CLIMATE CHANGE EFFECT ON WIDW ASPECT OF HUMAN LIFE ABD STRATEGY TO COPE WITH IT

ANDI EKA SAKYA

President WMO RA V South West Asia Pasifics

1. INTRODUCTION;
2. IMPACT OF GLOBAL WARMING;
3. PROJECTION OF CLIMATE CHANGE IN INDONESIA;
4. COPING WITH CLIMATE CHANGE IMPACT;
5. CLOSURE.
INTRODUCTION;
Sea Level Rise

Sea level rise is caused primarily by two factors related to global warming:
1. added water from melting land ice;
2. expansion of sea water as it warms.

Sumber: [climate.nasa.gov/vital-signs/sea-level/](http://climate.nasa.gov/vital-signs/sea-level/)

Impact of Global Warming

Potentially triggering:
- Cooling of the Southern Ocean, especially in the Western Hemisphere;
- Slowing of the Southern Ocean overturning circulation;
- Slowdown and eventual shutdown of the Atlantic overturning circulation with cooling of the North Atlantic region;
- Increasingly powerful storms; and
- nonlinearly growing sea level rise.

Sumber: James Hansen, et. al., 22 March 2016
PROCEEDING
of International Conference on Climate Change 2016

**VERTICAL AND HORIZONTAL IMPACTS — CLIMATE PERSPECTIVE**

**VERTICAL EXPANSION**
Expanding the galley space of cloud process
Rain, wind, thunder, lightning
Frequency and intensity of extreme weather events increases

**HORIZONTAL EXPANSION**
Expansion of the Tropical Belt
Agriculture, Plantation and Health — C55
Changing the climate system and induce various unprecedented events

**SECTORAL IMPACT OF CLIMATE CHANGE**

<table>
<thead>
<tr>
<th>FACTOR</th>
<th>IMPACT</th>
<th>CLIMATE SENSITIVE ASPECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climate Change: (1) Temperature, (2) Sea Level Rise, and (3) Precipitation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td>15%</td>
<td>25%</td>
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<tr>
<td>Water Reservoir</td>
<td></td>
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</tr>
<tr>
<td>Health</td>
<td>15%</td>
<td>25%</td>
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<tr>
<td>Ecosystem and Forest</td>
<td>15%</td>
<td>25%</td>
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<tr>
<td>Water Resource</td>
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</tr>
<tr>
<td>Extreme Weather</td>
<td>15%</td>
<td>25%</td>
</tr>
</tbody>
</table>

1. **Agriculture:**
   - Land degradation, seed and crop failure, shifting on planting and crop calendar;
2. **Health:**
   - Weather related mortality, respiratory and cardiovascular disease, new born vector;
3. **Ecosystem and Forest:**
   - Loss of tropical forest, small islands, coral bleaching, and biodiversity, shifting of ecological zone, loss of habitat and species;
4. **Water Resource:**
   - Increasing water stress, decreasing quality, aquifer and ground water
5. **Extreme Weather:**
   - Increase in frequency and scale of intensity of extreme weather (drought, flood, tropical cyclone, landslide, forest fire).
**IMPACT ON CORAL BLEACHING**

- The increase of CO₂ concentration and temperature lead to lowering the seawater pH and upsurge the ocean acidity;
- The significant difference of sea surface temperature variation causes coral bleaching.

*Source: Reefbase (2013)*

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**PROJECTION OF CLIMATE CHANGE IN INDONESIA**
### Potential Impacts of Climate Change on the Economics of Fisheries

<table>
<thead>
<tr>
<th>IMPACTS</th>
<th>REGIONS</th>
<th>CATCH</th>
<th>PRICES</th>
<th>COST</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FISHING</td>
</tr>
<tr>
<td>Shift in distribution of</td>
<td>Arctic</td>
<td>• Catch potential: increase</td>
<td></td>
<td>↑</td>
</tr>
<tr>
<td>species</td>
<td></td>
<td>• Invasion of warmer water species</td>
<td></td>
<td>↑</td>
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<tr>
<td></td>
<td>Temperate</td>
<td>• Catch potential: no change</td>
<td></td>
<td>Not yet known</td>
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<tr>
<td></td>
<td></td>
<td>• Changes in species</td>
<td></td>
<td>Not yet known</td>
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<td></td>
<td>composition resulting from</td>
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<tr>
<td></td>
<td></td>
<td>both species gains and losses</td>
<td></td>
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<tr>
<td>Ocean acidification</td>
<td>Global</td>
<td>• Catch potential: decrease</td>
<td></td>
<td>Not yet known</td>
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<tr>
<td></td>
<td></td>
<td>• Species losses</td>
<td></td>
<td>↑</td>
</tr>
<tr>
<td>Expansion of oxygen</td>
<td>Global</td>
<td>• Catch potential: decrease</td>
<td></td>
<td>↑</td>
</tr>
<tr>
<td>minimum zones</td>
<td></td>
<td></td>
<td></td>
<td>↑</td>
</tr>
<tr>
<td>Reduction in body size</td>
<td>Global</td>
<td>• No change</td>
<td></td>
<td>↑</td>
</tr>
<tr>
<td>Increased variability</td>
<td>Global</td>
<td>• Catch potential: decrease</td>
<td></td>
<td>↑</td>
</tr>
<tr>
<td>Increased extreme weather</td>
<td>Global</td>
<td>• Actual catch: decrease</td>
<td></td>
<td>↑</td>
</tr>
</tbody>
</table>

New study in "Nature Climate Change. Dr. Rashid Haji (nearthinfo.org)

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**AIR TRAFFIC AND WEATHER**

- **V**: ~ 950 kph, **Wsp**: 60 m; **P**: 57 m
  - Pax: 250 – 350; Dist: 13000 km.

