

Climatic Hazards Programme

Climate change and the ocean: Challenges and Opportunities

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Climate Change and the Ocean: Challenges & Opportunities

1 August 2022 (Monday) | 2.30-3.30 pm The IPCC Working Group Reports and other information are available at: <https://www.ipcc.ch/>

Keynote Speaker: Prof. Rashid Sumaila has been bestowed the University Killam Professorship at University of British Columbia, in recognition of his international research leadership on the future of oceans. His research integrates social, economic and fisheries sciences to build novel pathways towards sustainable fisheries. His work challenges today's approaches to marine governance, generating exciting new ways of thinking about our relationship to the marine biosphere.

Moderators: Prof. Joy Jacqueline Pereira, Universiti Kebangsaan Malaysia, Vice Chair, IPCC WG II Chair, ASM Committee on Climate Change and Disaster Risk Reduction; Dr. Sharina Abdul Halim, Deputy Director of LESTARI, Universiti Kebangsaan Malaysia, IPCC WG II Lead Author.

Commentator: Prof. Dato' Dr. Aileen Tan Shau Hwai, Director of the Centre for Marine and Coastal Studies (CEMACS), Universiti Sains Malaysia.

Aim: Mobilise scientific leadership and partnerships for climate resilient development

Schedule:

- 1430: Welcome Remarks
Associate Professor Dr. Goh Choo Ta
Director of LESTARI-UKM
- 1440: Keynote: Climate Change and the Ocean
Prof. Rashid Sumaila, International Distinguished Professor of LESTARI-UKM
- 1510: Commentator's Viewpoints
Prof. Dato' Dr. Aileen Tan Shau Hwai
ASM Fellow & Director of CEMACS-USM
- 1515: General Discussion
- 1525: Closing Remarks
Prof. Joy Jacqueline Pereira
Chair of ASM Committee on Climate Change and Disaster Risk Reduction
- 1530: Adjourn

According to the Intergovernmental Panel on Climate Change (IPCC), climate change is causing a profound impact on the oceans and marine life. This is apart from anthropogenic activities that are affecting the marine life and marine habitats. The consequences of climate change include the thermal expansion of water (the key cause of sea level rise), ocean acidification, deoxygenation (oxygen loss), and forcing marine life to redistribute to other places. This is already happening with the world now struggling to limit the increase in average temperature to 1.5°C in the future. It is evident that climate change has direct impacts on the ocean, fish and fisheries which in turn compromise food security and economies if it not well-managed. About 70% of the Earth's surface is water-covered and it is critical to help balance the conditions for the oceans are the primary life support system that we rely on. Yet, it has been neglected in most climate talks. Finally, for the first time, some progress is being shown with the latest international climate negotiations to include oceans permanently into the multilateral climate change regime.

A discourse on Climate Change and the Ocean: Challenges and Opportunities was jointly convened by the Academy of Sciences Malaysia (ASM), Institute for Environment and Development (LESTARI), Universiti Kebangsaan Malaysia and Asian Network on Climate Science and Technology (ANCST). This event was held on 1 August 2022 via Zoom from 2.30-3.30pm. The aim of this meeting was to mobilize scientific leadership and partnerships for climate resilient development in the ocean sector. The discourse received great support from more than 100 participants, including the scientists and experts from other regions. Professor Dr. Rashid Sumaila was the keynote speaker on climate change and the ocean. He was bestowed the

University Killam Professorship at University of British Columbia, in recognition of his international research leadership on the future of oceans. Currently, he is the Distinguished International Professor at LESTARI, UKM. The session was jointly moderated by Professor Joy Jacqueline Pereira, the Chair of the ASM Committee on Climate Change and Disaster Risk Reduction; and Vice Chair of the IPCC Working Group II on Impacts, Adaptation and Vulnerability; and Dr. Sharina Abdul Halim, the Deputy Director of LESTARI Universiti Kebangsaan Malaysia and the IPCC Working Group II Lead Author for Chapter 10 on Asia.

Professor Dr. Rashid Sumaila introduced the Ocean Canada partnership which comprised six working groups namely, Law and Policy; National Data and Integrated Scenarios; Knowledge Mobilization at the national level; Pacific Region, Arctic Region and Atlantic Region Working Groups at the regional level. Professor Rashid has linked Ocean Canada with the new initiative of Ocean Malaysia Partnership, which has been launched at LESTARI, UKM. He emphasized the importance of a collaborative approach to the management of Malaysia's ocean, and how real climate change is happening, regardless of where we are located. Everyday human activities are responsible for almost all of the increase in greenhouse gases in the atmosphere, besides pollution being generated. He commended the IPCC for bringing together all the scientists to help the world understand, and to come up with the policy measures to tackle the issues related to climate change and the ocean.

