets for between the East and West Coasts of the Americas, and from the Far East to the East Coast of the Americas, as well as a drop in container traffic from the Far East to the East Coast via the Suez Canal. Notably, by sailing eastward from Asia through the new Panama Canal rather than westward through the Indian Ocean from the Cape of Good Hope and then across the Atlantic Ocean to the U.S. East Coast, each voyage will cut down on carbon emissions by 29,561 tons, giving prominence to the Panama Canal's role in reducing CO_2 emissions. According to the Panama Canal Authority, by providing transit for larger vessels and significantly shortening maritime distances, the canal has reduced global shipping emissions by 17 million tons of CO_2 per year. Over more than a century, the Panama Canal has directly contributed to a decrease in CO_2 emissions by approximately 800 million tons due to shorter transport distances. Furthermore, during the expansion of the canal, massive water-saving basins were constructed next to each of the new locks, allowing 60% of the water used in the locks to be recycled and using 7% less water than the original locks. In addition to making significant contributions to global shipping and trade, the Panama Canal is also in line with the United Nation's Sustainable Development Goals.

Panama Canal Structure and Transit Procedure

The Panama Canal is a lock-type canal of approximately 80.5 kilometers long. The difference in sea level between the Pacific Ocean on the south side and the Atlantic Ocean on the north side is 50 cm [4], and in order to cross through the Panama Canal, ships must pass through three sets of locks, which act as stairs. To make a transit through the Panama Canal, a vessel is first lifted approximately 26 meters to Gatun Lake using a 3-flight set of locks. After reaching the other side of the lake, it passes through another 3-flight set of locks and descends to the other end of the canal. In order to overcome the 26 meters elevation difference between Gatun Lake at the center of the waterway and the Pacific Ocean and the Atlantic Ocean at either end, the canal has three sets of locks, each with two to four gates. After a ship passes through a gate into a lock chamber, the chamber is filled with water until it reaches the higher water level of the next lock chamber before the gate is opened to allow the ship to pass through [5].

The original Panama Canal had a major limitation—even Panamax-sized vessels could just barely pass through. It was impossible for other larger vessels to make the transit, leaving them no choice but to continue taking the old route around Cape Horn. This was the main reason for the expansion of the Panama Canal. A comparison of specifications between old and new canal lock chambers is shown in Table 1:

Table 1/ Comparison of specifications between old and new lock chambers of the Panama Canal

Old and New Canal Lock Chambers	Length	Width	Depth	Maximum Dimensions of Vessels
Old Canal Lock Chambers	304.8 meters	33.5 meters	12.8 meters	Panamax
New Canal Lock Chambers	427 meters	55 meters	18.3～28.3 meters	Neo Panamax

Source/ made by the author

In particular, the addition of a third lane of traffic has doubled the capacity of the canal. The new lane is able to accommodate the passage of Neo Panamax vessels, which are 1.5 times the size of Panamax ships. Currently, the Panama Canal can handle vessels up to 370.3 meters in length, which means that 96.8% of the world's container fleet can pass through it.

With the development of the shipping industry, the Panama Canal has become a very important channel for global trade. Any accident could disrupt the global supply chain, as evidenced by the blocking of the Suez Canal in 2021 by a container ship, Ever Given. The incident, which caused chaos in the global shipping system, not only drew the attention of the public, but also increased their understanding of the importance of safety of vessels traveling through canals. Due to safety considerations, vessels should not accelerate while passing through a canal or even travel at speed. This is to avoid damage to canal facilities which may be resulted from the inertial kinetic energy generated (possessed) by a ship of large mass. Thus, tugboats use winches to pull vessels smoothly through the lock gates by means of tow ropes attached to the vessels as they enter and exit the locks. Tugboats maneuver a vessel by pushing it, or pulling on ropes attached to the vessel. For better control, additional tugs push the vessel from behind to align it with the centerline of each lock. The second task of the tugboats is to escort the vessel along the narrow waterway and provide assistance in case of difficulties to maintain safe navigation.

Before expansion, the Panama Canal also had electric locomotives running on rack tracks on either side of the locks in addition to tugboat assistance. Tugboats aligned the vessel with the lock centerline, while mules performed the task of keeping the ship stable within the lock. These locomotives used steel cables to keep the vessel steady so that it did not collide with the lock walks and other channel facilities. They ran along the tracks on the lock walls and by means of cables attached to the vessel, kept the vessel aligned with the centerline as it passed through the lock. This was an important component of the operation that allowed ships to pass through the canal safely, securely, and efficiently.

