

## SABAH CLIMATE CHANGE INTERNATIONAL CONFERENCE

2021

14-15 December 2021 Kota Kinabalu, Sabah, Malaysia

Shangri-La's Tanjung Aru Resort and Spa, Kota Kinabalu

Strengthening Resilience and Diversity in an Era of Global Environmental Change

Organised by

Ministry of Tourism, Culture and Environment Sabah, Environment Protection Department and Southeast Asia Rainforest Research Partnership (SEARRP)

**Main Event Sponsor** 











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## CONFERENCE BACKGROUND

#### **About SCCIC 2021**

Climate change impacts are being felt across Southeast Asia, a region where expanding population is challenged by rising temperatures, increasing droughts, associated fires and haze, and frequent heavy rainstorms - causing inland and coastal flooding, as well as threatening food security.

The Sabah Climate Change International Conference (SCCIC) 2021 is timely and in line with the aspiration of the Sabah State Policy on the Environment and the Sustainable Development Goals to address climate change impacts both locally and globally and to provide an avenue for all relevant stakeholder's to participate in climate change mitigation and adaptation initiatives.

Due to the COVID-19 pandemic, this conference is organised as a hybrid event providing a platform to various stakeholders to learn about climate change, its causes and impacts, as well as strengthening resilience and diversity through management of the environment and economy. Over two days, the conference will gather global participants including youths from Sabah with various backgrounds, to draw their insights and experiences about their efforts and initiatives to prevent the continuous increase of global warming.



Create awareness on the impacts of climate change amongst government, private sector, research, civil society and indigenous organisations, youth and community groups in Sabah.

Share knowledge and experiences on the awareness approaches and initiatives that strengthen resilience to climate change at global and local scales

Facilitate networking and enhance cooperation amongst a broad base of stakeholder groups and promote public participation in both the climate change and conservation agendas.

Provide a platform for youths to participate and raise voices on climate change action.

## **CONFERENCE AIMS**

Ecosystem and Environmental Change

- Biodiversity
- Forest connectivity
- Coral reefs
- Ecosystem restoration



Resilient Communities

- · Indigenous systems
- Food security
- · Youth empowerment
- Disaster risks and recovery
- Environmental education

Corporate Climate Powershift

- · Climate smart leadership
- · Climate risk management
- · Resilience in diversity
- Corporate partnerships

Low Carbon and Clean Energy

- · Resilient Cities
- Urban design and planning
- Pollution
- · Water supply and quality
- · Flood mitigation
- · Green urban spaces

## **PREFACE**



DATUK SERI PANGLIMA HAJI HAJIJI HAJI NOOR THE RIGHT HONOURABLE CHIEF MINISTER OF SABAH

Greetings and salam Sabah Maju Jaya.

I would like to congratulate the Ministry of Tourism, Culture and Environment Sabah, the Southeast Asia Rainforest Research Partnership (SEARRP), the Environment Protection Department Sabah and the main event sponsor PETRONAS for organising this meaningful Sabah Climate Change International Conference 2021.

Climate change is indeed a serious issue that needs our utmost attention as it affects everyone globally. Moving forward, Sabah has established its Climate Change Action Council under the purview of the Sabah Forestry Department to discuss climate change policies and actions, drive green economic growth, catalyse green technology and low-carbon growth. Rest assured, the Sabah State Government will continue to take neccesary actions to address issues related to climate change in Sabah guided by the Sabah State Policy on the Environment (2017).

Let us take the lessons shared in the conference and use them as a practical guide to do better in managing climate change issues at all levels of implementation not only in Sabah but elsewhere, where climate change pose a threat.

I wish all participants a fruitful Conference.

Datuk Seri Panglima Haji Hajiji Haji Noor The Right Honourable Chief Minister of Sabah

## **FOREWORD**



**DATUK JAFRY BIN ARIFFIN** MINISTER OF TOURISM, CULTURE AND ENVIRONMENT SABAH

#### **GREETINGS AND SALAM SABAH MAJU JAYA.**

I am delighted to welcome all of you from near and far to this Sabah Climate Change International Conference 2021. This conference is an excellent platform to learn from one another on how we can tackle climate change issues locally and globally. As the Minister of Tourism, Culture and Environment, I am proud to say that Sabah is blessed with natural treasures such as beautiful and rich biodiversity, both on land and in the sea. We are stewards of these priceless natural treasures and we must take concrete actions to mitigate impacts of climate change. The Action Plans for the Sabah State Policy on the Environment (2019-2033) was formulated to ensure an orderly implementation of the policy. Climate change related issues in Sabah such as coastal erosion and flooding, marine biodiversity and habitat, among others are included in the action plans. Therefore, we must work together more effectively to implement the action plans and contribute to the global actions to mitigate climate change.

**Datuk Jafry Bin Ariffin** Minister of Tourism, Culture and Environment Sabah

## **FOREWORD**



DATUK Sr. HAJI MOHD YUSRIE ABDULLAH PERMANENT SECRETARY MINISTRY OF TOURISM, CULTURE AND ENVIRONMENT SABAH

Welcome and Selamat Datang to the Sabah Climate Change International Conference 2021. I am grateful for your presence during this conference, and I hope you will gain valuable insights from the myriads of interesting keynote papers as well as the presentations from four themes namely ecosystem and environmental change, low carbon and clean energy, resilient communities and corporate climate powershift. The participation of youths in this conference is pertinent as the inevitable onset of climate change directly impacts and threatens their future. I invite all of you to maximise the opportunity to reflect on the state of our environment, gain knowledge and to have a meaningful discourse during this conference.

Datuk Sr. Haji Mohd Yusrie Abdullah **Permanent Secretary** Ministry of Tourism, Culture and Environment Sabah

## **FOREWORD**





PETRONAS welcomes all of you to the Sabah Climate Change International Conference (SCCIC) 2021 physically in Kota Kinabalu, Sabah, and virtually from around the world.

Climate change is one of the most pressing and urgent challenges humanity is facing today. The 26th UN Climate Change Conference of Parties, also known as COP26, was just recently concluded in Glasgow. The conference saw world leaders and nations come together to discuss and reach a level of consensus on the collective actionable steps that must be taken to drastically reduce carbon emissions. As the international community accelerates measures to tackle climate change, the SCCIC 2021 comes at a timely moment for us to share ideas and best practices, and bring action plans closer to home.

PETRONAS recognises our responsibility as a global energy player to sustainably produce safer, cleaner, reliable energy. We are determined to take a holistic approach to sustainability through our Sustainability Agenda which encompasses the four lenses of Continued Value Creation, Safeguard the Environment, Positive Social Impact and Responsible Governance. To this end, we have declared our aspiration to achieve net zero carbon emissions by 2050, driven by the need to build a more sustainable business against the backdrop of operational excellence, technology and innovation delivery, and responsible governance.

As an organisation, PETRONAS is positioning itself to be part of the solution, in line with our purpose as a progressive energy and solutions partner, enriching lives for a sustainable future. Moving the world towards a just transition will require the collective effort of stakeholders at all levels, and we are prepared to partner and collaborate towards developing innovative energy solutions in contributing to this positive change.

Sabah is a key partner to PETRONAS, both in the development of Malaysia's energy resources, as well as in our energy transition journey. The proposed development of the state's first nearshore LNG plant reflects PETRONAS' commitment to continue developing LNG as a cleaner source of energy, while innovating contemporary solutions to monetise gas resources in an optimised and environmental-friendly manner. As part of our continuing commitment to conduct and grow business in ways that contribute positively to society and the environment, we have invested consistently over the years in education and human capital development. We have also partnered with Yayasan Sabah Group towards the conservation of Imbak Canyon, bettering the environment through biodiversity research, conservation and carbon neutral programmes.

On that note, I wish to record our appreciation to the Sabah State Government, Ministry of Tourism, Culture and Environment and Environment Protection Department for the opportunity extended to PETRONAS as a strategic partner in organising this conference. I hope that you will find the following papers and presentations to be intellectually enriching, and that the greater understanding that arises from the sharing will inspire further collaborative action towards mitigating the effects of climate change.

Finally, please allow me to wish you a successful and fruitful conference.

Thank you.

