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ASIAN DISASTER REDUCTION CENTER (ADRC)



Adaptation to Climate Change & Reducing Natural Disaster Risk: A Study on Country Practices and Lesson between Malaysia and Japan

[FINAL RESEARCH REPORT]

By :
SURINA BINTI OTHMAN
MALAYSIAN METEOROLOGICAL DEPARTMENT
(METMalaysia)
MINISTRY OF SCIENCE, TECHNOLOGY &
INNOVATION



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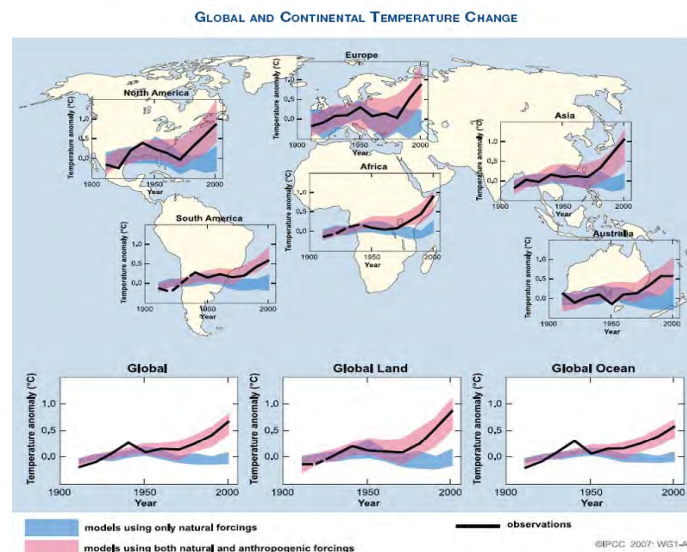
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Objectives

- As a preliminary study on Climate Change Adaptation (CCA) related to Disaster Risk Reduction (DRR) & their applications to developed country like Japan & the developing country such Malaysia.
- To study on Japan's approach in term of climate change policies & adaptation measures as comparison & reference to Malaysia in enhance the measures.
- To study recent research project & activities are being done/undertaken by Japan to support the development of adaptation strategies in regions
- To study on Legal Framework & National Climate Change Policy in Japan as comparison to Malaysia Policy – '*National Climate Change Policy of Malaysia*'
- To look at the roles of Government Organizations & NGOs involvement in CCA's planning in Japan & Malaysia.

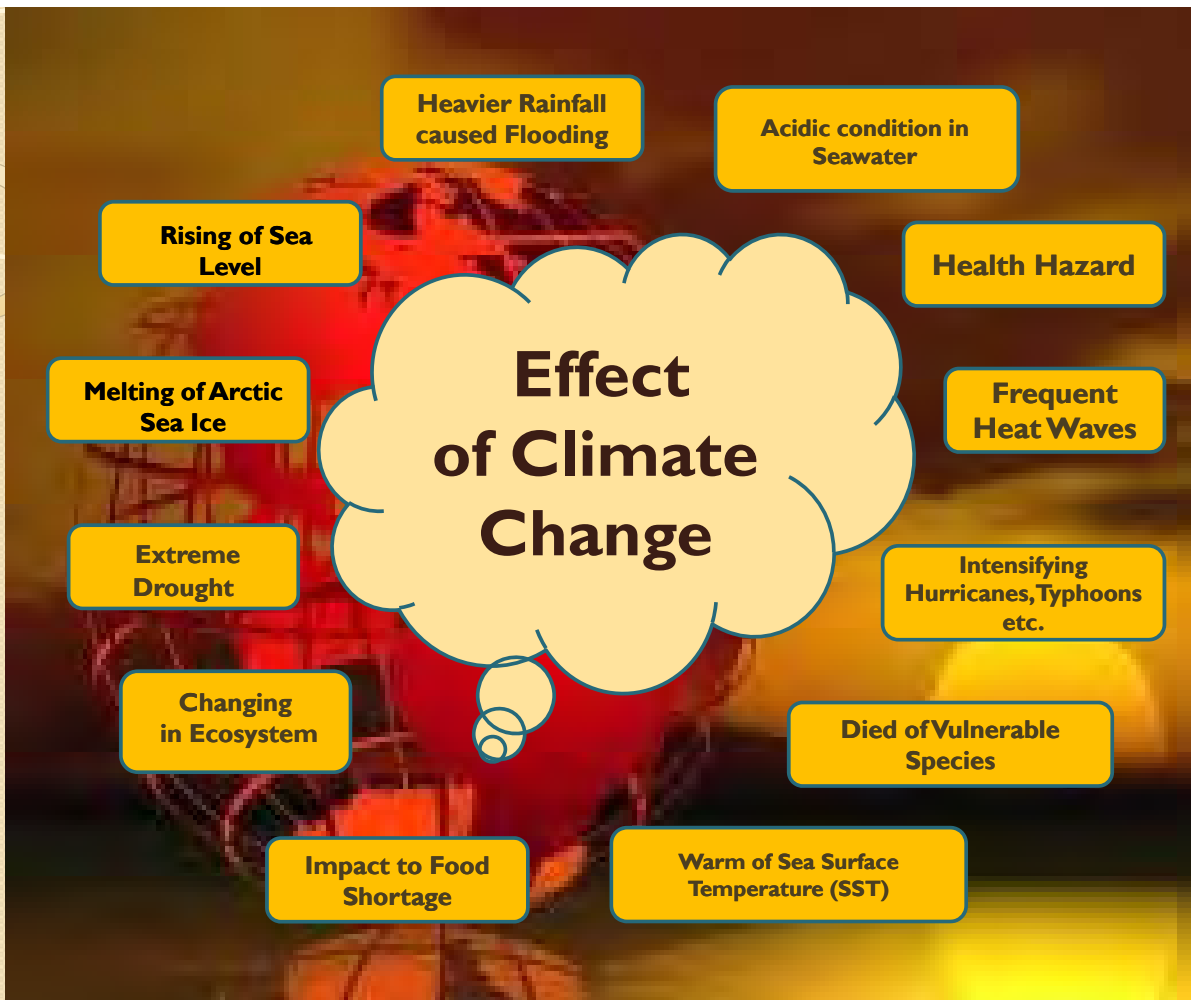
Introduction

- Intergovernmental Panel on Climate Change (IPCC) was formed by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) in 1988 - help people understand how the earth's climate system works - share the knowledge about the climate change.



Source: IPCC 2007 WGI – AR4

“Various regions of the world all show warming trends over the past 100 years. The world's surface air temperature increased an average of 0.6 °C (1.1°F)” - IPCC



Linkages between Climate Change Adaptation & Disaster Risk Reduction

- CCA and DRR share another common feature – they are not sectors in themselves but must be implemented through the policies of other sectors, in particular, those of agriculture, water resources, health, land use, environment, finance and planning.
- There are also linkages with other policies, most notably poverty eradication and planning for sustainable development, and education and science.

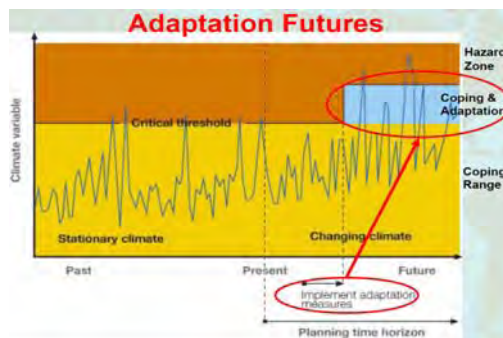
CCA

share losses, modify the threat, change in use/location, research, information, regulation etc.

