



**Mainstreaming Adaptation to Climate Change (MACC)**

**Climate Change Adaptation:  
Agriculture and Livelihood**



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- **Background:**
  - Climate change: an overview
- **Timescales of Climate Variation And Climate Change:**
  - Regional perspective
- **Framework of Climate Change and Agriculture:**
  - Relationship between adaptation, MACC and poverty and livelihood
- **Approaches to Adaptation and Livelihood:**
  - Integrating climate and climatic resources assessments under a decision-oriented framework

**Three questions under the adaptation and MACC framework:**

ISSUE

(1) Are planning strategies for agricultural resources in Malaysia supported by the climate record?

IMPACT

(2) What additional pressures will be placed on agriculture as a result of projected climatic variability and change?

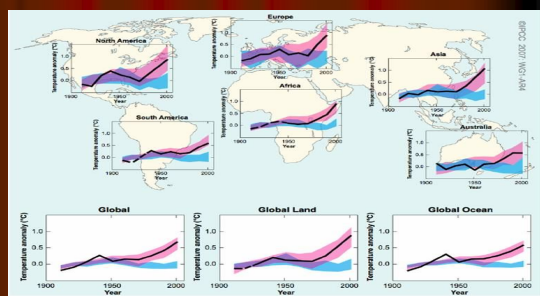
POLICY

(3) What practical strategies (adaptation options) can be engaged to reduce vulnerability and enhance livelihood outcomes?

**Background**

- **What is climate change?**
  - The variation in the Earth's global climate or in regional climates over time, such as
    - \* variations in sunlight intensity
    - \* greenhouse gas emission
    - \* higher sunlight intensity, temperature rise
    - \* extreme temperature
    - \* unexpected rainfall, losses of ecosystem and so on...
  - Caused by processes of internal and external forces to the Earth
  - More recently, human activities...
  - there is 90-95% likelihood that changes in modern climate have been in part caused by human actions.
- **Effects of climate change:**
  - Agriculture, agricultural product and supply
  - Forests
  - Ecosystems and biodiversity
  - Water resources
  - Coastal zones....

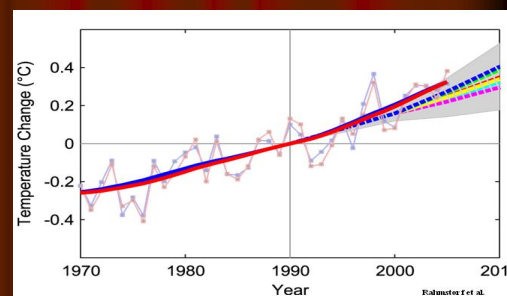
**Timescales: Climate Variation and Change**



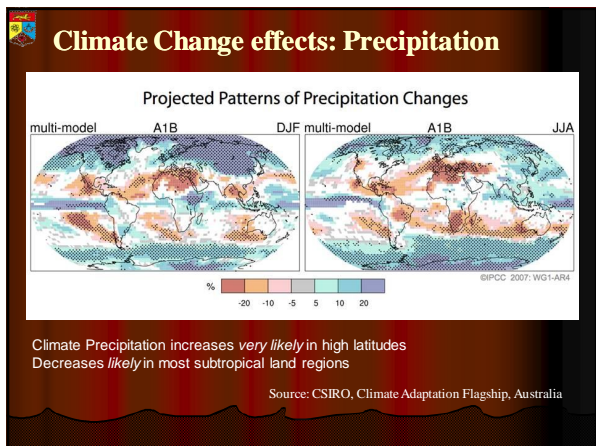
Climate change between 1900 and 2000

\* From: IPCC, 2007: Summary for Policymakers. In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

