

The 7th International Symposium on Cage Aquaculture in Asia (CAA7)

The 7th International Symposium on Cage Aquaculture in Asia (CAA7) was hosted by the Asian Fisheries Society (AFS), and jointly organized by Hainan University (HNU), Shanghai Ocean University (SHOU), China-ASEAN 'The Belt and Road' Joint Laboratory of Mariculture Technology, and the Center for Ecological Aquaculture (CEA). The CAA7 with the theme “Sustainable Development of Cage Aquaculture in Asia” held in the city of Haikou, Hainan University of China, from November 29th to December 2nd, 2023.



7th International Symposium on Cage Aquaculture in Asia

"Sustainable Development of Cage Aquaculture in Asia"

*Nov. 29th -Dec. 2nd, 2023
Hainan, China*



The President of the Asian Fisheries Society, Neil Loneragan, and the Director of the Fisheries and Aquaculture Division of the Food and Agriculture Organization of the United Nations, Matthias Halwart, joined by four Chinese academicians—Zhu Zuoyan, Gui Jianfang, Mai Kangsen, and Liu Shaojun, along with other prominent figures in the aquaculture industry, convened for a significant conference. The primary aim of this gathering is to assess the current status and experiences in cage aquaculture, address industry challenges, environmental pressures, and ecological needs. Together, they seek to explore the future development directions of aquaculture, with a particular focus on cage aquaculture, contributing valuable insights to the sustainable growth of the global aquaculture industry.

This conference attracted approximately 200 participants, including 150 experts and scholars, along with over 60 graduate students. Among the participants were more than 80 professionals from 26 countries and regions, including Malaysia, the Philippines, India, Cambodia, Vietnam, Thailand, Nepal, Bangladesh, Australia, Italy, the United States, Norway, New Zealand, Indonesia, Myanmar, and Hong Kong, China. The event featured pioneering plenary talks followed by six sessions including: Production Systems; Breeding and Seed Production; Nutrition and Feed; Carbon Sink and Fouling Organisms; Health and Environment Management; Economics, Gender, Livelihood and Policies. These are relevant to aquaculture as a whole i.e., extending beyond and more than cage and offshore aquaculture alone. The diverse themes provided a platform for domestic and international researchers, producers, and managers engaged in aquaculture, especially cage aquaculture, to exchange ideas and foster collaboration. This conference aims to support the healthy and rapid development of Asian aquaculture industry.



Below is a summary of speeches and presentations from several leading experts, including key highlights from plenary reports:



Xie Songguang, as the President of Hainan University, chaired the opening ceremony of the conference.



Neil Loneragan, the President of the Asian Fisheries Society (AFS), delivered the conference's opening speech.

"Asia plays a pivotal role in global fisheries and aquaculture production, contributing over 92% of the world's capture fisheries output and 86% of aquaculture products," highlighted Neil Loneragan, President of the Asian Fisheries Society (AFS). He underscored China's significant role, constituting 19% of global capture fisheries and 60% of aquaculture production, making it the largest consumer and trader of seafood products worldwide.



Matthias Halwart addressed the conference, Fisheries and Aquaculture Division at the Food and Agriculture Organization (FAO) of the United Nations.

"Global per capita fish consumption has doubled since 1960," highlighted Matthias Halwart. He underscored the crucial role of aquaculture in providing more food and employment opportunities for the continuously growing global population, projecting its ongoing significance in sustainable development.



Li Yun, a member of the Hainan Provincial Department of Agriculture and Rural Affairs, delivered the conference address.



Jiang Min, Shanghai Ocean University Vice President, delivered the conference address.



Cao Bing, Hainan University Vice President, delivered the conference address.



Plenary Keynote Speaker: Mai Kangsen,
Academician of Chinese Academy of Engineering, Professor of Ocean University of China

Report Title: 《Developing offshore & deep sea mariculture is a major strategic demand of China》

During the conference, Academician Ma Kangsen emphasized that the future of aquaculture in China lies in offshore deep-sea areas. With limited increments in inland and nearshore water and land resources, and the need for compression due to environmental requirements, the new frontier for aquaculture is anticipated to be in deep-sea zones—ushering in the era of blue pastures, also known as the "21st Century Blue Granary Quality Plan."

It is noteworthy that China boasts a coastline extending over 18,000 kilometers and encompasses more than 5,500 islands. However, the challenges of shallow depths and frequent typhoons in nearshore areas make offshore deep-sea aquaculture a demanding endeavor. Over the past decade, China has explored various models, including giant net cages (such as Shandong Deep Blue No. 1 and Guangdong Dehai No. 1), giant fences, composite aquaculture platforms, and dedicated aquaculture ships.

Despite a decade of research and practice leading to overcoming key technological hurdles and achieving initial success, Academician Ma Kangsen highlighted four primary challenges that persist in deep-sea aquaculture: 1) The current exploration and practices have yet to transition genuinely into deep-sea regions and remain confined to offshore nearshore areas. Moving towards deep-sea aquaculture poses unresolved technical and industrial chain issues. 2) The establishment of a life support system for aquaculture personnel, covering aspects such as renewable energy supply, freshwater provision, and the supply of fresh vegetables and fruits, is still pending. 3) A seamless connection system for cold chain logistics from deep-sea to land to the dining table has not been realized, posing a logistical challenge. 4) The construction of a complete industrial chain for deep-sea aquaculture and the resolution of issues related to sustainable development, including scale, profit models, and environmentally sustainable practices, remain imperative tasks.