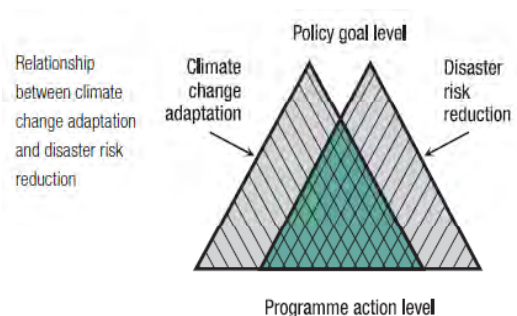


systematic development, strategies and practices to minimize vulnerabilities in context of sustainable development

DRR



Source: Adaptation Futures, by John E Hay



Relationship between CCA and DRR

Climate Change and Its Impact in Japan



Japan's Climate

- located on the east side of Eurasia, is a long and thin archipelago stretching approximately between latitudes 24° N and 46° N
- consists of 4 major islands—(from north to south) Hokkaido, Honshu, Shikoku, and Kyushu, > 6,800 other islands
- with subtropical zones in the S and subarctic zones in N, rich seasonal changes
- Two (2) primary factors influence Japan's climate:
 - location near the Asian continent
 - existence of major oceanic currents; *Kuroshio* current (warm) & *Oyashio* current (cold)
- Climate from June to Sept is marked by hot, wet weather brought by tropical airflows from the Pacific Ocean and Southeast Asia.

- rainy season, beginning in early June & continuing for about a month. It is followed by hot, sticky weather
- 5 or 6 typhoons pass over or near Japan every year from early August to early September
- Annual precipitation, which averages between 1,000 & 2,000 mm (39.4 and 78.7 in), is concentrated in the period between June & Sept

In winter, a high-pressure area develops over Siberia & a low-pressure area develops over the northern Pacific Ocean. The result is a flow of cold air eastward across Japan that brings freezing temperatures & heavy snowfalls to the central mountain ranges facing the Sea of Japan

Major Climate Components of Japan

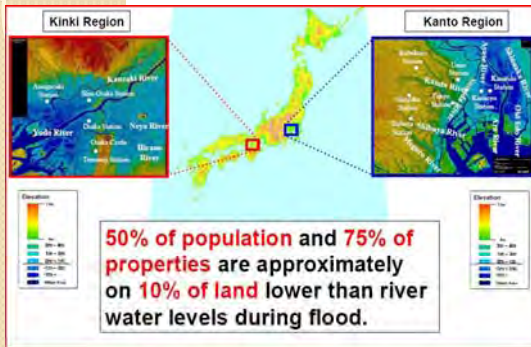
		Latitude	Longitude	Elevation (meters)	Annual Mean Temperature (°C)	Annual Mean of Daily Maximum Temperature (°C)	Annual Mean of Daily Minimum Temperature (°C)	Annual Precipitation (mm)
Northern Japan	Abashiri	44°01.0'	144°16.7'	37.6	6.2	10.0	2.6	801.9
	Nemuro	43°19.8'	145°35.1'	25.2	6.1	9.4	3.0	1,030.0
	Yamagata	38°15.3'	140°20.7'	152.5	11.5	16.4	7.2	1,125.0
	Ishinomaki	38°25.6'	141°17.9'	42.5	11.4	15.3	7.9	1,064.5
Eastern Japan	Fushiki	36°47.5'	137°03.3'	11.6	13.7	17.7	10.3	2,196.4
	Mito	36°22.8'	140°28.0'	29.3	13.4	18.5	8.9	1,326.0
	Choshi	35°44.3'	140°51.4'	20.1	15.3	18.3	12.3	1,580.1
	Iida	35°31.4'	137°49.3'	516.4	12.4	18.3	7.6	1,606.7
Western Japan	Sakai	35°32.6'	133°14.1'	2.0	14.9	19.0	11.1	1,894.9
	Hamada	34°53.8'	132°04.2'	19.0	15.2	19.1	11.5	1,705.7
	Hikone	35°16.5'	136°14.6'	87.3	14.4	18.5	10.8	1,617.9
	Miyazaki	31°56.3'	131°24.8'	9.2	17.2	21.8	13.0	2,457.0
	Tadotsu	34°16.5'	133°45.1'	3.7	16.0	20.0	12.2	1,090.7
Nansei Islands	Naze	28°22.7'	129°29.7'	2.8	21.5	24.7	18.6	2,913.5
	Ishigakijima	24°20.2'	124°09.8'	5.7	24.0	26.6	21.9	2,061.0

Source: JMA – 'Climate Table of Japan' (CD Rom – 8th Edition) (°C /century)

	Year	Spring (Mar. to May)	Summer (Jun. to Aug.)	Autumn (Sep. to Nov.)	Winter (Dec. to Feb.)
Entire Japan	+1.11	+1.35	+0.92	+1.07	+1.13
Northern Japan	+1.01	+1.30	+0.59	+0.80	+1.34
Eastern Japan	+1.13	+1.41	+0.88	+1.06	+1.19
Western Japan	+1.22	+1.46	+1.20	+1.29	+0.96
Okinawa/Amami	+1.06	+1.04	+1.18	+1.21	+0.82

- Long-term trends in annual & seasonal average surface temperature in Japan (obtained by linear regression analysis)
- Statistical period: 1898 to 2008. Regardless of the area and season, all increasing trends are significant with a 95% confidence level.

Japan's Situation Impact of Changing Climate

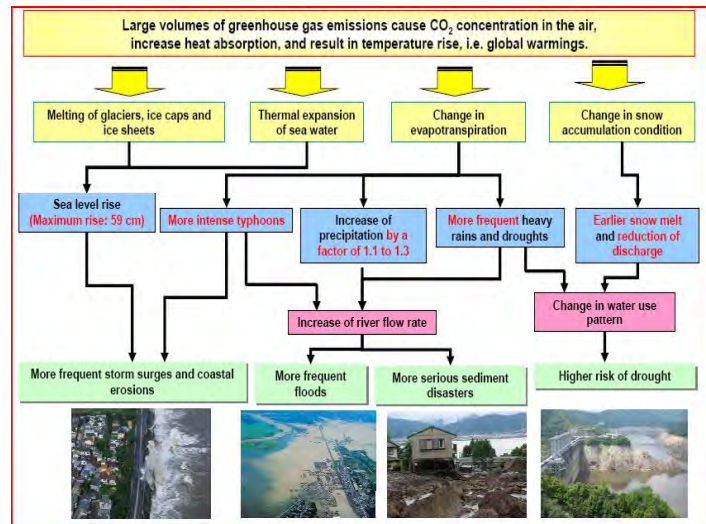


Source: Ministry of Land, Infrastructure, Transport and Tourism (MLIT), Japan

- eastern end of the Monsoon Asia, which is marked by high precipitation, receive a mean annual precipitation ~1,700 mm, which is twice as much as the world average
- the route of typhoons, large hourly precipitation of almost 200 mm, vulnerable to floods, sediment-related disasters, storm surges, risk of drought

Changing climate in Japan, include;

- Temperature rises
- Changing in precipitation patterns
- Increasing of Tropical Cyclones
- Changes in sea level
- Ocean acidification



Source: Ministry of Land, Infrastructure, Transport and Tourism (MLIT), Japan

Climate Change Plan, Practices & Initiative with Comprehensive Disaster Management Measures in Japan

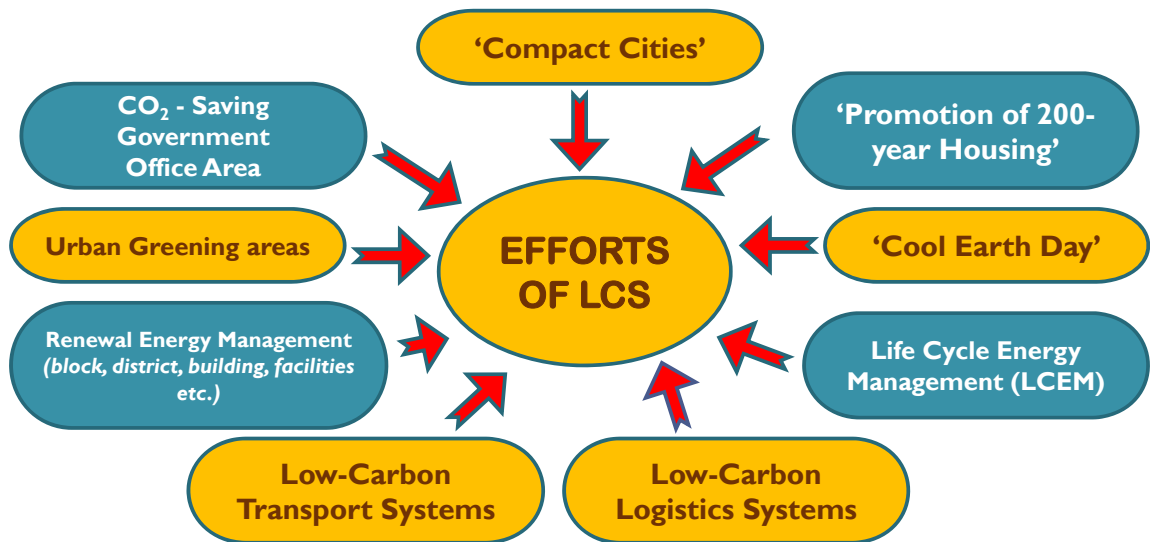
- The plan was drafted on April 2005, following the establishment of *Action Program to Arrest Global Warming (1990)*, *Basic Policy on Measures to Tackle Global Warming (1999)*, and *the Outline for Promotion of Efforts to Prevent Global Warming (1998, 2002)* as Japan promoted countermeasures against global warming due to climate change impact