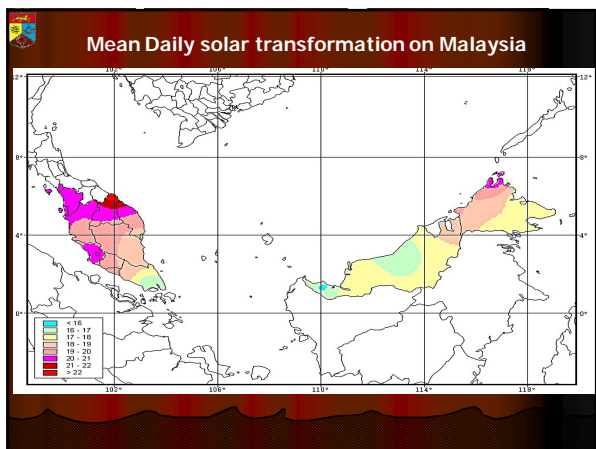
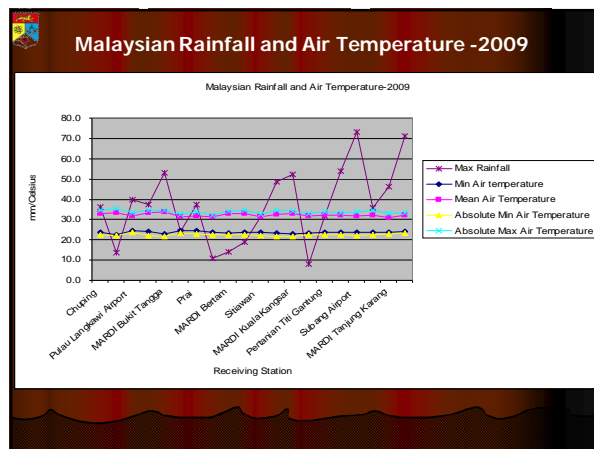
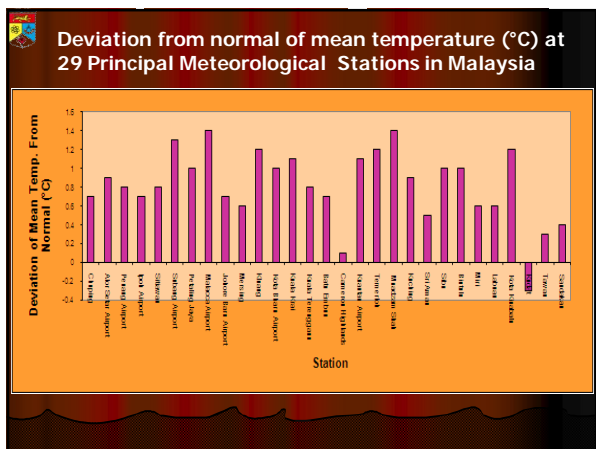
**Climate Change effects: Temperature**



Temperature projections from 1970 to 2010



## Climate Change (CC) and Agriculture: What about Malaysia?




### Climate change projections for Malaysia by IPCC

Year	2025	2050	2100
Carbon Dioxide Concentration	405 - 460 ppm	445 - 460 ppm	540 - 970 ppm
Mean Temperature Rise	0.2 - 0.4 °C	0.3 - 1.0 °C	0.6 - 2.3 °C
Mean Precipitation Change	- 5 % to + 5 %	- 5 % to + 5 %	- 5 % to + 5 %

Source: IPCC, 2001

### Possible climatic change of Peninsular Malaysia in 2041-2050 by NAHRIM



- Temperature rise 2°C
- More extreme hydrological conditions
  - Higher maximum rainfall; Lower minimum rainfall

**Potential implications**

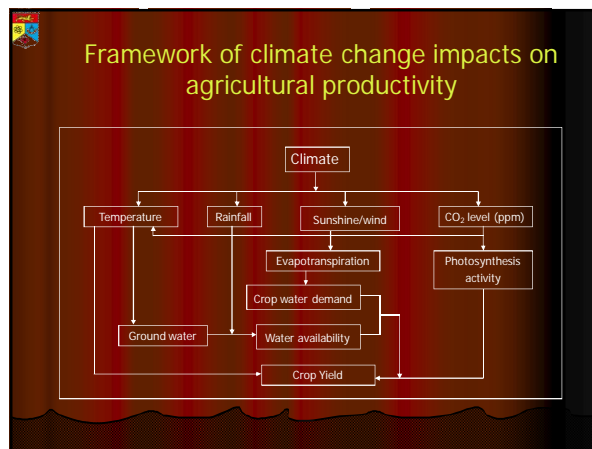
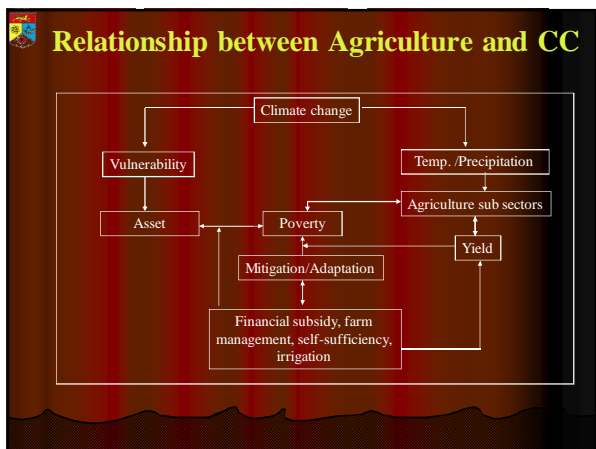
- Water balance → Water sufficiency
- Crops yields → Food security
- Plantation → Economic loss..