Traffic Separation Scheme of the Panama Canal

The Panama Maritime Authority considers the waters adjacent to the Panama Canal an important transit hub for international shipping, as a large number of vessels gather here. Nearby, there are 11 marine vulnerable ecosystems, such as a winter breeding area for humpback whales in the Gulf of Panama. Furthermore, there are coastal artisanal and recreational fisheries on the Pacific side of the isthmus. Meanwhile, there are also three vulnerable ecosystems in the Caribbean [6]. The Gulf of Panama is an important wintering ground for migrating humpback whales. This gives rise to a high risk of whale-vessel collisions, as calves are unable to dive for long periods. Therefore, mother-calf pairs

have to spend the majority of their time in shallow waters (<20 m). As a result, they are exposed to the threat of being struck by vessels. Between 2009 and 2011 alone, 13 incidents of ship-related cetacean deaths were recorded [7].

To ensure navigational safety, and safeguard marine ecosystems and resources, the Panama Maritime Authority has adopted a TSS and other measures to protect the marine environment. Therefore, a TSS for the Pacific coast of Panama and on the Caribbean side, as well as two large inshore traffic zones (ITZ), is planned for implementation, with a recommended seasonal speed limit of no more than 10 knots between August and November each year to reduce the likelihood of encounters between whales and vessels [4]. The migratory routes and breeding grounds of humpback whales are found only in the Pacific Ocean. Thus, additional protection is provided to whales along the coast by designating two large inshore traffic zones to the east and west of the TSS, equivalent to having two navigation-restricted routing systems.

A three-TSS system came into effect on the Pacific coast of Panama on December 1, 2014. The most important part of the traffic routing scheme is located in Gulf of Panama along a total length of approximately 111.5 km (60.2 nautical miles) [6][8]. In addition, from August to November, i.e., for the peak of the humpback whale breeding season, recommended seasonal speed restrictions are imposed on inbound and outbound vessels. They are required to reduce their speed to less than 10 knots while traveling eight degrees northward through parts of the traffic separation zone to avoid or reduce the risk of fatal collisions with whales [4]. Simultaneously, the proposed speed limit can reduce CO_2 emissions, lowering CO_2 emissions between 2017 and 2020 alone by up to 20,000 tons [2]. Thus, the function of the Panama Canal TSS is not only to maintain maritime traffic safety, but also to protect the environment as well as marine ecosystems.

Conclusion

The Panama Canal, located in the geomorphologically unique Isthmus of Panama, connects the Pacific Ocean and the Atlantic Ocean. The use of locks to lift passing vessels nearly 26 meters at one end of the canal, then lowering them down to sea level at the other end, has vastly reduced navigation time and made significant contributions to the shipping industry. Moreover, the addition of a new set of locks has given the shipping industry greater flexibility in route planning and ship deployment. Nevertheless, the Panama Canal Authority is not only focusing on the canal's contributions to shipping, but also taking further measures to protect the marine environment and ecosystems, thereby fulfilling their corporate social responsibility to achieve the United Nations Sustainable Development Goals.

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An Overview of Panama's Ministry of Environment and its Efforts Toward 30x30 Target

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Keywords: Ministerio De Ambiente, Aichi Biodiversity Target, 30x30 Target

Panama is located in southern Central America, connecting North and South America. It is bordered by the Caribbean Sea to the east and the Pacific Ocean to the west. Its key geographical location, coupled with the artificial Panama Canal, has made Panama a hub for sea routes between the Caribbean Sea and the Pacific Ocean. This has also made Panama's national development closely tied to the ocean. In addition to its geographical location, Panama's terrain and environmental features have made it has one of the highest biologically diversity in the world. Both the east and west coasts of Panama are coastal plains, with natural harbors and bays, that provide a natural foundation for development of the marine industry. Panama's marine resources include a variety of fish, marine organisms, and mineral resources. In terms of fisheries, major species of the offshore industry is tuna, which is mainly exported to Asia, while nearshore fisheries include lobster, shrimp, and shellfish, which supply the domestic market.

Panama's Ministry of Environment

Before the establishment of the Panama's Ministry of Environment (MiAMBIENTE), environmental affairs were administrated by the National Environmental Authority (Autoridad Nacional del Ambiente), established in 1998 under the Ministry of Planning and Economic Policy (Ministerio de Planificación y Política Económica, MIPPE). Its main task was to incorporate planning related to natural resources and the environment into the national development plan. With the acceleration of economic development and natural resource consumption, on March 25 of 2015, the Panamanian government passed Act No. 8, which separated environmental affairs from the Ministry of Economic Policy and established the current Ministry of Environment as a single department responsible for managing these affairs [1].

The Ministry of Environment is the major Panamanian government agency which is responsible for managing and supervising natural resources and environmental protection. Its missions include: I. developing, applying, and enforcing national environmental policies, laws, regulations, and relevant plans for the management of natural resources on land and in water (including oceans); II. jointly establishing environmental indicators with relevant agencies; III. collaborating with the public and private sectors to manage and implement national environmental policies; IV. representing the country in discussions on environmental issues with domestic and foreign organizations within its scope of responsibility; V. establishing land and marine protected areas within the jurisdiction of the country; VI. promoting citizen participation in environmental policy planning; VII. promoting scientific and technological innovation and research activities related to the environment; VIII. providing technical support to local governments on environmental issues; and IX. establishing and implementing guidelines related to environmental impact assessments [1]. To carry out these missions, the Ministry of Environment of Panama has six departments responsible for different environmental affairs, including biodiversity and protected areas, climate change, environmental impact assessments, coastal and marine areas, environmental policy planning, and environmental culture for each [2].

