



# Global Warming: Concerns and Challenges for the Philippines

The Third Jaime V. Ongpin Annual Memorial Lecture on  
Public Service in Business and Government

*Ateneo de Manila University*

*29<sup>th</sup> September 2004*



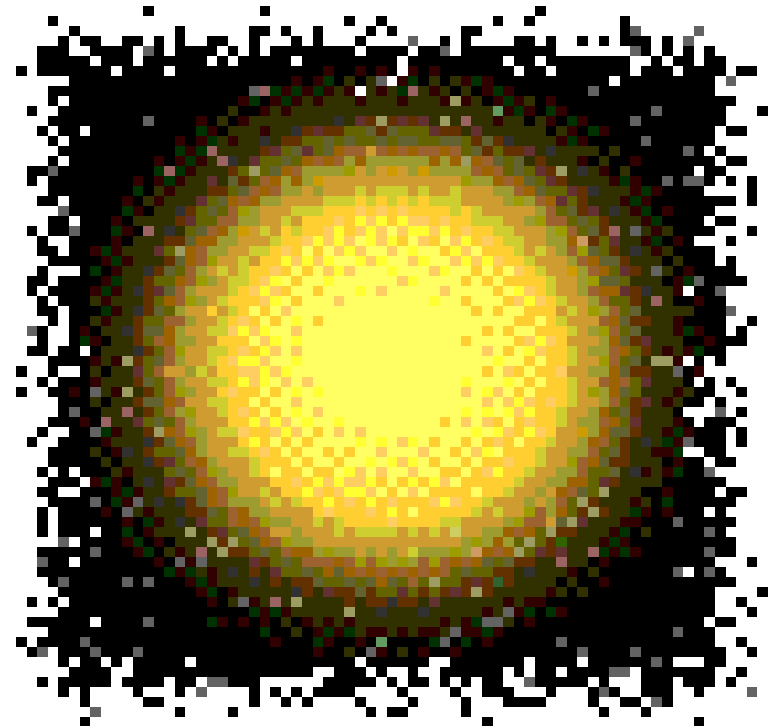
# Outline



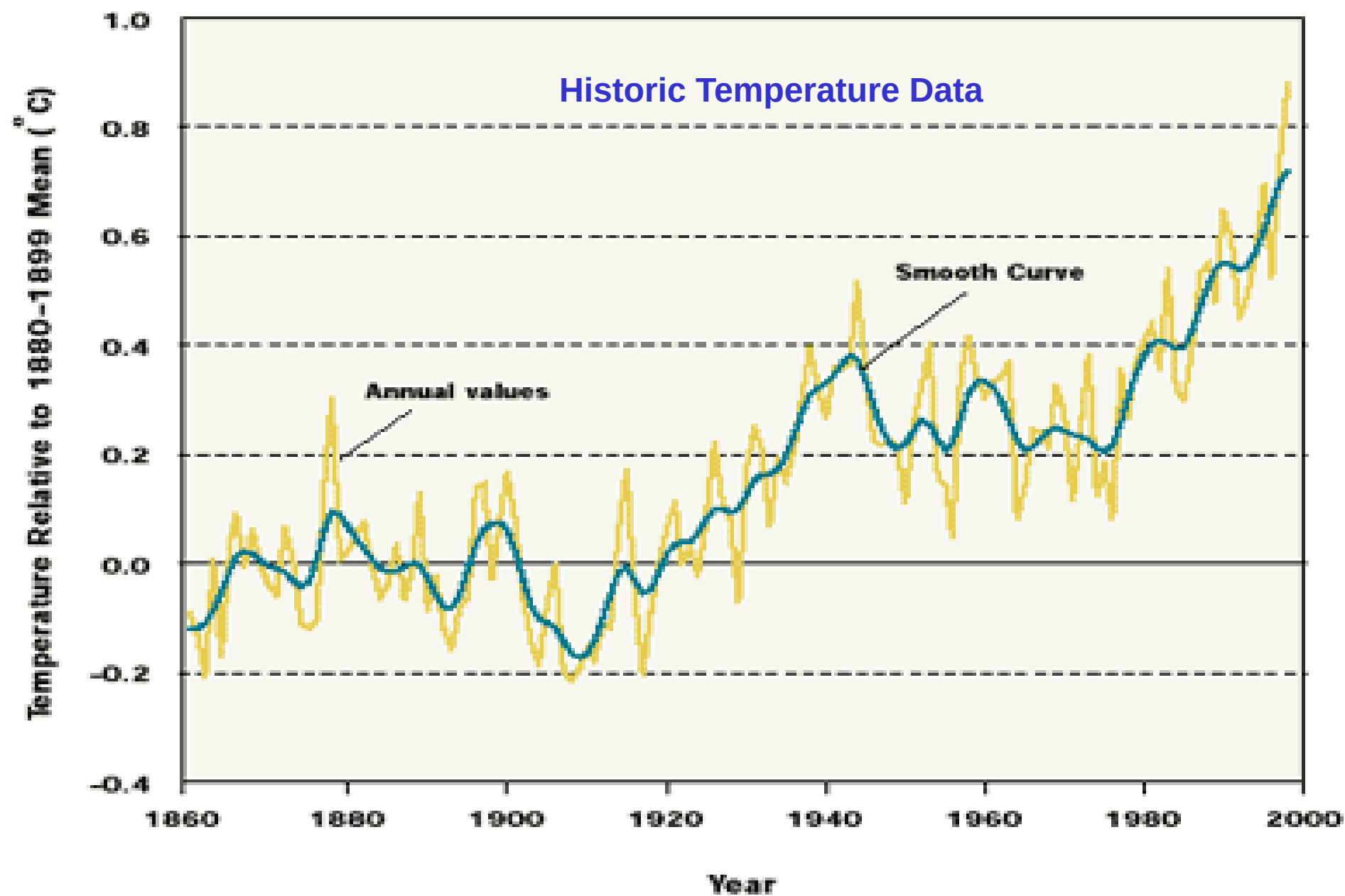
1. Concerns: Problem of global warming & climate change
2. Challenges: Responding to the problem
  - a) Types of responses
  - b) Role of the Citizen
  - c) Role of the State
  - d) Role of the Market



# 1. Problem of global warming & climate change



# Global-Mean Temperatures



# Adverse impacts of Climate Change

- Sea level rise
  - Make many islands, coastal areas uninhabitable, displacing millions of people
- Wet seasons become wetter, dry seasons become drier
  - Disruption of water supplies, agriculture becoming unviable, famines
- More frequent and intense storms, heat waves, floods and droughts
  - Disasters that cause deaths, misery & economic damage





# Adverse impacts of climate change

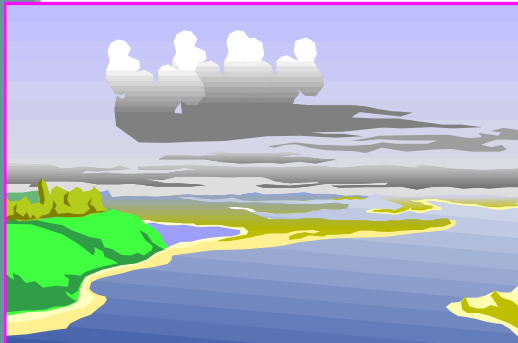
- Temperature extremes
  - Human health impacts (heat stress, more widespread vector-borne diseases like malaria & dengue, epidemics)
  - Health of ecosystems (e.g., forests & corals)

