

THE EAST ASIAN SEAS CONGRESS



## Charting a New Decade of Healthy Ocean, People and Economies

1-2 DECEMBER 2021 • Hosted by the Royal Government of Cambodia

Collab 22

### Recent Advances in Marine Environmental Research

27 November 2021, 8:00 AM - 4:00 PM (GMT+7)  
Online via Zoom

ORGANIZERS:



State Key Laboratory of Marine Pollution



香港城市大學  
City University of Hong Kong

City University of Hong Kong



Department of Applied Biology and  
Chemical Technology, The Hong Kong  
Polytechnic University



Department of Science and Environmental  
Studies, The Education University of  
Hong Kong

## **Collab 22: Recent Advances in Marine Environmental Research**

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### **1. Introduction**

The symposium featured a series of talks focusing on toxins or man-made substances that pollute the ocean or affect its living biodiversity. The symposium consisted of three interrelated themes: (1) innovative technologies in pollution monitoring and control; (2) environmental risk assessment of emerging chemicals of concern; and (3) ecological restoration.

Participants learnt about the most recent technology for pollution monitoring and control; occurrence and impacts of emerging chemicals of concern; problems of eminent stressors such as hypoxia and algal toxins; and novel approaches in ecological restoration. Attendees had a chance to express their views on the challenges in marine environmental research during the panel discussion.

The event was organized by State Key Laboratory of Marine Pollution (SKLMP); City University of Hong Kong (CityU); Department of Applied Biology and Chemical Technology, The Hong Kong Polytechnic University (PolyU); and Department of Science and Environmental Studies, The Education University of Hong Kong (EdUHK).

### **2. Opening Ceremony**

Dr. Leo Chan from SKLMP, CityU and Dr. Henry He from the School of Energy and Environment, CityU co-chair the Symposium Session, and gave a welcome speech and introduction of this Session.

### **3. Metagenomic Insights into Antibiotic Resistance Genes in Environments**

Professor Tong Zhang from the Department of Civil Engineering, The University of Hong Kong (HKU) focused his presentation tracking antibiotic resistance genes (ARGs) by metagenomic methods which is powerful approaches for surveillance of ARGs, and it can contribute to

understanding the genetic mechanisms and environmental driving factors, development of management tools. And assessment of the risk.

#### **4. Stress Responses in Corals: Winners or Losers under Climate Change?**

Professor Jianwen Qiu from the Department of Biology, Hong Kong Baptist University (HKBU) focused his presentation on stress responses in corals under the climate change. He reviewed the background of coral and investigated the corals in various ways (such as bleaching, effect, and recovery) in Hong Kong to explain the impact of global change on corals.

#### **5. Recent Progress and Future Research on Ciguatera Causing Marine Benthic Dinoflagellates in Asian Pacific Regions**

Dr. Leo Chan introduced an issue of local, regional and global importance: ciguatera causing marine benthic dinoflagellates in Asian Pacific regions. He introduced what are ciguatoxins (CTXs) and how they transfer and affect the environment, and established and optimized an effective analytical methodology for them.

#### **6. Implications of Antibiotic Resistome in Mariculture for Coastal Environmental Quality and Seafood Safety**

Dr. Ling Jin focused his presentation on implications of antibiotic resistome in mariculture for coastal environmental quality and seafood safety. Through investigation and research, the following conclusions have been drawn:

1. The pristine oceans are featured by naturally-occurring stable antibiotic resistomes of lower potential for horizontal gene transfer and narrower host ranges of mostly non-pathogenic bacteria;
2. Mariculture induced a significant loss of bacterial diversity and a contrasting increase in mobility potentials and pathogenic host ranges of antibiotic resistance genes;
3. Resistant pathogens in mariculture products may cause foodborne health risk via seafood consumption.