“Significance of the Revised Kyoto Protocol Target Achievement Plan”

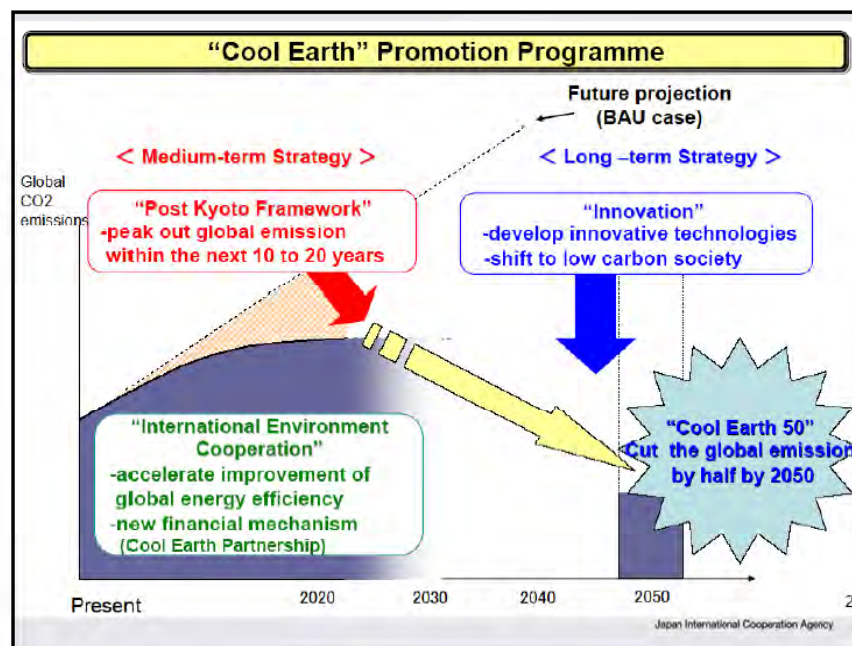
- The plan was completely revised in March 2008 where the Global Warming Prevention Headquarters, which is composed of all Cabinet members, completed a proposal for the plan's revision and amendments to *the Kyoto Protocol Target Achievement Plan* were adopted by the Cabinet of Japan.
- Thus, National Government has the role of comprehensively promoting global warming countermeasures and taking the initiative in implementing such countermeasures. An achievement of the reduction commitments of developed countries such as Japan, stipulated in the Kyoto Protocol is a significant milestone toward achieving the ultimate objective of the UNFCCC: *Stabilization of Greenhouse Gas Concentrations in the Atmosphere*.
- In order to achieve its commitment under the Kyoto Protocol, Japan will promote the measures necessary to reduce its total greenhouse gas emissions by 6% from the base year level in the first commitment period (2008-2012).

Low Carbon Society in Japan

- Due to CO₂ emissions projected - rapidly increase as a result of the future population growth and economic development on a global scale.
- Government of Japan will reconstruct urban structures into low-carbon since urban structures can have a big impact on global warming, taking into account the aims of the Improvement Plan for Cities and Urban Lives.



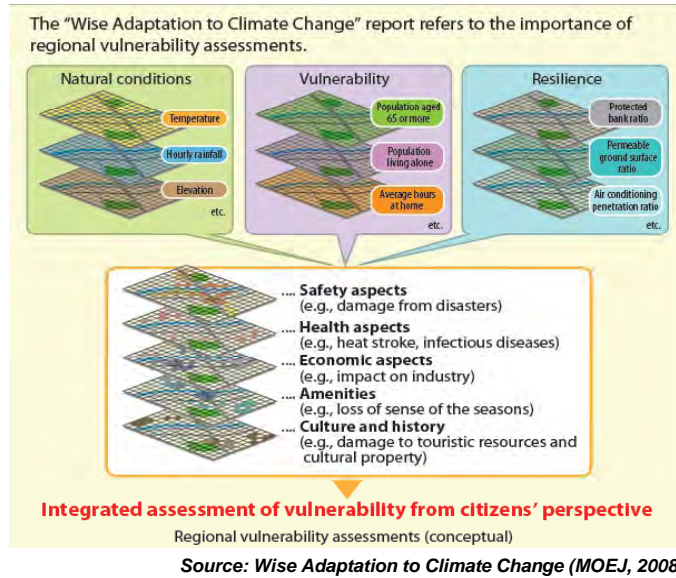
“Cool Earth 50” Promotion Program in Japan



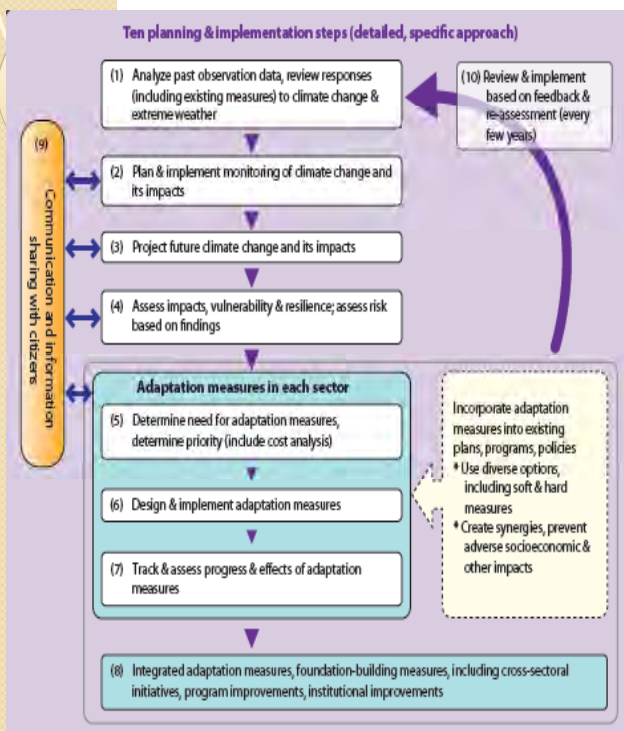
Source: Japan International Cooperation Agency (JICA)

Recent Adaptation Measures : Ministry of Environment of Japan (MOEJ)

- In 2008, MOEJ released “Wise Adaptation to Climate Change” report
- A scientific knowledge available to date on the impacts of, and adaptation to, climate change in Japan and Asian developing countries, and to present concepts of “wise” (effective and efficient) adaptation



Implementation of Adaptation Measures – Performance of Roles and Collaboration between National Governments, Local Governments, Citizens & Business in Japan



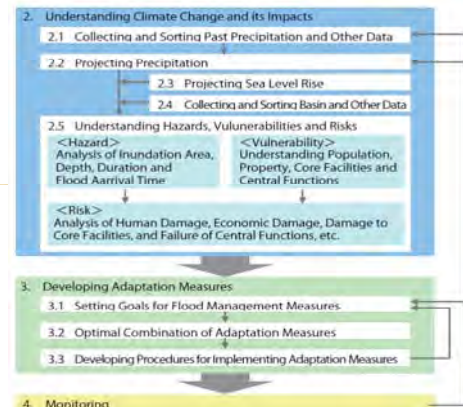
Foundations for the Implementation of Adaptation Measures

The items below are essential foundations to implement the adaptation measures listed on the left.

