

Marine Eco-Environmental Protection in China (III)

中国的海洋生态环境保护(下)

2. Laying a solid foundation for green development of the marine economy

China is committed to achieving its targets for peak carbon dioxide emissions and carbon neutrality. One way in which the country aims to reach these targets is by integrating green and low-carbon concepts into the development of its marine economy. This includes promoting sustainable fishing and the green growth of ports, shipping, and shipbuilding, as well as the sound exploitation and utilization of clean marine energy. China's marine industries have already made positive progress in embracing this green transformation.

Modern ocean ranches. Ocean ranching is an approach to preserving aquatic life resources and restoring the marine eco-environment that has played a pivotal role in the sustainable development of marine fisheries in China.

By 2023, the country had established 169 national demonstration ocean ranches, generating an annual eco-environmental benefit of nearly RMB178.1 billion. The conservation of marine fishery resources led to a five-fold increase in the numbers of large yellow croaker, small yellow croaker, cutlass fish, and cuttlefish in Zhejiang Province in 2019 compared to the late 1990s, and the density of small yellow croaker increased by 34.1 percent.

Mariculture has expanded from offshore to deep-sea areas and high seas. The first item of fully submersible deep-sea fish farming equipment independently developed by China has been put into operation, creating a unique green mode of deep-sea and high-sea fish rearing.

Greener and more intelligent ports, shipping, and shipbuilding. China has intensified its efforts to build smart and green ports with growing clean energy utilization. The Port of Qingdao has established a cutting-edge hybrid energy supply system that integrates wind and solar power with hydrogen production and storage. Clean energy now accounts for 66 percent of the total supply at the port, and its intelligent sky rail logistics system reduces energy consumption by over 50 percent. The introduction of intelligent zero-carbon emission docks at the Port of Tianjin will contribute to carbon neutrality in production and consumption, lowering energy consumption.

China is also active in the construction of three green shipping corridors—connecting the Port of Shanghai with the Port of Los Angeles and the Port of Long Beach, the Port of Guangzhou with the Port of Los Angeles, and the Port of Tianjin with the Port of Singapore. These corridors will accelerate the decarbonization of the shipping industry.

Additionally, China is making significant progress in the adoption of green ships and new energy vessels. Its first methanol dual-fueled ship can reduce carbon emissions by 75 percent, nitrogen emissions by 15 percent, and sulfur and particulate matter emissions by 99 percent. Its 700-TEU fully-electric container vessel reduces the same amount of carbon emissions as 160,000 trees can do in a year.

Booming clean marine energy. China's usage of clean marine energy continues to increase in both scope and share. By the end of 2023, the country's installed capacity of offshore wind power had reached

(二) 厚植海洋经济绿色底色

积极践行双碳目标，将绿色低碳理念融入海洋经济发展方式，可持续发展海洋渔业，绿色化发展港口航运与船舶制造，科学开发利用海洋清洁能源，海洋产业绿色转型取得积极成效。

建设现代化海洋牧场。海洋牧场作为养护水生生物资源、修复海洋生态环境的重要手段，在促进海洋渔业可持续发展方面发挥了重要作用。截至2023年，累计创建国家级海洋牧场示范区169个，年产生生态效益近1781亿元。海洋渔业资源养护成效明显，2019年浙江沿岸的大黄鱼、小黄鱼、带鱼和墨鱼等资源发生量比20世纪90年代末增加了4倍以上，其中小黄鱼资源密度增加了34.1%。海水养殖逐步由近海向深远海拓展，自主研发的全潜式深海智能渔业养殖装备投入运营，开创了我国独特的深远海绿色养殖模式。

港口航运与船舶制造绿色化、智能化。建设智慧港口、绿色港口，加强沿海港口清洁能源利用。青岛港构建风光氢储一体、多能互补的现代能源体系，港口清洁能源占比达66%，智能空中轨道集疏运系统实现降低能耗50%以上。天津港推进“智慧零碳”码头建设，助力港口生产消耗“碳中和”，降低能源消耗。推进上海港-洛杉矶/长滩港、广州港-洛杉矶港、天津港-新加坡港三条绿色航运走廊建设，航运业脱碳加速。绿色船舶和新能源船舶迅速发展，首艘甲醇双燃料动力绿色船舶可减少75%碳排放、15%氮排放和99%硫及颗粒物排放，700TEU（标准集装箱）纯电动集装箱船全年减排量相当于种植16万棵树木，降碳减排作用突出。

海洋清洁能源蓬勃发展。海洋清洁能源利用能力不断提升，清洁能源规模扩大、占比提升。至2023年底，中国海上风电累计装机容量达到3769万千瓦，占全球比重约50%，连续四年全球排名第一。海洋可再生能源快速发展，兆瓦级潮流能发

37.69 million kW, accounting for about half the global total capacity and solidifying its position as the global leader for the fourth consecutive year.

Renewable marine power is growing rapidly. The megawatt-class Fenjin marine current turbine generates green power that is fed into the State Grid; the Nankun, China's first independently developed deep-sea megawatt-class wave power generation platform, provides clean electricity to remote islands; and the Penghu deep-sea fish rearing platform can meet its own electricity needs using clean energy from wave and solar energy converters and energy storage devices.