#### **7. Universal Biosensors for Pollution Monitoring**

Dr. Chun Kit Kwok from the Department of Chemistry, CityU presented universal biosensors for pollution monitoring. He introduced source and fate of pollutant especially antibiotics. Because of the limitations of current methods, he established and optimized detection methods of antibiotics that contributed to the study of antibiotics in the future.

## **8. Non-Invasive Methods for Assessment of Coral Health In-Situ**

Dr. Walter Dellisanti from the Department of Applied Biology and Chemical Technology, PolyU came up with non-invasive methods for the assessment of coral health in-situ. He introduced coral metabolism and showed techniques to assess coral health. He also established in-situ observations of metabolic responses of the coral *Platygyra carnosa*.

## **9. The Influence of Environmental Temperature and Salinity on the Toxicity of Zinc Oxide Nanoparticles**

Dr. Racliffe Lai from SKLMP, CityU introduced that ZnO-NPs were most toxic at high temperature and low salinity. According to the results, he presented how temperature and salinity would affect the physicochemical properties of ZnO-NPs and what the toxicity of ZnO-NPs would be under different temperatures and salinities, and different species response differently under the joint impact of temperature, salinity, and ZnO-NPs.

## **10. Hypoxia: Nothing Could be Worse!**

Professor Rudolf's presentation focused on hypoxia. His discoveries show as follows:

- 1) Hypoxia is an endocrine disruptor, affects selected genes, receptors, and neurotransmitters along the HPG axis and impairs reproduction;
- 2) It is a teratogen, leading to delay in development and malformation;
- 3) It affects sex differentiation and sex determination, leading to a male biased population, and pose a significant threat to sustainability of natural population;
- 4) It alters epigenome, leading to transgenerational reproductive impairments in subsequent generations.

## **11. Liquid Crystal Monomers (LCMs): A Class of Emerging Contaminants Related to E-Waste**

Dr. Henry He from the School of Energy and Environment, CityU introduced the source, fate, and toxicity of LCMs, and established and optimized an effective analytical methodology for LCMs. He also pointed out the limitations of existing work and directions for future work, including expanding the LCMs standard bank for target analysis, developing methods for suspect and nontarget analysis, determining LCMs and their analogs in various environmental matrices and biota samples, and obtaining basic toxicological data.

## **12. Enhancing Marine Biodiversity on Seawalls through Ecological Engineering**

Professor Kenneth Leung introduced the benefits of eco-engineered shorelines as follows:

1. Coastal got defense and protection against storms, land erosion, and floods;
2. Enhance biodiversity, reduce biological invasion, increase eco-connectivity, and gene flow and promote ecosystem functions and services;
3. Amenity values and education and scientific research opportunities.

Then he provided examples of how the eco-engineered shorelines works, by testing the effects of eco-engineered tiles and bivalve seedings (*Saccostrea cucullata*) on biodiversity at seawalls in Hong Kong, as part of the World Harbor Project.

### **13. Degradation and Restoration of Coral Communities: Experience in a Marginal Coral Environment, Hong Kong**

Dr. Apple Chui from the School of Life Sciences, Chinese University of Hong Kong (CUHK) presented degradation and restoration of coral communities in Hong Kong with the following goals:

- 1) Develop techniques of using sexually propagated corals in re-establishing coral communities in degraded sites in Hong Kong;
- 2) To enhance the resilience of coral stocks used for restoring degraded coral communities in Hong Kong;
- 3) To enhance community awareness, knowledge and promote long-term engagement of the public in coral conservation and restoration.

### **14. Ocean Acidification Threatens Chinese Oysters: Can Some Species Adapt Within This Century?**

Dr. Vengatesen Thiyagarajan from the Swire Institute of Marine Science, HKU focused on Chinese oysters that threaten by ocean acidification (OA). He discussed oyster culture in south China, transgenerational epigenetic signals for stress adaptation in oysters and technological innovation for sustainable aquaculture, with the following conclusions:

- 1) Calcium transport and signaling involved in maintaining biomineralization under OA;
- 2) DNA methylation plays a minor role in maintaining gene expression related to biomineralization;
- 3) As expression of most shell matrix proteins and biomineralization related proteins remain unaffected, shell properties also remain unaffected under OA.