Professor Dr. Rashid explained the need for management and marine protection for human-ocean interaction in order to secure both the marine environment and fish economy. He

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summarized how climate change has direct impacts on the ocean, fish and fisheries. It has been observed that the factors such as temperature rise, salinity, hypoxia and acidification have caused the changes in the body size, reproduction, primary productivity and habitats of the living organisms in the ocean. Furthermore, changes in population growth, abundance, species distribution; community structure, trophic interactions, biodiversity; fisheries catch, fisheries economics and fisheries management are also among the consequences of climate change. If there is no proper care being taken of the ocean, the food security as a whole will be threatened.

Audiences were also given an overview on the three models being developed for the South China Sea (SCS) fisheries, namely reef fisheries, continental shelf fisheries and deep-water fisheries. Over the past few decades, extensive overexploitation, overcapacity and overfishing are among the major issues in most of the SCS coastal fisheries. Majority of the assessed SCS fisheries have shown temporal decline in Catch per unit effort (CPUE). Besides that, increasing proportions of low value fish in the catch and fisheries shifting to smaller and faster recruiting species have been observed. Other than that, there is an increase attention on developing offshore fisheries. The key concerns that need to be tackled to ensure ocean sustainability are the governance; conflict; fishing industry subsidies; illegal, unregulated and unreported (IUU) fishing; environmental degradation and climate change; feed grade fishing; and biodiversity loss.

The scenario modelling, which comprises two climate change scenarios and four fisheries management scenarios are being developed as a reference for the fishing industry to project the future impacts of climate change due to the greenhouse gas (GHG) emissions. Under the best-case scenario with mild climate change (low GHG emissions: RCP2.6) and a 50% decrease in fishing efforts, it is projected that the SCS will have a 22% biomass loss and USD 6.7bn annual revenue loss. Whilst, under a worst-case scenario with severe climate change (high GHG emissions: RCP8.5) and a 50% increase in fishing effort, the SCS is projected to have a 93% biomass loss and USD 11.4bn annual revenue loss.

Despite all the challenges, the fishing industry can generate revenue if proper practices are implemented on the feed-grade fishing (FGF), such as through the rebuild process to avoid catching juveniles and allowing them to mature and reproduce in the wild instead. The modelling across five Chinese provinces from 2015-2099 showed that the revenues from the rebuild scenario projected to be 10 to 25 times higher than under current FGF practices. In order to address the issue of FGF practices, we should halt the catch of juveniles through the enforcement of laws that are already in place. Besides that, the minimum mesh size should be revised and appropriate protein feed sources independent of FGF should be developed.

More regional dialogues, engagement of further scientific research and integration of climate change and fisheries management policies are the key recommendations to ensure sustainability of the ocean. In addition, the issues of overfishing and climate change must be addressed, as continued inaction will jeopardize both wildlife and humans. The keynote speaker ended his speech by highlighting the important of 'walk-the-talk'.

Professor Dato' Dr. Aileen Tan Shau Hwai, the Director of the Centre for Marine and Coastal Studies (CEMACS) at Universiti

Sains Malaysia, was invited as the commentator for this discourse. She delivered a comprehensive viewpoint that enabled the audiences to understand the current status, issues and challenges of the ocean and marine sector in Malaysia. To date, there is no policy on ocean and marine management in the country. Hence, this call is indeed timely to start and initiate the cross-sectoral as well as cross-ministerial collaboration. In Malaysia, we are blessed with rich biodiversity. And yet, people tend to focus less on the vast ocean heritage which can be turned into wealth, as the ocean biodiversity representing a wealth of systematic ecological data that helps us understand our natural world and the origin.

She pointed out that land discharge, marine litter and plastic pollutions are often the factors threatening the ocean besides the changing of climate, especially to the living organisms. The future of our ocean will be challenged and will be a bare habitat without life, if we do not take the responsibility to protect and conserve it now.

Professor Dato' Dr. Aileen emphasized that there is a need to engage the public in environmental issues, like the biodiversity crisis. The important message about the linkages and connection between humans and the nature (ocean) has to be made clear to the general public, scientists and the policymakers with the intent that everyone is aware of and able to foresee the consequences, if we risk depleting it.

She also pointed out that our ocean blue resources have the great potential to feed the world in addressing the food security issue with a lower environmental footprint than many other food resources. When compared to terrestrial, the ocean blue resources do not just refer to the fish but also cover the invertebrates, such as molluscs and the plants (seaweeds). Due to the issue of overfishing and climate change, aquaculture is actually taking over and will continue to grow; it has contributed to more than 50% of the seafood consumed.