Marine biodiversity and marine protected areas are managed by the Biodiversity and Protected Areas Directorate (Direccion de Areas Protegidas Y Biodiversidad) under the Ministry of Environment. This department is responsible for managing and protecting Panama's biodiversity and protected areas, including national parks, wildlife reserves, and other natural areas. Panama currently has over 150 protected areas (including terrestrial and marine protected areas) for conserving a variety of unique ecosystems such as rainforests, coral reefs, seagrass beds, and highland ecosystems. The Biodiversity and Protected Areas Directorate is also responsible for the conservation and management plans of the protected areas, including environmental research and ecological monitoring plans. In terms of the coastal and marine ecology, the Biodiversity and Protected Areas Directorate works in collaboration with the Coastal and Marine Directorate (Direccion de Costas Y Mares), another department within the Ministry of Environment, to jointly plan the management of the protected areas and coastal ecosystems, conduct joint surveys and monitoring of biodiversity and ecosystems in the coastal and protected areas, provide information for decision-making, develop and implement programs related to stakeholder participation, marine conservation, and environmental education, and collaterally develop and identify priorities for natural resource conservation, which are integrated into national and regional plans [1].

From Aichi Targets to 30 by 30 Target

The Panamanian government has achieved the global target of marine biodiversity conservation through the establishment of marine protected areas earlier than the world. The early discussions among governments regarding targets for global protected areas, including marine and terrestrial areas was in the United Nations Convention on Biological Diversity. In 2010, the 10th Conference of the Parties to the Convention on Biological Diversity (COP 10) adopted the Aichi Biodiversity Targets, which Target 11 calling Contracting Parties to "protect at least 17% of terrestrial and inland water areas and 10% of coastal and marine areas" by 2020 [3]. As the Convention on Biological Diversity is a multilateral treaty with signatories worldwide, this target gradually became a common goal for utilizing marine protected areas to conserve marine biodiversity globally. However, in the United Nations' review of the Aichi Targets which released in 2020 found that although there has been progress towards increasing protected oceans and lands, there is still a lot to improve in order to fully achieve the target [4].

Figure 1/ Aichi Targets: 30X30
Image by Pride Advertising Agency Ltd.

With the expiration of the "Aichi Targets" in 2020, international environmental organizations and scientists were looking for a new marine conservation target, known as the "30X30 Target". The core of this target is to protect at least 30% of the world's marine and terrestrial habitats by 2030. The "30X30 Target" was supported at the World Conservation Congress of the International Union for Conservation of Nature in 2016 [5]. In 2019, the UK government lead like-minded governments and organizations to advocate for the "30X30 Target." [6]. Finally, at the 15th Conference of the Parties to the Convention on Biological Diversity (COP 15) in 2022, over 190 countries signed and passed the "Kunming-Montreal Global Biodiversity Frame work". The "30X30 Target" was officially written in Goal 3 of the Kunming-Montreal Global Biodiversity Framework and it is now replacing the "Aichi Targets" as the latest global biodiversity target using protected areas to conserve the nature as for the next 10 years after 2020 [7].

The major actions taken by the Panama in marine conservation areas is the establishment and expansion of two protected areas, the Cordillera de Coiba Managed Resources Area (the Coiba Marine Protected Area) and the Banco Volcán Area of Managed Resource. The Ministry of Environment of Panama has commissioned the Smithsonian Institute of Tropical Research to conduct scientific research on these two MPAs since 2004. Based on the scientific evidences, the Ministry of Environment of Panama established the Coiba Marine Protected Area on the Pacific side and the Banco Volcán Area of Managed Resources on the Caribbean side in 2015. After the establishment of these two protected areas, 13% of Panama's marine area was protected, surpassing the Aichi Targets in 2015 [8].

Regarding the expansion plan of the Coiba Marine Protected Area, Panama passed a bill to triple its size on June 8, 2021, also the World Oceans Day. The Coiba Marine Protected Area is located in the eastern tropical Pacific, southwest of Panama, and was established to protect the marine biodiversity of this tropical region with a deep-sea volcanic range [9]. The Coiba Marine Protected Area covers 67,900 square kilometers of deep-sea ecosystems, and the Coiba Ridge is perceived as the last habitat for many endangered marine species. Two-thirds of the protected area are designated as no-take zones, prohibiting destructive activities such as commercial fishing and deep-sea mining [10]. With the expansion of the Coiba Marine Protected Area, Panama has once again exceeded the international "30X30 target" to protect 30% of marine and terrestrial areas ahead of schedule in 2021. This expansion also made Panama's Coiba Marine Protected Area award the Gold Blue Park Award at the 5th International Marine Protected Area Congress (IMPAC5) in 2023. This Award was established in 2017 to recognize outstanding achievements in effectively conserving marine ecosystems in marine protected areas [11].

