FNCA 2021 Study Panel AQUATIC SESSION

Nuclear and Isotopic Techniques for Blue Carbon Study Related to Climate Change in Indonesia

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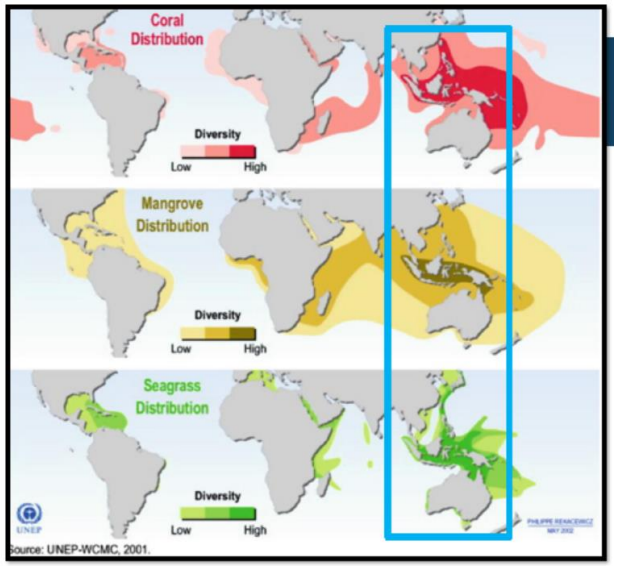
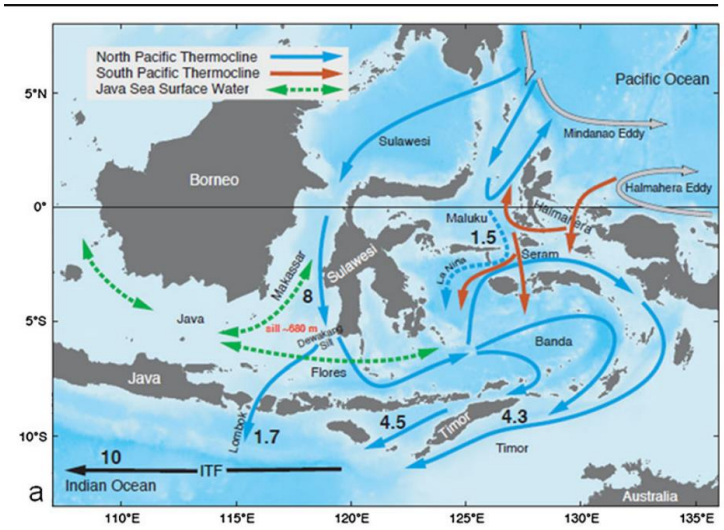
INTRODUCTION : CLIMATE CHANGE



Distribution of Coral reefs, Mangrove and Seagrass

INDONESIA: Country overview

- Indonesia is a vast tropical archipelago with more than 17,000 islands, 81,000 km of coastline, with 1/3 of land and 2/3 marine.
- Population of 257.6 million and 42 million people living on low-lying land.
- Biodiversity of Coral reefs (Coral Triangle Initiative), Mangrove and Seagrass.



Indonesian Throughflow (ITF)

(Source: Shanmugam, G, Geo-Mar Let 2011)

CLIMATE

- Rainfall ranging from 1800 – 3200 mm.
- Temperature varies little by season, average annual 23^{0}C.
- Climate is strongly influenced by El Niño Southern Oscillation (ENSO), warmer and drier weather in El Nino years and colder and wetter weather in La Nina years, and also IOD (Indian Ocean Dipole)

PROJECTED CLIMATE by 2050:

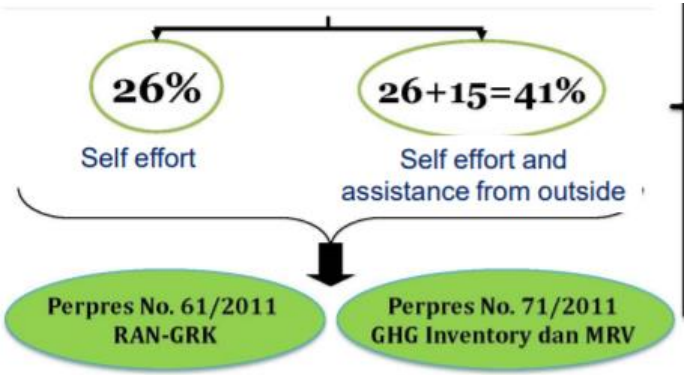
- Increased temperature of 0.8 – 2.0^{0}C.
- Increased frequency (3-23 %) and intensity (2-7%) heavy rainfall events
- Sea level rise of 150 – 450 mm