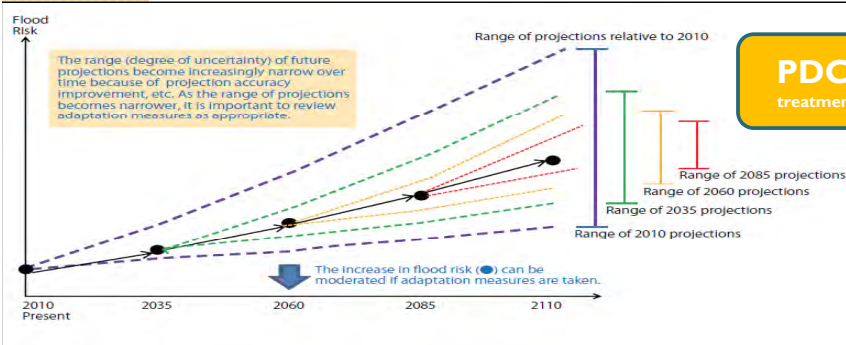
- (1) Clarification of responsibilities among national and local government bodies
- (2) Performance of roles and collaboration of each entity
 - National governments** Monitoring of measures and projects implemented at the national level; projections at the national level; implementation of risk assessments; sharing of information with citizens; formulation and implementation of adaptation measures, promotion of research and development; awareness-raising.
 - Local governments** Monitoring of measures and projects implemented at the local level; projections at the local level; implementation of risk assessments; sharing of information with local citizens; formulation of adaptation measures.
 - Citizens** Implementation of adaptation measures that can be done by citizens and households in daily life; participation in and cooperation with adaptation initiatives of local governments.
 - Businesses** Awareness of and responses to global warming impacts in business activities (including changes in demand; increased frequency and severity of disasters, etc.); consideration of adaptation in business activities; development of new businesses that contribute to adaptation.
- (3) Sharing information with citizens
- (4) Training and utilization of human resources
- (5) Promoting research and technological development that can be used in the next several years (3 to 5 years)

Recent Adaptation Measures : Ministry of Land, Infrastructure, Transport and Tourism (MLIT)

- by River Bureau of the Ministry of Land, Infrastructure, Transport and Tourism (MLIT), Japan
- implement adaptation measures to climate change especially in the field of water-related disasters, such as floods, sediment-related disasters, storm surges and droughts.
- comprehensive MLIT flood protection measures; improve the water-retaining & retarding functions of river basins, construct river channels, regulating basins, underground rivers & use the dams for flood mitigation
- transfer of technology, promotion of international exchanges & dispatching of advisory attaches



Adaptation Measures proposed by MLIT, Japan

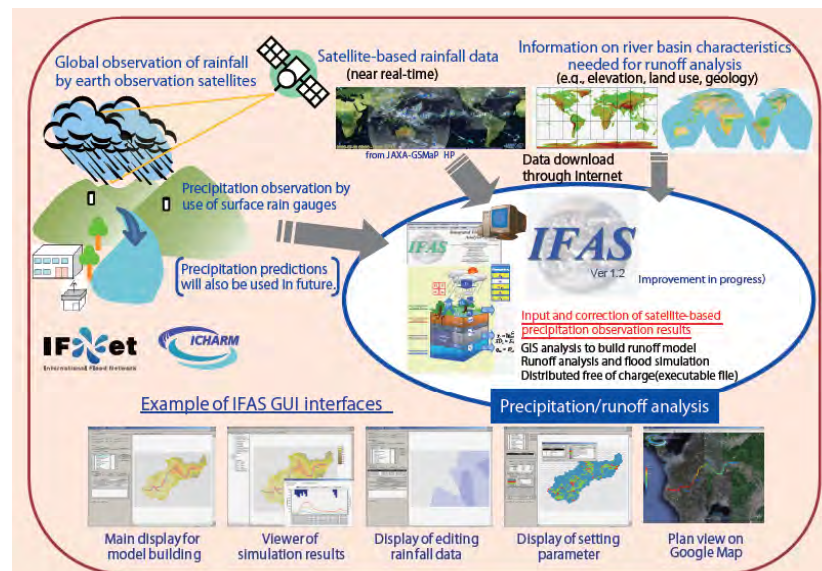


PDCA Concept of treatment of uncertainty

- understand the latest knowledge on climate change, social conditions such as population & changes in land use, development of flood control facilities, & subsequent investment capability
- advance the uncertainties of future projection

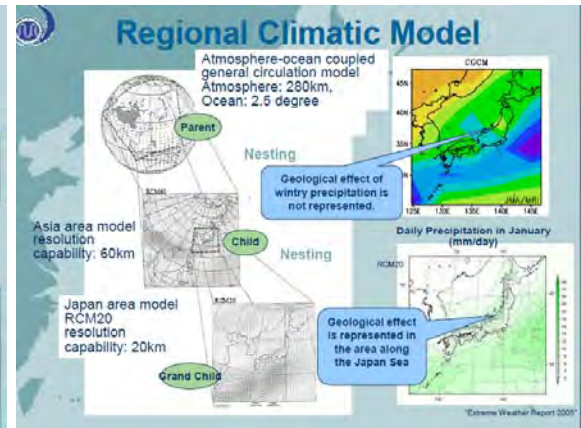
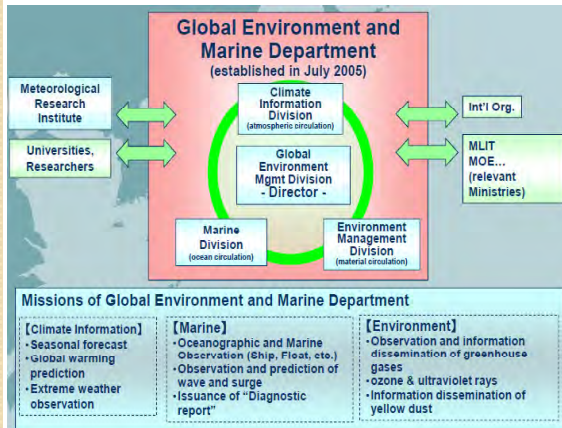
Integrated Flood Analysis System (IFAS)

- by International Center for Water Hazard & Risk Management (ICHARM) under MLIT
- Flood management is needed to be developed with a long-term perspective in Japan
- uses satellite based precipitation data to perform integral analyses, including runoff analysis & calculations of flood propagation in river channels.
- particularly useful in developing countries that do not have adequate ground-based hydrologic observation systems.



Meteorological Operation : Japan Meteorological Department (JMA)

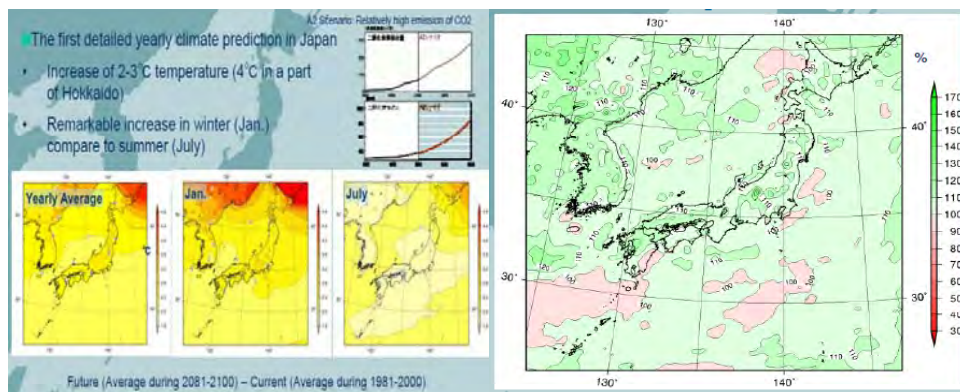
- JMA contributes to the development of mitigation & adaptation measures related to climate change in various sectors through the provision of scientific information & expertise on climate change - *preparing assessment reports for IPCC*
- JMA monitors, analyzes climatic conditions in Japan & around the world as well as greenhouse gas (GHG) concentrations & global average surface temperatures.
- *Global Environment and Marine Department* as one of JMA's departments was established in July 2005 – Climate Information, Marine & Environment Observations



Source: Japan Meteorological Agency (JMA)

