



CLIMATE CHANGE ADAPTATION MEASURES IN SUSTAINABLE DEVELOPMENT

By: Emil Salim

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emilsalim2002@yahoo.com**

ADAPTATION

- Adaptation is the adjustment in natural or human system in response to actual or expected climatic stimuli or their effect, which moderates harm or exploits beneficial opportunities.

(source; IPCC)



VULNERABILITY

- Vulnerability is the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes;
- Future vulnerability depends on climate change and development pathway;

Source: IPCC



FACTORS OF VULNERABILITY

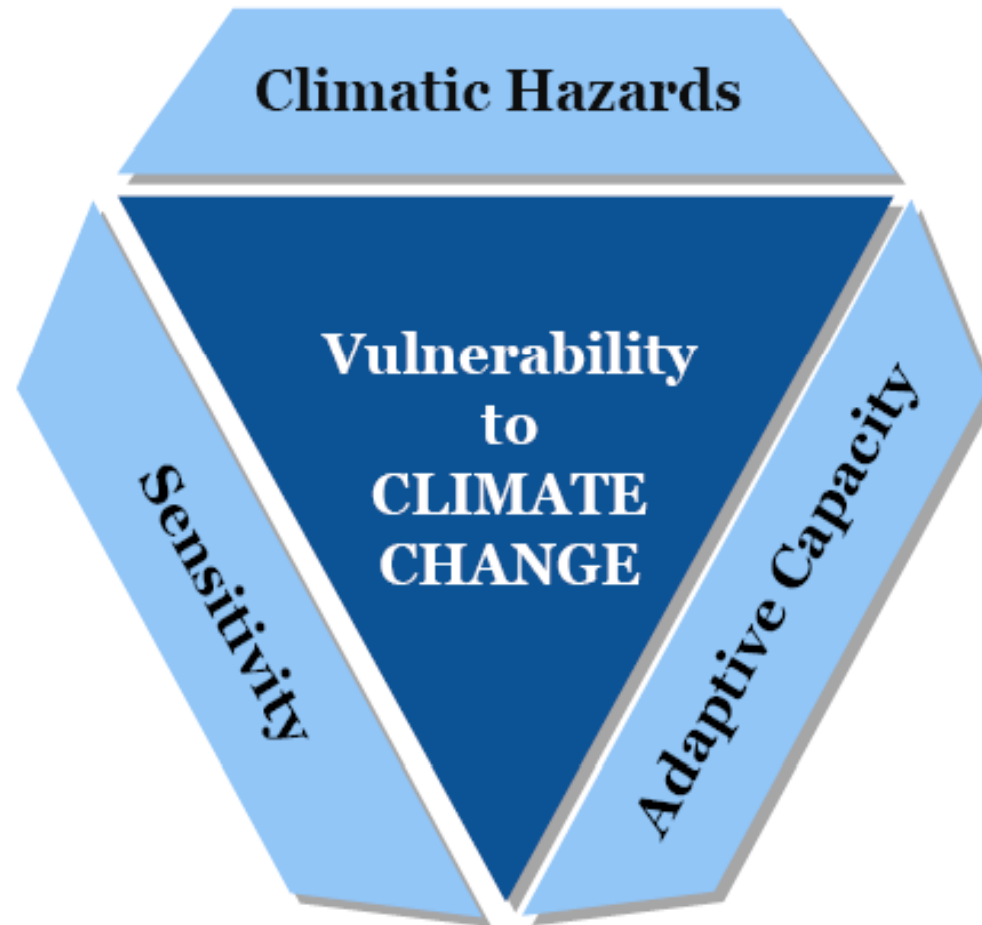
Vulnerability is a function of:

- Climatic hazards (character, magnitude; rate of climate change; variation to which a system is exposed);
- It's sensitivity;
- It's adaptive capacity;