Datuk Tengku Muhammad Taufik **President and Group CEO PETRONAS** 

## CONFERENCE PROGRAMME

## CONFERENCE DAY 1: 14 DECEMBER 2021 (TUESDAY)

	EREITOE DAT 1: 14 DECEMBER 2021 (10ESDAT)
TIME	PROGRAMME
8.30 am – 9.00 am	Registration
9.00 am	Arrival of Yang Berbahagia Datuk Sr. Haji Mohd Yusrie Abdullah, Permanent Secretary, Ministry of Tourism, Culture and Environment Sabah
	Arrival of Tengku M. Taufik Tengku Kamadjaja Aziz, President & Group Chief Executive Officer of PETRONAS
9.20 am	Arrival of Yang Berbahagia Datuk (Datu) Rosmadi Datu Sulai, Director-General of Sabah State Civil Service Department
	Arrival of Yang Berhormat Datuk Seri Panglima Sr. Haji Safar Bin Untong, Sabah State Secretary
	Arrival of Yang Berhormat, Datuk Jafry Bin Ariffin, Minister of Tourism, Culture and Environment Sabah
9.30 am	Arrival of Yang Amat Berhormat Datuk Seri Panglima Haji Hajiji Haji Noor, The Right Honourable Chief Minister of Sabah
	Cultural performance by Sabah Cultural Board (Sambut tamu)
9.35 am	Negaraku Sabah Tanah Airku
9.40 am	Sabah Maju Jaya
9.45 am	Welcoming Remarks by Tengku M. Taufik Tengku Kamadjaja Aziz, President & Group Chief Executive Officer of PETRONAS
9.55 am	Officiating Speech by Yang Amat Berhormat Datuk Seri Panglima Haji Hajiji Haji Noor, The Right Honourable Chief Minister of Sabah
10.20 am	Presentation of Memento from Tengku M. Taufik Tengku Kamadjaja Aziz, President & Group Chief Executive Officer of PETRONAS to Yang Amat Berhormat Datuk Seri Panglima Haji Hajiji Haji Noor, The Right Honourable Chief Minister of Sabah
10.25 am	Group photo
10.30 am - 10.50 am	Tea Break
10.50 am - 11.05 am	Keynote Paper 1 Addressing Climate Change Challenges to Foster a Sustainable Global Future Prof. Dr. Tan Sri Zakri Abd Hamid Chairman (Atri Advisory), Ambassador & Science Advisor (Campaign for Nature), Malaysia
11.05 am - 11.20 am	Keynote Paper 2 Climate Change Adaptation Actions in Malaysia Dato' Seri Ir. Dr. Zaini bin Ujang Secretary General, Ministry of Environment and Water Malaysia

## CONFERENCE DAY 1: 14 DECEMBER 2021 (TUESDAY)

-TIME	PROGRAMME
TIME	PROGRAMME
11:25 am - 11.30 am	Session 1 : Ecosystems and Environmental Change Chairperson : Dr. Robert Ong (Deputy Chief Conservator of Forests (Research and Development), Sabah Forestry Department)
11.30 am - 11.45 am	Paper 1.1  'Tackling Climate Change Through Sustainable Forest Management and Community Development' in Sabah, The Sabah EU-REDD+ Project Experiences  Mdm. Rosila Anthony, Mr. Joseph Pirin & Mdm. Heidi Henry William Sabah Forestry Department, Sabah, Malaysia
11.45 am - 12.00 pm	Paper 1.2 Sabah Parks Approach: Area-Based Ecosystems Conservation Mr. Ludi Apin Sabah Parks, Sabah, Malaysia
12.00 pm - 12.15 pm	Paper 1.3 Future Surface Temperature and Precipitation in Borneo Island Under Climate Change Scenarios Assoc. Prof. Dr. Justin Sentian Universiti Malaysia Sabah, Sabah, Malaysia
12.15 pm - 12.30 pm	Paper 1.4 Priority Actions for Protecting Malaysia's Biodiversity Against the Impacts of Climate Change Dr. G Balamurugan ERE Consulting Group, Malaysia
12.30 pm - 12.45 pm	Paper 1.5 Building Reef Resilience Through Co-Management on Tioman Island Marine Park Mr. Alvin Chelliah, Ms. Chen Sue Yee & Mr. Julian Hyde Reef Check (Malaysia)
12.45 pm - 1.45 pm	Lunch Break
1.45 pm - 2.00 pm	Paper 1.6 Protected Areas and Landscape Connectivity Benefits to Support Biodiversity Responses to Climate Change Prof. Jane Hill University of York, United Kingdom
2.00 pm - 2.15 pm	Paper 1.7 The Road to Recovery of Tropical Asian Forests: A Synthesis of Evidence From Restoration Experiments Dr. Lindsay F. Banin (UK Centre for Ecology & Hydrology), Professor David FRP Burslem (University of Aberdeen) & Dr. Beth Raine (UKCEH), United Kingdom
2.15 pm - 2.30 pm	Paper 1.8 Embedding Biodiversity And Resilience into reforestation: The 10 Golden Rules Dr. Kate A Hardwick Kew Gardens, London, United Kingdom
2.30 pm - 2.35 pm	Session 2 : Corporate Climate Powershift (Chairperson: Mdm. Mary Malangking Deputy Permanent Secretary II, Ministry of Tourism, Culture and Environment, Sabah, Malaysia)

## CONFERENCE DAY 1: 14 DECEMBER 2021 (TUESDAY)

TIME	PROGRAMME
2.40 pm - 2.55 pm	Paper 2.1 Tourism and Adaptation to Climate Change Mdm. Noredah Othman Sabah Tourism Board, Sabah, Malaysia
2.55 pm - 3.10 pm	Paper 2.2 Why Climate Governance Is Needed For Increased Climate Ambition Dato' Seri Ahmad Johan Mohammad Raslan Climate Governance Malaysia
3.10 pm - 3.25 pm	Paper 2.3 PETRONAS: To Pursue Profitable Growth with Net Zero Carbon Emissions Mr. Thirupathi Rao AL Narayanamoorthy PETRONAS Group Health, Safety, Security & Environment (GHSSE), Malaysia
3.25 pm - 3.40 pm	Paper 2.4 Beyond Net Zero: From Incremental to Exponential Solutions Mr. Geoff Lye South East Asia Rainforest Research Partnership (SEARRP), United Kingdom
3.40 pm - 4.00 pm	Tea Break
	Youth Forum
4.00 pm - 4.15 pm	Youth Paper 1
4.15 pm - 4.30 pm	Youth Paper 2
4.30 pm	End of programme for Day 1



## CONFERENCE DAY 2: 15 DECEMBER 2021 (WEDNESDAY)

TIME	PROGRAMME
8.30 am – 8.45 am	Keynote Paper 3 Sabah and Climate Change: Actions and the Way Forward Datuk Sr. Haji Mohd Yusrie Abdullah Permanent Secretary Ministry of Tourism, Culture and Environment, Sabah, Malaysia
8.45 am – 9.00 am	Keynote Paper 4 Mitigating Climate Change Through Forest-Based Carbon Financing: The Kuamut Rainforest Conservation Project Datuk Dr. Glen Reynolds Director of Southeast Asia Rainforest Research Partnership (SEARRP), Sabah, Malaysia
9.05 am - 9.10 am	Session 3 : Resilient Communities (Chairperson: Mdm. Monique Sumampouw, Head of Marine Programme, WWF Malaysia-Sabah)
9.10 am – 9.25 am	Paper 3.1 Embracing Environmental Sustainability in Sarawak through Environmental Education (EE) programmes Mr. Paul Bond Chamberlin & Mdm. Nur Aida Bt Nur Azwan Natural Resources and Environment Board, Sarawak, Malaysia
9.25 am – 9.40 am	Paper 3.2 mayaPAS-JPAS: Virtual Climate Change Awareness Outreach to Sabah Schools Dr. Susan Pudin & Mdm. Nurfaeziane Nordin Environment Protection Department, Sabah, Malaysia
9.40 am – 9.55 am	Paper 3.3 The Value of Community Involvement in Increasing Resilience to Face The Impacts of Climate Change in Mabul Island Mdm. Rojaniah Jawalani, Mr. Gavin Jolis. Dr. Farrah Anis Fazliatul Adnan & Dr. Justin Sentian WWF-Malaysia, Universiti Malaysia Sabah, Malaysia
9.55 am – 10.10 am	Paper 3.4 Supporting Climate Resilience and Adaptability of Indigenous and Local Communities through the Democratisation of Data with Citizen Science and Open Data Tool-Kits Mr. Neville Yap Forever Sabah, Malaysia
10.10 am -10.25 am	Paper 3.5 Community Resilience and Adaptation on Climate Change Mr. Nasiri Sabiah PACOS Trust, Sabah, Malaysia
10.25 am -10.40 am	Tea Break
10.40 am -10.55 am	Paper 3.6 Climate Change Awareness Through Environmental Education Highlighting an International Collaboration Between the Sabah State Government and Conference of Earth Environment from Akita, Japan Mdm. Daisy Aloysius, Dr. Dayang Siti Maryam binti Mohd. Hanan & Mdm. Ailen Ganing Environment Protection Department, Sabah, Malaysia