Panama's efforts on marine conservation continue after the expansion of the Coiba Marine Protection Area. A new plan to expand the Banco Volcán Area of Managed Resources is being carried out by the Panama Environmental Ministry and the Smithsonian Tropical Research Institute. Scientific studies were conducted to investigate the necessity of expanding the protected area, and it was found that the original area was insufficient to maintain the connectivity of the ecosystem in the Caribbean region. Therefore, in order to further protect the important marine ecosystems, endangered flora and fauna, and important fishery resources within Panama's exclusive economic zone in the neighboring Caribbean Sea, the President of Panama and the Minister of Environment signed a law during the opening ceremony of "2023 Our Ocean Conference" on March 2, 2023, with the aim to expand the Banco Volcán Area of Managed Resources from about 14,200 square kilometers to over 90,000 square kilometers by 2024, and at least half of the area will be designated as a fully protected area, which means all fishing, collecting, or harmful activities will be prohibited. This expansion plan will bring 54.26% of Panama's exclusive economic zone under conservation management. The expansion of this protected area is considered a critical first step in establishing a large-scale regional marine biodiversity protection in the area. Panama's marine conservation area has surpassed the "30X30 target" [12].

In addition to establishing marine protected areas, the Ministry of Environment of Panama took further actions on coastal ecosystems. Seagrass beds and mangroves have been found to have five times the carbon sequestration capacity of tropical rainforests based on scientific studies. These ecosystems are referred to as "blue carbon." At "2023 Our Ocean Conference", the Panamanian Ministry of Environment also launched the "Blue Carbon Action Partnership", which introduces market mechanisms to collaboratively restore, conserve, and sustainably manage coastal and marine ecosystems with businesses, communities, and civil society organizations [13].

Figure 2/ Panama's expansions of two marine protected areas
Source/ Smithsonian Research Institute [8]

Conclusion

To conclude, from the organizational development of the Panamanian Ministry of Environment, it can be seen that Panama's view on the natural environment has shifted from prioritizing economic development to environmental conservation, as evidenced by the separation of environmental affairs from the Ministry of Economy and the establishment of the Ministry of Environment. All matters related to the natural environment of the oceans and land are under the jurisdiction of the Ministry of Environment. This design provides benefits from an integrated governance. The Ministry of Environment of Panama also considers the differences between land and sea, and particularities of different environmental issue, specialized departments are established within the Ministry of Environment to address different issues. Specialized departments also jointly address overlapping issues. Panama's governance approach to marine protected areas focuses on large-scale MPAs, including exclusive economic zones. The recent two ambitious expansion plans allow Panama to achieve global goals for marine protected areas ahead of schedule.

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Report on Panama's Participation in G20 Action Plan on Marine Plastic Litter

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Translated by Linguitronics
Keywords: Panama, Marine Plastic Litter, Implementation Framework

This article introduces the third G20 (Group of Twenty, abbreviated as G20) Report on Actions against Marine Plastic Litter [1], with a particular focus on Panama.

Plastics have wide-ranging applications, and they play a significant role in human livelihoods. However, the amount of plastic in the oceans around the globe has been growing rapidly year by year, posing a threat to the environment and our way of life [2][3][4]. Thus, a growing number of countries, local governments, organizations and enterprises have stated that they will take action on plastics. G20 Implementation Framework for Actions on Marine Plastic Litter is an initiative launched in 2019, with 20 countries pledging a united front and declaring their commitment to a common global goal, the Osaka Blue Ocean Vision (OBOV). It aims to cut additional pollution by marine plastic litter to zero by 2050 through a comprehensive life-cycle approach. As of 2021, the number of countries and regions sharing the Osaka Blue Ocean Vision has risen to 87 countries.

As each country has its own policies, approaches, and circumstances regarding action on marine plastic litter, the G20 members share information on relevant policies, plans, and measures taken/to be taken in an effort to promote policies and measures through mutual learning from best practices. Therefore, under the aforementioned consensus, the first G20 report on Actions against Marine Plastic Litter was published in 2019. The second report was published in 2020, extending the reporting scope to not only countries and regions sharing the OBOV, but also institutions beyond the G20 members. In 2021, the third G20 report on Actions against Marine Plastic Litter was completed. In addition, to facilitate information-sharing and updating more efficiently, while simultaneously fostering greater connection with the wider international community, each report and the most recent relevant news are regularly updated on the G20 Marine Plastic Litter portal site (https://g20mpl.org/).