3. Exploring methods for realizing the values of ecosystem goods and services

Blue seas and clean beaches, like clear waters and green mountains, are invaluable assets. China has been working to develop new systems for marine carbon sink, stimulate the business management and development of marine ecosystem goods and services, and explore mechanisms to realize their values.

Planning a compensation system for offshore eco-environmental protection. China has established a system that guides those who benefit from marine ecosystems in fulfilling their compensation obligations and motivates those involved in the protection of the marine eco-environment to perform their jobs to the highest level. By implementing this system, a positive relationship has been fostered between the two groups, ultimately promoting sustainable development of the marine economy.

The Opinions on Furthering the Reform of the Eco-Environmental Protection Compensation System, issued in 2021, stipulates the task of establishing a compensation system for offshore protection. Hainan Province, Hebei Province, Guangxi Zhuang Autonomous Region, Lianyungang City in Jiangsu Province, and Xiamen City in Fujian Province have all tailored marine compensation policies to their specific local conditions and acted on these, with positive responses.

Developing new systems for marine carbon sink. Marine carbon sink will significantly contribute to the realization of China's targets for peak carbon dioxide emissions and carbon neutrality. The country has developed an action plan for blue carbon sink and has set technical standards for blue carbon surveying and monitoring. Pilot schemes have been launched to survey carbon stock and quantify carbon sinks in blue carbon ecosystems such as mangroves, salt marshes, and sea-grass beds. Monitoring of sea-air carbon dioxide flux and greenhouse gas emissions reduction on oil and gas platforms is also under way.

China has published the Measures for the Administration of Voluntary Greenhouse Gas Emission Reduction Trading (Trial) and the Methodology of Greenhouse Gas Emissions Voluntary Reduction Project: Mangrove Vegetation Creation (CCER-14-002-V01), and supported marine carbon sink projects in joining the China Certified Emission Reduction (CCER) trading market. Innovative initiatives such as incentive carbon trading, carbon sink insurance, and carbon sink mortgages, have been piloted in multiple provincial-level administrative regions, including Shandong, Jiangsu, Zhejiang, Fujian, Guangxi, Guangdong, and Hainan.

Encouraging the business management and development of marine ecosystem goods and services. In 2021, China issued the Opinions on Establishing and Improving the Mechanism for Realizing the Values of Ecosystem Goods and Services and made comprehensive arrangements for its implementation. The Criteria for Crediting the Overall Values of Ecosystem Goods and Services (Trial) was published and came into effect alongside the Typical Cases for Realizing the Values of Ecosystem Goods and Services, providing the theoretical and technical underpinning for

电机组“奋进号”不断地向国家电网输送绿色能源，中国自主研发的首台深远海兆瓦级波浪能发电平台“南鲲”号为远海岛礁提供清洁电力供应，深海养殖平台“澎湖”号通过搭载波浪能和太阳能发电设备及储能装置实现清洁能源自给。

(三) 探索生态产品价值实现

碧海银滩就是绿水青山、金山银山。中国不断探索海洋碳汇相关制度创新，积极推动海洋生态产品经营开发，探索建立生态产品价值实现机制。

谋划建立近海生态保护补偿制度。海洋生态保护补偿是引导海洋生态受益者履行补偿义务，激励海洋生态保护者保护生态环境，构建海洋生态保护者和受益者良性互动关系，推动海洋经济可持续发展的重要手段。2021年出台《关于深化生态保护补偿制度改革的意见》，要求建立近海保护补偿制度。海南、河北、广西、江苏连云港、福建厦门等地出台与本地区实际条件相适应的海洋生态补偿政策，开展补偿实践，各地补偿激励效果逐步体现。

不断探索海洋碳汇相关制度创新。海洋碳汇是助力中国“碳达峰、碳中和”战略目标实现的重要组成部分。中国制定海洋碳汇行动计划，出台系列蓝碳调查监测技术标准，开展红树林、滨海盐沼、海草床等蓝碳生态系统碳储量调查和碳汇计量监测试点工作，实施海-气二氧化碳通量监测和海上油气平台温室气体减排监测。出台《温室气体自愿减排交易管理办法（试行）》，发布红树林营造温室气体自愿减排项目方法学，支持海洋碳汇项目参与全国温室气体自愿减排交易市场。山东、江苏、浙江、福建、广西、广东、海南等地积极开展碳普惠交易、碳汇保险、碳汇抵押等创新模式的探索。

积极推动海洋生态产品经营开发。2021年发布实施《关于建立健全生态产品价值实现机制的意见》，系统部署生态产品价值实现机制建设。有关部门发布实施《生态产品总值核算规范（试行）》《生态产品价值实现典型案例》，为生态产品价值实现机制建设提供理论技术支撑。沿海地方积极创新路径机制，浙江温州洞头创新“上级专项奖励+地方政府自筹+社会资本参与”模式，吸

realizing the values of marine ecosystem goods and services.