## CONFERENCE DAY 2: 15 DECEMBER 2021 (WEDNESDAY)

TIME	PROGRAMME
10.55am– 11.10 am	Paper 3.7 The Institution for Actions against Climate Change at Local Administration in Japan and its Introduction to Sabah, Malaysia Dr. Jiro Iguchi Conference Of Earth Environment, Akita (CEEA), Japan
11.10 am- 11.25 am	Paper 3.8 Environmental Education; Our Greatest Climate Change Communication Tool Prof. Mary Helen Gagen Swansea University, United Kingdom
11.25 am - 11.40 am	Paper 3.9 Resilience in communities faced with the Climate Crisis Dr. Bernie Jones (Smart Villages Research Group) & Prof. Sir Brian Heap (Centre of Development Studies, University of Cambridge), United Kingdom
11.40 am - 11.55 am	Keynote Paper 5 Life Cycle Thinking in Addressing Climate Change Dr. Salmaan Hussain B Inayat Hussain Interim Head, Environment, Social Performance & Product Stewardship PETRONAS, Malaysia
12.00 pm - 12.05 pm	Session 4 : Low Carbon and Clean Energy Chairperson: Mr. Raymondee Junior Julius, Head (OIM-OGF) PETRONAS Iraq
12.05 pm - 12.20 pm	Paper 4.1 PETRONAS Efforts Towards Low Carbon & Clean Energy Mdm. Raidah Rahim PETRONAS Carigali Sdn Bhd - Sabah Asset, Malaysia
12.20 pm - 12.35pm	Paper 4.2 PETRONAS: Diversifying Energy Supply Mr. Sy Malek Faisal Sy Mohamad General Manager (Business Development) PETRONAS, Malaysia
12.35 pm - 1.35 pm	Lunch Break
1.35 pm - 1.50 pm	Paper 4.3 Sabah Electricity Supply Situation, Outlook and Challenges Towards Net Zero Emissions by 2050 Mr. Terrence Kouju Sabah Electricity Sdn Bhd (SESB), Sabah, Malaysia
1.50 pm - 2.05 pm	Paper 4.4 The Impact of Community Based Micro Hydro Mini Grid System in Creating Low Carbon Society Mr. Adrian Lasimbang TONIBUNG, Sabah, Malaysia
2.05 pm - 2.20 pm	Paper 4.5 Sime Darby Plantation's Journey in Response to Climate Change Action Mdm. Arnina Hussin & Mdm. Siti Norralakmam Binti Yahya Sime Darby Plantation Bhd, Malaysia
2.20 pm - 2.35 pm	Paper 4.6 Iskandar Malaysia – Charting Towards Low Carbon Region Mdm. Kamisah Mohd Ghazali Iskandar Regional Development Authority, Johor Bharu, Malaysia

## CONFERENCE DAY 2: 15 DECEMBER 2021 (WEDNESDAY)

TIME	PROGRAMME
2.35 pm - 2.50 pm	Paper 4.7 Financing the Energy Transition in the ASEAN Mr. Pradeep Tharakan Asian Development Bank (ADB), Manila, Philippines
2.50 pm - 3.05 pm	Paper 4.8 Role of Renewable Energy in Meeting Net-zero Emission Target of Indonesia Mr. Paul Butarbutar Indonesia Renewable Energy Society, Jakarta, Indonesia
3.05 pm - 3.20 pm	Paper 4.9 Negative emissions: Removing atmospheric carbon dioxide from the atmosphere via enhanced rock weathering on an oil palm plantation in Sabah Malaysia Prof. Rachael James School of Ocean and Earth Science University of Southampton, United Kingdom
3.20 pm - 3.50pm	Tea Break
3:50 pm	Arrival of Yang Berbahagia Datuk (Datu) Rosmadi Datu Sulai, Director-General of Sabah State Civil Service Department
3.55 pm	Arrival of Yang Berhormat, Datuk Jafry Bin Ariffin, Minister of Tourism, Culture and Environment Sabah
4.00 pm	Our Voice on Climate Change
4:15 pm	Closing Speech by Yang Berhormat, Datuk Jafry Bin Ariffin, Minister of Tourism, Culture and Environment Sabah
4.35 pm	Group Photo End of Conference Tea Break





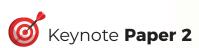




**Addressing Climate Change Challenges** to Foster a Sustainable Global Future

Prof. Dr. Tan Sri Zakri Abd Hamid Chairman (Atri Advisory), Ambassador & Science Advisor (Campaign for Nature)





**Climate Change Adaptation Actions in Malaysia** 

Dato' Seri Ir. Dr. Zaini bin Ujang Secretary General, Ministry of Environment and Water Malaysia





Sabah and Climate Change: **Actions and the Way Forward** 

Datuk Sr. Haji Mohd Yusrie Abdullah **Permanent Secretary** Ministry of Tourism, Culture and Environment, Sabah, Malaysia







**Mitigating Climate Change Through Forest-Based Carbon Financing: The Kuamut Rainforest Conservation Project** 

**Datuk Dr. Glen Reynolds Director of Southeast Asia Rainforest Research** Partnership (SEARRP)





### Life Cycle Thinking in Addressing Climate Change

Dr. Salmaan Hussain B Inayat Hussain Interim Head, Environment, Social Performance & Product Stewardship **PETRONAS** 

## ABSTRACTS

## Session 1: Ecosystems and Environmental Change

#### Chairperson:

Dr. Robert Ong
Deputy Chief Conservator of Forests Research and Development,
Sabah Forestry Department



## **TACKLING CLIMATE CHANGE THROUGH** SUSTAINABLE FOREST MANAGEMENT AND **COMMUNITY DEVELOPMENT' IN SABAH, THE** SABAH EU-REDD+ PROJECT EXPERIENCES

#### Rosila Anthony<sup>1</sup>, Joseph Pirin<sup>2</sup>, Heidi Henry William<sup>3</sup>

'Head (Forest Sector Planning Division) cum Project Coordinator, Sabah EU-REDD+ Project, Sabah Forestry Department <sup>2</sup>Project Officer, Sabah EU-REDD+ Project, Sabah Forestry Department, <sup>3</sup>Senior Planning Officer, Sabah Forestry Department

> Email: rosila.anthony@sabah.gov.my<sup>1\*</sup>, joseph.pirin@sabah.gov.my<sup>2</sup>, heidihenry.william@sabah.gov.my<sup>3</sup>

#### **ABSTRACT**

The Sabah-EU REDD+ Project is a European Union (EU) funded project entitled Demonstration Initiative on Community Based Forest Management and REDD Plus in Sabah under the EU's programme on "Tackling Climate Change through Sustainable Forest Management and Community Development". It is an 8-year project which started on 05 December 2013 and ends on 30 November 2021. The overall objective is to contribute to the sustainable and low carbon development of Sabah, with the specific objective to enhance Sabah's REDD+ readiness through the implementation of REDD+ activities, by strengthening communities' engagement in forest protection and pro-poor sustainable forest management. Over the years, the Project has assisted in developing sustainable alternative livelihood activities for the communities living adjacent to forest reserves in the three REDD+ demonstration sites, namely at Kg Gana, Kota Marudu; the riparian areas along Sg Kinabatangan in Kota Kinabatangan, and within the Kinabalu Ecolinc area around Kinabalu Park, Ranau. Through the Project, more than 1,350 ha of degraded forest areas have been restored and rehabilitated with at least 450,000 trees planted. Critical forest patches were connected to provide forest connectivity through the set-aside of some 4,205 ha of critical lands by the local communities and the private companies such as the oil palm plantation. This paper outlines the results as well as lessons learnt from the community engagement initiatives, particularly on community-based monitoring approaches in the three REDD+ demonstration sites. It also highlights the cross-sectoral approach in mainstreaming conservation within a multi stakeholder' landscape involving oil palm sector, tourism sector and non-government organizations, who share a common vision to enhance the forest connectivity in areas affected with deforestation and forest fragmentation.

#### **KEYWORDS:**

REDD+, Climate Change, Sustainable Forest Management, Community Development, Forest Connectivity, Cross-Sectoral Approach.