In Malaysia, the aquaculture sector has been focusing on the high value seafood such as tiger prawns, groupers and sea bass. In this case, the small fish was used to feed the big fish.



Photo by SEADPRI-UKM

The event was jointly moderated by Professor Dr. Joy Jacqueline Pereira (top row, right) and Dr. Sharina Abdul Halim (top row, left). The keynote speaker, Professor Dr. Rashid Sumaila (second row, left) and commentator Professor Dato' Dr. Aileen Tan Shau Hwai (second row, centre).

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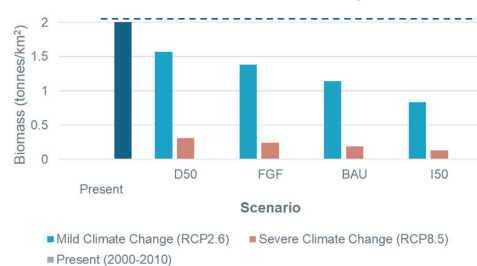
As such, there is a need to look into other options such as fish on the lower trophic level that produces less carbon footprint; this is now branded as aquatic food or the blue food. Even so, the blue food in this region and in Malaysia is still greatly underutilized and under-resourced.

The sustainable aquaculture of blue food is believed to be able to meet the agenda 2030 for Sustainable Development Goals (SDGs) which directly contributes to a number of SDGs: poverty, hunger, good health, gender employment, sustainable production, climate, marine and land base resource. This has also indirectly contributed to other SDGs, such as education, clean water, innovation, equity, urban development and partnership.

Each region, including the Western Pacific and also the areas around South China Sea, has their own opportunities, advantages and challenges in implementing and protecting the ocean resources. Hence, this will open up more opportunities for collaboration that is moving towards transboundary solutions for a better future.

However, when it comes to climate change, global data collection is the information that is always being relied on. Professor Dato' Dr. Aileen mentioned that the best way is to translate the global scenario or global climate prediction to the local scale; this is much more meaningful for the scientists and policymakers to make more appropriate decisions and actions pertaining to climate change in the local scenario. This way, we will be able to find local solutions to global issues and further translate the scientific findings to impactful actions and solutions. Most importantly, solutions are needed to make a better change to our ocean future.

Biomass: How much is left in our bank account?



South China Sea

22 to 59% loss in biomass under a **mild climate change** scenario.

85–94% loss in biomass under a **severe climate change** scenario.

Large benefits to reducing fishing effort.

Species groups undergoing most change:

- Threadfin breams
- Pomfrets
- Shrimps

Fisheries Management Scenarios:

D50: decreasing fishing effort by 50%

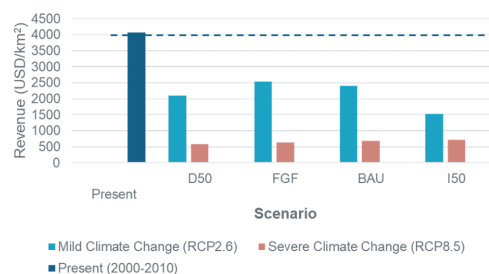
FGF: decreasing feed-grade fish landings by 50%

BAU: business-as-usual

I50: increase fishing efforts by 50%

(Source: Sumaila et al., 2021)

Revenue: How much can we earn?



South China Sea

Revenue from all key commercial species groups, except shrimps, will be reduced to a fraction of present values.

Fisheries Management Scenarios:

D50: decreasing fishing effort by 50%

FGF: decreasing feed-grade fish landings by 50%

BAU: business-as-usual

I50: increase fishing efforts by 50%

(Source: Sumaila et al., 2021)

Scenario Modeling

- 2 climate change scenarios;
- 4 fisheries management scenarios.

Climate change scenarios (n=2)		Fisheries management scenarios (n=4)			
Mild (RCP2.6) Low greenhouse gas emissions		Decrease fishing effort by 50% (D50) 50% decrease in fishing in the initial ten years, then held constant to 2099	Decrease FGF landings by 50% (FGF) 50% reduction in the landings of fleets responsible for FGF	Business-as-usual (BAU) Current level of fishing is extended to 2099 with no change	Increase fishing effort by 50% (I50) 50% increase in fishing in the initial ten years, then held constant to 2099
Severe (RCP8.5) High greenhouse gas emissions					

*FGF denote feed-grade fishing; BAU stands for business as usual.

(Source: Sumaila et al., 2021)