The third report covers actions taken by the G20 members, those of other countries and regions that share the OBOV, as well as relevant key international organizations. This report will seek to help support and improve ongoing actions undertaken by each country, and provide assistance through mutual learning of the development of new actions. Unlike the two previous reports, the third report emphasizes a shift from the planning phase, where the actual implementation of marine plastic litter initiatives is accelerated through strengthening internationally coordinated actions. This article will focus on Panama's actions in the third G20 report.

Figure 1/ Plastic waste washes ashore near the Panama Canal
Source/ https://unctad.org/news/un-agencies-cop27-urge-action-tackle-impact-plastic-climate

Policy Framework

In the third edition of the G20 report, published in 2021, 41 countries reported their activities on marine plastic litter. Of which, 26 countries have national action plans or strategies against marine plastic litter, 35 countries have legislation on marine plastic litter, and 19 countries have specific indicators for monitoring and evaluating progress toward relevant activities.

Action plans undertaken by Panama on the national level include the following: I. National Action Plan for Marine Litter in Panama 2021-2025 (The plan was in the legal process for adoption when the report was released). This action plan is a guiding tool to reduce the threat posed by marine litter to coastal and marine biodiversity and ecosystems, and eliminate sources of marine litter; II. Plan Estratégico de Gobierno 2019 – 2024. The plan includes 15 environmental tasks, such as implementing municipal and industrial waste recycling systems in major cities (e.g., Panama, Colon, San Miguelito, Santiago, David, etc.). Furthermore, the plan also implements a restoration program and national protection of the ten most threatened terrestrial and marine ecosystems in the country through alliances with communities, NGOs, the private sector, and international organizations.

In terms of legal framework, to prevent pollution from ships, Panama ratified the MARPOL agreement through Law No. 17 of November 9, 1981, Law No. 1 of October 25, 1983, and Law No. 30 of March 26, 2003, and implemented Annexes V, VI, and Addenda to said agreement. Law No. 6, ratified on February 6, 2017, established an integrated management of solid waste such as paper, cardboard, aluminum strips, disposable plastic bottles, etc. in public institutions through guidelines, obligations and responsibilities. Law No. 1 of January 19, 2018 adopted measures to promote the use of reusable bags in commercial establishments. It also prohibits the use of polyethylene bags in supermarkets and other commercial establishments. On May 30 of the same year, Law No. 33 was formulated, establishing the Zero Waste Policy and its comprehensive waste management framework of action, as well as dictating other provisions. The framework is said to be based on the concept of circular economy. Subsequently, Law No. 187 of December 2, 2020 prescribes to progressively reduce and replace single-use plastics by establishing a regulatory framework that governs single-use plastics in the country as part of Panama's public environmental policy.

At the same time, Panama has established three major indicators to evaluate the effectiveness of its marine plastic litter policies, which are the number of beach clean-up activities, the amount of garbage (in tons) collected in beach clean-up activities, and the number of participants in beach clean-up activities by gender.

Measures and Achievements

We already know that measures to lower the prevalence of marine plastic littler include reducing single-use plastic, conducting clean-up activities along rivers and coasts, creating multi-stakeholder partnerships, promoting innovative solutions, sharing scientific information and knowledge, improving waste recycling systems, and participating in international cooperation. As noted in the third G20 progress report, more than 20 countries are taking such measures, and countries are initiating various upstream and downstream measures against macroplastics. Additionally, 16 countries are taking further action against microplastics.

The following is a brief introduction of the various measures taken by each of the G20 member countries and the respective results, with a more detailed illustration on Panama's approach to each objective.

In terms of "Prevention and Reduction of Plastic Waste Generation," the third report notes that 29 countries have implemented measures to restrict single-use plastics. Approximately 24 countries have launched initiatives to encourage sustainable or circular product design to reduce plastic waste generation, while 15 countries reported on the situation regarding microplastics. Panama's approach is based on two main measures: charge for single-use plastic products, and encourage sustainable/circular product design initiatives. With regard to the former, Panama first passed Law No. 1 of January 19, 2018, which adopted measures to promote the use of reusable bags in commercial establishments, in particular shopping bags. Meanwhile, supermarkets and other commercial establishments are mandated to ban the use of polyethylene bags. Following which, Law No. 187 of December 2, 2020 regulates the gradual reduction and replacement of single-use plastics, with a total of 11 targeted products, including ear swabs, clothing covers, plastic egg cartons, disposable coffee or tea stirrers, balloon rods, toothpicks, cocktail stirrers, candy sticks, can rings, disposable plastic plates, etc. In general, the campaign is a way of promoting a new lifestyle—using reusable bags when shopping in establishments such as supermarkets and reducing plastic bags. The latter objective is exemplified by three initiatives, the first being the Bottles of Love Foundation. The foundation educates the general public and companies on contributing to the collection of plastic materials, which are then transformed into raw material for manufacturing recycled plastic lumber (RPL) to be used for the construction of social works and for improving the quality of life of vulnerable communities. Secondly, the Ecobricks Fundación Costa Recicla initiative is a concept of making eco-bricks using non-recyclable plastic bottles. It is stemming from the challenge faced by society in giving waste another important function. Finally, making brands responsible. In the case of Nestle, it used packing material made from recyclable and reusable products. This is a real contribution to the reduction of waste that reaches landfills. All of the above are new measures that Panama is actively pursuing to reduce marine plastic waste, which have been well received by the community.