IMPACTS

- Degradation/loss of mangrove and increased coral bleaching.
- Decreased marine biodiversity and fish populations
- Increased rate of coastal erosion
- Decreased viability of fishing livelihoods

NATIONAL ACTION PLAN

1. President Commitment made at the G20 Meeting (Pittsburgh) and COP15 (Copenhagen) on Indonesia GHG Emission in 2020

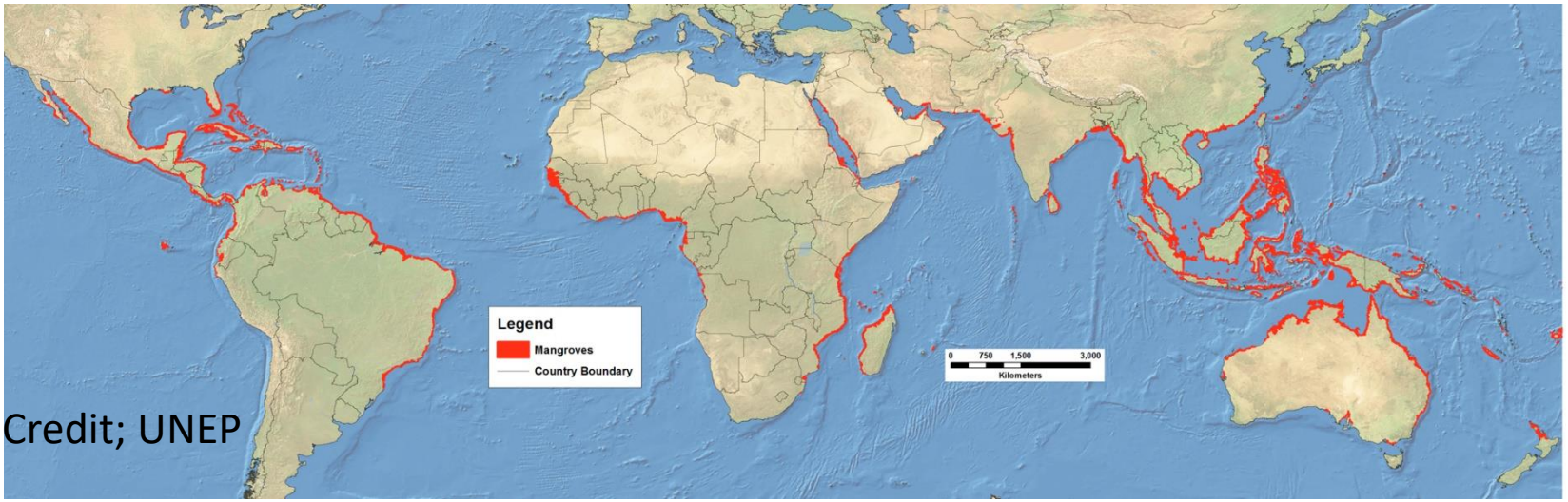


2. UNFCCC COP 21 in 2015 Paris Agreement to reduce the emission at least 29% in 2030.

3. Indonesia Medium Term Development Plan (RPJMN 2020-2024) launched the Low Carbon Development Indonesia initiative, which is the first low carbon development plan in Indonesia

BLUE CARBON

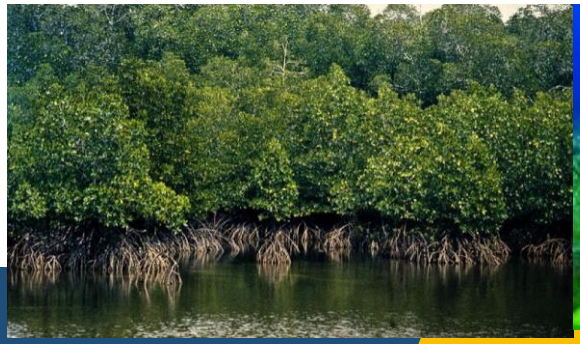
BLUE CARBON: Biological carbon captured by coastal-marine living organisms through photosynthetic process (ex. **Mangroves**, Seagrass, Seaweed and Chlorophyll)



Credit; UNEP

- Indonesia; about 23 % all mangrove ecosystems in the world.
- Mangroves are carbon-rich ecosystems that can hold up to three times as much carbon per hectare as terrestrial forests and about 80% are stored in the sediment.

