
Your Carbon Footpri
HUFF POST CLIMATE CHANGE
It could lead to global conflict
Yet the politicians squabble
THE CHALLENGE
How you can bet on the markets like a Wall Street trader: Commodities up on hopes Trump will boost manufacturing and fossil fuels
11/11/16 23:17
In recent years, increasing numbers of ordinary savers have been taking bets on everything from gold to more obscure metals such as palladium.
27 comments 5 shares
UN climate talks dominated by fears Donald Trump will derail $100 billion plan launched by Hillary Clinton to help poor countries cope with global warming
11/11/16 20:45

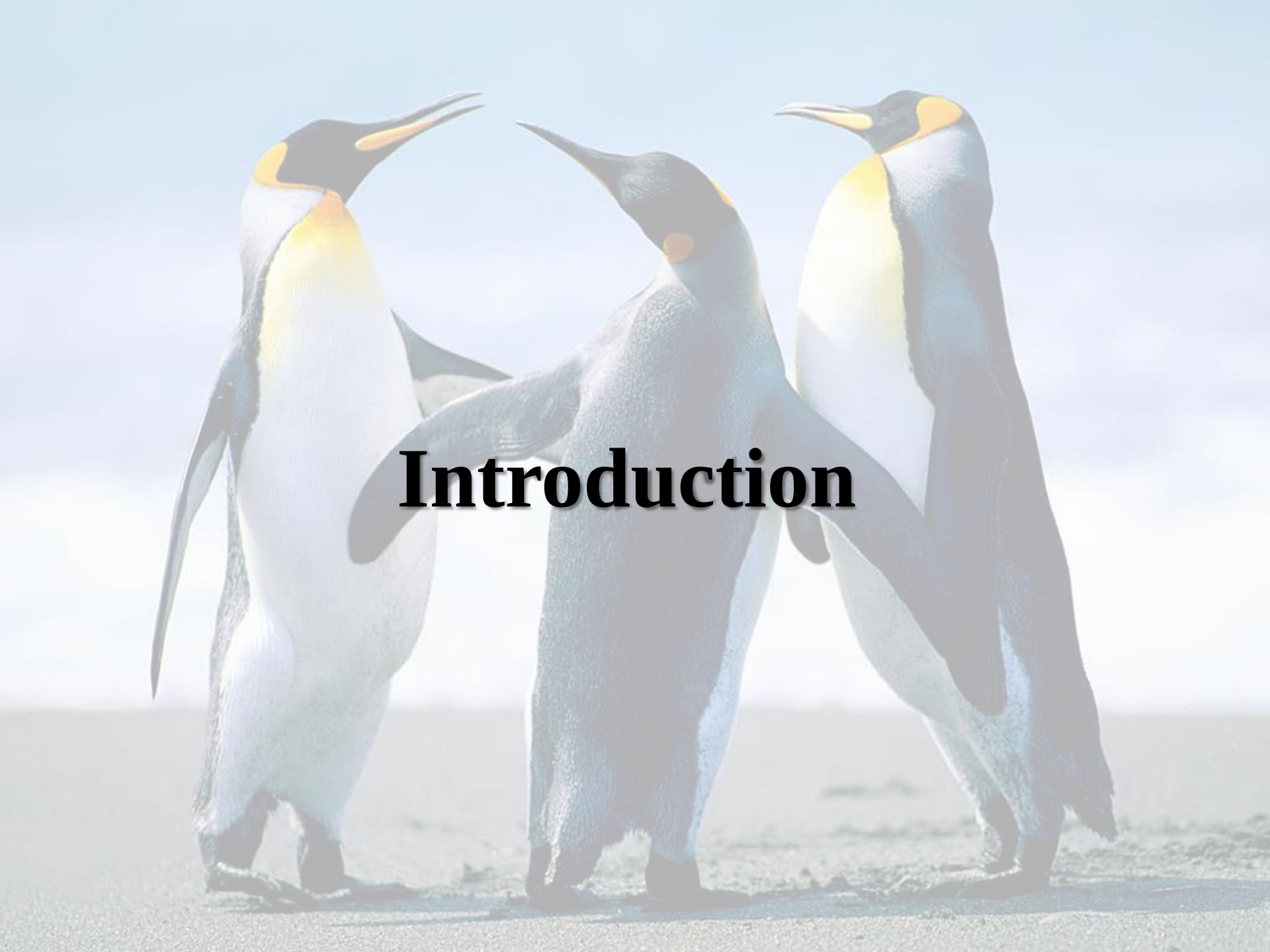
Climate change(CC) agriculture in Thailand