### **15. Emerging Chemicals of Concern: Stress in Microalgae**

Dr. Xiaying Xin from SKLMP, CityU introduced stress in microalgae that concerned as emerging chemicals. She presented the fate of pharmaceuticals and personal care products (PPCPs) and the effect on algae, with the following conclusions:

- 1) Species diversity determines their various sensitivity to triclosan;
- 2) Algae have different sensitivity towards one specific endpoint under triclosan exposure;
- 3) Environmentally relevant concentrations can cause multiple long-term effects, such as inhibition, resilience, resistance, and stimulation (hormesis).

## 16. Panel Discussion

**Professor Rudolf Wu** suggested focusing on two aspects in our discussion. The first is that what is the grand challenge of this marine environmental issues in the east Asia region which is much more relevant and closer to us. And the second is that the state level of revolution has considerable expertise and strength in marine pollution in our capacity as the leader of the regional center of excellence in marine coalition of PEMSEA in what way that we can share help and contribute to the ideas and the consortium. Then we can have a better future.

**Professor Kenneth Leung** thought some common issues like hypoxia are still the greatest challenges in our region. Because we have a high density and population in coastal cities and many of our countries in the region are without the financial and also the infrastructure support to treat the wastewater to a more acceptable level. So basically, the organic pollution and the nutrient discharged remain one of the key challenges in the region. When talking about chemical pollution, they have impact but rather in a gradient that means in the discharge location you may have a more adverse effect. But once they reach out with dilution, the effect will be lessened. On the contrary, if there is a hypoxia, the impact area will be very huge and that will have a long-lasting impact.

**Dr. Vengatesen Thiyagarajan** agreed that hypoxia and eutrophication are key issues in marine pollution studies, as well as the global climate change. However, we cannot ignore the regional climate change such as heavy rain and unusual weather pattern.

**Dr. Henry He** proposed a topic about nuclear pollutants, concerning about Fukushima nuclear water as an emerging and profound issue, as the environmental impact and toxicity of these nuclear pollutants on ecosystems are largely unknown.

**Professor Kenneth Leung** thought southeast Asia and Hong Kong are safe because the current won't bring the nuclear pollutants down here. He thought the impact area will be Yellow Sea, eastern sea of Korea and Japan themselves. And the current will bring the pollutants all the way

to USA. We are quite lucky in southeast Asia. We have no problem because the China government has been monitoring this since the incident.

**Professor Rudolf** pointed out if you just based on the hydrography so basically, the water and discharge from the Hiroshima that they would serve Fukushima zone and then go around in Japan and go up. And then the water the current won't come down. The Japanese say that it is no problem and the same as the Americans. Several months ago, they tried to use an artificial mussel to explore the possibility of monitoring radioactivity which actually take up uranium, cesium, and strontium.

**Professor Jianwen Qiu** said that he knows SKLMP has lots of expertise to analyze various chemicals and to conduct comprehensive toxicity tests, and if we can do more about this kind of meetings, to develop some large-scale studies, we can contribute more to solve problems in southeast Asia, such as the coral restoration.

**Professor Rudolf Wu** pointed out why we are best told with the title of the regional center of excellence is that they expect us to take the lead, contribute, and help each other in the region. He thought we should sort of pursue for that effort, try to help each other out and share with them. For example, the things that we do we are good at something like the coral restoration, we can share that workshop with them, so that they can follow and the same path. And then improve the environment in the other country particularly in the developing country.

**Dr. Apple Chui** agreed that coral restoration can be a connectivity for research among countries in this region and to strengthen the collaborations among different institutes. We shall bring forward our knowledge to help the conservation in terms of climate change.

**Dr. Ling Jin** thought that we really need to think deeply about the protection goals based on the current investigations and future research to target what has been really occurring in the environment.