# Climate Change and Environmental Impacts

Changes in temperature, weather patterns and sea level rise

## **Coastal Areas:**

Erosion and flooding  
Inundation  
Change in wetlands



## **Water Resources:**

Changes in water supply  
and water quality  
Competition/Trans-border  
Issues

## **Agriculture:**

Changes in crop yields  
Irrigation demands,  
Productivity

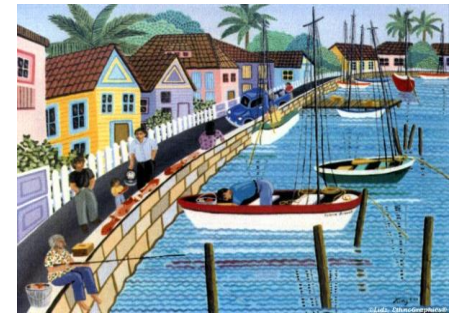


## **Forests:**

Change in Ecologies,  
Geographic range of species,  
and  
Health and productivity

## **Human Health:**

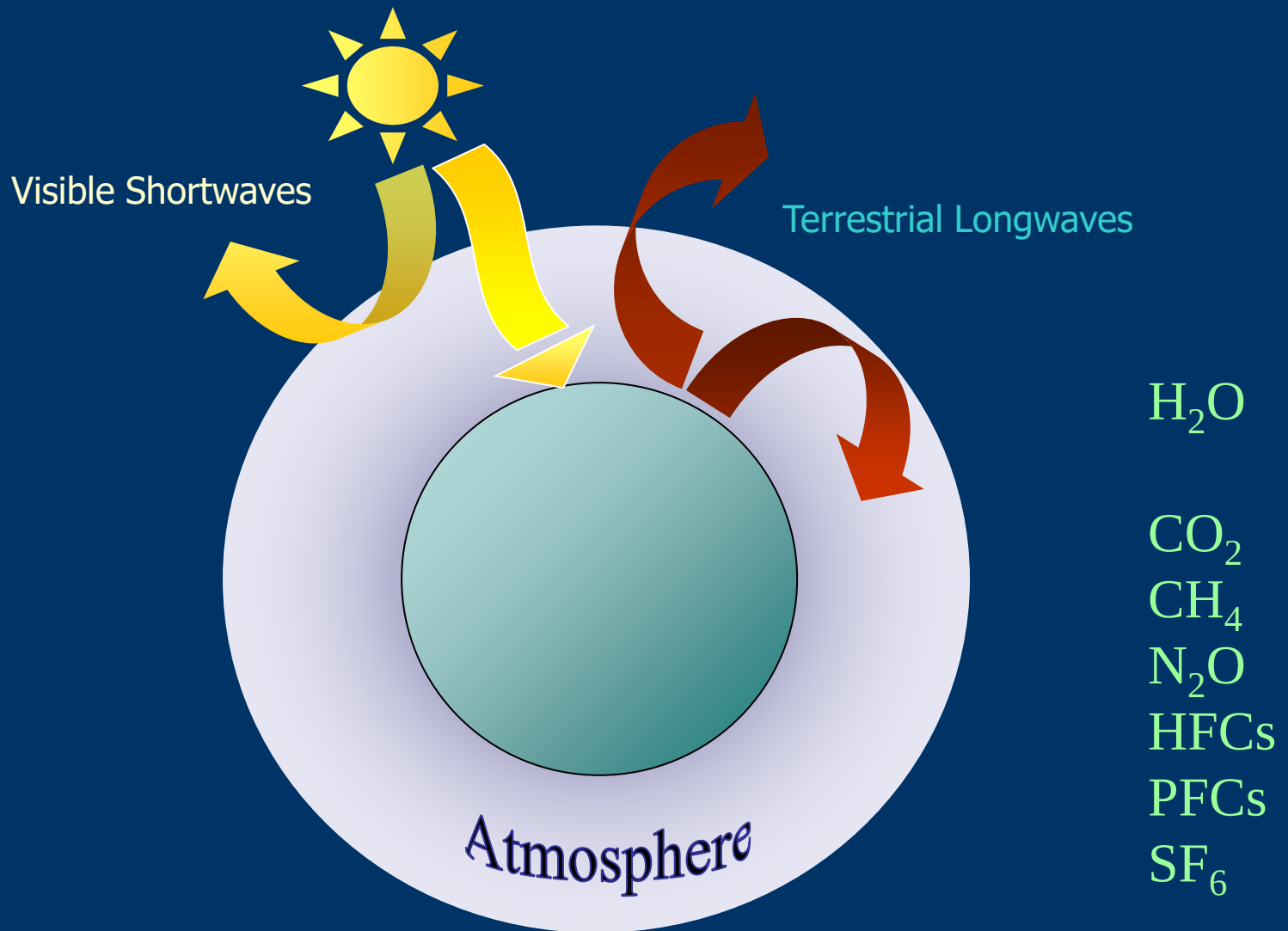
Weather related  
mortality  
Infectious disease  
Air quality - respiratory  
illness



## **Industry and Energy:**

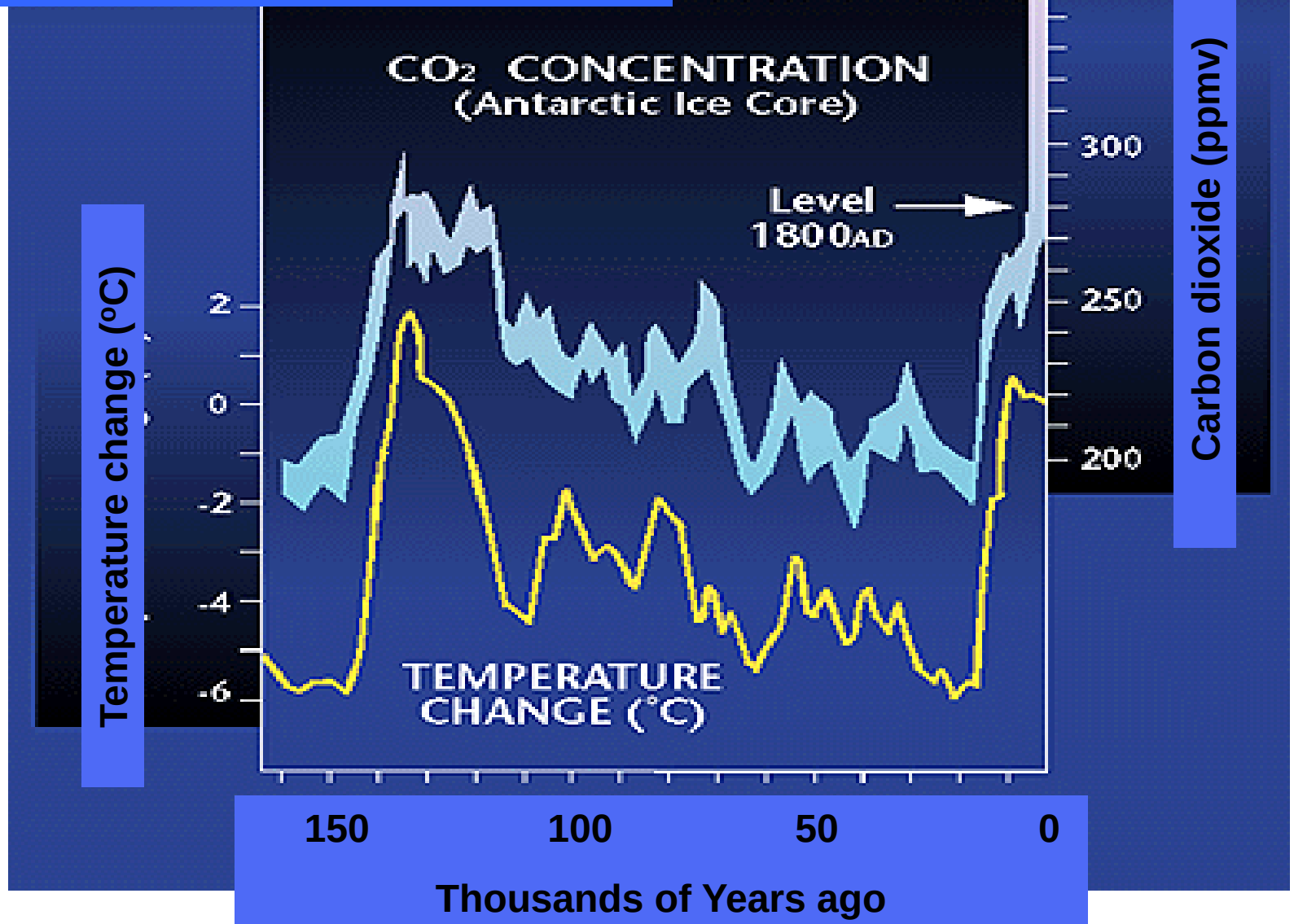
Changes in Energy  
demand  
Product demand &  
Supply