Regarding "Environmentally-sound Waste Management," 31 countries have stated that they are able to enforce a proper waste management system, while 30 countries reported on actions to prevent littering, illegal dumping and unintentional disposal of waste into the ocean. This aspect of plastic waste management is in fact a downstream measure and requires capacity building, especially in developing countries with limited capacity. Panama, however, has demonstrated its commitment by, first, mandating proper waste management systems, reducing and reusing plastic waste; and, second, prohibiting littering, illegal dumping, and unintentional disposal of waste into the ocean. In the first category, Panama has motivated the public in four ways, including the Recycle for Your Future program, inter-institutional alliances, monthly community service activities, and regional projects to reduce marine plastics and plastic pollution in Latin American and Caribbean cities through a circular economy approach, all of which are giving rise to positive improvement in the country. Recycle for Your Future, for example, has completed the installation of 31 recycling stations, collected over 350 ton of recyclable material, raised awareness of marine plastic litter in over 100,000 people, and created new full-time and part-time jobs. In the second category, Panama has installed a water wheel to help catch garbage floating on the surface of the Juan Diaz river. This system is aimed to effectively reduce the impact on the coastal ecosystems of Panamá Bay and the Humedal Bahía de Panamá wetlands from litter dumped by residents of the upper, middle and lower basins of the river. Although the system is still in early stages of testing, Panama hopes that the system will serve as an exhibition, awareness, and environmental education center, as well as a model for citizen-initiated changes in environmental behavior, to help mitigate Panama's serious waste management problems.

According to "Clean-up of Marine Plastic Litter," 36 countries have carried out beach clean-up activities while 21 developed countries, with corresponding technological and financial resources, have taken further steps to remove plastic litter from the oceans directly. Based on the concept of collecting

scattered waste from beaches, Panama has carried out beach clean-up activities, while also calling for the public's increased awareness of the importance of cleaning the oceans and other bodies of water for the benefit of biodiversity and health. In 2020, the Panamanian government removed over 30 tons of waste from beaches. In 2016, 3,083 participants in 39 clean-up activities collected 91 tons of garbage; in 2017, 4,895 participants in 43 activities collected 90 tons of garbage, including three tons of plastic; and in 2018, 5,382 participants in 50 activities collected 52 tons of garbage. The data on the national cleaning of beaches, coasts, and rivers clearly demonstrate the Panamanian government's determination and effectiveness in proactively promoting beach clean-up. As for removing plastic litter from the oceans, in addition to the removal of trash below the ocean surface, Panama also focused on the removal of ghost gear. It has signed on to be part of the Global Ghost Gear Initiative (GGGI), which is in cooperation with NGOs, diving organizations, universities and other important institutions in the country.

In terms of "Education and Awareness-Raising," 29 countries are encouraging awareness and participation in campaigns through local and national education systems. Panama is also working on two fronts: first, to establish an education system that encourages public awareness on marine plastic waste; and second, to organize a wide range of campaigns at different levels (national and international) to raise public awareness of marine plastic litter. The Ecological Flag initiative in the education system is a collaborative effort between education centers and environmental volunteers to provide green classrooms for environmental education for teachers and students, with the support of other organizations. There is a steady increase in the number of educational centers joining the program. So far, 105 schools have tried implementing the initiative. At the national level, awareness-raising activities include a campaign led by the Tortuguía Foundation to educate the public about the damage caused by the massive consumption of single-use plastic products. The MarViva Foundation collaborates with artists to create artwork that demonstrate the problem of overconsuming single-use plastics. Meanwhile, country representatives take lead in celebrating National Recycling Day to give the public a real sense of the country's commitment to combating marine plastic waste. All of the above are campaigns proactively carried out in Panama. From 2018 to 2019, for instance, over 200 restaurants participated in related campaigns. At the international level, the MarViva Foundation advocates a change in consumer habits to reduce the use and consumption of single-use plastic bottles, promotes and raises awareness of the impact of single-use plastics on marine and coastal environments, and works in part to disprove myths and misperceptions about waste disposal and recycling as a solution.

For "Monitoring and Scientific Research on Marine Plastic Litter," 26 countries encouraged monitoring and scientific research on plastic flows and ocean surface microplastics. However, currently, it is mainly the developed countries of the G20 that report more international engagement and scientific research actions. For its part, Panama mainly implements Project FID16-044, which targets the analytical determination of microplastics in water and sediments. Led by the Technological University of Panama and the Center for Hydraulic and Hydrotechnical Research, the project's objective is to determine the presence of microplastics as a point source of contamination in water and sediments, and to establish measurable indicators by quantity and origin, for which regulation of actions and a decrease in its entry into the sea through surface waters can be achieved.