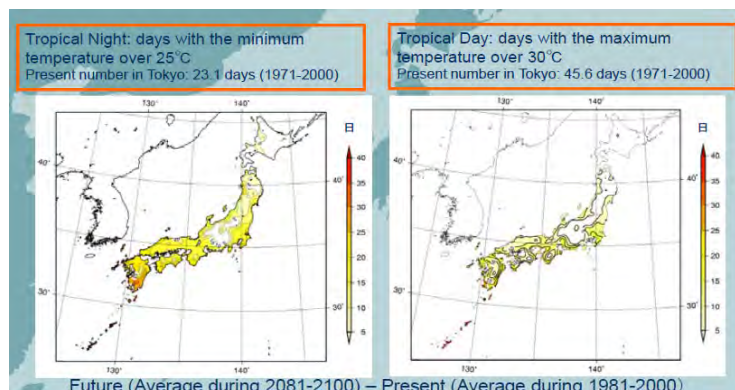
Prediction of Change in Temperature & Precipitation in Japan

Source: Extreme Weather Report JMA, 2005



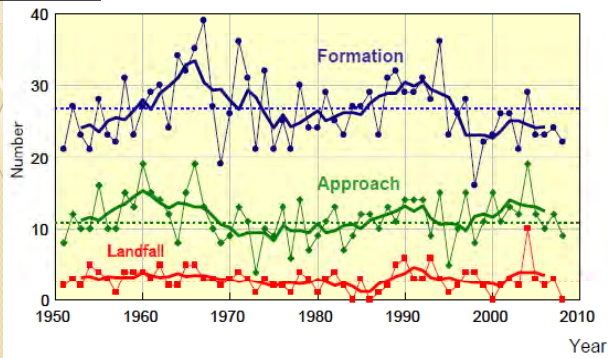
Change in Average Temperature

Change of Yearly Precipitation

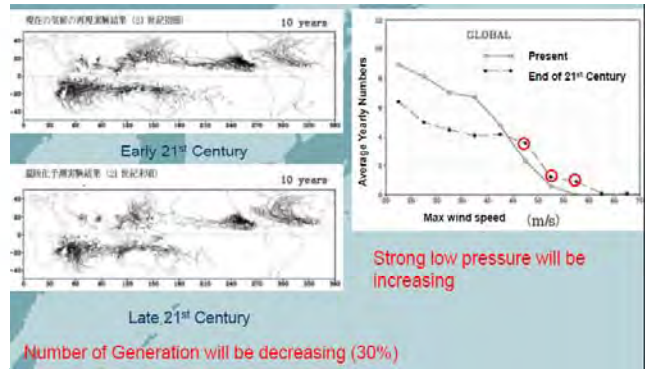


Change of Numbers of Tropical Day and Extremely Hot Day

Forecast of Tropical Low Pressure in Japan



Change of Number of Formation, Approaching and Landfall of Typhoon – remarkable change in 20 – 30 year cycle, more intense, large peak wind speeds, more heavy rainfall



Source: Extreme Weather Report JMA, 2005

Future Perspective of Extreme Weather & CC in Japan

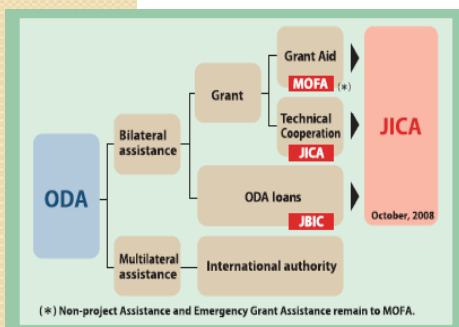
Japan's situation in 100 years

- Annual Mean Temperature : 2 – 3°C increase
- Annual Mean Precipitation : **Increase** (especially large increase in West Japan)
- Annual Snowfall : **decrease** (especially 50% decrease in Hokuriku region)
- Extremely hot days & tropical night : **Increase** (in Tokyo 10 – 15 days increase)
- Number of days with over 100mm rainfall : **Increase** > 1 day than now (1.5 – 2 times more)

Source: Japan Meteorological Agency (JMA)

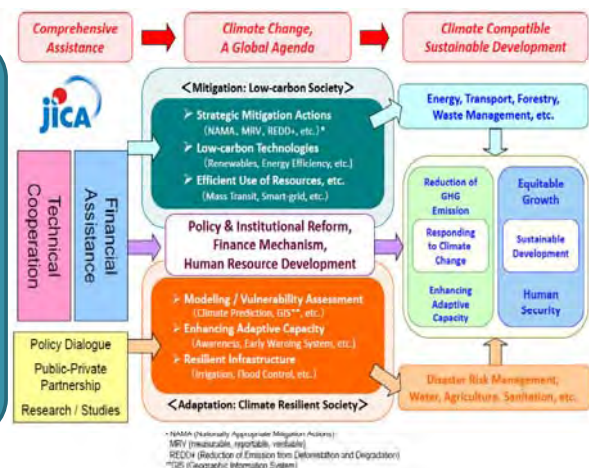
Capacity Building : Japan International Cooperation Agency (JICA)

- Japan International Cooperation Agency (JICA), was established in 1974 is the semi - Japanese Governmental Agency
- provides strategic & effective ODA through integrated & comprehensive implementation of Technical Cooperation, Loan Aid and Grant Aid as one of the largest ODA executing agency in the world
- JICA undertakes many climate change related projects and programs in developing countries through this (3) schemes



(*) Non-project Assistance and Emergency Grant Assistance remain to MOFA.

Low Carbon & Climate Resilient Development Cooperation



Source: Japan International Cooperation Agency (JICA)

JICA's Projects related to Climate Change

Kenya Adaptation
The Programme for Community based Flood Disaster Management to Adapt to Climate Change in the Nyando River Basin aims to establish a community-based disaster management system as well as to provide structural measures including eleven boreholes, four evacuation centres, nine toilets, two stores, 44 cabinets, seven footbridges and one well in an area particularly vulnerable to flood risk under climate change.

Egypt Mitigation CDM
The Zafarana Wind Power Plant Project has constructed a 120 MW wind power plant, contributing to a CO₂ emissions reduction of 250,000 t. (See page 5)

Ethiopia Mitigation Adaptation REDD+
In the Participatory Forest Management Project in Beleta-Gera Regional Forest Priority Area, JICA is cooperating with local authorities and 8,000 locals to achieve the dual goals of forest conservation and poverty reduction. (See page 9)

Kirgizstan Mitigation
The Biogas Technology Dissemination Support Project utilizes livestock manure to recover biogas for energy use, contributing both to improving the rural living conditions and reducing GHG emissions. (See page 4)

India Mitigation CDM
The Delhi Mass Rapid Transport System Project aims to alleviate the world's worst urban pollution and traffic congestion as well as to reduce GHG emissions. (See page 4)

Bhutan Adaptation
The Study on Glacial Lakes Outburst Floods (GLOF) in Bhutan Himalaya will produce a hazard map for GLOF and propose optimal measures to mitigate flood impacts in the Mangle Chu valley. (See page 8)

Laos Mitigation Adaptation REDD+
In the Participatory Land and Forest Management Project for Reducing Deforestation, JICA has assisted the Lao government with forest management and community assistance projects in six provinces in the northern part of the country, contributing both to preservation of the forest and improving the living conditions in the rural areas. (See page 9)

Vietnam Mitigation Adaptation REDD+
In the Development Study on Capacity Development for AR-CDM promotion, JICA cooperated with the Vietnamese government in carrying out capacity-building and in designing a pilot project to promote AR-CDM. The pilot project was registered as the first AR-CDM project in Vietnam and the fourth in the world.

Solomon Adaptation
The Project for Strengthening of Malaita Control has provided assistance for the establishment of an extreme climate control system. (See page 9)

Bangladesh Mitigation
The Master Plan Study for Utilization of Solar Energy contributes both to mitigating deforestation and reducing GHG emissions through the utilization of solar energy. The project achieves rural electrification and improves the quality of life in rural areas. (See page 4)

Zambia Mitigation
The Increased Access to Electricity Services Project aims to extend the existing power grid to replace carbon intensive energy sources by cleaner energy sources in six provinces, contributing to GHG emissions reduction by 30,000 t/y. (See page 5)

Bangladesh Mitigation
The Programme for Improvement of Solid Waste Management in Dhaka City toward the Low Carbon Society will reduce carbon emission from garbage trucks by 60% and also contribute to improving the living environment for urban residents.