# THE GREENHOUSE EFFECT





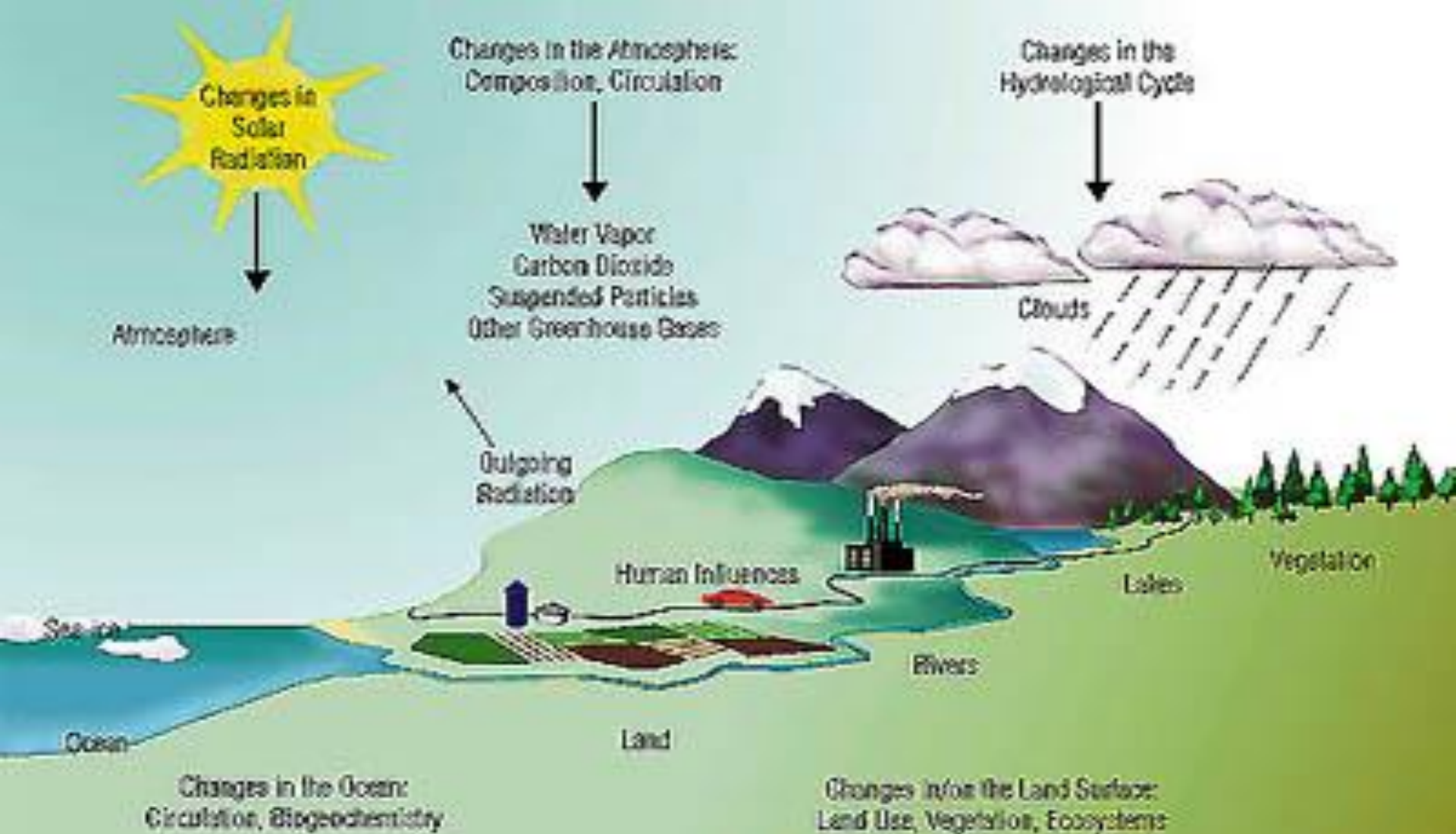
# Atmospheric CO<sub>2</sub> Concentration and Temperature Change



# Climate Change



- Climate change is caused by both natural events (like volcanic eruptions) and human activities



# Human Sources of GHGs

Carbon Dioxide ( $\text{CO}_2$ ) – Most prevalent GHG

Methane ( $\text{CH}_4$ ) – Second most common, 21x the potency of  $\text{CO}_2$

Nitrous Oxide ( $\text{N}_2\text{O}$ ) – 310x the potency of  $\text{CO}_2$

Other Gases – HFCs, PFCs, and  $\text{SF}_6$  = range 600 – 23900x potency of  $\text{CO}_2$

## Transport

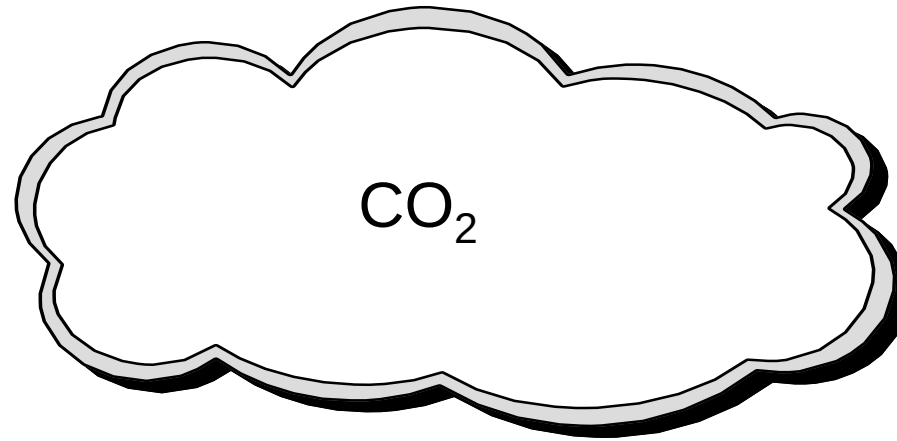


## Land Use: Agriculture & Forestry

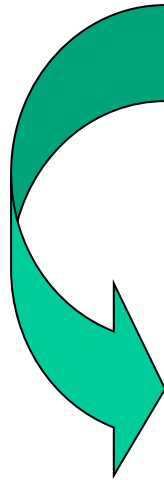


## Energy Generation Industrial Processes





Photosynthesis



Burning





# Waste as a source of GHG emissions

- Decaying solid waste in landfills emits methane



# Reality and Modeling Meet

Only when climate models include human activity do they mirror real warming trends.