### SABAH PARKS APPROACH: AREA-BASED ECOSYSTEMS CONSERVATION

#### **Ludi Apin**

Deputy Director, Sabah Parks, P.O. Box 10626, Block H, KK-Times Squares, Kota Kinabalu Email: apinludi@gmail.com

#### **ABSTRACT**

The term "ecosystem services" is increasingly being used by practitioners, scientists, and policymakers to describe the mixture of benefits that society derives from our natural environment. One of their main messages is that the preservation of all of these benefits is contingent on how well we care for our unique natural biodiversity and the ecological structures that support it. After all, we are dependent on these ecosystems. As our environments deteriorate, so do the services we provide. We have incorporated the concept of ecosystem services into our approach to managing biodiversity, water, primary industries, human settlements, regional planning, and climate change. It is also changing people's perceptions of sustainable environmental management and igniting new approaches to landscape resilience management. Despite scientific advancements in ecosystem services, there is still debate about how to measure, monitor, and value many services. As a result, so far, the Parks or Protected Areas system is the best way to preserve functional Ecosystem Services. Any areas in developing countries that are not designated for legal management and protection are destined to degrade quickly, preventing socio-economic development. The challenge, as a result of the sporadic and isolated declaration, is how well the terrestrial ecosystems connected to the coastal marine ecosystem can perform their full range of services. Given the scarcity of pristine areas for a larger area of conservation, Sabah Parks recognises the three UNESCO Programmes, namely, World Heritage Site, Man and Biosphere, UNESCO Global Geopark, and potential Other Effective Conservation Measures (OECM) of IUCN, such as Community Conserved Areas, as the way forward for involving stakeholders in conservation and sustainability.

#### **KEYWORDS:**

Ecosystem Services, Sustainable Environmental Management, Landscape Resilience Management, World Heritage Site, Man and Biosphere, UNESCO Global Geopark, Community Conserved Areas.

## **FUTURE SURFACE TEMPERATURE AND** PRECIPITATION IN BORNEO ISLAND UNDER **CLIMATE CHANGE SCENARIOS**

#### **Justin Sentian**

Climate Change and Polar Research Group (CCPRG), Faculty of Science and Natural Resources, Universiti Malaysia Sabah

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#### **ABSTRACT**

Climate change effects analysis on the surface temperature and precipitation are essential for the assessment of impact vulnerability, and mitigation and adaptation strategies. Climate models can provide projections of climatic changes in the future, based on greenhouse gas emissions scenarios. In this study, the Weather Research and Forecasting (WRF) climate model was used to project and evaluate the future changes (2050 and 2100) of surface temperature and precipitation for the island of Borneo using the RCP4.5 and RCP8.5 emissions scenarios during winter monsoon (January) and summer monsoon (July). A general increase of mean surface temperature from the year 2050 to 2100 of 0.6 - 0.9°C (January), and 0.7 - 1.5°C (July) under RCP4.5, while more pronounced changes were observed for the same period under RCP8.5 of 0.5 - 2.0°C (January), and 1.2 - 2.5°C (July). Comparatively, this region is expected to experience a warming atmosphere under a higher greenhouse gas emissions scenario at the end of this century. In the case of regional total precipitation, great variability was observed for the same period, whereby a decrease of mean values up to 56% and 53% during winter monsoon (January) under RCP4.5 and RCP8.5 respectively. During the summer monsoon (July), an increase of mean values up to 61% and 28% were observed under RCP4.5 and RCP8.5 respectively. It is projected to see a shift in future monsoonal conditions, whereby more precipitation is expected during the dry period (July) and less rain during the wet period (January). This study contributes to the analysis of climate change impacts in the island of Borneo, which is considered as one of the hotspots of global warming, enhancing the use of modeling tools to investigate possible future scenarios.

#### **KEYWORDS:**

Borneo, Climate Change, Precipitation, Surface Temperature, WRF Model.

# PRIORITY ACTIONS FOR PROTECTING MALAYSIA'S BIODIVERSITY AGAINST THE IMPACTS OF CLIMATE CHANGE

#### Dr. G Balamurugan

ERE Consulting Group, 9, Jalan USJ 21/6, 47630 Subang Jaya, Malaysia

Email: gbm@ere.com.my

#### **ABSTRACT**

Malaysia is a global biodiversity hotspot, with diverse and complex ecosystems ranging from incredible coral reefs and marine fisheries, coastal mangrove systems, montane and lowland tropical rainforests to wetlands. As with all countries, Malaysia's biodiversity is also under pressure from the impacts of climate change. Although there is much uncertainty about the likely magnitude of impacts, but it is clear that there will be potentially significant impact on flora and fauna – including the loss of ecosystems and as well as changes in distribution and movements of species. This presentation will highlight these potential impacts and discuss the priority actions that are needed for protecting Malaysia's biodiversity.

#### **KEYWORDS:**

Malaysia's Biodiversity, Impacts of Climate Change, Loss of Ecosystems, Flora and Fauna, Changes in Distribution, Movements of Species, Potential Impacts, Priority Actions.

## **BUILDING REEF RESILIENCE THROUGH CO-MANAGEMENT ON TIOMAN ISLAND** MARINE PARK

Alvin Chelliah<sup>1\*</sup>, Chen Sue Yee<sup>2</sup> & Julian Hyde<sup>3</sup>

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#### **ABSTRACT**

Resilience refers to the ability of a coral reef to absorb and recover from disturbances and change, to adapt to future challenges and transform in ways that enhance its functioning positively. In 2013 Reef Check Malaysia conducted reef resilience survey around the Tioman Archipelago to identify and better protect resilient reefs within the marine protected area. A year later the Cintai Tioman programme was initiated to build social and ecological resilience towards climate change on the island by managing local threats. Island wide communication, education and public awareness programs were held to promote better understanding of coral reefs and the impacts they faced. Sustainable tourism programs were also introduced via assessments and certifications of snorkel guides, resorts, and scuba diving operators. The Tioman Marine Conservation Group, a team of local islanders were trained with skills and knowledge required to address the local threats. The formation of this group not only opened doors to islanders looking to participate in management but also created a platform to encourage communication and corporation among stakeholders and government. While reef health surveys have shown declines in live coral cover for many locations around Malaysia, coral cover around Tioman has not changed proving that local efforts can promote resilience.

#### **KEYWORDS:**

Coral Reefs, Resilience, Climate Change, Co-Management.

# PROTECTED AREAS AND LANDSCAPE CONNECTIVITY BENEFITS TO SUPPORT BIODIVERSITY RESPONSES TO CLIMATE CHANGE

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#### **ABSTRACT**

Rainforests on Borneo support exceptional concentrations of biodiversity, but many of these forest-dependent species are threatened by the conversion of rainforest to agricultural plantations. Climate change is also a threat if forest species fail to track climate changes because they cannot move through inhospitable non-forest landscapes. Methods to improve the environmental sustainability of palm oil cultivation involve conserving patches of natural forest which support high conservation values and store high carbon stocks. These protected areas of forest set-aside within oil-palm dominated landscapes can also improve landscape connectivity, acting as stepping stones and corridors to support species responding to climate change. This paper discusses the evidence for the best design of set-asides to conserve biodiversity under climate change, and how management practices could be implemented to improve their value for conserving nature and carbon. It also highlights research gaps and opportunities to restore nature in oil-palm dominated landscapes.

#### **KEYWORDS:**

Climate Change, Carbon Stocks, Conservation, Landscape.

## THE ROAD TO RECOVERY OF TROPICAL ASIAN **FORESTS: A SYNTHESIS OF EVIDENCE FROM** RESTORATION EXPERIMENTS

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#### **ABSTRACT**

There is a huge impetus to plant trees to offset carbon emissions and restore the ecological function of forests. Tropical forests in particular have the capacity to accumulate carbon quickly and can simultaneously deliver other ecosystem service benefits and secure local livelihoods - the 'triple-win'. Knowledge has been gained at specific sites but we lack a synoptic view on the efficacy of tree planting to help deliver these aims. Here, we present a synthesis of evidence on the survival and growth of planted seedlings and the biomass and biodiversity of regenerating forest plots from approximately 200 sites across tropical Asia, a restoration target hotspot. Reflecting on the evidence-base demonstrates variation in restoration outcomes and will help to guide effective restoration efforts in the future.

#### **KEYWORDS:**

Offset Carbon Emissions, Ecosystem Services, Forest, Restoration.