Mr. Methanon Moonpo

Miss Likhit Pollayos

Outline

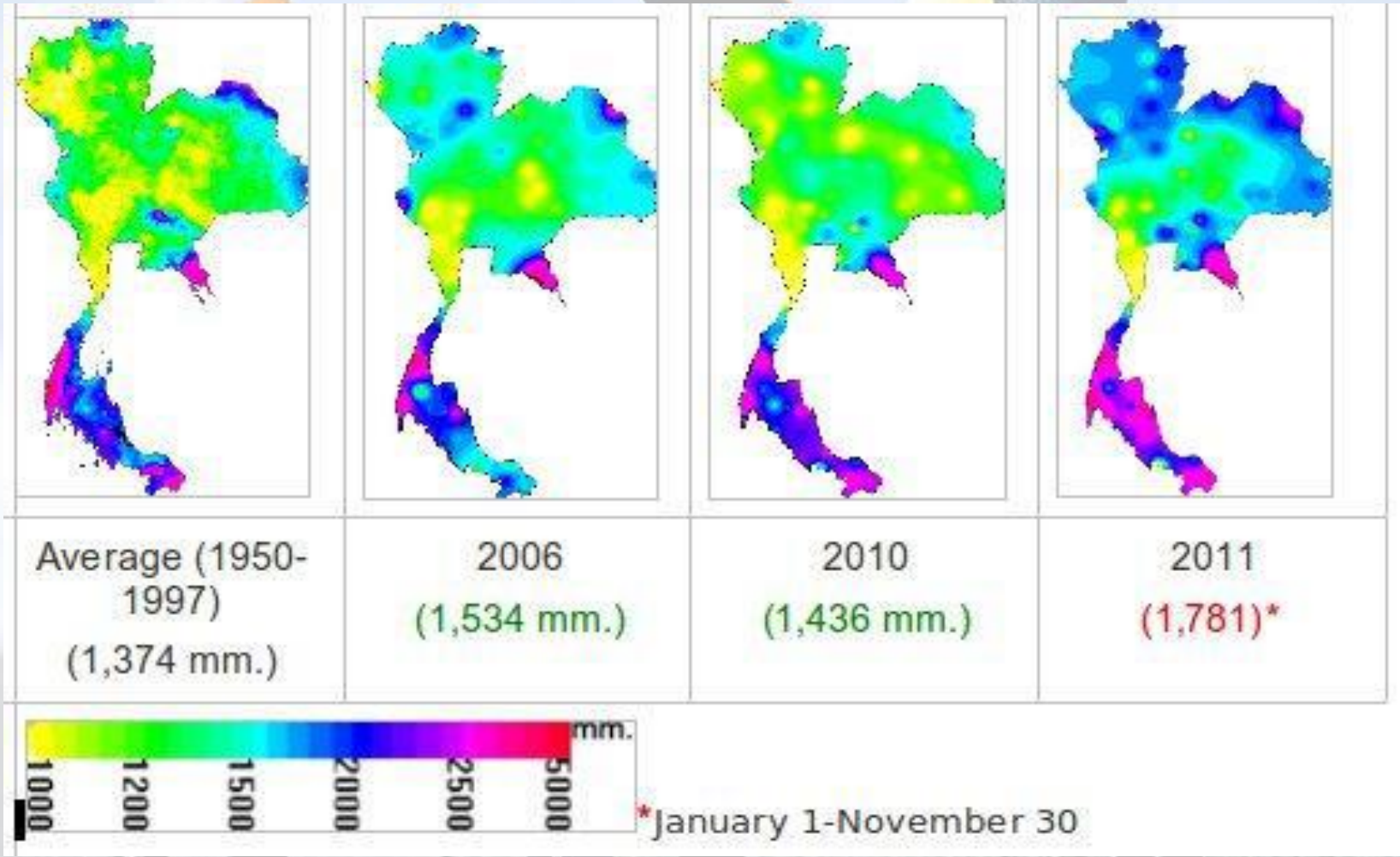
- Introduction (Cause of CC , Rainfall, Temp,)
- Current Situation of Climate Change
- Impact on human and natural system
- Government Reaction
- Research and Development