- **V**: ~ 1,020 kph, **Wsp**: 80 m, **P**: 73 m
  - Pax: 800 – 950; Dist: 16000 km.

**Problems**:  
1. Airport capacity ↔ Runway;  
2. A/C Type ➔ T/O, L/D, and wake turbulence;  
3. **Delay time reduction**

**Weather Impacts**:  
- 70% of delay was caused by weather;  
- 2/3 of delays can be reduced by improving **WEATHER INFORMATION**.

***Total economic losses caused by delays in US domestic air traffic reached $41 BILLION in 2007.***

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**ACCIDENT DUE TO WEATHER PHENOMENA**

- Water 78%
- Land 12%
- Land 10%

- Non-nature 54%
  - Nature 24%
  - Weather and Climate related phenomena

***Sources: BMKG, 2016***
~ 99% of Disaster is of Hydro-meteorological Ones

Impact of El Nino in Agriculture

Affecting ~ 250 Thousand Ha farm land and in danger of ~ 2 Mill Ton crop failure
COPING WITH CLIMATE CHANGE IMPACT

PARIS AGREEMENT 3Cs

1. Consensus
   • Keep temperature rise in this Century to well below 2 degC above pre-industrial levels and to pursue efforts to limit temperature increase to 1.5 degC;
   • Strengthen the ability of countries to deal with the impacts of climate change;

2. Commitment:
   • 188 INDCs (2030 pledges)

3. Comprehensive
   • Mitigation;
   • Adaptation;
   • Loss and damage;
   • Capacity Building;
   • Financial Support.
WMO PERSPECTIVE – GLOBAL FRAMEWORK FOR CLIMATE SERVICES

WMO STRATEGY THROUGH GFCS

- Paving the way, optimizing climate information product globally:
  - World Climate Conference-3 (WCC-3), held from 31 August to 4 September 2009 in Geneva through the Conference declaration, decided to establish a Global Framework for Climate Services (GFCS) to strengthen the production, availability, delivery and application of science-based climate monitoring and prediction services;
  - Indonesia was one of the member of High Level Task Force upon establishment of GFCS and now is becoming the one of the members of Inter-governmental Body for Climate Services (IBCS) within GFCS.

- Global Framework for Climate Services (GFCS):
  - Framework designed to mainstream climate science into decision-making at all levels and help ensure that every country and every climate-sensitive sector of society is well equipped to access and apply the relevant climate information;
  - Goal:
    - To enable better management of the risks of climate variability and change at all levels, through development and incorporation of science-based climate information and prediction services into planning, policy and practice.

CLIMATE CHANGE SCENARIO

CORDEX RESULT ON CC SCENARIO

CLIMATE PROJECTION

- Difference between minimum temperature and maximum temperature are projected to increase towards the end of the century;
- That indicates trend of a drier condition towards the end of century

Periods:
- NEAR = 2016 – 2035.
- MID = 2046 – 2065.
- END = 2081 – 2100.

CORDEX’s result on 2 (two) scenario RCP 4.5 and 8.5.
CC SCENARIO – PERIOD OF CONSECUTIVE WET DAYS

Period of CWD in DJF, MAM, JJA, and SON (near future, 2032 – 2040) tend to be shorter

CC SCENARIO – PERIODS OF CONSECUTIVE DRY DAYS

CDD in Indonesia at the period of DJF, MAM, JJA, dan SON (near future, 2032 – 2040) tend to be longer
DATA MANAGEMENT

FROM DI DAH TO SACA&D

1. Initiated in 1st February 1999 through MoU KNMI - BMKG;
2. Implementation Agreement, December 2009, covering:
   - Digitization of Historical Data (1886 – 1970);
   - Digitization of Recent Data (1971 - 2010);
   - Capacity Building;
   - Expert Visit BMKG – KNMI;
   - International Workshops;
   - Development of Indonesian Climate Assessment and Dataset (ICADO) → South-East Asian Climate Assessment and Dataset (SACADO).

Progress Status

Result of SACA&D

An OBE could detect rainfall more than 200 mm

Jakarta Flood in 3 Feb 2007
Agreement between agencies to establish integrated Marine Data and Analysis System (MIDAS) as a national portal to support maritime data and information in Indonesia in April 2013.

Coverage of MIDAS Present Status:

- Mooring 93BT 12LS
- Mooring 908T 0LU
- Mooring 908T 8LU
- AWS Ship
CLIMATE FIELD SCHOOL FOR FISHERMEN – OFGOD

Wave Formation
One Fishermen Group On Display
From Seeking to Catching

CLOSURE
CONCLUDING REMARKS

1. The global warming as indicated by the increase of global average temperature has induced **climate change** (and its variability);

2. The climate change (and its variability) has brought **unavoidably negative impact** to both **climate sensitive sectors** and **vulnerability** of the surroundings;

3. Coping with problem arises, several activities related to **mitigation and adaptation of climate change impact** has been implemented, among others: **CC scenario, historical data recovery and establishment of portal data (MIDAS), climate change literacy program for farmers and fishermen**.