Governments in coastal areas have actively sought innovation in their policies and mechanisms. In Dongtou District of Wenzhou City in Zhejiang Province, a creative model based on the government awarding funds and local budget funds was introduced to attract private capital to participate in the Blue Bay Restoration Project and the Ocean Garden Initiative. The China Oceanic Development Foundation established the Guangdong-Hong Kong-Macao Greater Bay Area's first eco-environmental special fund, designed to support the construction of the marine industrial parks, eco-parks, and marine engineering centers in the area and to facilitate technological innovation and industrial development of marine ecosystem goods and services.

Continuing to improve compensation for marine eco-environmental damage. China attaches great importance to compensation for marine eco-environmental damage, and defined a clear framework for its implementation in the 1999 amendment to the Marine Environmental Protection Law. Subsequently, the country promulgated the Measures of National Claims for Marine Ecological Damages and the Regulations on Several Issues in the Adjudication of Disputes Concerning Claims for Marine Ecological and Resource Damages to provide further practical guidance, leading to improved results in this area. In 2023, another amendment was made to the Marine Environmental Protection Law to further improve this system.

4. Launching a nationwide green and low-carbon campaign

China has developed a variety of education and scientific outreach initiatives aimed at promoting marine culture. These programs are designed to strengthen public awareness regarding environmental and ecological preservation, advocating for simple, moderate, and healthy lifestyles that prioritize green living and low-carbon practices. They encourage people to voluntarily participate in China's green development, fostering a sense of care, protection, and personal engagement with the sea among the public.

Building public awareness of marine eco-environmental conservation. China hosts yearly themed activities celebrating World Oceans Day (also China's National Ocean Awareness Day), Earth Day, World Environment Day, and World Wetlands Day. More than 160 ocean awareness promotion centers have been established across the country to foster public interest in ocean conservation.

A number of celebrations centered around the sea have become significant exhibition platforms for China's marine culture, including the Zhoushan Islands-China Ocean Culture Festival, the China (Xiangshan) Fishing Season Opening Festival, and renowned conferences and forums like the China Marine Economy Expo and the World Ocean Week in Xiamen. The National Maritime Museum of China, hailed as the "Forbidden City on the Sea", has opened to the public, providing an important space for people to learn about oceanic civilization and marine resources, and to reshape their values towards the ocean.

Furthermore, the National Marine Knowledge Competition has been held for the past 14 years, attracting six million participants from the public and students from over a thousand universities and colleges. The result of these efforts has been a significant increase in public interest and understanding of the ocean, and in the public's sense of duty, responsibility, and pride regarding the governance and utilization of the sea.

Encouraging public engagement in marine eco-environmental conservation. Eco-environmental awareness is championed throughout Chinese society, and every member of society is encouraged to spread environmental awareness and be an active practitioner. In 2019, the

引社会资本参与“蓝色海湾”整治行动项目，推进“海上花园”建设。中国海洋发展基金会成立粤港澳大湾区首个以海洋经济为主题的生态文明建设专项基金，支持该区域海洋产业园、海洋生态公园、海洋工程中心建设等事项，加快推动海洋生态产品价值实现相关技术革新和产业发展。

持续健全海洋生态环境损害赔偿。中国高度重视海洋生态环境的损害赔偿，在1999年修订海洋环境保护法时，明确建立海洋生态损害国家损失赔偿工作。中国先后出台《海洋生态损害国家损失索赔办法》《关于审理海洋自然资源与生态环境损害赔偿纠纷案件若干问题的规定》，指导实施海洋生态环境损害赔偿，取得了良好的效果。2023年，中国再次修订海洋环境保护法，进一步修改完善海洋生态环境损害赔偿制度。

(四) 开展绿色低碳全民行动

积极开展多样海洋文化宣教及科普活动，增强全民环保意识、生态意识，倡导简约适度、绿色低碳、文明健康的生活方式，把绿色理念转化为全体人民的自觉行动，吸引社会各界共同爱海护海、亲海近海。

海洋生态环保意识深入人心。连续多年在世界海洋日暨全国海洋宣传日、世界地球日、世界环境日、世界湿地日等举办主题活动，在全国范围内建设160余家“全国海洋意识教育基地”，共同守护蓝色家园。舟山群岛—中国海洋文化节、中国（象山）开渔节等海洋节庆及中国海洋经济博览会、厦门国际海洋周等知名会展论坛，成为展现中国海洋特色文化的重要平台。建成开放“海洋上的故宫”国家海洋博物馆，成为人民了解海洋文明、认识海洋资源、重塑海洋价值观的重要课堂。连续开展14届全国海洋知识竞赛，每年吸引千余所高校学生及600万人次公众参与，全民关心海洋、认识海洋的自觉意识明显提高，经略海洋的使命感、责任感和自豪感不断增强。

全民参与海洋生态环境保护行动。海洋生态环境保护充分发挥人民力量，全社会积极行动起来，争做生态文明理念的积极传播者和模范践行者。2019年中国提出“蓝色市民”概念，连续多年开展多种项目和活动，倡导社区居民为美丽清洁海洋付出行动，支持蓝色市民成长。自2017年起，