Plenary Keynote Speaker: Gui Jianfang,

Academician of Chinese Academy of Engineering, Institute of Hydrobiology, Chinese Academy of Sciences

Report Title: 《Chinese wisdom in aquaculture》

In addition, Professor Gui elaborated on three aspects: 1) the evolution of China's traditional aquaculture industry from fishing to modern technology cultivation; 2) the scientific and technological advancements in modern aquaculture; and 3) the role of aquaculture in contributing to global food security. Professor Gui Jianfang explained that the silver carp is a hexaploid subspecies within the polyploid carp complex. This complex includes the sexually reproducing tetraploid goldfish and the unisexual hexaploid silver carp. These species are not only significant in aquaculture but also represent a unique polyploid group among vertebrates, offering valuable insights into the mechanisms underlying the generation of unisexual polyploids. Furthermore, Professor Gui and the research team discovered an effective strategy for generating diverse clone lineages in the polyploid carp complex. This discovery has the potential to enable female nucleus-developing carp to evade genomic decay, thereby enhancing their evolutionary adaptability. The findings contribute to a broader understanding of the origin of unisexual species and genetic diversity. Recently, Dr. Yu Peng, member of Professor Gui's

team, pioneered precision breeding biotechnology for goldfish, incorporating efficient reproduction, gene editing, artificial female nucleus development, and temperature-induced sex reversal.



Plenary Keynote Speaker: Alice Joan G. Ferrer

Immediate Past President of AFS, Professor of University of the Philippines Visayas, PHILIPPINES

Report Title: 《Regulatory impact assessment towards promotion of cage culture :the case of the Philippines》

At the conference, Professor Alice provided a comprehensive overview of the regulatory aspects of cage aquaculture, addressing two key dimensions. She highlighted the substantial potential of cage fish farming to enhance fish production. Acknowledging the benefits it can bring, she underscored the necessity of finding solutions to overcome the constraints hindering its development, emphasizing the importance of a sound regulatory environment. Alice explained that the Philippines currently has five laws and regulations in place to govern cage aquaculture. However, the aquaculture sector in the Philippines is grappling with challenges such as unfavorable cage locations and insufficient service facilities. Consequently, legal

support is crucial to improving the environmental conditions at fish cage farming sites and resolving these issues.



Plenary Keynote Speaker: Dong Shuanglin, Professor, Ocean University of China

Report Title: 《Development of deeper-offshore aquaculture in the context of global climate change》

Professor Dong Shuanglin, in his presentation, discussed the challenges confronting the development of the aquaculture industry within the framework of the dual-carbon strategy. He delved into three main aspects: the dilemmas faced by aquaculture under the dual-carbon strategy, the development and issues of deep-sea aquaculture in China, and innovations in China's deep-sea aquaculture system.

Professor Dong highlighted that China's previous rapid advancements in aquaculture were primarily achieved by intensifying production systems. However, as production intensity increased, so did the energy consumption and nutrient discharge per unit weight of products. It is noteworthy that China ranks among the world's 13 most water-scarce countries, restricting the growth of inland freshwater aquaculture. Additionally, the per capita arable land is only 40% of the world average, and nearshore marine aquaculture has nearly saturated the areas within

10 meters of depth. Professor Dong emphasized that the development potential in deep-sea aquaculture is extensive, benefiting from robust self-purification capabilities and abundant renewable energy sources such as waves, wind, and solar energy. Effectively harnessing the environmental self-purification capacity and renewable energy sources in the sea can help overcome the three challenges facing aquaculture. This approach facilitates the sustainable development of deep-sea aquaculture, utilizing the vast available space and leveraging the rich renewable energy resources within the marine environment.



Plenary Keynote Speaker: Bard Skjelstad, Aqualoop CEO, Norway

Report Title: 《Cage farming is moving offshore》

Mr. Bard Skjelstad, the Chief Executive Officer (CEO) of Norway's Aqualoop company, brings substantial expertise to the fields of aquaculture, offshore, and onshore bioprocess industries. He is actively involved in pioneering new aquatic cage systems. During his presentation, he specifically delved into the historical development of salmon farming. He underscored that addressing one of the most pressing sustainability challenges in salmon production—the salmon louse—can be achieved through deep-sea cultivation. Given the

distinctive behaviors of salmon compared to other fish species, thorough research into salmon habits is essential for sustainable development. Building on their extensive understanding of salmon behaviors, they have successfully engineered deep-sea cage equipment tailored for salmon farming.

The esteemed guests seated in the front row.





Modern Fisheries Industrial Park in Fengjiawan, Wenchang City, Hainan Province, China, highlights China's remarkable progress in addressing the challenges posed by the conflicting goals of aquaculture and the development of marine ecological civilization.