## **EMBEDDING BIODIVERSITY AND RESILIENCE INTO REFORESTATION:** THE 10 GOLDEN RULES

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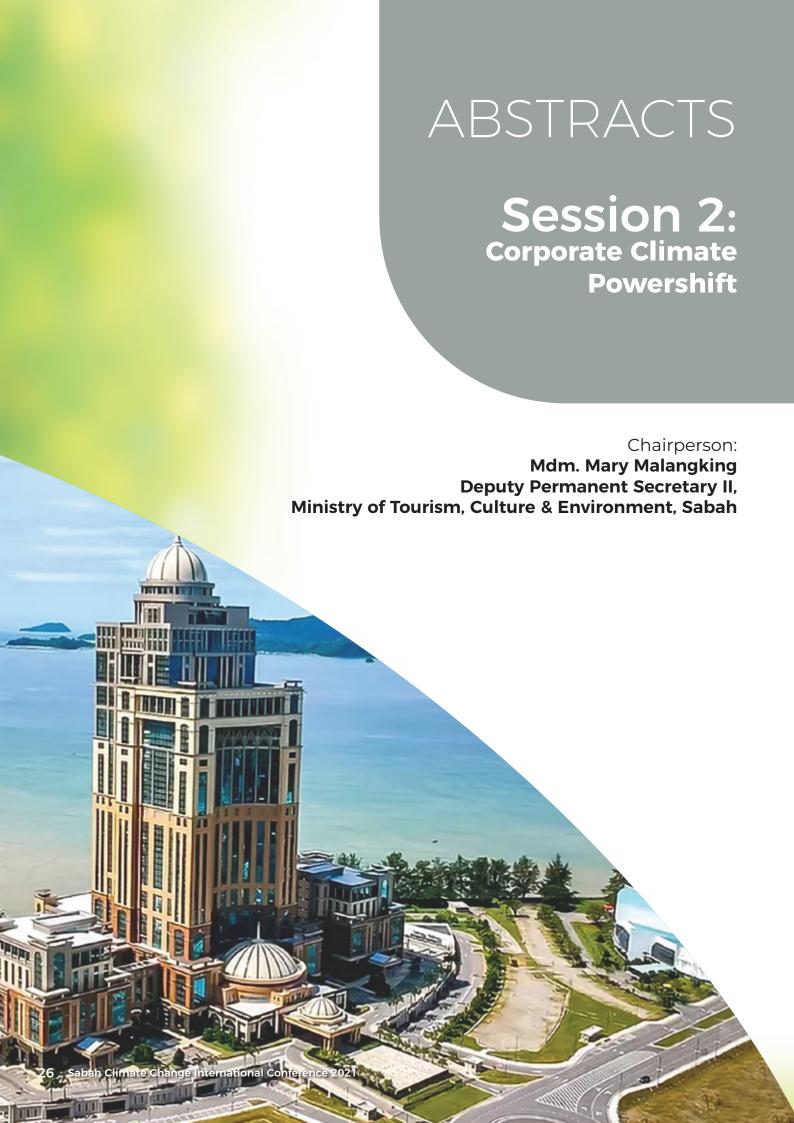
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#### **ABSTRACT**

Tree planting is often portrayed as an easy answer to the climate crisis, but a study led by RBG Kew and BGCI highlighted problematic issues with many global large-scale tree planting initiatives. The authors proposed '10 golden rules' for reforestation, focusing on protecting existing forest, involving and benefiting local communities and implementing measures to restore ecosystems that will be rich in biodiversity and resilient to climate and other environmental changes. Since the publication of this paper, the 'Kew Declaration on Reforestation for Biodiversity, Carbon Capture and Livelihoods' called for adherence to biodiversity safeguards and was signed was by 423 organisations and 2,612 individuals from 114 countries. At COP26 in Glasgow, UK, Botanic Gardens Conservation International announced the Global Biodiversity Standard, the world's first and only international certification to specifically recognise and promote the protection, restoration and enhancement of biodiversity - an important step towards implementing these objectives.

#### **KEYWORDS:**

Reforestation, Resilience, Climate Change, Biodiversity.



## TOURISM AND ADAPTING TO CLIMATE CHANGE

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#### **ABSTRACT**

Sabah has always been known for its eco treasures and outstanding biodiversity offerings in nature-based tourism attractions. With today's constant debate over climate change, the tourism sector is highly vulnerable to the changes and effects of climate change. Tourism is also the subject of criticism and climate instability will disrupt the industry in painful ways. So how can Sabah, as a nature tourism destination can take up this challenge of minimising the footprints of travellers and continue to be sustainable. What measures can we adopt as part of our responsible tourism practices? Can we make a difference? Where do we start? What will be our limitations to adapt to climate change?

#### **KEYWORDS:**

Outstanding Biodiversity, Nature-Based Tourism, Climate Change, Vulnerable, Climate Instability, Minimising the Footprints, Sustainable, Tourism Practices, Adapt to Climate Change.

## WHY CLIMATE GOVERNANCE IS NEEDED FOR **INCREASED CLIMATE AMBITION**

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#### **ABSTRACT**

This paper will give the corporate perspective in the Climate Change effort. Companies are a major part of the cause of climate change. Potentially, companies are also able to play a big part in fighting Climate Change and its effects. We do not have the luxury of time, and nor can we afford to retreat into antagonistic camps in the struggle against Climate Change. Therefore, this paper discusses the following to address the issue:

- 1. Why climate risks are important to businesses
- 2. Climate change the impact on businesses
- 3. The need got increased transparency & disclosure by companies
- 4. Overview of climate governance principles
- 5. No one party can do this alone Governments (national and States), scientists and academia, civil society and NGOs, young people, and companies (including the people who work in them, those who hold shares and those who manage them)
- 6. All need to work together. We can and should call each other out when we fail to live up to our responsibilities, but ultimately, we need to pull each other along in this journey
- 7. What do people think? How can this be improved?

#### **KEYWORDS:**

Corporate Perspective, Climate Change, Climate Risks, Climate Governance Principles.

## **PETRONAS:** TO PURSUE PROFITABLE GROWTH WITH NET ZERO CARBON EMISSIONS

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#### **ABSTRACT**

This paper will share the basic knowledge of PETRONAS's statement of purpose and long term Aspiration of Net Zero Carbon Emissions by 2050. PETRONAS's statement of purpose is to be "A progressive energy and solutions partner enriching lives for a sustainable future". PETRONAS seeks to advance sustainability strategies from four lenses of sustainability namely Continued Value Creation, Safequard the Environment, Positive Social Impact, as well as Responsible Governance. The motivation for the PETRONAS's new aspiration is to achieve "Net Zero Carbon Emissions by 2050" which has been announced by the PETRONAS's presidents in October 2020. PETRONAS is committed to pursue profitable growth with net zero carbon emissions aspiration with 3 strategies namely increase Scope 1 and 2 emissions-reduction efforts as they are the most commonly reported GHG emissions, scale-up renewables and low carbon solutions, as well as optimize the use of forest-based carbon offsets. The four-building blocks of operational excellence, low carbon energy solutions, accelerate technology development and innovation, and offset carbon emissions to balance towards net zero are determined as the levers for Petronas to achieve net zero carbon emissions. PETRONAS believed that both business and society can be balanced if they take the responsibility to reduce the carbon emissions. The ultimate goal is to achieve Just Transition, where PETRONAS will continue to contribute to the capability development of employees, contractors, as well as the communities by making sure that the opportunities of new socio-economic communities can be generated and benefited. The Just Transition from good condition of labor and work, protecting natural environment, and towards better life quality will be the ultimate goals of energy transition moving towards net zero carbon emissions. The sustainability agenda and long-term business aspiration of PETRONAS will be shared to shareholders through this paper.

#### **KEYWORDS:**

Net Zero Carbon Emissions, NZCE, Sustainability, Emissions-Reduction Efforts, Low Carbon Energy Solutions, Offset, Capability Development.

## **BEYOND NET ZERO:** FROM INCREMENTAL TO EXPONENTIAL **SOLUTIONS**

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#### **ABSTRACT**

It is now widely acknowledged that the 2020s will prove to be a tipping point towards climate 'breakdown' or 'breakthrough'. We have the knowledge, technologies and economic instruments to make the positive breakthroughs necessary to stay below 1.5 degrees. This will need, however, not only the political will of governments to act, but also - and more particularly - the critical role of the private sector in developing and implementing radical carbon-reducing innovations.Traditional corporate strategies of reducing negative environmental impacts are no longer equal to the challenge: incremental carbon reduction programmes need to be accelerated to exponential climate innovations. This talk will make the case for key actors to move beyond Net Zero to Climate Positive outcomes. It will reflect the vital role of corporations in focusing resources on climate solutions at scale; in extending their accountability beyond reducing carbon footprints; and in shifting to innovations with exponential positive climate outcomes. It will illustrate not only current market failures but also best practice from 'carbon capture and utilisation' (CCU) to geo-engineering solutions.

#### **KEYWORDS:**

Carbon-Reducing Innovations, Climate Innovations, Net Zero, Carbon Footprints, "Carbon Capture and Utilization" (CCU).