In summary, it is further evident that Panama is indeed committed to regional and national activities to reduce marine plastic waste from policy to law. However, what is lacking is a combination of "Promotion of Innovative Solutions" and "Others/Cross-cutting Activities," such as encouraging the use of alternatives like biodegradable plastics, and promoting circular product design in public-private partnerships to implement such innovative solutions.

Future Practice

Panama proposed the best practices for marine plastic litter at the national level, local level, private sector, and international cooperation, which may also serve as a reference for Taiwan's marine plastic waste management and action promotion:

I. National Level

i. Formulate direct regulation to reduce single-use plastic.
ii. Impose explicit prohibition of the use of polyethylene bags and promotion of the use of reusable bags.
iii. Reduce marine litter through beach clean-up activities. Launch cleanup activities in coastal areas of the country assessed to be most vulnerable during the Month of the Oceans (September) and on Oceans Day (June 8) and Earth Day (April 22).

II. Local Level

i. Establish recycling stations and provide training through the aforementioned "Recycle for Your Future" program.
ii. Fishermen, public institutions, NGOs, diving institutions, and universities, etc. work together to extract abandoned ghost nets.
iii. Implement practical solutions to marine pollution, such as retaining barriers or floating traps.

III. Private Sector

Promote innovative solutions to raise stakeholder and public awareness of making contributions to the collection of plastic materials and its transformation into recycled plastic.

IV. International Cooperation

i. Take part in Project GEF-LAC, which promotes a circular economy approach to reduce marine plastic pollution in Latin American and Caribbean cities.
ii. Support the development of the National Action Plan for Marine Litter in conjunction with international organizations (such as UNEP and UNDP) through the Sustainable Azuero Project.
iii. Promote action on marine litter by funding international cooperation projects.

Marine plastic litter has become an environmental issue that cannot be ignored in this century. From a brief report on Panama's efforts, it is evident that the country is determined in solving the problem of marine plastic litter despite ongoing challenges on how to implement proper waste management, improve recycling systems, and raise the awareness of citizens, enterprises, and governments. Moreover, the financial support required for technological development presents a major challenge. Meanwhile, many countries have mentioned the impact of the COVID-19 pandemic in recent years, which has resulted in delays in marine plastic waste management. As an island nation, Taiwan should continue to take advantage of international programs to help solve the problem of marine plastic litter along Taiwan's coast and in the surrounding ocean.

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Eastern Tropical Pacific Marine Corridor: A Regional Cooperation Mechanism Dedicated to Ocean Governance

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Keywords: CMAR, ocean governance, regional cooperation, sustainable use, biodiversity

The Eastern Tropical Pacific Ocean (ETPO) provides high levels of productivity and biodiversity. Several world-renowned marine protected areas (MPAs) are created in this region. To further protect and sustainably use marine living resources, the countries bordering this region, Panama, Ecuador, Columbia, and Costa Rica, jointly created the Eastern Tropical Pacific Marine Corridor (CMAR) in 2004, putting the MPAs of all countries and the passages connecting the MPAs under the management of this initiative. The CMAR is a non-binding agreement, but offers a regional cooperation mechanism for these four countries to propose management strategies. This essay is to introduce the CMAR with a focus on its structure and the challenges it faces. Meanwhile, creating a legally binding regional agreement and enhancing enforcement capacity at the national level are the ways to achieve effective conservation and sustainable use of marine resources.

Figure 1/ The Eastern Tropical Pacific Marine Corridor
Source/ Friends of Cocos Island Foundation (FAICO)

Introduction

The Eastern Tropical Pacific Ocean (ETPO) is one of areas with high levels of productivity and biodiversity in the world. It is characterized by an extraordinary number of native, and migratory species and features key habitats for whales, tunas, rays, sea turtles, and birds, as well as the world's highest concentrations of sharks. In recognition of the exceptional levels of biodiversity, Columbia, Costa Rica, Ecuador, and Panama have created marine protected areas, respectively, to help safeguard biological hot spots, including Cocos Island National Park (Costa Rica), Coiba National Park (Panama), Galapagos National Park (Ecuador), Malpelo Fauna and Flora Sanctuary and Gorgona National Natural Park (Columbia) [2] .

To encourage collaboration on conservation and sustainable use of coastal and marine resources across this area, Columbia, Costa Rica, Ecuador, and Panama collectively issued the San Jose Declaration and formally established the Eastern Tropical Pacific Marine Corridor (CMAR) in 2004, a non-binding, voluntary cooperation mechanism [3]. The CMAR covers the MPAs created by the four countries as well as the pathways linking the MPAs, creating a 500,000-square-kilometer transboundary biosphere reserve [2] (Figure 1).