## KEY:

**ACTUAL CHANGE** Observed temperature shift from the 1890-1919 average.

**TEMPERATURE CHANGE WITH HUMANS** Model of natural changes plus the effects of greenhouse gases (from fossil fuels), sulfates (from coal) and ozone pollution.

RANGE OF ESTIMATES

ANOMALIES FROM 1890-1919 AVERAGE:

+0.72 DEGREES F

+0.36

0

-0.36

+1.44

+1.08

**TEMPERATURE CHANGE WITHOUT HUMANS**

Model showing only influences of the Sun and volcanic activity.

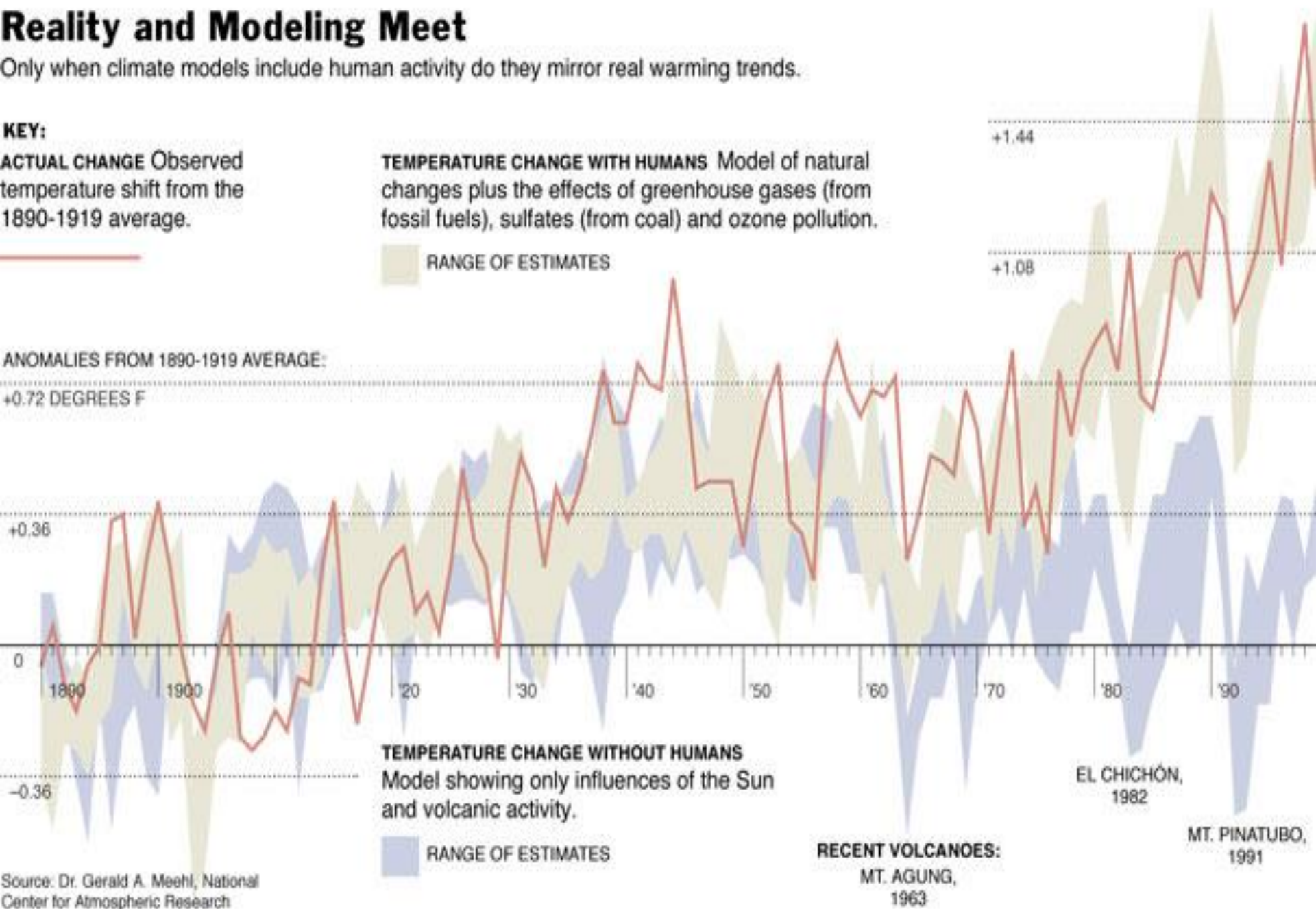
RANGE OF ESTIMATES

**RECENT VOLCANOES:**  
MT. AGUNG,  
1963

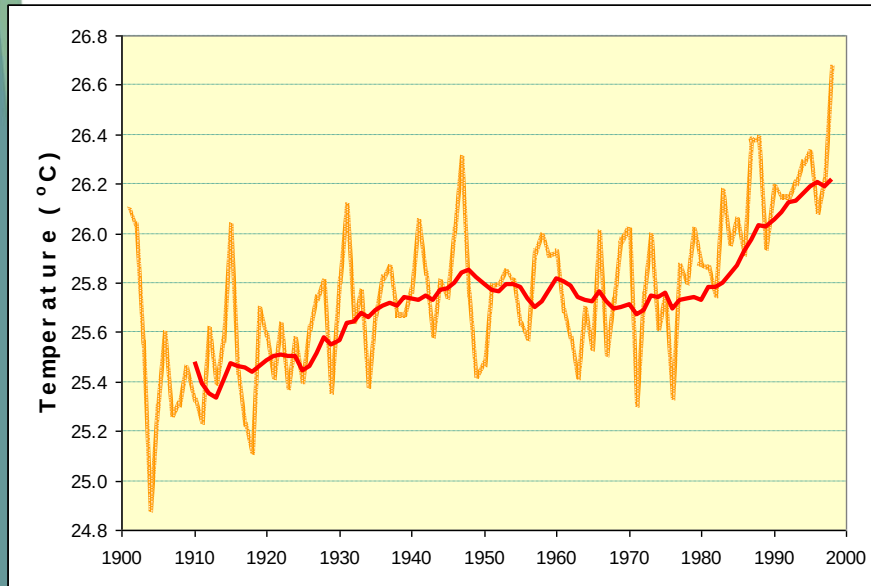
EL CHICHÓN,  
1982

MT. PINATUBO,  
1991

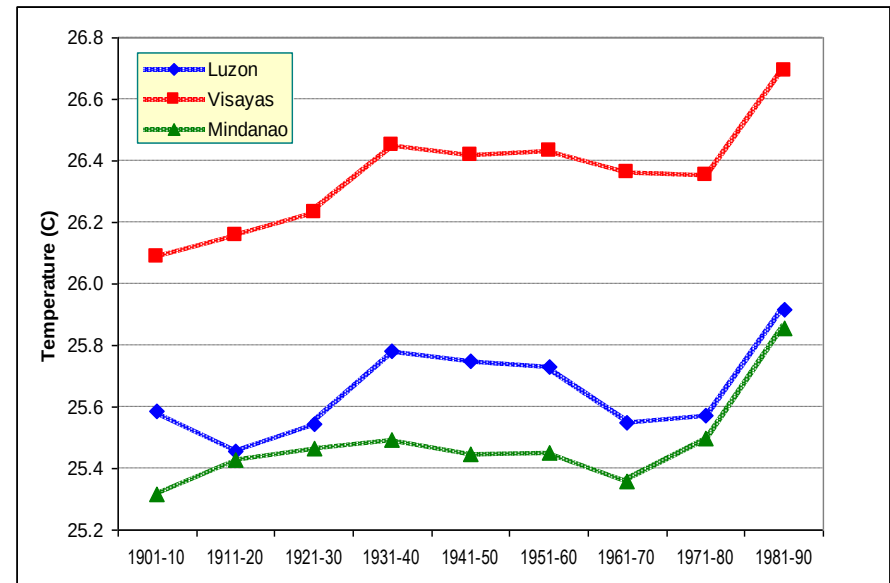
Source: Dr. Gerald A. Meehl, National Center for Atmospheric Research