➤ Source: IPCC



CLIMATE CHANGE VULNERABILITY MAPPING



IPCC FRAMEWORK



Climatic Hazards



▶ Tropical Cyclones



▶ Drought



▶ Flood



▶ Landslide



▶ Sea level rise



Sensitivity



▶| Population
Density



▶| Extent of
Protected Area



Adaptive Capacity



Socioeconomics

- Human Development Index (Income, Longevity, Education)
- Poverty Incidence
- Inequality



Technology

- Electricity Coverage
- Extent of Irrigation



Infrastructure

- Road Density
- Communication

CLIMATE CHANGE VULNERABILITY MAPPING FOR SE ASIA

Climate change vulnerability mapping for Southeast Asia is made from overlays of:

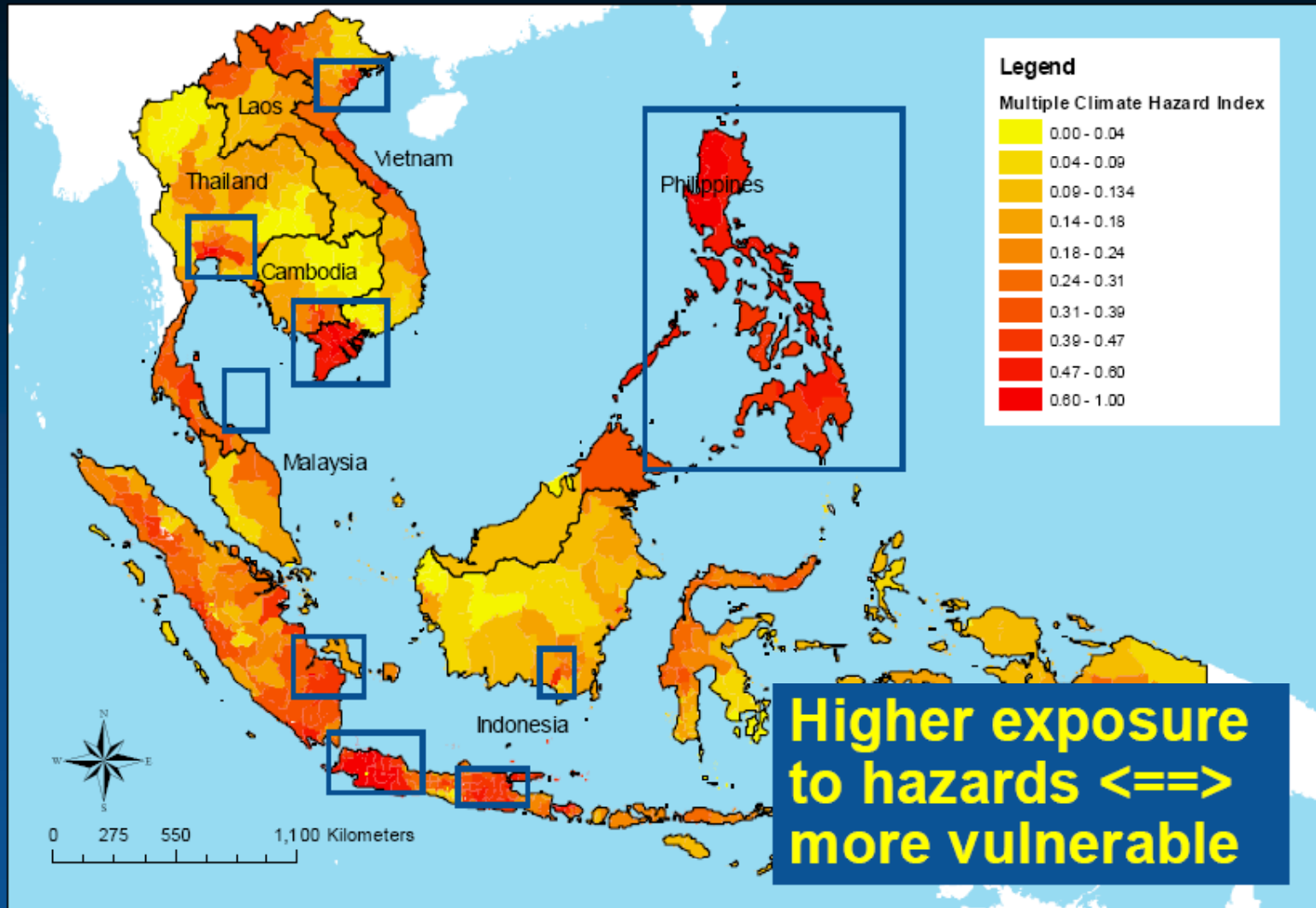
- Annual tropical cyclone frequency map;
- Annual flood frequency map;
- Annual drought frequency map;
- Landslide exposure;
- Sea level rise (5-m inundation zone);
- Human (population density) map;
- Ecological (protected areas) sensitivity map;