## ABSTRACTS

# Session 3: Resilient Communities





PAPER 3.1

## **EMBRACING ENVIRONMENTAL SUSTAINABILITY** IN SARAWAK THROUGH ENVIRONMENTAL **EDUCATION (EE) PROGRAMMES**

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#### **ABSTRACT**

The Natural Resources and Environment Board (NREB) Sarawak has emphasized the importance of all quarters of the society of its responsibilities to address issues such as global warming and climate change. Citing the old sayings of "think globally, act locally", efforts to protect the environment will only succeed if all stakeholders civil society, the private and public sectors work hand in hand towards the cause. NREB being the leading environmental agency in the State, with the rising challenges from the emerging environmental issues, the anticipated expansion of responsibilities resulting from the MA63 Transfer of Autonomy on Environment to the State Government, and to facilitate the State's recovery plan from severe impacts due to the unusual precedence of the Covid-19, has necessitated the NREB to revisit and review its strategies. These strategies ensure NREB effectively cope with the challenges and new mandates, together with its existing roles, functions and powers as stipulated in the Natural Resources and Environment Ordinance, 1993, "to provide information and education to the public regarding the protection and enhancement of the environment". This paper shares the knowledge, experiences and challenges in sustaining its environmental education (EE) programmes, awareness approaches and initiatives that strengthen resilience to climate change from Sarawak's perspective.

#### **KEYWORDS**:

Natural Resources and Environment Board (NREB) Sarawak, Leading Environmental Agency, Environmental Education (EE), Awareness Approaches, Climate Change.

**PAPER 3.2** 

# mayaPAS-JPAS: VIRTUAL CLIMATE CHANGE AWARENESS OUTREACH TO SABAH SCHOOLS

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#### **ABSTRACT**

The pandemic has thrown many unprepared for its myriads of consequences, including how we protect the environment. The Environment Protection Department (EPD) Sabah - as with many other organisations - had to swiftly re-organise strategies on enforcement, assessment, project implementation and environmental education in order to maintain its quality of service delivery as much as possible. Communication with each other is changed with new norms, and virtual interactions being the key tool of interaction. Environmental education is one of the tools in environmental management that requires a face-to-face interaction for it to be at its best. However, due to restrictions and Standard Operating Procedures (SOPs), virtual interaction is the best alternative for environmental education. EPD has introduced a virtual programme called "Pendidikan Alam Sekitar Secara Maya Jabatan Perlindungan Alam Sekitar" (mayaPAS-JPAS) or EPD's Virtual Environmental Education. This programme is offered to all primary and secondary schools in Sabah with the aim to extend outreach to as many schools as possible and to spread awareness on climate change and an environmentally-friendly school programme known as "Sekolah Rakan Alam Sekitar" (SERASI). Application for the programme is carried out online using a google form of which details of proposed date, number of students and teachers, schooling level (primary or secondary), and information of teacher-in-charge are required. The duration of programme is about two hours with talks on climate change and SERASI, video presentations and environmental quiz via online platform. The contents of the climate change talk include definition of climate change, connection of climate change and global warming, human activities contributing to the impacts of climate change, as well as actions that can be taken by society to reduce climate change. The contents were prepared as such to raise awareness and understanding of climate change and motivate students and teachers to play a role in addressing climate change. The talk on SERASI highlights background of the programme, its impacts since it began in 2003, award categories, criteria and how schools can participate the programme. It is planned that when the world slowly returns to some sort of normality and schools re-open state-wide, the awareness programme on climate change will be continued physically at school or outdoors to regain the connection only face-to-face interaction could provide.

#### **KEYWORDS:**

Environmental Education, Climate Change, Virtual Interaction, Pandemic, Primary Schools, Secondary Schools.

PAPER 3.3

# THE VALUE OF COMMUNITY INVOLVEMENT IN INCREASING RESILIENCE TO FACE THE IMPACTS OF CLIMATE CHANGE IN MABUL ISLAND

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#### **ABSTRACT**

This study is about the methods of how coastal communities are involved in the process to increase their resilience towards the impacts of climate change thus demonstrating the importance of community participation in the process. Coastal communities are no exception in experiencing the impacts of climate change which is a phenomenon that significantly affects human life and the environment. For example, in Mabul Island, the ecological and social resources on which the community depends, i.e. groundwater, coral reefs, the fisheries and tourism sectors are also affected. Groundwater was reported to be salty and not potable due to saltwater intrusion; coastal erosion occurs frequently damaging housing infrastructure and storms threaten the lives of fishermen who head to sea for fishing. This is the reality of communities that are highly vulnerable to the impacts of climate change. Therefore, the Local Early Action Plan initiative was introduced in Mabul Island to increase community resilience through adaptation measures and better prepare for natural disasters or other climate change impacts in the future. In response to the call at the state, national and regional levels to build resilient communities in the facing of impacts from climate change, the guidelines in the Local Early Action Plan itself puts the full community involvement with the support from government agencies or non-governmental organizations. In each activity performed, it uses different methods and obtains different results. In the Step 2 workshop, the community recorded climate change stories that led to creation of community mapping, seasonal calendars and timeline stories. In the Step 3 workshop, community members developed a resource vulnerability assessment table resulting from discussion of how climate change is impacting their resources. While in Step 4 workshop, the community together designed adaptation measures that are appropriate to be implemented. Thus, all activities such as education awareness talks, meetings, workshops and consultations provide the opportunity for the community to be involved in the decision making process, sharing climate stories and traditional knowledge which are among the key components that develop the adaptation plan document successfully.

#### **KEYWORDS:**

Climate Change, Climate Change Adaptation, Coastal Community, Local Early Action Plan, Mabul.

### SUPPORTING CLIMATE RESILIENCE AND ADAPTABILITY OF INDIGENOUS AND LOCAL COMMUNITIES THROUGH THE DEMOCRATISATION OF DATA WITH CITIZEN SCIENCE AND **OPEN DATA TOOL-KITS**

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### **ABSTRACT**

It is now recognised that the knowledge of Indigenous and local communities can play critical roles in mitigation of and adaptation to climate change. Bridging knowledge systems is often difficult. The history of science as a professionalised and quantitative enterprise has erected many constraints for the free flow of information between communities and scientific institutions. On the other hand, numerous experiments in collaborative research and citizen, science have demonstrated the great potential of research democratisation in recent years. This is especially the case in remote complex environments where conventional data sources often remain weak whilst local knowledge is unusually deep, and access for conventional scientists is difficult and expensive, even prior to COVID. However, in these contexts, even with brilliant and well-trained community researchers, managing the digitization, flow and analysis of data is often difficult. This presentation focuses on the practical experience of indigenous and local communities as citizen scientists who use tools like Open Data Kit (ODK) to connect field data collection with data management and analysis. Examples are provided from a variety of climate change mitigation and adaptation contexts including the Sabah Renewable Energy Rural Electrification Roadmap, a Rice Farming Transition Project and work on the resilience of the mangrove fisheries of the Lower Kinabatangan and Segama Wetlands. Citizen or civic science is research conducted, in whole or in part, by trained but amateur (i.e. nonprofessional) scientists; their engagement in studying issues on the ground is typically shown to contribute both to documenting patterns of change and to building public understanding and practical action. Open Data Kit (ODK) is a free, open-source suite of tools that allows data collection using Android mobile devices and data submission to an online server, even without an Internet connection or mobile carrier service at the time of data collection. The data collection process is streamlined using the application "QDK Collect" by replacing traditional paper forms with smart-phone ready electronic forms that allow text, numeric data, GPS, photo, video, barcodes, and audio uploads to an online server. The system also immediately digitizes data for analysis, allows for remote monitoring and real time support of the data collectors, and prevents delays and data loss between paper survey and analysis. Drawing on examples from our work we argue that citizen science with ODK may profoundly impact the future of both data gathering in general and scientific collaboration with Sabahan communities. This data democratisation approach can not only bring new knowledge to the table for scientists and planners, it also enables local communities to ask and answer their own questions and use the results of their work for their own climate change efforts.

### **KEYWORDS:**

Communities, Climate Resilience, Open Data Kit, Citizen Science.