Source: NAHRIM (2006)

### Future projection of climate change on Malaysia: selected states

Climate Factor	Projected Change in Maximum Monthly Value			
	North West Region (West Coast, Perak, Kedah)	North East Region (North east coast, Terengganu, Kelantan)	Central Region (Klang, Selangor, Pahang)	Southern Region (Johor, Southern Peninsula)
Rainfall	+ 6.2 %	+ 32.8 %	+ 8.0 %	+ 2.9 %
Temperature	+1.80 °C	+1.88 °C	+1.38 °C	+1.74 °C

Source: NAHRIM, 2006



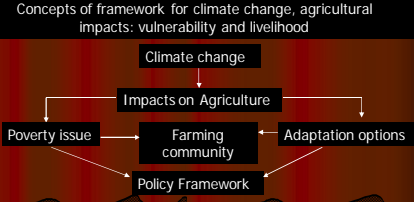
### Climate Change Adaptation, MAEC and Livelihood Framework

### Climate Change adaptation concepts: Agriculture, poverty and livelihood...

First of all we need to understand the following concepts:

- What is Adaptation?
- Why we need to pursue adaptation in Agriculture?
- What is poverty and livelihood concept in agricultural adaptation?
- Concepts of livelihood: way of thinking about the objectives, scope and priorities for development
- What are the linkages between climate change and agricultural impacts: vulnerability and livelihood?

Concepts of framework for climate change, agricultural impacts: vulnerability and livelihood



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    graph TD
      CC[Climate change] --> IA[Impacts on Agriculture]
      IA --> FC[Farming community]
      IA --> PI[Poverty issue]
      IA --> AO[Adaptation options]
      FC --> PF[Policy Framework]
      PI --> PF
      AO --> PF
  
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## Adaptation in Agriculture?

- **What is Adaptation?**
  - Adaptation involves developing ways to protect people and places by reducing their vulnerability to climate pattern.
  - Agricultural adaptation options could be grouped as: (a) technological developments, (b) government programs, (c) farm production practice, and (d) farm financial management.
- **(a) Technological developments**
  - Technological adaptations could be developed in Malaysia through research programme undertaken. These includes:
    1. *Resource management innovations (e.g. water management innovation, irrigation, farm level resource mgt- to address risk of moisture deficiency)*
    2. *Crop development (crop varieties tolerant to changing climatic conditions)*
    3. *Weather and climate information systems (e.g. early warning system, daily and seasonal weather forecasts)*

## Cont...

- **(b) Government programs**
  - Government programs are institutional responses to the economic risks associated with climate change and have the potential to influence farm-level risk management strategies. These includes:
    1. *Agricultural subsidy and support programs (modify subsidy and insurance programs wrt to climate related loss of crop yield)*
    2. *Resource management programs (water res use & mgt strategies wrt changing climatic conditions)*
- **(c) Farm production practice**
  - Farm production practices (i.e. diversify crop types and varieties, land use pattern, irrigation etc.) involve changes in farm operational practices, which may be stimulated or informed by government programs or industry initiatives. These includes:
    1. *Farm production (diversify crop type & varieties to suit climatic changes)*
    2. *Land Use (change location of production to address risks wrt climate change)*
    3. *Irrigation (to address moisture deficiency wrt climate change)*
    4. *Timing of operations (change to address changing duration/season due to climate change)*

## Cont...

- **(d) Farm financial management**
  - Farm financial adaptations involve decisions with respect to crop insurance, crop shares and futures, income stabilization programs, household income (invest in crop shares & futures to reduce risks of climate change income loss)
  - Farm financial adaptation options are farm-level responses using farm income strategies such as both private and government supported to reduce the risk of climate-related income loss which might support and incentive programs greatly influence farm financial management decisions (e.g. participate in income stabilization prog. to reduce risk of income loss due to climatic conditions and variability)
  - **WHAT IS OUR CURRENT STEPS FOR CLIMATE CHANGE ON AGRICULTURE?**