Source; A.A Yusuf & Herminia Fransisco paper, National Council of Climate Change, Indonesia

2009



All Climate Hazards Index



All hazards Index

Source: Authors' calculation



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GAW NETWORK

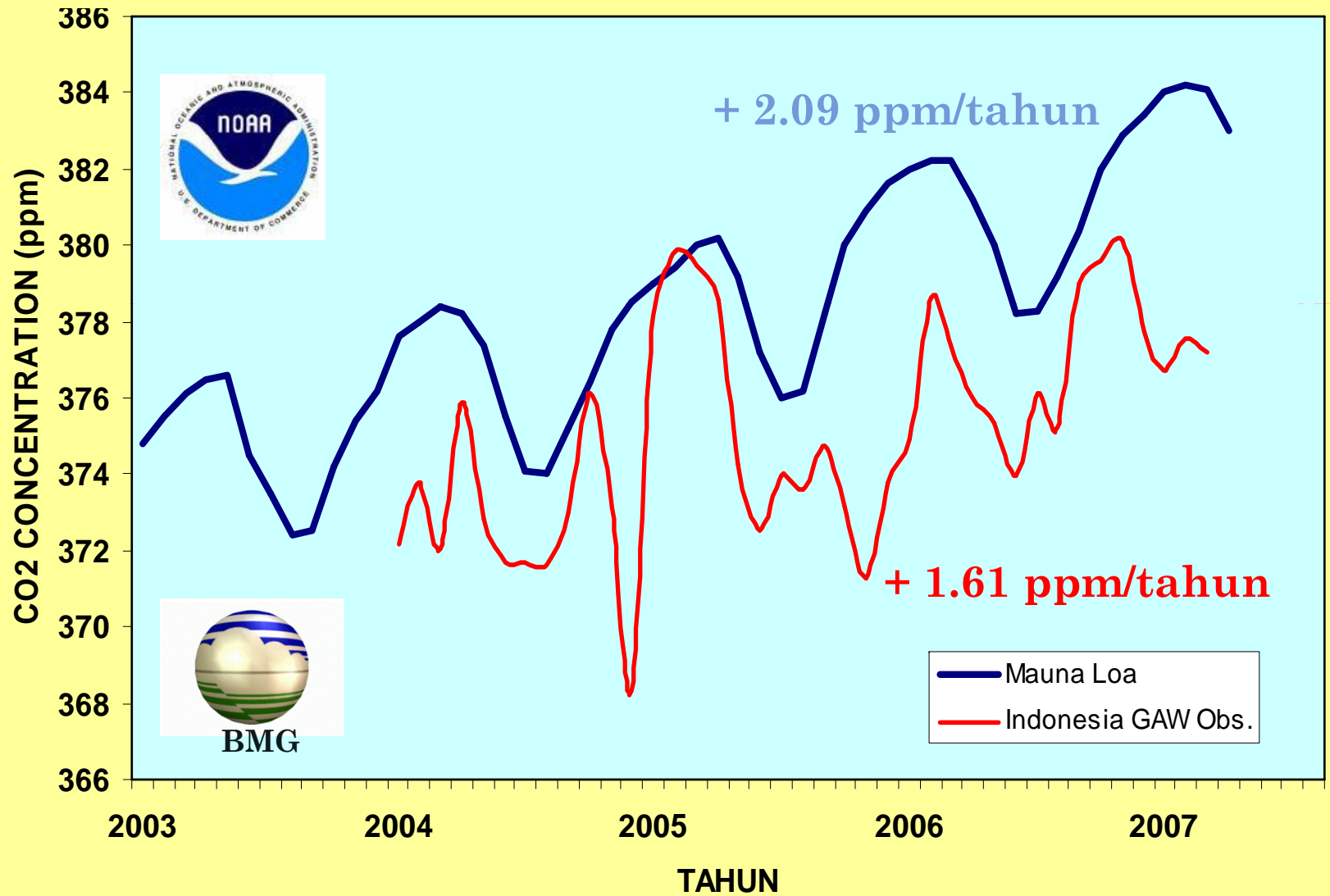




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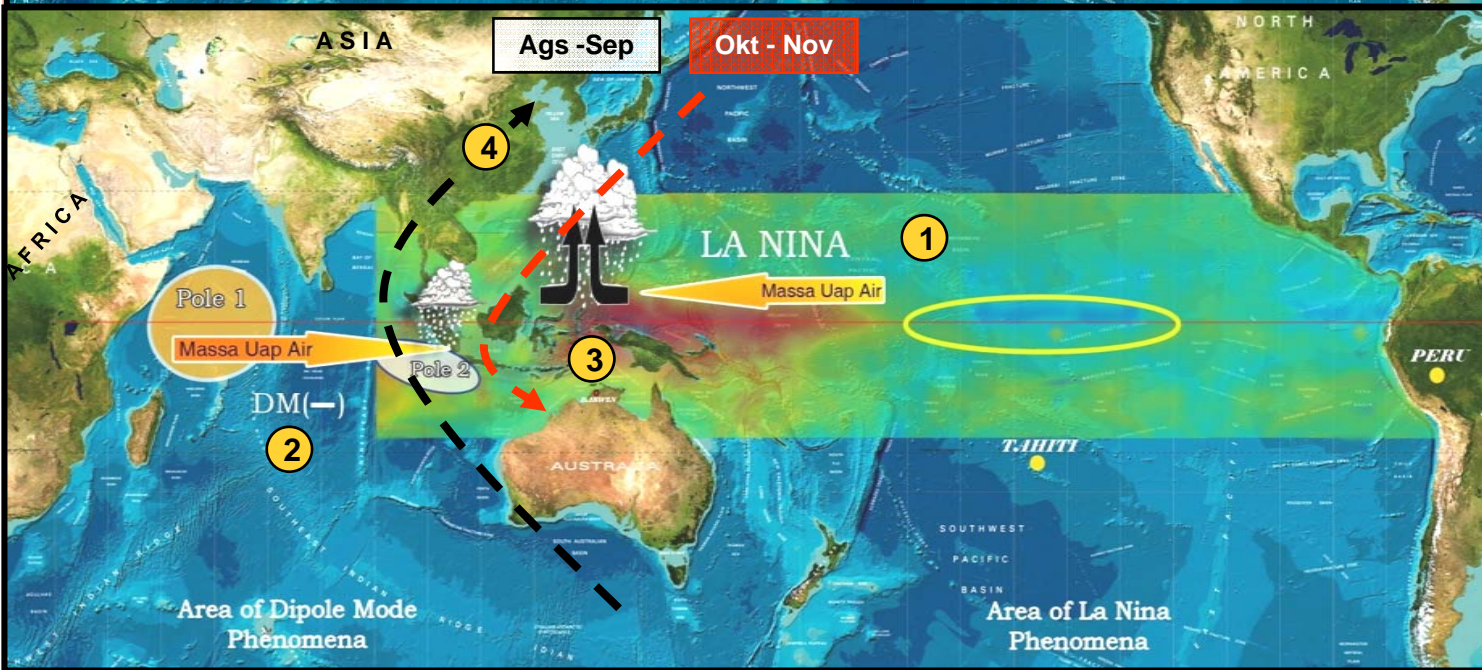
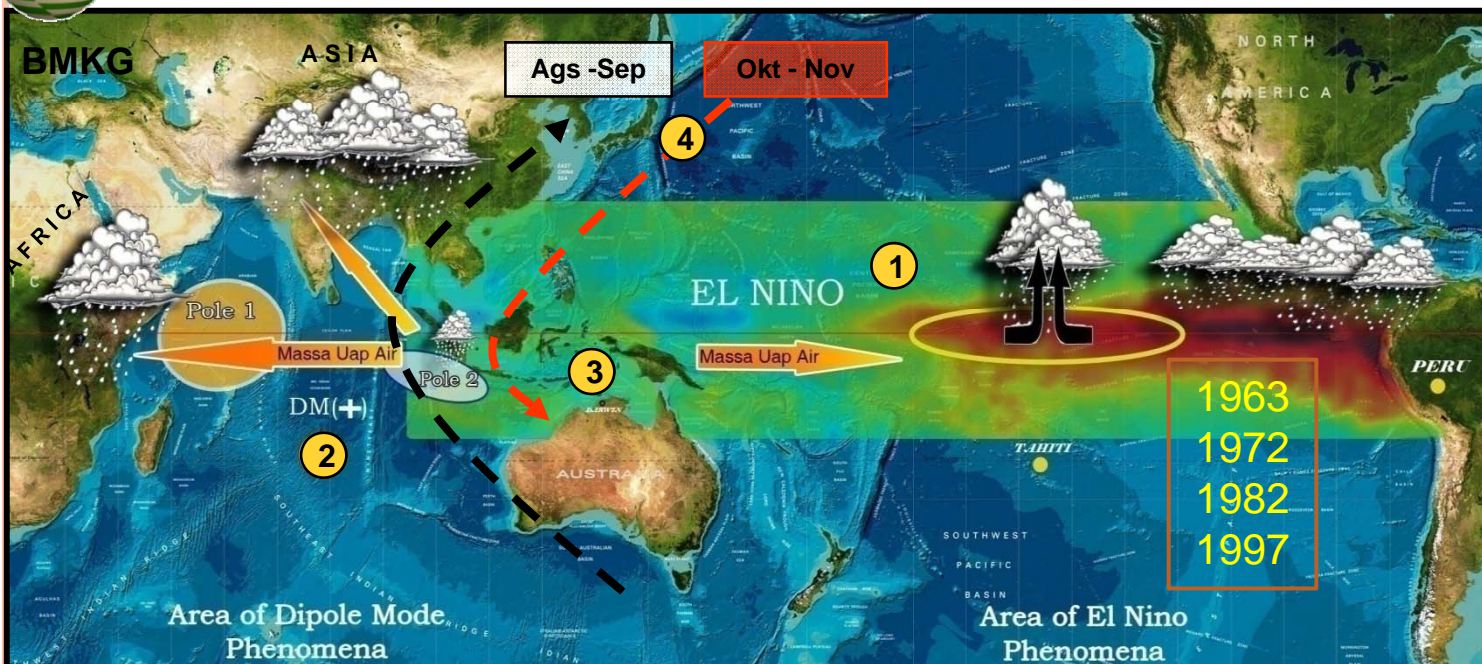
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FAKTOR PENGENDALI CURAH HUJAN DI WILAYAH INDONESIA



- 1 EL NINO / LA NINA
- 2 DIPOLE MODE POSITIF / DIPOLE MODE NEGATIF
- 3 SUHU PERAIRAN INDONESIA
- 4 ANGIN MUSIM TIMURAN / BARATAN