### **COMMUNITY RESILIENCE AND ADAPTATION** ON CLIMATE CHANGE

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### **CLIMATE CHANGE AWARENESS THROUGH ENVIRONMENTAL EDUCATION HIGHLIGHTING AN** INTERNATIONAL COLLABORATION BETWEEN THE SABAH STATE GOVERNMENT AND CONFERENCE OF EARTH **ENVIRONMENT FROM AKITA JAPAN**

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#### **ABSTRACT**

Environmental education and dissemination of information regarding environmental issues namely climate change will be a key aspect of the Sabah State Policy on the Environment that was launched on the 12th April 2017. This too is closely in line with the Environment Protection Department (EPD) Sabah's fourth objective, which is to increase public awareness on the importance of restoration and protection of the environment. Specifically on the agenda of climate change in Sabah, the Policy states that all reasonable steps are to be taken to safeguard the air quality from deteriorating due to development activities within the State. It is the aspiration of the policy that Sabah will actively participate in national and global efforts to mitigate negative effects of climate change due to increase of greenhouse gases and to adapt to unavoidable global changes, that may affect the livelihoods of the people. To ensure orderly implementation of the Policy, the Government formulated the Sabah State Policy on the Environment (2019-2033) which was approved on 9th October 2019. In this document, the Action Plans cover climate change issues such as coastal erosion and coastal flooding, marine biodiversity and habitat, among other. EPD started its official international collaboration on climate change awareness with the Conference of Earth Environment from Akita (CEEA), Japan on 24th March 2017 until March 2019. The main objective of the collaboration was to increase awareness and change the behaviour of local communities in Sabah towards global warming and climate change. The collaboration between EPD and CEEA has proved to significantly contribute to advocating and raising awareness on global warming and Climate Change in Sabah, at the same time also highlighting the Sustainable Development Goals (SDGs) at State level. Within the collaboration period, EPD and related departments and organisations have conducted 153 climate change awareness programmes throughout the State involving 15,728 various target groups mainly primary and secondary schools. This collaboration is currently ongoing for the second phase as a growing realisation of the need to continue the efforts in elevating the awareness and knowledge of climate change issues to the people of Sabah.

### **KEYWORDS:**

Climate Change, Global Warming, Environmental Education, Collaboration, Programme.

### THE INSTITUTION FOR ACTIONS AGAINST CLIMATE **CHANGE AT LOCAL ADMINISTRATION IN JAPAN AND ITS INTRODUCTION TO SABAH, MALAYSIA**

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#### **ABSTRACT**

In Japan, Law Concerning the Promotion of the Measures to Cope with Global Warming was enacted in 1998. As stipulated in the law, an effective institution at the local administration level for promoting countermeasures against global warming was established, such as the prefectural promotion centres for climate change actions, assignment and training of the climate change action officers assigned among local citizens, etc. To learn lessons from the institution in Japan and apply it to Sabah, an international collaboration project for six years was planned and implemented to establish Sabah Centre for Climate Change Action in Sabah (SC3A) and develop its capacity with assistance from Japan. With financial assistance from the Environmental Restoration and Conservation Agency (ERCA) of Japan, the Environment Protection Department Sabah (EPD) implemented the project, with technical assistance from the Conference of Earth Environment from Akita (CEEA), an Environmental NGO based in Akita, Japan. This paper introduces the institution in Japan and reports the project in particular its 2<sup>nd</sup> phase. After the first phase of the project (2016-2019) which established SC<sup>3</sup>A at EPD, in the ongoing 2<sup>nd</sup> phase of the project (2019-2022), they are strengthening sustainability of SC3A from the institutional, technical, and financial points of view. Further training of instructors, preparation of training materials and institutionalisation of SC<sup>3</sup>A activities are being conducted, even under the pandemic of COVID-19.

#### **KEYWORDS:**

Climate Change, Collaboration, Technical Assistance, Capacity Building

### **ENVIRONMENTAL EDUCATION: OUR GREATEST CLIMATE CHANGE COMMUNICATION TOOL**

### Mary Gagen

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#### **ABSTRACT**

This paper explores how we can use environmental education and outreach to inspire action on climate change in communities. Environmental action does not come from the top down, but from the empowerment of communities to make change. Education is the most powerful environmental tool because education empowers us, and when we feel we can raise our voices up to protect what we love, real change happens. Through S4 (Swansea University Science for Schools Scheme) case studies have been developed in the UK and Borneo, exploring how to use environmental education and engagement to promote climate action in young people. S4 has worked with over 6000 school students, delivering hands-on science and environmental workshops such as "Myth Busting Climate Change, Hydrogen Cars of the Future, Super Cells and Busting Plastic Pollution". It is vital to make science more accessible for all. If students do not feel science is for 'people like me' we run the risk of future generations not finding a pathway into science; and science is at the heart of protecting our environment and building a sustainable future. At S4 we bring school students into the world of science and the environment, whatever their background. This paper discusses the delivery of a month-long environmental education programme, in Sabah in 2018 and the lessons learned about environmental education and outreach from the S4 project. This paper will also explore how S4 continued to offer experiential learning and outreach then the pandemic closed schools in 2020, as well as exploring case studies around online learning, at-home 'science kits' and outdoor experiential learning. Lastly, this paper also summarises S4's lessons for running successful environmental education and outreach programmes for inclusivity.

### **KEYWORDS:**

Outreach, Environmental Education, Public Engagement.

### RESILIENCE IN COMMUNITIES FACED WITH THE CLIMATE CRISIS

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#### **ABSTRACT**

The global climate crisis generated by the industrialisation of developed countries has resulted in massive inequalities, with the world's poor doing little to cause climate change but suffering the most. Indeed experience shows that it is precisely that lack of progress in development which makes communities not only more vulnerable to the effects of climate change, but also less able to fight or even protect against them. Integrated development initiatives in communities, which aim to address multiple development priorities with full buy-in, effective community ownership and governance, building social capital in communities as well as economic capital. Together, these give communities effective buffers and resources to be able to become more resilient to the effects of climate change, as well as the social tools and structures to be able to exert a greater degree of stewardship over their environment, reducing the likelihood of adverse climate change effects in their vicinity. These integrated development approaches, and community social capital-building activities vary from community to community, but tend to include access to energy, ICT and information as catalytic elements. Amongst other development outcomes, these give communities the ability to give voice to their own concerns, findings and observations, as well as benefiting from information from the outside world. As well as the tools and resources to make themselves more resilient, this then allows communities to engage more symbiotically with other similar communities, urban communities in their own countries, and internationally. To achieve net zero emission of greenhouse gases by 2050 and to build resilience and adaptation against this crisis needs an increase in these empowered "smart villages" and smart cities that work collaboratively and use clean and renewable sources of energy as a catalyst of development and transition, respectively. Exemplars of resilience show the importance of an integrated approach with green initiatives that use minigrids, access to technical capacities and services, equitable planning and policy frameworks, and affordable finance at scale from public and private sector involvement. Clean and sustainable electricity from distributed renewable sources helps to address food security and cooking, while information and communications technologies (ICT) empower youth by inclusive education and environmental awareness, better health services and future proofing against pandemics, and peoples' participation at local, regional and national levels of governance. The UN goals are clearly set out in its Sustainable Development Goal (SDG7) with a High-Level Dialogue in 2021 bringing together businesses, cities, foundations, youth and other civil-society representatives in Energy Compact commitments and partnerships for bold transformative action.

### **KEYWORDS:**

Climate Crisis, Climate Change, Integrated Development Initiatives, Communities, Resilience and Adaptation, Net Zero Emission, Smart Villages, Smart Cities, Clean and Renewable Sources, Integrated Approach, Public and Private Sector Involvement, Environmental Awareness, People-Participation.

# ABSTRACTS

## Session 4: Low Carbon and Clean Energy

### Chairperson:



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### **ABSTRACT**

This paper will share how PETRONAS is stepping out and embarking on renewable energy as part of its effort in future proofing the business. As an O&G player in the energy transition, PETRONAS has embraced the need to transform the way we conduct and operate our businesses. While fossil fuel is forecasted to remain as the largest portion in the energy mix till 2040 and remains as PETRONAS' core business for the foreseeable future, we continue to reshape and pivot our portfolio mix to place greater significance to advocate the use of cleaner sources of energy such as natural gas and renewables. Additionally, PETRONAS also sees the role of natural gas growing increasingly important during this transition, being the cleanest burning fossil fuel, which can complement renewables to provide uninterrupted supply of cleaner and clean energy. PETRONAS New Energy, continues to explore opportunities in Solar, Wind, Hybrid solutions together with storage technologies, to provide longer and more flexible solutions for clean energy generation. Through our presence in India, the UAE and Malaysia, we are open to collaborate with potential partners in achieving the Net Zero Carbon Emissions by 2050.

### **KEYWORDS:**

Net Zero Carbon Emissions, Sustainability, Emissions-Reduction Efforts, Low Carbon Energy Solutions, Offset, Renewable Energy.