**Ms. Daisy O Padayao** hoped that SKLMP can provide capacity building to most of our partners in the region. Most of the universities and local governments in the region don't have the capacity. They don't have the technologies that SKLMP have. We can take it in consideration in terms of possible collaboration and partnerships. They are developing the PEMSEA roadmap plan. In that plan they are identifying the priority programs or priority management programs in the region so that covers a range of issues like climate change, marine pollution, habitat protection, food security, and fisheries management. They can identify what are in developing the plan to identify the issues and what are the needs in the region.

**Ms. Daisy O Padayao** thought people in developing countries can also consult with SKLMP on some of the aspects in the plan are that SKLMP can help implement and how SKLMP can share knowledge and expertise to countries. She thought that's where SKLMP can particularly help and identify targeted research for marine pollution assessment. People in developing countries can also organize similar workshops in the future maybe more targeted or more subject-specific like microplastics. And then they can target specific participants who would benefit for those types of workshops and seminars.

**Dr. Leo Chan** thought that the China government has been concerned about how we can develop the SOPs into the international standards of scientific methods. The inter-country sample sharing is important to validate these different scientific methods.

**Professor Rudolf Wu** summarized that's a good idea and the most important thing is to identify what is the thing that you need most urgently. The other thing is something like the toxicology, and also the toxicity test and that kind of thing may be a possibility for collaboration. After this symposium probably they would have a much better understanding on the current expertise of the stakeholder laboratory.