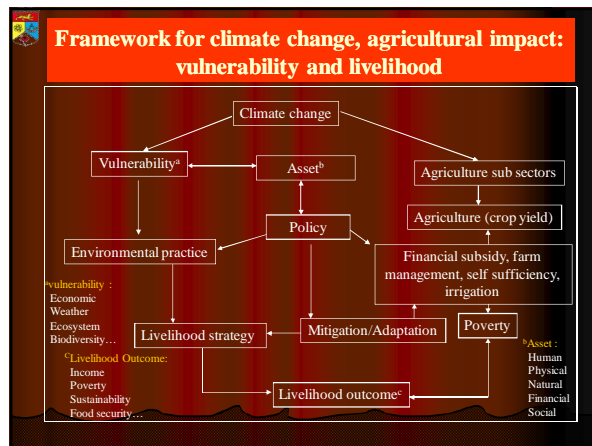
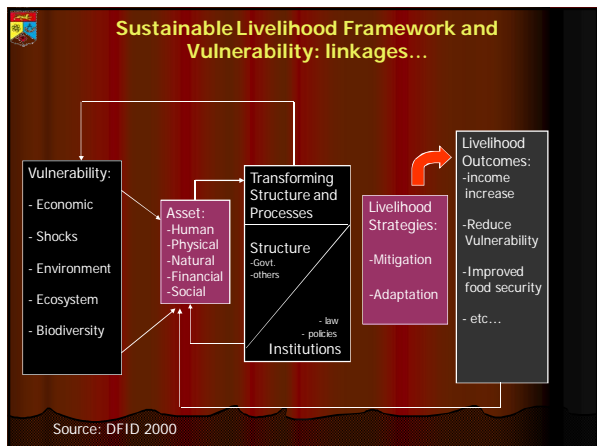
## Why do we need to know about MACC?

- Building capacity to identify climate change risks – among other things, this will include strengthening networks to monitor impacts on regional climate, downscaling global climate models, and developing impact scenarios;
- Building capacity to reduce vulnerability to climate change;
- Building capacity to effectively access and utilize resources to minimize the costs of climate change;
- Public education and outreach of impact modeling; and
- Harmonized methodology for assessing climate change vulnerability and adaptation toward policy making.

## Why do we need to know adaptation strategy for MACC?

- To promote adaptations: (i) incorporating development concerns into climate policy and (ii) incorporating climate concerns into development policy;
- To know whether the proposed adaptation options for agricultural resources fully supported by development planning;
- To establish climate and natural resources roundtables;
- Approaches of risk communication and associate assumptions to alleviate vulnerability to the poor farmers;
- To know interventions for current adaptation appraisal whether they are effective or not;
- To establish relationship between MACC and sustainable livelihood

## How to link between climate change, sustainable livelihood and MACC?



### Developing effective decisions

**Establish Climate and Natural Resources Roundtables (which also provide for data sharing)**

- Serve as a clearinghouse mechanism for promoting, initiating and facilitating climate change programs and policies;
- Review national strategies for enhancing the objectives of the UN Framework Convention on Climate Change and advising government on the way forward;
- Evaluate options, information, and to examine the most benefited alternative from analyzing inputs among existing institutions;
- To identify the indirect influencing factors in the context of vulnerability: natural resource seasonality, rural infrastructure, technology, economic growth, population, health & diseases, risks to climate change, flooding, drought, employment opportunities, market demands, diversification (fishing, tourism, etc);
- Explore the feasibility of establishing action plans to identify and adapt, where appropriate;
- Identify entry points for information at different levels of governance

### Approaches to risk communication and associated assumptions

Approach	Assumptions and actions
Social processes of risk communication	Engage in a process that addresses concerns about risk Aimed at enhancing understanding among stakeholders
Development and delivery of a risk message	Aimed at bringing public views into line with expert views to ensure expert view of more validity for decision-making
Dialogue about risk	Interactive exchange of risk information—continuous Aimed at balancing the content of risk message Assumes both views contribute to decision-making

### Institutional mechanisms: Realizing implementation

- **Past recommendations :** How effective were they? What criteria are used for evaluation?
- **Past interventions:** How effective were they?
- **Do we need to involve local organizations? If so then what will be the interest?**
- **How is the common interest pursued and secured? Where and why have particular local organizations been successful and sustained?**
- **Partnerships (not only stakeholder assessments)**

### Policy?

- What activities already exist?
- What partnerships need to be engaged?
- Goals of participants: What is being valued? (role of experts, state agencies, NGOs, local communities)
- Trends: Robustness: choice, inventory and baselines
- Conditioning factors: reconstructing influences on events, past interventions
- Alternatives: acting under uncertain information
- Pathways to decision-making