Introduction

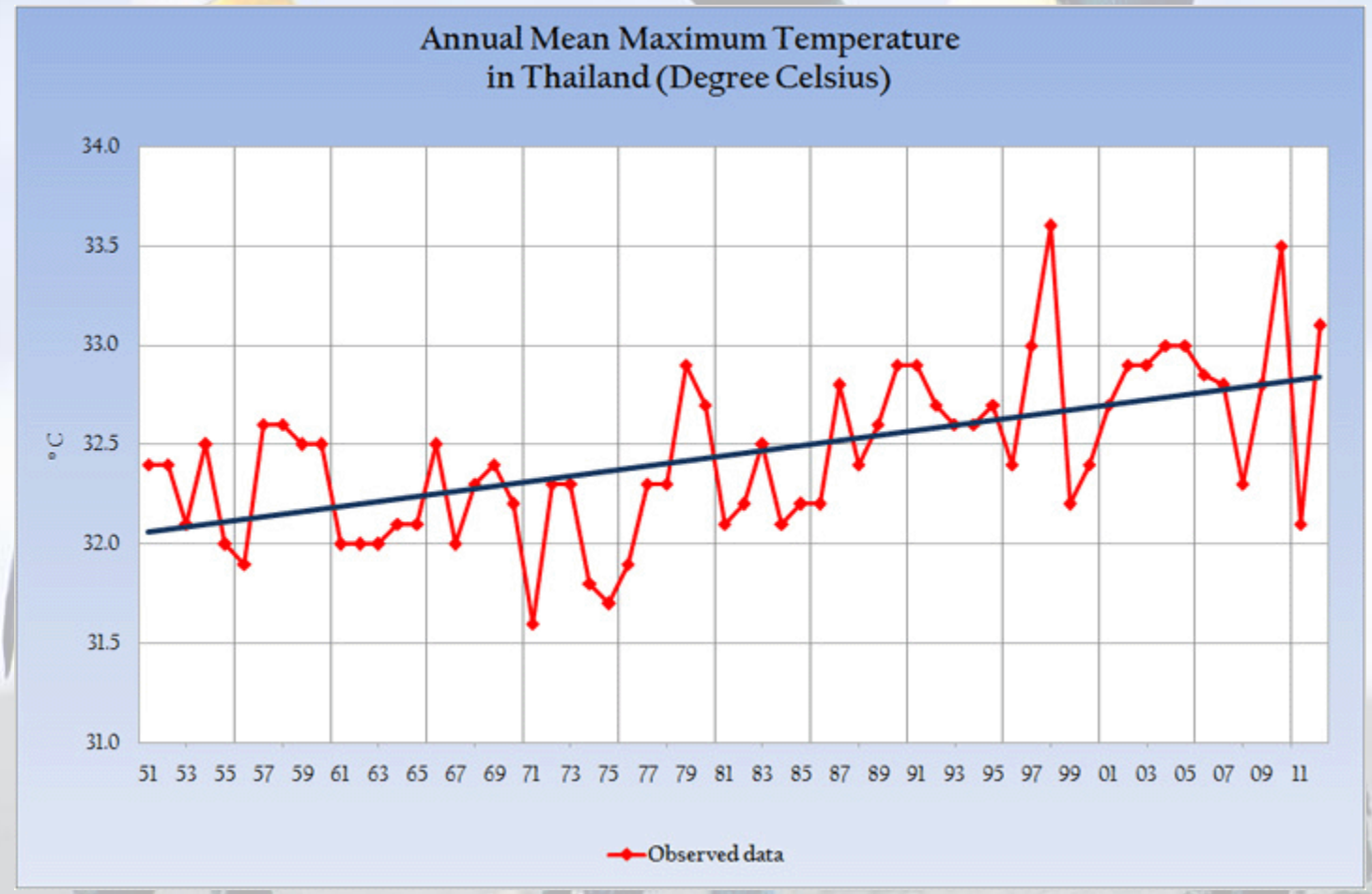
Cause of Climate Change

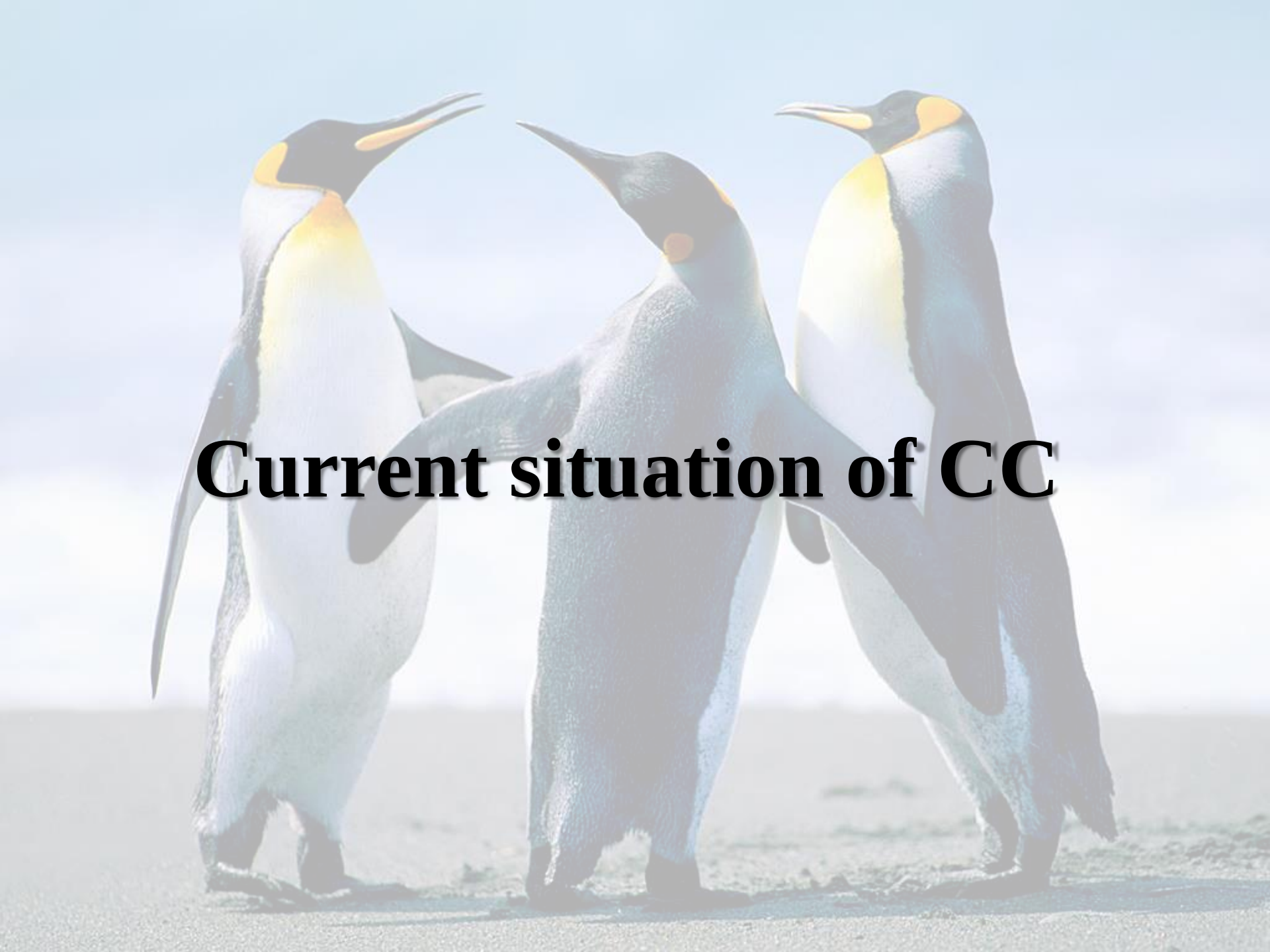
Annual Rainfall



Thai Meteorological Department

Annual Mean Maximum Temperature





Current situation of CC

Climate Change Scenarios in Thailand

Climate change scenario – annual average precipitation:

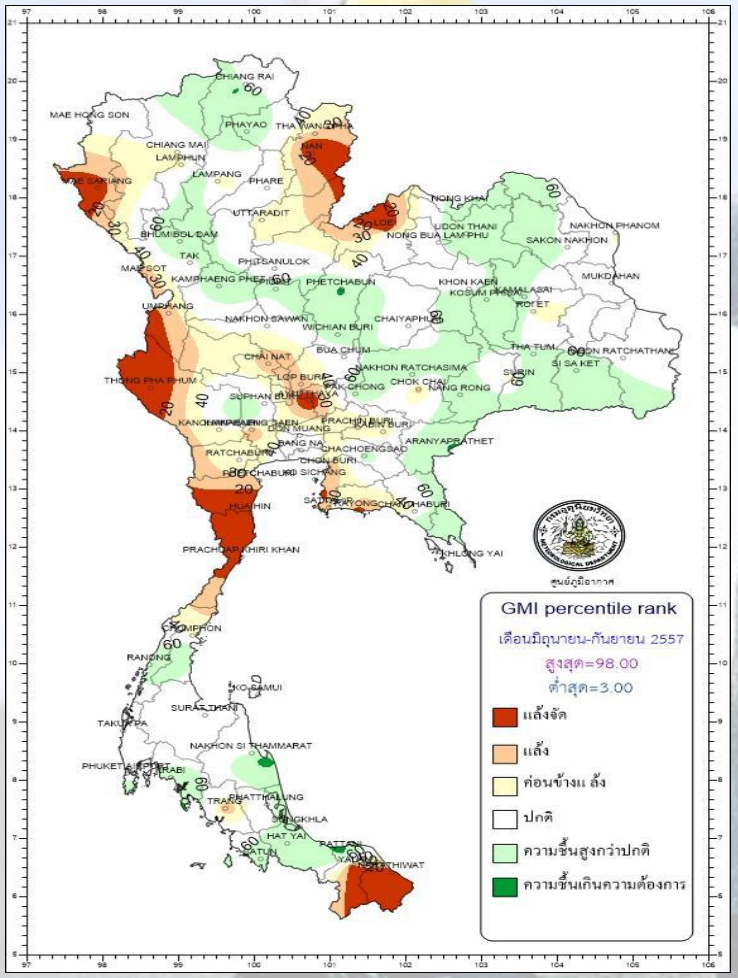
Region	Current climate	Future climate (average during 2045-2065)		
		Upper range	Lower range	Median
Northern mountain and valley	1,055 mm.	1,499 mm.	720 mm.	1,119 mm.
Central plain and Chao Phraya River basin	1,095 mm.	1,627 mm.	839 mm.	1,210 mm.
Western region	1,311 mm.	1,863 mm.	825 mm.	1,213 mm.
Mekong River corridor	1,567 mm.	2,225 mm.	1,043 mm.	1,494 mm.
Northeastern plateau	1,089 mm.	1,564 mm.	779 mm.	1,096 mm.
Eastern region	2,224 mm.	3,285 mm.	1,775 mm.	2,541 mm.
Lower gulf of Thailand coast	1,857 mm.	3,805 mm.	1,336 mm.	2,603 mm.
Lower Andaman coast - Phuket	2,360 mm.	3,417 mm.	1,846 mm.	2,555 mm.

Climate Change Scenarios in Thailand

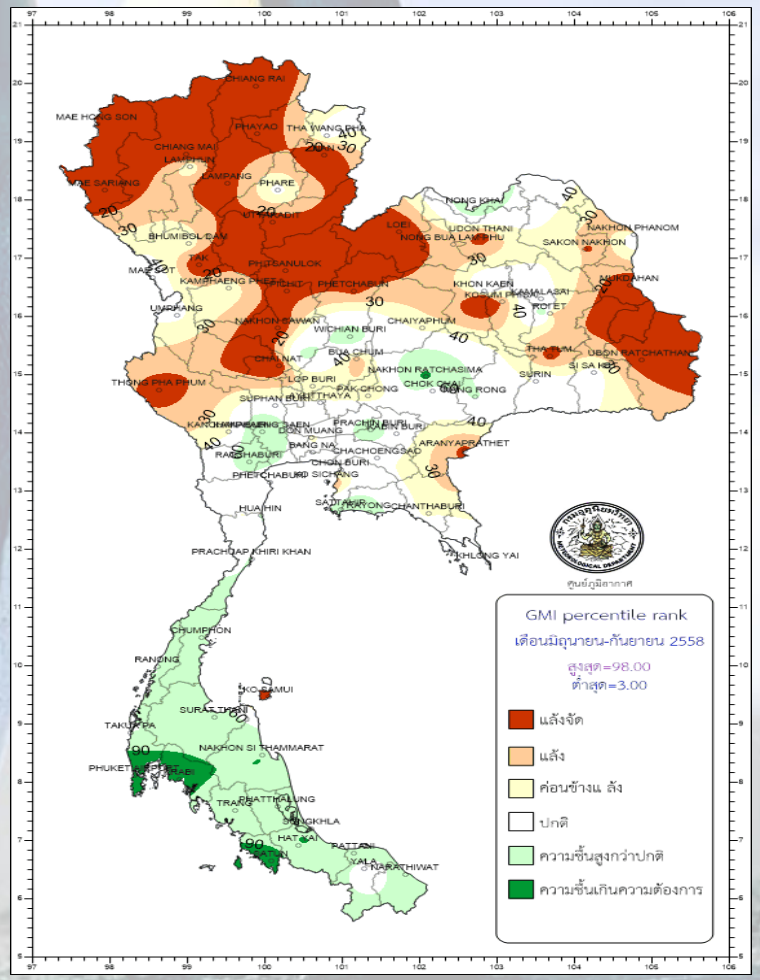
Climate change scenario – annual average maximum temperature:

Region	Current climate	Future climate (average during 2045-2065)		
		Upper range	Lower range	Median
Northern mountain and valley	32.41°C	37.76°C	34.91°C	35.82°C
Central plain and Chao Phraya River basin	33.49°C	38.22°C	36.41°C	36.90°C
Western region	33.25°C	37.81°C	35.51°C	36.39°C
Mekong River corridor	32.09°C	37.35°C	34.81°C	35.57°C
Northeastern plateau	32.66°C	37.84°C	35.36°C	36.11°C
Eastern region	32.90°C	37.22°C	35.58°C	36.42°C
Lower gulf of Thailand coast	31.96°C	35.70°C	34.15°C	34.81°C
Lower Andaman coast - Phuket	32.38°C	36.20°C	34.99°C	35.57°C

Generalized Monsoon Index (GMI)

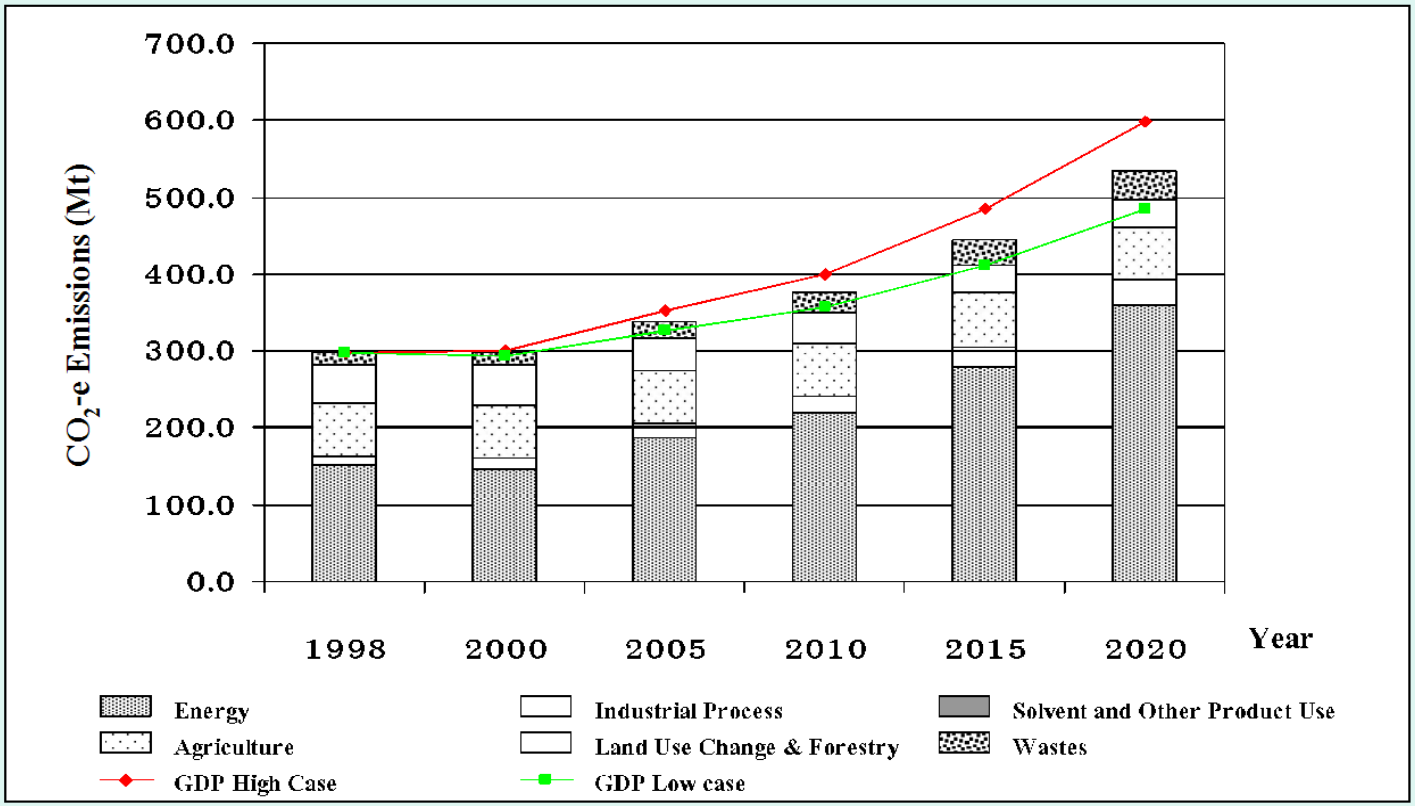


September 2014



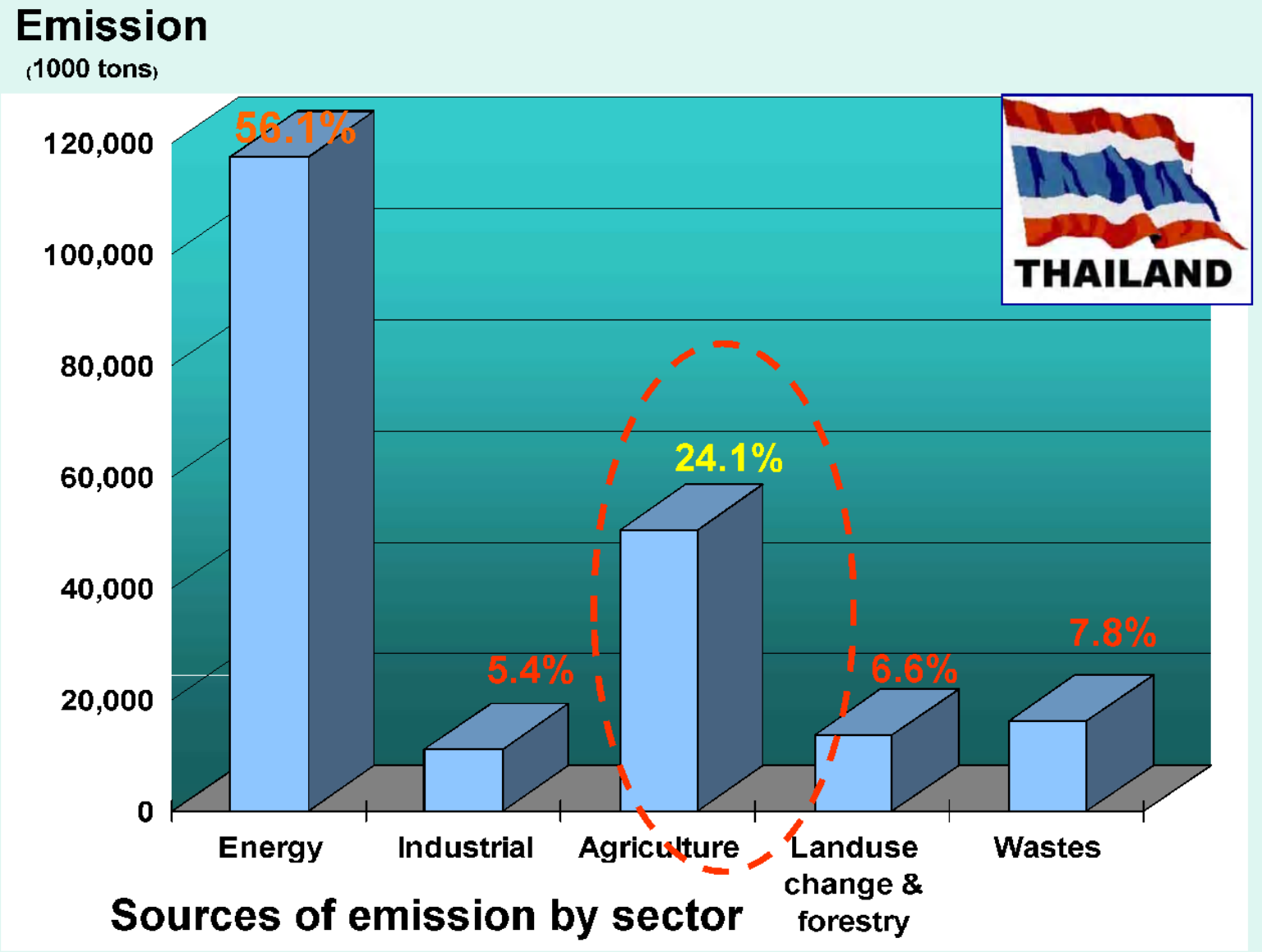
September 2015

Trend of GHG emission in Thailand

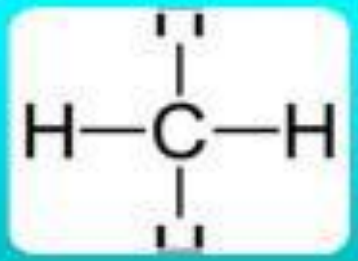


Emissions of greenhouse gas

แหล่งข้อมูล : องค์การบริหารจัดการก๊าซเรือนกระจก



GHG from Agriculture



Methane

- Flooded rice cultivation
- Livestock and aquaculture waste

Nitrous Oxide

- Nitrogen fertilizer
- Livestock and aquaculture feed
- Animal droppings

Carbon Dioxide

- Weed & residual burning
- Deforestation

GHG from Livestock in Thailand