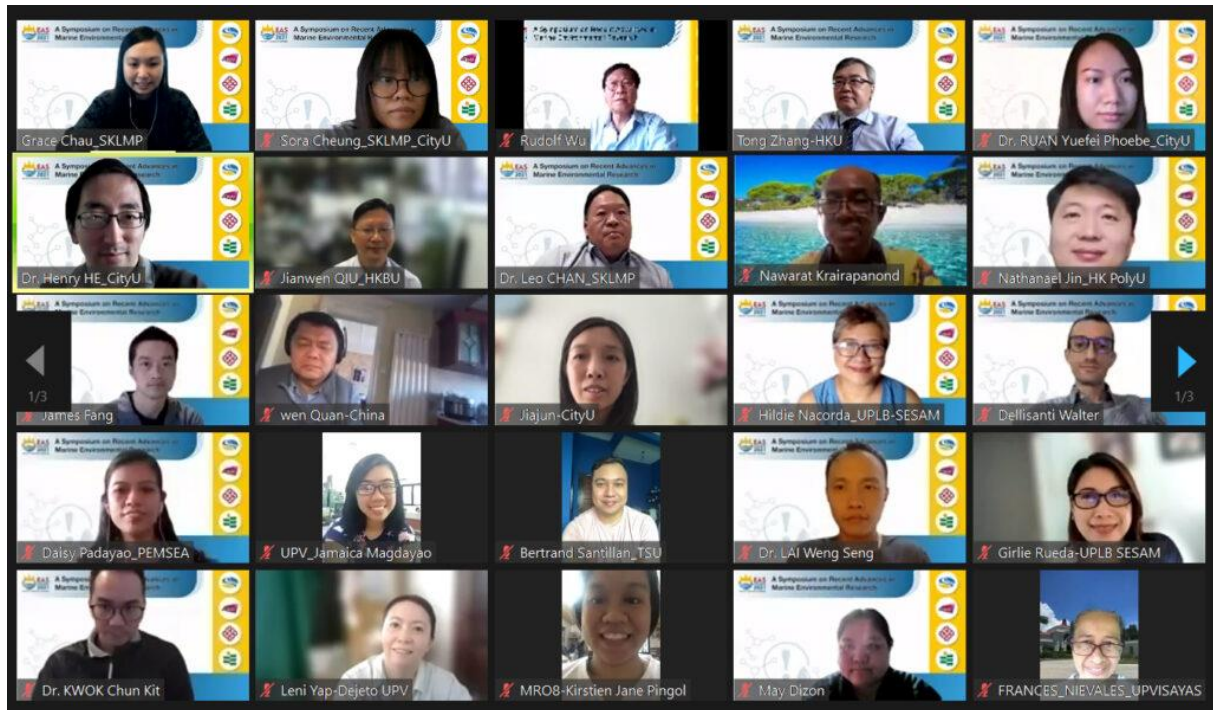


## ANNEX 1. AGENDA.

Time (GMT+7)	Presentation/Session	Speaker
08:00 AM - 08:10 AM	Welcoming and Introduction	<b>Dr. Leo Chan</b> , SKLMP, CityU
08:10 AM - 08:40 AM	Metagenomic insights into antibiotic resistance genes in environments	<b>Professor Tong Zhang</b> , Department of Civil Engineering, HKU
08:40 AM - 09:10 AM	Stress responses in corals: winners or losers under climate change?	<b>Professor Jianwen Qiu</b> , Department of Biology, HKBU
09:10 AM - 09:30 AM	Recent progress and future research on ciguatera causing marine benthic dinoflagellates in Asian Pacific regions	<b>Dr. Leo Chan</b> , SKLMP, CityU
09:30 AM - 09:40 AM	Break	
09:40 AM - 10:00 AM	Implications of antibiotic resistance in mariculture for coastal environmental quality and seafood safety	<b>Dr. Ling Jin</b> , Department of Civil and Environmental Engineering, PolyU
10:00 AM - 10:20 AM	Universal biosensors for pollution monitoring	<b>Dr. Chun Kit Kwok</b> , Department of Chemistry, CityU
10:20 AM - 10:40 AM	Non-invasive methods for assessment of coral health in-situ	<b>Dr Walter Dellisanti</b> , Department of Applied Biology and Chemical Technology, PolyU
10:40 AM - 11:00 AM	The Influence of environmental temperature and salinity on the toxicity of zinc oxide nanoparticles	<b>Dr. Racliffe Lai</b> , SKLMP, CityU
11:00 AM - 01:00 PM	Lunch break	
01:00 PM - 01:30 PM	Hypoxia: Nothing could be worse!	<b>Professor Rudolf Wu</b> , Department of Science and Environmental Studies, EdUHK
01:30 PM – 01:50 PM	Liquid crystal monomers (LCMs): A class of emerging contaminants related to e-waste	<b>Dr. Henry He</b> , School of Energy and Environment, CityU
01:50 PM - 02:10 PM	Enhancing marine biodiversity on seawalls through ecological engineering	<b>Professor Kenneth Leung</b> , SKLMP, CityU
02:10 PM - 02:20 PM	Break	
02:20 PM - 02:50 PM	Degradation and restoration of coral	<b>Dr. Apple Chui</b> , School of Life

Time (GMT+7)	Presentation/Session	Speaker
	communities: Experience in a marginal coral environment, Hong Kong	Sciences, CUHK
02:50 PM - 03:10 PM	Ocean acidification threatens Chinese oysters: Can some species adapt within this century?	<b>Dr. Vengatesen Thiyagarajan</b> , Swire Institute of Marine Science, HKU
03:10 PM - 03:30 PM	Emerging chemicals of concern: Stress in microalgae	<b>Dr. Xiaying Xin</b> , SKLMP, CityU
03:30 PM - 04:00 PM	Panel Discussion – Grand Challenges of Marine Environmental Research in East Asia	<u>Moderator:</u> <b>Professor Rudolf Wu</b> <u>Panel Members:</u> <b>Professor Kenneth Leung</b> <b>Professor Jianwen Qiu</b> <b>Dr. Vengatesen Thiyagarajan</b> <b>Dr. Apple Chui</b> <b>Dr. Ling Jin</b> <b>Dr. Henry He</b>

## ANNEX 2. SUPPORTING FILES.



Group Photo: <https://tinyurl.com/Collab22-GroupPhoto>

Recording: <https://youtu.be/IBhRZE11-2c>