The CMAR serves as an intergovernmental cooperation mechanism, enabling the four states to collaboratively protect biodiversity of the ETPO as well as address complex, multidimensional challenges, including overfishing; illegal, unreported, and unregulated fishing; ocean ecosystem degradation, and biodiversity loss [3].

The structure of CMAR

The CMAR consists of the Secretariat, the Regional Ministerial Committee (RMC), Regional Technical Committee (RTC) and Regional Working Groups (RWGs) on various thematic areas [3]. The Secretariat is responsible for carrying out CMAR management actions and coordinating cooperation between the four participating Sates and any involved international organizations and NGOs. The RMC and RTC represent political and technical components, respectively, which complement each other.

The RMC, made of the Environment Ministers of each State, is the main decision-making body of CMAR. It meets once a year with the host rotating every 3 years between the four Sates. Meanwhile, the RMC is advised by each Sate's Foreign Ministry with respect to matters of international relations between the four States.

The RTC acts the advisory body to the RMC and is responsible for defining the actions needed to implement CMAR. It acts the advisory body to the RMC and made up of a delegate of each State's Ministry of Environment, who is often a high-level official in charge of MPAs. Currently, the delegates are the Director of the Galapagos National Park, Ecuador, Vice Minister for Water and Seas, Costa Rica, the Director of National Natural Parks, Columbia, and the Director of Coasts and Seas, Panama. The RTC meets twice a year; in terms of decision making, each State has one vote, yet all decisions are adopted by consensus.

The RWGs are created according to various key thematic areas which are identified as priorities for the conservation of the biodiversity of the region, including such as tourism, MPAs, science, fisheries, communication, etc. These groups are made up of representatives from government institutions, NGOs, research and academia. They provide input and advice and work with the Secretariat to push forward technical matters such as the creation and joint management of projects of CMAR.

Financial supports for the CMAR

In recognition of high levels of biodiversity in the ETPO, several philanthropic, government, and non-government organizations offer financial supports to the CMAR to strengthen its work on the protection of biodiversity. These organizations include Bezos Earth Fund, Development Bank of Latin America, Enduring Earth, Shark Conservation Fund, German Ministry for Economic Development and Cooperation, Pew Charitable Trust, US Department of State, UK government, Gordon and Betty Moore Foundation, Minderoo Foundation, etc. [4].

For example, on March 22, the Governments of Columbia, Costa Rica, Ecuador, Panama, and the United States of America held a high-level dialogue on the CMAR. During the dialogue, Under Secretary and Assistant Secretary announced US government support for the CMAR. The US government will work with the governments of the four States to identify opportunities for US engagement [5].

The challenges of the CMAR

The CMAR is a voluntary agreement between four States, and therefore not legally binding. This type of less formal approach is viewed as a positive since it can secure political engagement from the four States more readily and may result in less opposition from industry. On the other hand, the drawback is that the lack of a legally binding element makes it hard to implement management measures and enforce rules at the national level. Given the voluntary nature of the agreement, the challenges are identified in the CMAR [3].

- **Unstable operation of the Secretariat**

  The Secretariat does yet have a permanent physical infrastructure and currently rotates between each State every 3 years. The State that exercises the Secretariat cover the expenses of operating the Secretariat with funds that are provided by the government's budget or via international cooperation. These circumstances make the Secretariat being in an unstable operation as well as not being financed with a secure funding stream.

- **Resistance from fishers**

  The creation of CMAR is not the result of the consultation with multi-sectoral stakeholders from the outset, instead a top-down political decision. This therefore results in resistance from the fisheries sector. Fishers were concerned that the marine corridor sough absolute protection of marine resources, therefore excluding them from fishing in the region.

- **Slow progress on formalizing the initiatives**

  The CMAR involves transboundary marine management across four jurisdictions. When framing the initiatives, each State has its viewpoints and position, making the progress to reaching a consensus slow.

- **Insufficient enforcement capacity**

  Given that the four States have already faced significant challenges in effectively managing MPAs within their jurisdictions from a law enforcement perspective, it remains to a big issue on whether this can be effectively done on a large scale.

Conclusion

The ETPO features exceptional high levels of productivity and biodiversity. To protect and sustainably use marine resources in this region, Panama, Ecuador, Columbia, and Costa Rica created the CMAR in 2004, putting the MPAs created by the four States and the pathways linking the MPAs under the management of the CMAR. This regional agreement won financial supports from several international organizations. However, due to its non-binding nature, it is hard to implement measures as well as enforce rules at the national level. In addition, several challenges are identified, including unstable operation of the Secretariat, resistance from fishers, slow progress on formalizing the initiatives, and insufficient enforcement capacity. To address these challenges, it is advised to have a legally-binding regional agreement with its area of competence further including the high seas of the ETPO as well as enhanced enforcement capacity of each State.

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