EL NINO (°C)	
SEP 09	1.38/ Mod
OKT 09	1.95/ Mod
NOV 09	2.07/ Kuat
DES 09	1.94/ Mod

DIPOLE MODE (°C)	
SEP 09	(+) 0.38/ Netral
OKT 09	(+) 0.40/ Netral
NOV 09	(+) 0.32/ Netral
DES 09	(+) 0.22/ Netral

ARAH ANGIN MUSIM	
AGS - SEP TIMURAN	eq
OKT - NOV BARATAN	eq

FACTORS AFFECTING RAINFALL

- El Nino
- Dipole Model (positive and negative);
- Surface Temperature of sea level;
- Wind flow (western or eastern)

Source: Institute of Meteorologi, Climatologi and Geofisics, Jakarta 2009;



SEA Mapping shows:

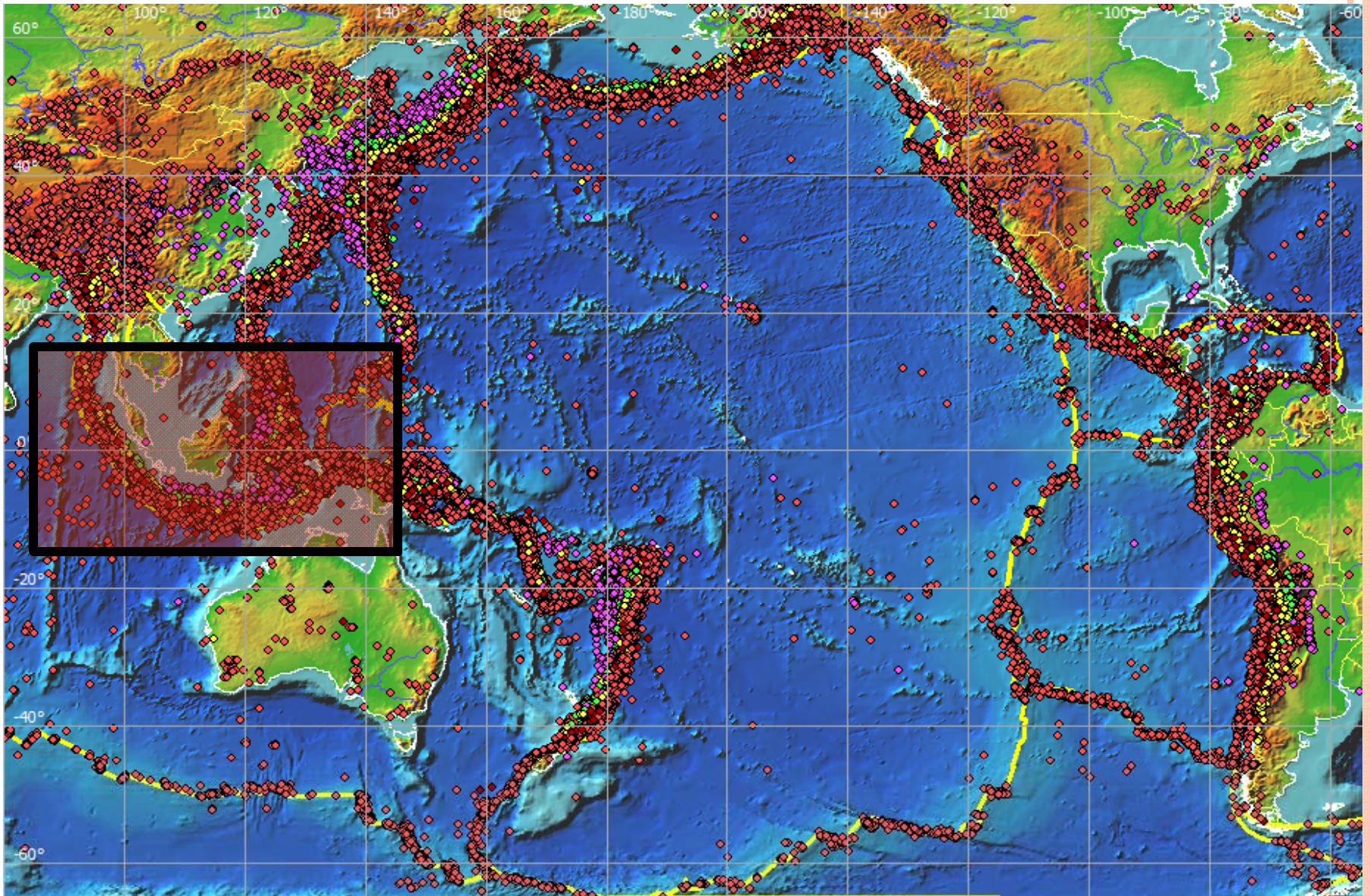
- Climate Hotspots:
 - all the regions of the Philippines;
 - the Mekong River Delta in Vietnam;
 - almost all the regions of Cambodia;
 - North and East Lao PDR;
 - the Bangkok region of Thailand;
 - West Sumatra, South Sumatra, Western Java, and Eastern Java of Indonesia
- Adaptive capacity is generally critical in reducing vulnerability