Bangladesh Adaptation
The Project for Construction of Multipurpose Cyclone Shelters, Emergency Disaster Damage Rehabilitation Project has established 14 shelters in the country which is especially vulnerable to tropical cyclones. The shelters serve as school buildings in ordinary times. (See page 4)

Indonesia Mitigation REDD+
Support on Forest Resources Management through Leveraging Satellite Images Utilizing the Japan Aerospace Exploration Agency's land observation satellite "ALOS" to help manage forest resources.

Indonesia Adaptation
Aiming to conserve four beaches on the island, the Bali Beach Conservation Project is considered an effective adaptation measure to cope with a sea level rise due to climate change. (See page 8)

Paraguay Mitigation CDM
The Yaguazá Hydropower Station Construction Project aims to optimize the power supply in Paraguay by constructing a hydropower station with a facility output of 200 MW to meet peak demand, contributing to GHG emissions reduction.

Brazil Mitigation Adaptation REDD+
Utilization of ALOS Images to Support Protection of the Brazilian Amazon Forest and Combat against Illegal Deforestation assists the development of a system and the capacity to utilize satellite data for monitoring illegal logging, which is one of the biggest problems in forest management in the Brazilian Amazon. (See page 4)

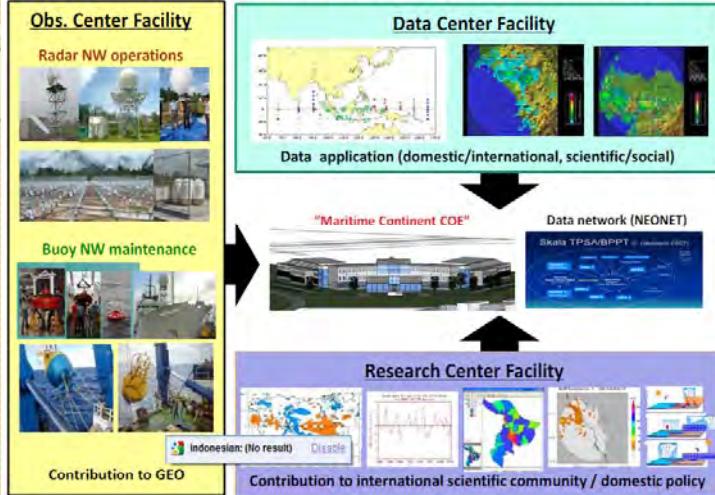
Samoa Mitigation
The Power Start or Extension Project will improve the power sector in Samoa by installing a new hydropower plant and improving existing power plants. The project will also upgrade the national grid system, making it more energy efficient, which in turn will contribute to GHG emissions reduction.

Legend: Countries where JICA supports projects targeting climate change.

Research Development : Japan Agency for Marine–Earth Science Technology (JAMSTEC)

- Japan Agency for Marine–Earth Science and Technology (JAMSTEC) was inaugurated on April 1, 2004 - independent administrative institutions upon re-organized from its former organization, Japan Marine Science and Technology Center.
- wide range of research activities & projects at the international levels; one of research institutes – “Research Institute of Global Change (RIGC)”
- actively participate in IPCC - important measures to contribute decision-making on climate change solutions & enhancement of earth’s sustainability
- **Focusing in the Global Warming Projection Research Project for Contribution to AR5 of IPCC, the project is to perform a part of below researches:**
 - **by MEXT: “Innovative Program of Climate Change Projection for the 21st Century”**
 - **by Environment Ministry (MOEJ) : “Policy-Support to Global Warming and Total Research which relates to the Climate Change Scenario in order to Prevalence & Enlignment”**
- The Earth Simulator, which was developed, as a National Project of Government of Japan, by three (3) governmental agencies, National Space Development Agency of Japan (NASDA), the Japan Atomic Energy Research Institute (JAERI) & Japan Marine Science and Technology Center (JAMSTEC)
- Using the super computer “**Earth Simulator**”, the researches of sophisticated global warming prediction model, cutting down of prediction uncertainty & impact assessment of natural disaster are driven forward & are contributed to the IPCC 5th Evaluation Report

Climate Variability Study and Societal Application through Indonesia-Japan "Maritime Continent COE"
 - Radar-Buoy Network Optimization for Rainfall Prediction
 A Scientific & Technology Research Partnership for Sustainable Development (SATREPS-MCCOE)



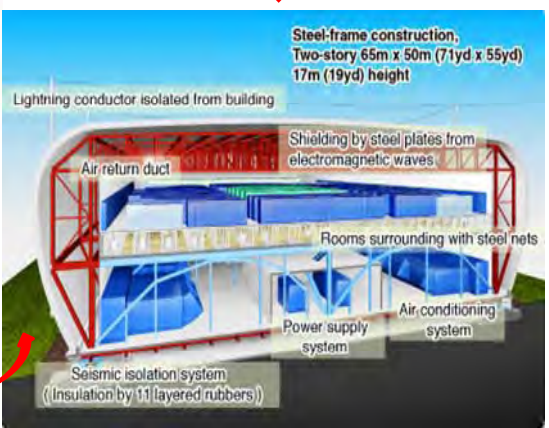
Maritime Continent Center of Excellence (MCCOE) Source: Yamanaka et al., 2008

Innovative Program of Climate Change Projection for the 21st Century
 Extreme Event: Hurricane Typhoon, Severe Thunder Storm, Drought, GLOBAL WARMING
 KAKUSHIN
 All for ephemeral life

Source: <http://www.jamstec.go.jp/kakushin21>



Earth Simulator (ES)

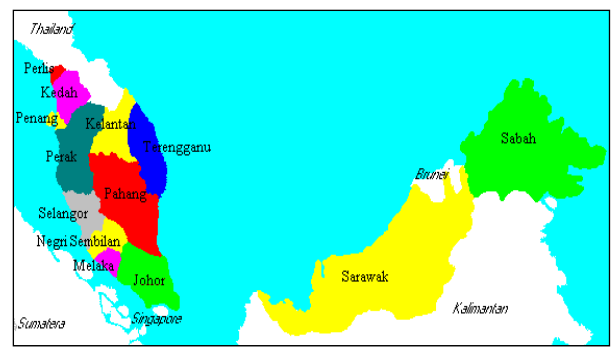


Source: Japan Agency for Marine-Earth Science and Technology (JAMSTEC)

Malaysia as Developing Country faced the Climate Change

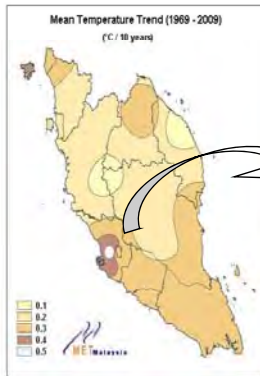
Malaysia's Climate

- tropical climate with uniform temperature (maximum = 33°C, minimum = 23°C)
- high humidity where situated in equatorial doldrums
- two (2) seasons; Southwest Monsoon, Northeast Monsoon & two (2) shorter periods of Inter-monsoon seasons
- climate influenced by the mountainous topography and complex land-sea interactions
- Intraseasonal & interdecadal fluctuations such as the ENSO, IOD & MJO are known to significantly influence the interannual climate variability of Malaysia
- geographically located just outside the "Pacific Rim of Fire" & generally free from severe natural disasters; earthquake, volcanic eruption and typhoon
- Increase in tropical storms in the South China Sea have contributed to more extreme events of rainfall & gusting in both East & West Malaysia.