**Philippine temperatures  
have been soaring**

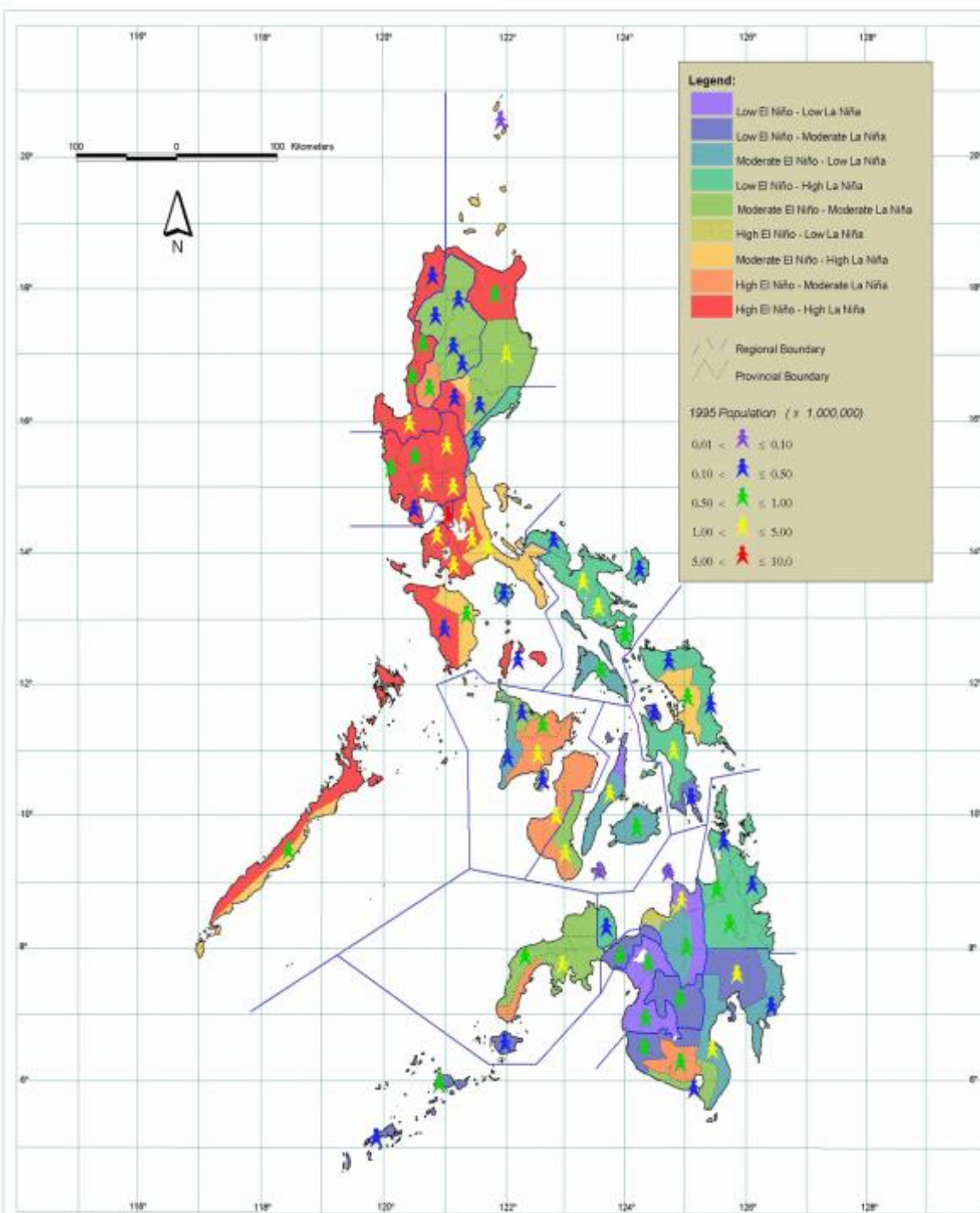


# Vulnerability to Climate Change

**Dry seasons becoming drier.**

**Wet seasons becoming wetter.**

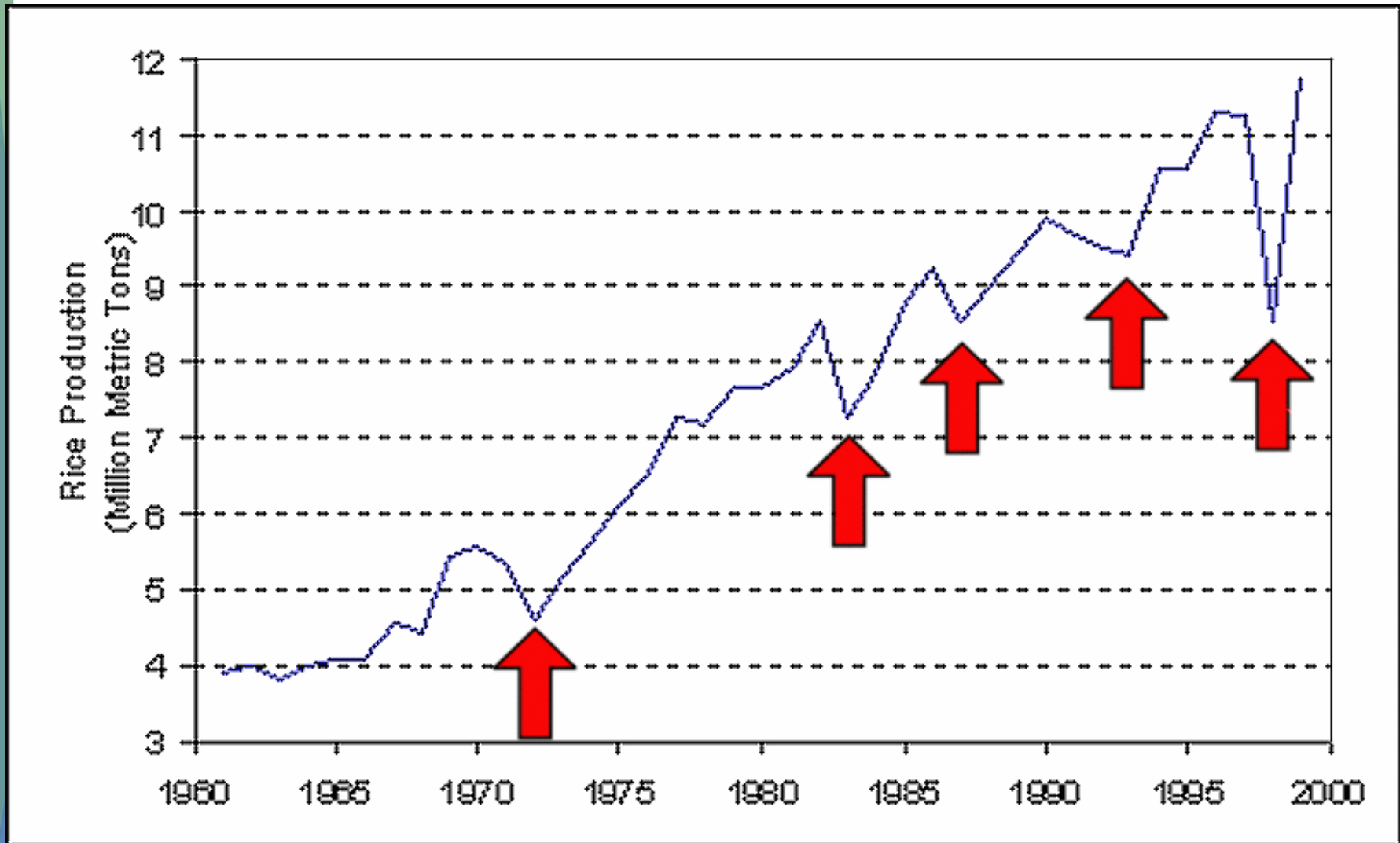
## El Niño - La Niña Vulnerability Map



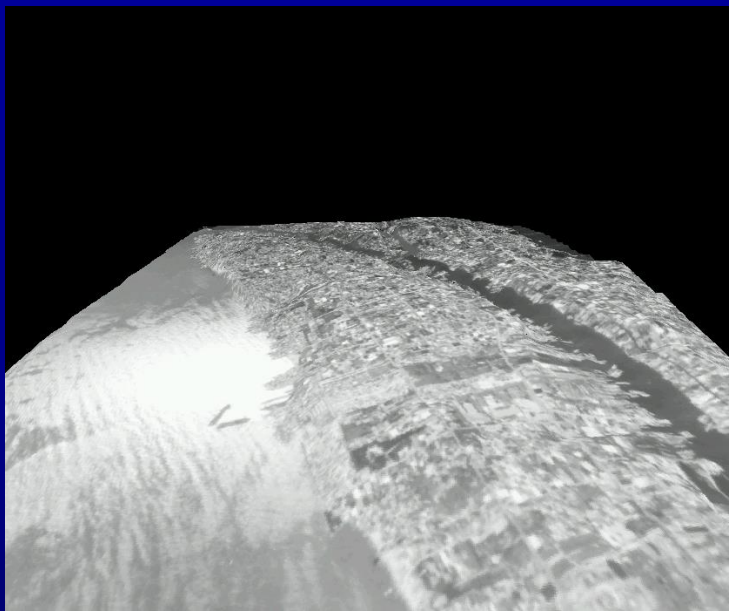


## Philippine Rice Production. Arrows indicate El Niño events.

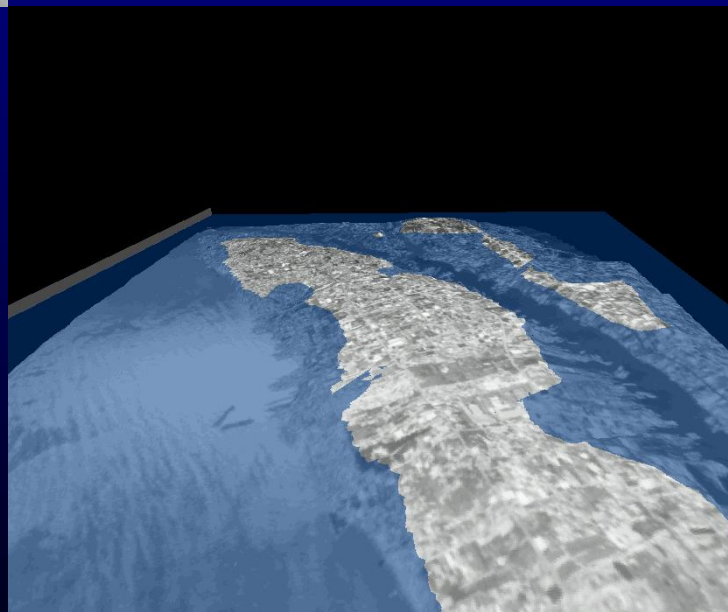
(source: Food and Agricultural Organization)



Aerial Photo over DEM of  
Navotas at 0 m SLR



Navotas 1.0 m SLR



## 2. Responding to the problem of climate change







## 2a. Types of responses

# Adaptation

Adapt to the impacts of climate change which are already present

## *Examples*

- Coastal protection (sea walls?)
- Better weather tracking and warning systems
- Disaster preparedness
- Disaster management
- Better health care facilities
- Better capabilities to manage epidemics
- Improved irrigation systems
- Insurance protection against natural disasters



# Mitigation

- Reduce CO<sub>2</sub> emissions from burning of fossil fuels (oil, coal)
  - Transport
  - Power generation
  - Industries
- Capture GHG (CH<sub>4</sub>, N<sub>2</sub>O) emissions
  - From solid waste
  - From bio-mass
- Sequester carbon in forests



# Sustainable Development

- Climate change as a problem of **Sustainable Development**
- The **poor** as most vulnerable to the negative impacts of climate change.
  - Floods, droughts, epidemics
- The **poor** are located in ecologically fragile areas





## 2b. Role of the Citizen





# **“Small things can stop something big like climate change” -- WWF**

- Conserve energy.
- Switch to compact fluorescent lamps.
- Use fans more, airconditioners less.
- Take the bus or the MRT.
- Carpool.
- Keep your vehicles in tip-top shape.
- Support “green” electricity.
- Don’t leave water running.
- Don’t use narra. Support log bans.
- Reduce. Reuse. Recycle.
- Don’t burn your waste. Segregate.
- Save paper.