### SABAH ELECTRICITY SUPPLY SITUATION, **OUTLOOK AND CHALLENGES TOWARDS NET ZERO EMISSIONS BY 2050**

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### **ABSTRACT**

More than 130 countries including Malaysia have already committed to net zero emissions by 2050 to limit global warming to 1.5 degrees Celsius. In Malaysia, the electricity supply industry was the highest contributor of CO2 emissions by sector in 2016 at 103,047 Gg CO2 equivalent to 39% of the country's total emission. To cut emissions and to meet Malaysia's commitment under the Paris Agreement, the government plans to increase the generation share of renewable energy (RE) in installed capacity to 31% by 2025 and 40% by 2035. Sabah currently has a RE mix of 15% or 218MW on grid. Sabah is still highly reliant on gas for power generation at 74% mix while the 11% capacity is from oil-based sources such as diesel and Medium Fuel Oil (MFO). The RE mix is expected to increase to 19% under current business as usual scenario, far from the 31% target set by Malaysia by 2025. Sabah has abundant RE resources including hydropower, solar, geothermal, biomass, biogas, and maybe some wind. However, there are costs and technical challenges in deploying more RE in Sabah. The cost factor is that the cost of supplying RE is still higher than the present generation cost from gas which is being regulated or subsidised by the government to well below the market price. Hence, taking up more RE will increase the electricity tariff for Sabah consumers. The technical factor is the electricity system in Sabah can only accept a maximum limit of 20% from intermittent sources such as Solar Photovoltaic (PV) and wind to ensure grid reliability and avoid curtailments. Going forward, the success of Sabah's energy transition plan requires solutions to these challenges whilst also being in line with the Sustainable Development Goal 7 of ensuring access to affordable, reliable, sustainable and modern energy for all.

### **KEYWORDS:**

Net Zero Emissions, Renewable Energy, Generation Cost, Electricity Tariff.

### THE IMPACT OF COMMUNITY-BASED MICRO HYDRO MINI GRID SYSTEM IN CREATING LOW **CARBON SOCIETY**

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### **ABSTRACT**

In achieving Goal 7 of the Sustainable Development Goals, community-based energy systems have been given much attention lately. In many developing countries renewable energy technologies such as micro hydro has been an option for rural electrification. Many community-based micro hydro projects have been implemented around the world including Malaysia. In Malaysia, TONIBUNG, a Non-Government Organisation based in Sabah has implemented over 30 community-based micro hydro systems since 2001. Micro hydro is a renewable energy technology used to generate electricity using flowing water with generation capacity in the range of 5kW to 100kW. Typically designed as a run off river system which does not require construction of large dams for water storage. Rely solely on what is the available flow of the river, hence directly rely on the watersheds to sustain the water flow. Community-based micro hydro system is managed and maintained by the communities. The most important component that needs to be maintained by the community apart from the structure and equipment of the micro hydro is the watershed areas. With possible threat due to climate change, communities need to find a solution to sustain the micro hydro systems. The community-based sustainable management model will benefit many other rural communities in Malaysia that have the same micro hydro system as in Ulu Papar, a region located in the upper Papar river in Sabah. This will increase the level of awareness and readiness of the communities on the threat and effects of climate change.

#### **KEYWORDS:**

Community-Based, Micro Hydro, Watershed Area, Climate Change, Awareness and Readiness.

### SIME DARBY PLANTATION'S JOURNEY IN **RESPONSE TO CLIMATE CHANGE ACTION**

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#### **ABSTRACT**

Reduction of operational carbon emission is one of Sime Darby Plantation (SDP) key initiatives in addressing the climate change agenda, with the aspiration to achieve 40% carbon reduction by 2030. The work on measuring the operational emission started way back in 2009 and since then SDP have been aggressively working towards sustainable solutions to reduce the operational carbon footprint. The Company embarked on renewable energy solutions to minimise the carbon emission with 11 biogas plants across its operations in Malaysia, Indonesia, and Papua New Guinea and another nine are scheduled to be up and running in 2022. Between 2023 to 2030, the Company is expecting to develop an additional 16 biogas plants to ensure that it meets its carbon reduction target. With the 11 biogas plants, SDP achieved a relative carbon emission reduction of 18%. Apart from the biogas plants, SDP is also actively pursuing solar, biomass utilisation, water recycling solutions and improvement in agronomic practices to reduce the carbon emission. Other initiatives that SDP had outlined in addressing the climate change agenda focused on the following:

- Implementing Nature-based Solutions (NBS) NBS to significantly contribute to SDP's global footprint reduction and offset;
- Eliminating Deforestation in Our Supply Chain 100% fully traceable and No Deforestation, Peat & Exploitation (NDPE) compliant supply chain by 2025;
- Adapting and Mitigating to Material Climate Risks 100% of material climate risks responded with adaptation and/or mitigation with progressive action plans in place; and
- Climate Change Related Governance & Disclosure Disclosures aligned with leading practices, e.g. TCFD and GHG Protocol.

### **KEYWORDS:**

Climate Change, Nature-based Solutions (NBS), Carbon Footprint, Renewable Energy, Biogas Plant.

# ISKANDAR MALAYSIA CHARTING TOWARDS LOW CARBON REGION

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### FINANCING THE ENERGY TRANSITION IN THE ASEAN

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## ROLE OF RENEWABLE ENERGY IN MEETING NET-ZERO EMISSION TARGET OF INDONESIA

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#### **ABSTRACT**

Indonesia's energy supply are still dominated by fossil fuel although abundant renewable energy sources are available in the country. One of the main reasons is since government still considered renewable energy more expensive than fossil, in particular coal. As part of the National Energy Policy renewable energy is expected to contribute 23% in the primary energy mix in 2025 and 31% in 2050 respectively. Indonesia has submitted Nationally Determined Contribution (NDC) to UNFCCC. Under the NDC, Indonesia commits to reduce 29% of GHG emission by 2030 with its own resources and this could be increased to 41% with international support. For the energy sector, this means Indonesia would reduce 314 millions tCO2 by 2030 with its own resources. Renewable energy would contribute almost 50% of this target. Other reduction would come from energy efficiency, fuel switching and clean coal technology. Government of the Republic Indonesia has announced the plan to meet the Net-Zero Emission target by 2060 or earlier. Renewable energy will play significant role in meeting this target since renewable energy would contribute much more then defined in the national energy policy.

### **KEYWORDS:**

Renewable Energy, Energy Efficiency, Net-Zero Emission.

### **NEGATIVE EMISSIONS: REMOVING ATMOSPHERIC CARBON DIOXIDE FROM THE ATMOSPHERE VIA** ENHANCED ROCK WEATHERING ON AN OIL PALM PLANTATION IN SABAH. MALAYSIA

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#### **ABSTRACT**

While significant reductions in greenhouse gas emissions are essential for managing the climate crisis, it is now apparent that limiting the increase in global temperature to less than 2 °C above pre-industrial levels cannot be achieved without active removal of carbon dioxide (CO<sub>2</sub>) from the atmosphere. Carbon dioxide can be removed from the atmosphere in a variety of ways- for example, by planting trees, or by direct air capture with subsequent burial in geological storage reservoirs. Enhanced rock weathering (ERW) is a technique that aims to speed up natural weathering processes that capture CO, and convert it to hydrogen carbonate ions (alkalinity) or soil carbonate, by amending agricultural soils with crushed silicate rocks and harnessing the photosynthetic energy of the crops to increase weathering rate. While model simulations have indicated that ERW could potentially remove between 0.5-2 Gt  $CO_2 yr^{-1}$  (up to 40% of that required to keep warming to <2 °C), there is a pressing need to confirm the efficacy of ERW as a CO<sub>2</sub> removal technique in large-scale field trials. We report results from the first field trials of ERW carried out on a palm oil plantation in Sabah, Malaysia. Crushed silicate rock was applied to three plots within the plantation at a rate of 50 tonnes ha<sup>-1</sup> yr<sup>-1</sup>, with three adjacent plots left untreated and monitored for reference. We quantify carbon dioxide removal, and the effects of soil amendment on water quality, palm oil yields and resistance to herbivorous attack. Our data indicate that rates of CO<sub>2</sub> removal by weathering of the tropical agricultural soils are very high, and soil amendment with crushed silicate rock has no detrimental effect on water quality.

### **KEYWORDS:**

Rock Weathering, Carbon Dioxide Removal, Agricultural Soil, Field Trials, Water Quality.

# Acknowledgement

The Ministry of Tourism, Culture and Environment Sabah, **Environment Protection Department Sabah and Southeast Asia** Rainforest Research Partnership (SEARRP) together with the main event sponsor PETRONAS would like to convey our sincere appreciation and gratitude to:

Chief Minister's Office

Ministry of Youth and Sports Sabah

Sabah State Computer Services Department

Sabah Tourism Board

Ceremonial and Protocol Division, Sabah

All departments and agencies of the Sabah State Government and Federal Government,

Private sector

Non-Governmental Organisations

Higher Institutions and Schools

Youths (participants of the Youth Mini Talk Series and Youth Climate Change Survey)

The Media

and all individuals

for making this meaningful conference a success.





SABAH CLIMATE CHANGE INTERNATIONAL CONFERENCE 2021