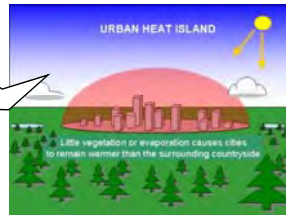


Changing Climate of Malaysia and the Vulnerability

Source: Malaysian Meteorological Department (METMalaysia)



- most developing countries, there are many challenges facing the country, especially in urban areas – economic growth
- vulnerability occurs specially urban area in capital city of Kuala Lumpur due to ‘urban heat Island’ effect - change the climate
- tall buildings (concrete & little vegetation)
- Heat & pollutants create a ‘haze dome’ - prevents warm air from rising & being cooled at a normal rate, especially in the absence of strong winds



Future Climate Change Projections in Peninsular Malaysia

- study undertaken by National Hydraulic Research Institute of Malaysia (NAHRIM)
- temperature & rainfall : **Increase** (Northeast region)
- Most Vulnerable States vs. Poverty

Regions/Sub-regions/states	Projected change ^a in maximum monthly value	
	Temperature (°C)	Rainfall (%)
North East Region-Terengganu, Kelantan, Northeast-coast	+1.88	+ 32.8
North West Region-Perlis (west coast), Perak, Kedah	+1.80	+ 6.2
Central Region-Klang, Selangor, Pahang	+1.38	+ 8.0
Southern Region-Johor, Southern Peninsula	+1.74	+ 2.9

^aDifference = Average 2025-2034 and 2041-2050 minus Average 1984-1993. NAHRIM (2006)

Table 5: Most vulnerable states: Hardcore poverty and climate change

States	Household size	Incidence of hardcore poverty (%)	Projected temperature change (°C)	Projected rainfall change (%)
Terengganu	5.0	4.4	+1.88	+ 32.8
Perlis	4.2	1.7	+1.80	+ 6.2
Kelantan	5.2	1.3	+1.88	+ 32.8
Kedah	4.6	1.3	+1.80	+ 6.2
Perak	4.1	1.1	+1.80	+ 6.2

NAHRIM (2006) and Ninth Malaysia Plan (2006)

Extreme Weather Occurred in Malaysia

The climate change is real & the impacts are being felt in Malaysia e.g. floods, drought, haze which causes losses in revenue & productivity and health risk to the people. As we know that, climate change is due to the increase in GHG emission especially in CO₂, CH₄, N₂O etc which causes changes in ambient temperature, extreme weather events, rise in sea water level; rapid long term changes in weather patterns induced by human activities. Thus, such increasing temperatures would also result in more extreme weather and climate variability.



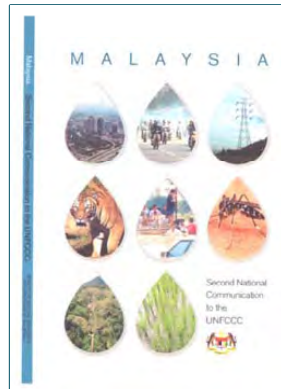
Source: Malaysian Meteorological Department (METMalaysia)

Adaptation Initiative by Government of Malaysia

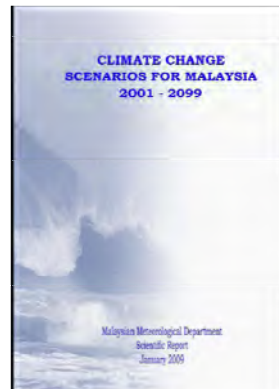
- Regarding to support & strengthen the adaptation initiative by the Government of Malaysia for long term climate change in Malaysia,
- The Government recognizes, the impacts of climate change transcend all levels, sectors, stakeholders and major groups. Therefore, institutional capacity for implementation can only be made effective through collaborative participation, based on indigenous & scientific knowledge.



National Policy on Climate Change (2010)



Second National Communication (NC2) to the UNFCCC (2010)



Modeling on Climate Change Scenarios for Malaysia (2001 - 2099)

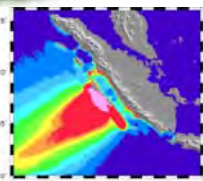


Climate Change on Hydrologic Regime & Water Resource of Peninsular Malaysia (2006)

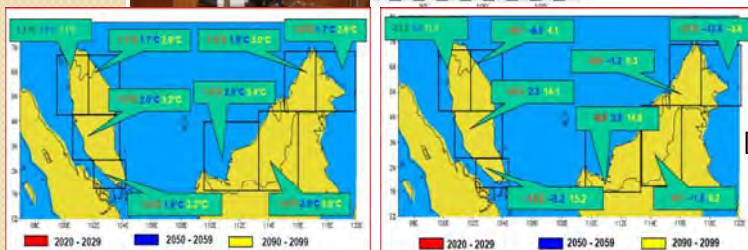
Research Activities related to *Natural Disaster Impact: Malaysian Meteorological Department (METMalaysia)*



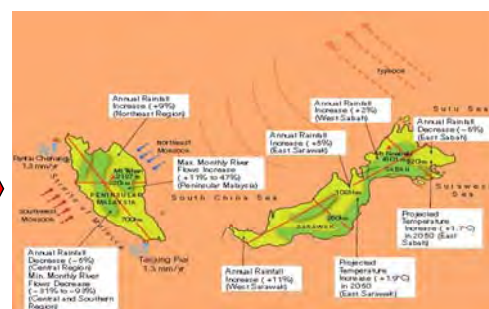
- Malaysian Meteorological Department (METMalaysia) under Ministry Science, Technology & Innovation (MOSTI) is committed to provide effective meteorological & seismological services to improve protection of life
- METMalaysia hosted several seminars and international conferences; *InterRegional Workshop on Policy Aspects of Climate Change* (19 – 21 April 2010). Participants included; Representatives of Malaysian & International Partner Organizations, Permanent Representatives with WMO, National Meteorological Services (NMSs) & WMO Secretariat. On October 04, 2011, METMalaysia - *National Climate Forum – Winter Monsoon 2011/2012*.



- Impact of global warming on monsoons over Malaysian regions, studied by using *Twelve Coupled Atmosphere-Ocean General Circulation Models (AOGCMs)*.
- Regional climate modeling simulations - *Providing Regional Climates for Impacts Studies (PRECIS)RCM* – climate variability



Annual Mean Temperature & Rainfall Anomaly Relative to 1990 - 1999 (METMalaysia)



Climate projection using HadCM3 AOGCM - research studies by METMalaysia

Research Plan Related to *Water-Resource Impact: National Hydraulic Research Institute of Malaysia (NAHRIM)*

- National Hydraulic Research Institute of Malaysia or NAHRIM was setup in September, 1995 under Ministry of Natural Resources and Environment (NRE)



Source: www.nahrim.gov.my

- a team of experienced researchers in coastal and river engineering hydraulics, water resources & water environment
- conducted climate change projection for Malaysia using **Regional Hydro-Climate**
- had many research paper publications, basically research studied on climate change related to water resource, such as;
 - > *Study of the Impact of Climate Change on the Hydrologic Regime & Water Resources of Peninsular Malaysia (2006)*
 - > *Study of the Impact of Climate Change on the Hydrologic Regime & Water Resources of Sabah and Sarawak (2007-2010)*
 - > *Restoration and Enhancement through Mangrove Forest Establishment*
 - > *Drought in Malaysia: A Look at Its Characteristics, Impacts, Related Policies & Management Strategies*
- specialist consultancy services in project planning & impact assessment; hydraulic engineering encompassing river & coastal engineering, water resources & water environment

Flood Mitigation Projects: Department of Irrigation & Drainage (DID)

- Department of Irrigation and Drainage (DID) - Ministry of Natural Resources and Environment (NRE), is responsible for the planning, implementing & operation of irrigation, drainage and flood control projects
- expanded task of River Basin Management and Coastal Zone, Water Resources Management & Hydrology, Special Projects, Flood Management and Eco-friendly Drainage

River Basins with Forecasting Models

River Basin	Catchments Area (km ²)	Number of Forecasting Point	Forecasting Model
1. Muda River	4,300	2	Stage Regression
2. Perak River	14,700	3	Stage Regression
3. Muar River	6,600	2	Linear Transfer Function
4. Batu Pahat River	2,600	2	Stage Correlation
5. Johor River	3,250	2	Regression Model
6. Pahang River	29,300	3	Linear Transfer Function and Stage Regression (back-up)
7. Kuantan River	2,025	1	Tank Model
8. Besut River	1,240	1	Stage Regression
9. Kelantan River	13,100	2	Tank Model and Stage Regression (back-up)
10. Golok River	2,175	1	Stage Regression
11. Sadong River	3,640	1	Linear Transfer Function
12. Kinabatangan River	17,000	1	Linear Transfer Function
13. Klang River	1280	5	Flood Watch