ADAPTATION IN SUSTAINABLE DEVELOPMENT POLICY

National level:


- Food security (dry weather resistance rice seed, Sorghum as staple food, adjustment of planting to changing season;
- Water security (develop high crop/output per drop of water technology, water catchments preventing rivers to flow freely into the sea, water saving building codes, desalination of sea-water Singapore model);
- Energy security (demand side management, “hydrogen city” development with stack fuel cell technology, geo-thermal and other renewable energy development;
- Compact cities, mass transportation, bio-mimicry technologies (bio-architecture, bio-medicines, bio-agriculture);
- “Get the price right,” financial & economic policies;

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ADAPTATION IN SUSTAINABLE DEVELOPMENT POLICY

Regional South East Asia level:

- Managing regional seas (“Indonesian through flow”, El Nino, Dipole Mode impacts on climate, weather and fishery, Sea Surface Temperature Coupled Model);
 - Managing “coral triangle development” for fishery and Calcium Carbonate production to absorb carbon;
 - Early warning systems on geotectonic movements of Indian Ocean-Australian Plate, Eurasian Plate, Phi-lippine Plate, Pacific Plate surrounding “the Ring of Fire”;
 - Capacity building and scientific cooperation on the regional common resources of sea, air and geo-physics;
 - Capacity building of society to adapt to climate change;
- 

SUSTAINABLE DEVELOPMENT MATRIX

	Economic	Social	Ecology
Economic	Raise welfare	Impact	Impact
Social	Impact	Millenium Development Goals	Impact
Ecology	Impact	Impact	Sustain life support eco- system

TRIANGLE OF COOPERATION

- Adaptation must be managed by a triangle of cooperation embracing Government, Business and Civil Society;
- Climate change vulnerability issues are predominantly local specific and people involvement with local wisdom is crucial in coping with vulnerability;
- Important for managing vulnerability is availability of the right information on the right time at the right place;
- Overall comprehensive climate-change vulnerability map needs to be drawn from local to regional;
- To meet the challenges of projected vulnerability issues, joint efforts are required with government, business and civil society;

NETWORKING OF REGIONAL COOPERATION

- The seas, the moving templates, the air and climate can act as the integrating factors to stimulate regional cooperation among governments, businesses and civil societies through networking of scientific endeavors to cope with climate change vulnerabilities;
- A combined long term goal should be envisaged of a globe 2030 below the threshold of 450 ppm CO₂ concentration and less than 2° C temperature, with a prosperous South East Asia united in their efforts to meet the challenges of climate change through mainstreaming of adaptation measures in sustainable development policy;
- Inducing policies moving from brain-drain to brain-gain in the region;