- Coastal ecosystems: mangroves, tidal salt marshes, and seagrasses
- Benefits: mitigation and adaptation to the impacts of climate change by sequestering and storing significant amounts carbon, from the atmosphere and oceans.
- The services from coastal ecosystems: are essential for climate adaptation and resilience along coasts;
  - Protection from storm surge and sea level rise.
  - Erosion prevention along shorelines.
  - Nutrient recycling.
  - Sediment trapping.
  - Habitat provision for numerous commercially important and endangered marine species,
  - Food security for many coastal communities



UTILIZATION/APPLICATION NUCLEAR TECH.

The research is to provide the information on the flux of organic carbon and its sources in the coastal ecosystems through the Application of Nuclear and Isotopic Techniques for Identifying and Characterizing Sources of Blue Carbon.

1. IMPLEMENTATION SYSTEM:
   - Research on the Blue Carbon in the Coastal Mangrove and Seagrass
   - The research is by conducted in the field and analysis in the laboratory.
   - Fieldwork by doing transect of mangrove as well as seagrass to quantify the amount of organic carbon above ground.
   -

1. IMPLEMENTATION SYSTEM (cont):
   - Fieldwork & lab by doing sediment coring to quantify the amount of carbon stock as well as carbon accumulation rates below ground by using environmental isotope Pb-210 and/or C-14.
   - For identification of the sources of the organic carbon can be done by analysis of Stable Isotopes (C-13 and N-15) in sediment core.
   - Finally, by combining the data of above and below ground, we can quantify the carbon stock and the sources for a certain period depend on the dating techniques.

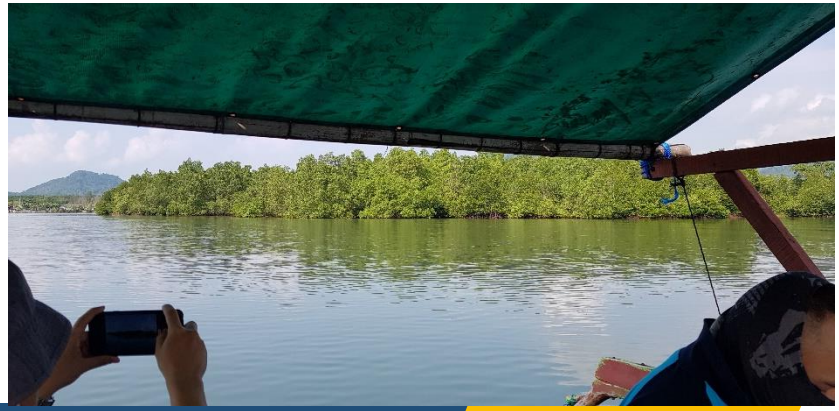
2. SUBJECT OF MONITORING; coastal/marine

3. Any challenges in its implementation;
   - Conducting transect of mangrove and seagrass.
   - Analysis of sediment for carbon flux in sediment and the dating techniques (using
   - Pb-210 and C-14).
   - More challenging in analyzing C-14 by AMS as only a few country have facility.

4. PUBLICATION OF RESULTS; the result of the study will be submitted to the government as a recommendation for the climate mitigation and adaptation. The publication is also in the journals

5. COLLABORATION;

- IAEA Technical Cooperation Project INS7008 “Applying Nuclear and Isotopic Techniques for Identifying and Characterizing Sources of Blue Carbon in Coastal Ecosystems”
- IAEA RCA RAS7031 “Assessing the Vulnerability of Coastal Landscapes and Ecosystems to Sea-Level Rise and Climate Change (RCA)”
- ANSTO “The lake archives from the tropics, with a main focus on the variability of the monsoon system over the past 10,000 years”.



Thank you