Source: Department of Irrigation and Drainage (DID), Malaysia

For example, 'An Integrated Flood Forecasting & Warning System for the Muda River Basin in Northern Peninsular Malaysia'

Stormwater Management and Road Tunnel Project (SMART)



FLOOD FORECASTING & WARNING SYSTEM PROGRAM



monitoring on water resources related issues like water quality, drought & debris flow



Control Room of the IFFRM project

Case Study of Iskandar Malaysia as Sustainable Eco Planning City: University Technology of Malaysia, Johor

- Malaysia will continue to experience a rapid increase of CO₂ emissions
- planning of sustainable regions involves creation of Low Carbon Society (LCS) by promoting low carbon emission is needed
- Case study of transforming the Iskandar Malaysia (IM) that situated at Johor state in Malaysia into environmentally sustainable urban region had been studied
- a prototype of a green and sustainable urban region to achieve carbon reduction

Iskandar Malaysia (IM) Project



City/region	CO ₂ emissions from energy use (metric tons)		Remarks
	Total	CO ₂ /capita	
IM	5,103,000	4.9	
Tokyo	71,300,000	5.8	Year 2003
Greater London	50,800,000	6.9	Year 2003

Source: TMG (2006)

Source: TMG (2006)

CO₂ emissions from energy use in IM in comparison with Tokyo and Greater London, 2005

- IM had been chosen - natural & green environment that covers a total of more than 150,000 ha of green spaces including forests, mangrove areas, parks and open spaces as well as a agricultural areas
- Master Plan for IM known as *Comprehensive Development Plan for South Johor Economic Region (2006 – 2025)*

Recommendation and Future Plan

- ❖ To enhance & strengthen the adaptation, five (5) guiding principles that should be understand which consist of :-
 - ✓ *Sustainable Development*
 - ✓ *Resilience*
 - ✓ *Governance*
 - ✓ *Knowledge & Information sharing*
 - ✓ *Economics & Financing*
- ❖ Although the phenomena of climate had been changing are not or only partly understood by the prediction of data & climate projection for the future, the National Government must draw up appropriate adaptation measures
- ❖ Adaptation measures should be planned using a 'flexible approach' by which adaptation measures will be revised based on future observation data & accumulated knowledge about impacts of climate change
- ❖ In Malaysia, the integration between disaster risk reduction and climate change adaptation is making a significant progress
- ❖ In spite of the absence of cap on emission, Malaysian Government has been continuously promoting environmental stewardship in all its development plans
- ❖ In future, as in 10th Malaysia Plan (2011- 2015) that had been announced in *Malaysia Budget Plan 2012* on October 07, 2011 by the Prime Minister - the Government of Malaysia will introduced a new tariff called, *Feed – in Tariff (FIT)* to support renewable energy efforts, provide fiscal incentives & funding for green technology investments.

Conclusions

In conclusions, adaptation to climate change should be taken into account in all development plans for both countries; Malaysia as developing country as well as Japan, the developed country

Better and enhanced understanding of the interlink ages between environment issues and disaster mitigation at various levels of action, better and enhanced understanding of the need for multi-disciplinarily in disaster management as a whole. Even, disaster risk management (DRM) and climate change adaptation (CCA) both need to address processes that define environmental & socioeconomic vulnerabilities in the future.

In addition, numerous tools for assessing climate change vulnerabilities & adaptation measures exist that can be linked with/complement DRM methodologies.



References

- *Adaptation Strategies for Water and Agricultural Sectors in Southeast Asia*, Regional Climate Change Adaptation Knowledge Platform for Asia (Adaptation Knowledge Platform) – October 2010
- Jessica Mercer, *Disaster Risk Reduction or Climate Change Adaptation: Are We Reinventing the Wheel?*. Journal of International Development J. Int. Dev. 22, 247–264 (2010) Published online in Wiley InterScience (www.interscience.wiley.com) DOI: 10.1002/jid.1677
- Tearfund. 2008. *Linking Climate Change Adaptation and Disaster Risk Reduction*. Tearfund: London.
- Lewis J. 1999. *Development in Disaster-prone Places: Studies of Vulnerability*. Intermediate Technology Publications: London.
- Wisner B, Blaikie P, Cannon T, Davis I. 2004. *At Risk: Natural Hazards, People's Vulnerability and Disasters*. (2nd edn). Routledge: London.
- Tran P, Shaw R. 2007. *Towards An Integrated Approach of Disaster and Environmental Management: A Case Study of Thua Thien Hue Province in Central Vietnam*. Environmental Hazards 7(4): 271–282.
- United Nations International Strategy for Disaster Reduction (UNISDR). 2004. *Terminology: Basic Terms of Disaster Risk Reduction*. UNISDR: Geneva.
- *Statement on Tropical Cyclones and Climate Change* - WMO International Workshop on Tropical Cyclones, IWTC-6, San Jose, Costa Rica, November 2006.
- *IPCC (2007): The Fourth Assessment Report*
- *Japan's Fifth National Communication*: Under the United Nations Framework Convention on Climate Change. The Government of Japan. (2010).
- *Wise Adaptation to Climate Change*. The Committee on Climate Change Impacts and Adaptation Research, Ministry of the Environment Japan. (MOEJ). (2008).
- *The Role of Adaptive Measures in the Water-Related Disaster Sector for Climate Change Accompanying Global Warming* (Report). Council for Social Infrastructures, Ministry of Land, Infrastructures, Transport and Tourism Japan. (2008).
- *Practical Guidelines on Strategic Climate Change Adaptation Planning: Flood Disaster*. October 2010. River Bureau, Ministry of Land, Infrastructures, Transport and Tourism Japan (MLIT). (2010).
- *Final Report for Study on Mainstreaming Climate Change Considerations into JICA Operation (Adaptation)*. (June 2011). Japan International Cooperation Agency (JICA). (2011).
- Deni, S.M., S. Jamaludin, W.Z.W. Zin and A.A. Jemain, 2008. *Tracing Trends in the Sequences of Dry and Wet Days Over Peninsular Malaysia*. J. Environ. Sci. Technol., 1: 97 – 110.
- Scientific Report: *Climate Change Scenarios for Malaysia (2001 – 2099)* by Malaysian Meteorological Department (METMalaysia), Ministry Science, Technology and Innovation Malaysia (MOSTI)
- R.A. Begum, C. Siwar, R.D.Z.R.Z. Abidin and Joy Jacqueline Pereira, 2011. *Vulnerability of Climate Change and Hardcore Poverty in Malaysia*. J. Environ. Sci. Technol., 4(2): 112 – 117
- *National Policy on Climate Change for Malaysia* published by 2010. Ministry of Natural Resources and Environment Malaysia (NRE).
- Sumiani Yusoff, Ph.D. International Institute of Public Policy and Management (INPUMA), University of Malaya, Malaysia. *Development of a National Policy on Climate Change: Malaysia's Experience*. Presentation at Mahidol Univ. Bangkok (2010).
- Ando, K., F. Syamsudin, Y. Ishihara, W. Pandoe, M. D. Yamanaka, Y. Masumoto and K. Mizuno, 2010: Development of new international research laboratory for maritime-continent seas climate research and contributions to global surface moored buoy array. *Proceedings of the "OeanObs'09: Sustained Ocean Observations and Information for Society" Conference (Annex), Venice, Italy, 21-25 September 2009*, Hal, J., D. E. Harrison and D. Stammer (eds), ESA Publication WPP-306.
- Yamanaka, M. D., S. Mori, Wu P.-M., Hamada J.-I., N. Sakurai, H. Hashiguchi, M. K. Yamamoto, Y. Shibagaki, M. Kawashima, Y. Fujiyoshi, T. Shimomai, T. Manik, Erlansyah, W. Setiawan, B. Tejasukmana, F. Syamsudin, Y. S. Djajadihardia, and J. T. Anggadiredja, 2008: *HARIMAU Radar-Profilers Network Over Indonesian Maritime Continent: A GEOSS Early Achievement for Hydrological Cycle and Disaster Prevention*. J. Disaster Res., 3, 78-88.
- C.-S. Ho and W.-K. Fong, University Technology Malaysia. 2011. *Eco-City Planning - Policies, Practice and Design: Towards a Sustainable Regional Development in Malaysia*. J. Springer., 196 – 219.

THANK YOU ...