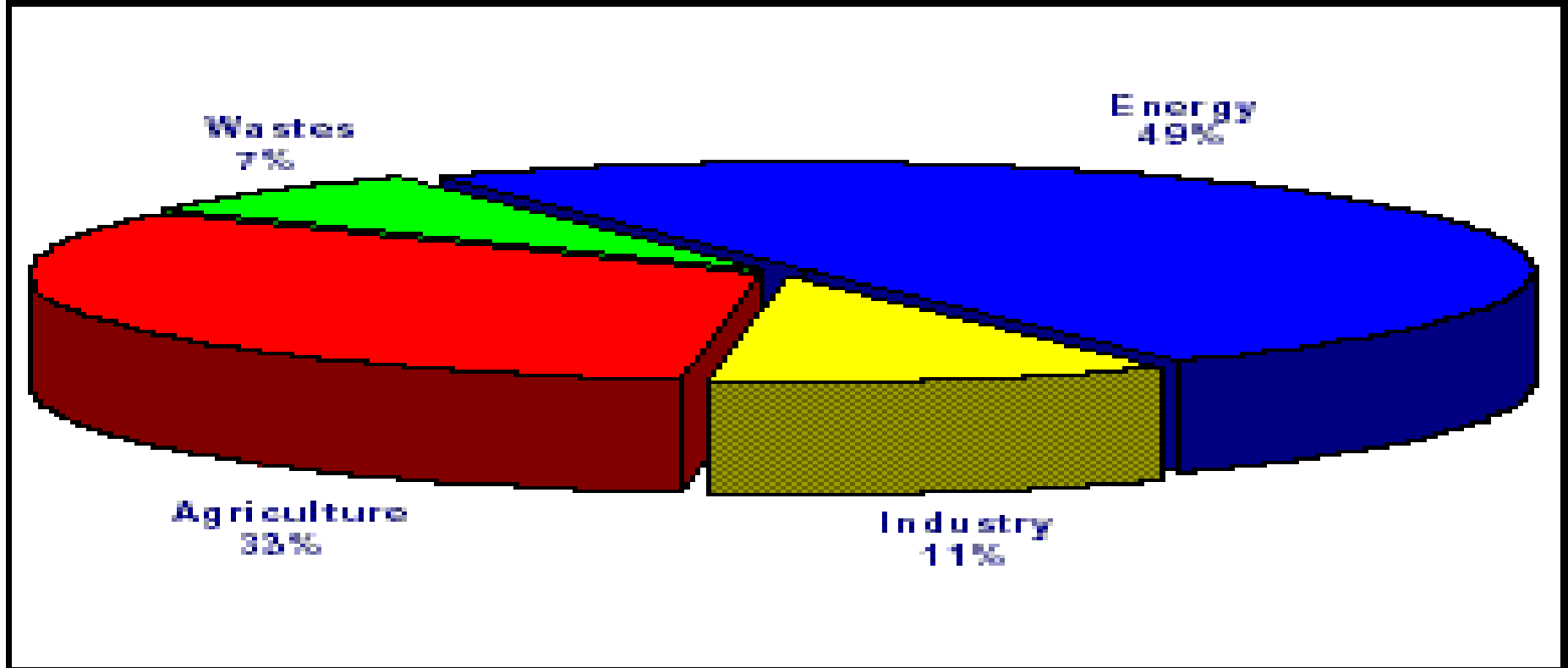


## 2c. Role of the State



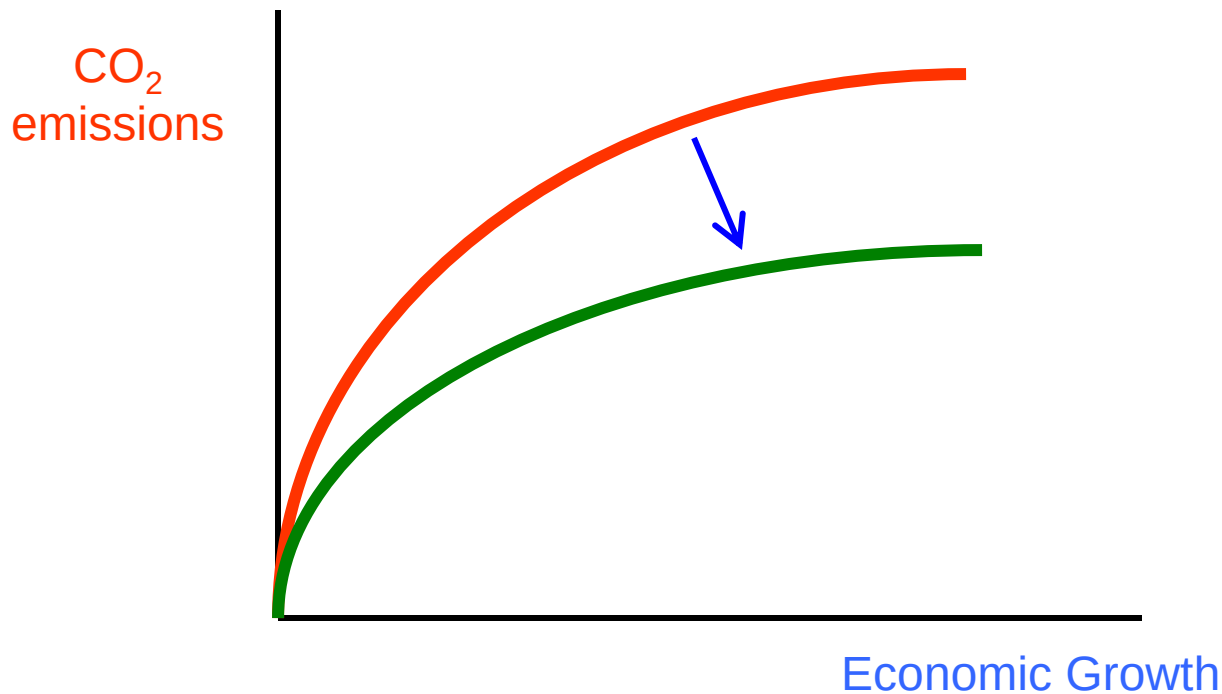
**Figure 2.1. 1994 GHG Emissions from the Four Non-LUCF Sectors of Energy, Agriculture, Industry, and Waste .**

| SECTOR       | CO <sub>2</sub> Emissions (ktons)) |
|--------------|------------------------------------|
| Energy       | 50,038                             |
| Industry     | 10,603                             |
| Agriculture  | 33,130                             |
| Wastes       | 7,094                              |
| <b>TOTAL</b> | <b>100,864</b>                     |



# Mitigation

- Balancing the demands of economic growth and a less-carbon intensive economy



# Mitigation

- Promote the use of renewable energy sources
- Promote reforestation and afforestation
- Promote solid waste management
- Promote fuel-switching to less carbon-intensive fuels (e.g., CNG, Coco-diesel)
- Promote energy efficient electricity transmission
- Promote end-use energy efficiency



# Adaptation

- Better weather tracking and warning systems
- Disaster preparedness
- Disaster management
- Better health care facilities
- Better capabilities to manage epidemics
- Improved irrigation systems







## 2d. Role of the Market



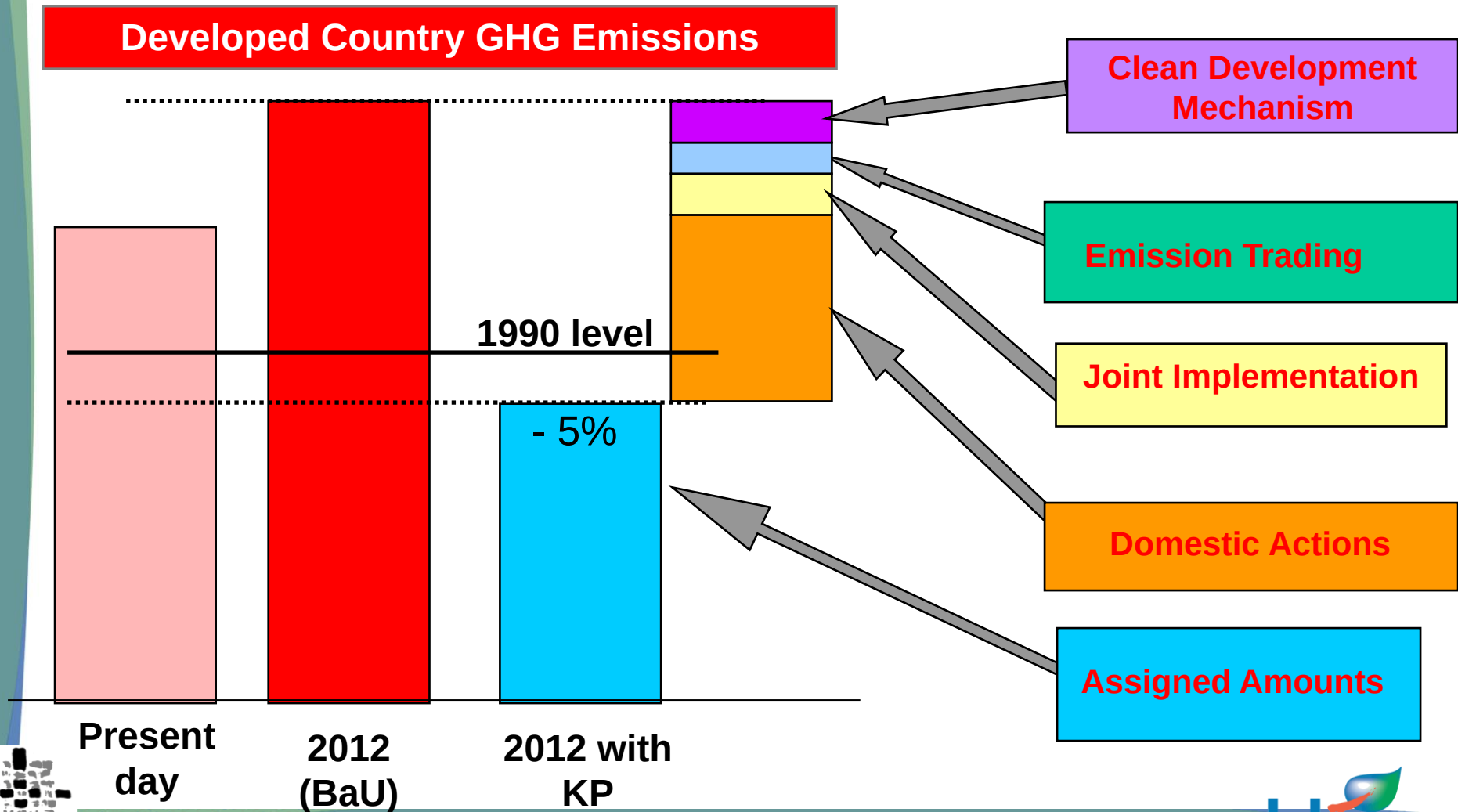


# Lessening the discord between market & environment

- Use market-based mechanisms to achieve environmental goals
  - Market-based mechanisms
    - Achieving environmental goals
    - At least cost
- Emerging market mechanism: CDM
  - Clean Development Mechanism (CDM) of the Kyoto Protocol on Climate Change



# Kyoto Protocol: Flexibility Mechanisms



# Clean Development Mechanism

- Allows developed countries to invest in carbon emission reduction projects in developing countries
- These emission reduction projects must
  - Assist developing countries in achieving sustainable development
  - Generate carbon reduction credits for the investors from developed countries



# Simplistic CDM example

Provide electricity for a barangay

- “Business-as-usual” (baseline): Diesel generator sets
  - Cost of project \$10
  - Emissions 1 tCO<sub>2</sub>
- Cleaner project (CDM-eligible): Micro-hydro
  - Cost of project \$13
  - Zero Emissions



# Simplistic CDM example

- CDM Investor (e.g. Japan)
  - Invests \$3 (\$13-\$10, difference between cleaner and business-as-usual project)
  - Gains Certificate of Emissions Reduction of 1 tCO<sub>2</sub>, which it can meet some of its Kyoto Protocol commitments to reduce emissions



# Simplistic CDM example

## WIN – WIN – WIN

- WIN for the host country
  - Sustainable development benefit: Cleaner energy production technology
- WIN for the CDM investor country
  - Credits for carbon emissions reduction
- WIN for the Global Environment
  - Reduction of carbon emissions, a globe pollutant





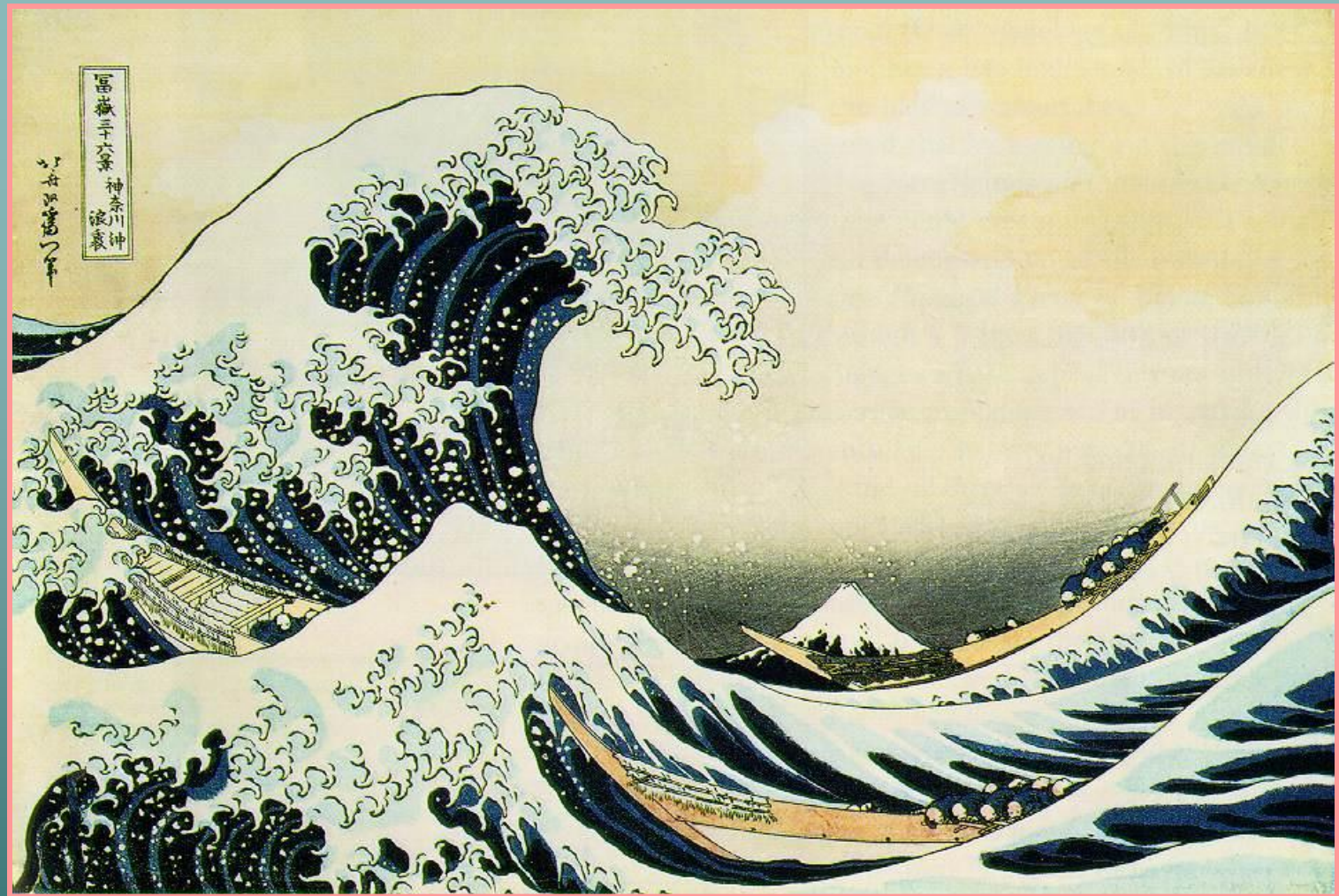






Sustainability ... means leaving  
something for our children





*“The worst is not that we may be overwhelmed by disaster,  
but to fail to live by principle.”*

*- W. Beckett*



# Daghang salamat!!

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