2008----- total GHG 360-380 MtCO2

- **GHG from Agriculture = 24.1% of total = 89.2 MtCO2**

Impact on human and natural system

Impact of climate change in Thailand

- Water resources and fresh water ecosystems
- Food security
- Coastal areas , oceans and fisheries
- Forest resources
- Biodiversity
- Health

Coastal erosion in Thailand

- ประเทศไทย มี 5 จังหวัดที่พบว่าอัตราการกัดเซาะที่ชายฝั่งชายฝั่งมีความรุนแรงที่สุดในประเทศ คือ *ฉะเชิงเทรา สมุทรปราการ สมุทรสาคร สมุทรสงคราม และ*


พื้นที่ชายฝั่ง จ.สมุทรปราการ
ที่ถูกน้ำทะเลกัดเซาะในอนาคต
สนามบิน
สุวรรณภูมิ
พื้นที่ชุมชน
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อีก 50 ปี
อีก 20 ปี
อ่าวไทย
Gulf of Thailand


ปทุมธานี
PATHUM THANI
ปราจีนบุรี
PRA CHIN BURI
กาญจนบุรี
KANCHANA BURI
นนทบุรี
NONTHA BURI
กรุงเทพ
BANGKOK
ฉะเชิงเทรา
CHA CHOENG SAO
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SAMUT SAKHON
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RA YONG

Climate Change on Livestock

- **The mostly direct impact is the heat stress resulted form the global warning**
- **Vital body heat dissipation**
- **Feed intake, milk yield, daily gain, reproduction …all are decreased**
- **Food supply decreased**

Government Reaction

Government reaction - agriculture in Thailand

- Ministry of Agriculture and Cooperation
- LDD (Zoning, Fertilization according to soil analysis, soil and water conservation)
- RID (water requirement, irrigation methods)
- DLD (Breeding, feed)
- Ministry of Natural Resource and Environment - GHGs reduction projects

Master plan on global warming mitigation, MOAC

Strategies:

- Knowledgebase management
- Mitigation and adaptation
- Capacity building and public dissemination

Master plan on global warming mitigation, MOAC

Objective:

* Research on GHG emission, sequestration and adaptation in agriculture areas.
* Develop efficient database, knowledgebase and warning system.
* Identify activities and areas to improve cropping system and mitigate.
* Capacity building for relevant organization, staffs, and cooperation system.

Research and Development

DLD Project of CC

- Mitigation by production system improvement
- Adaptation of livestock for high production, reproductive in CC
- Forage crop production in CC
- Carbon footprint

Mitigation Options

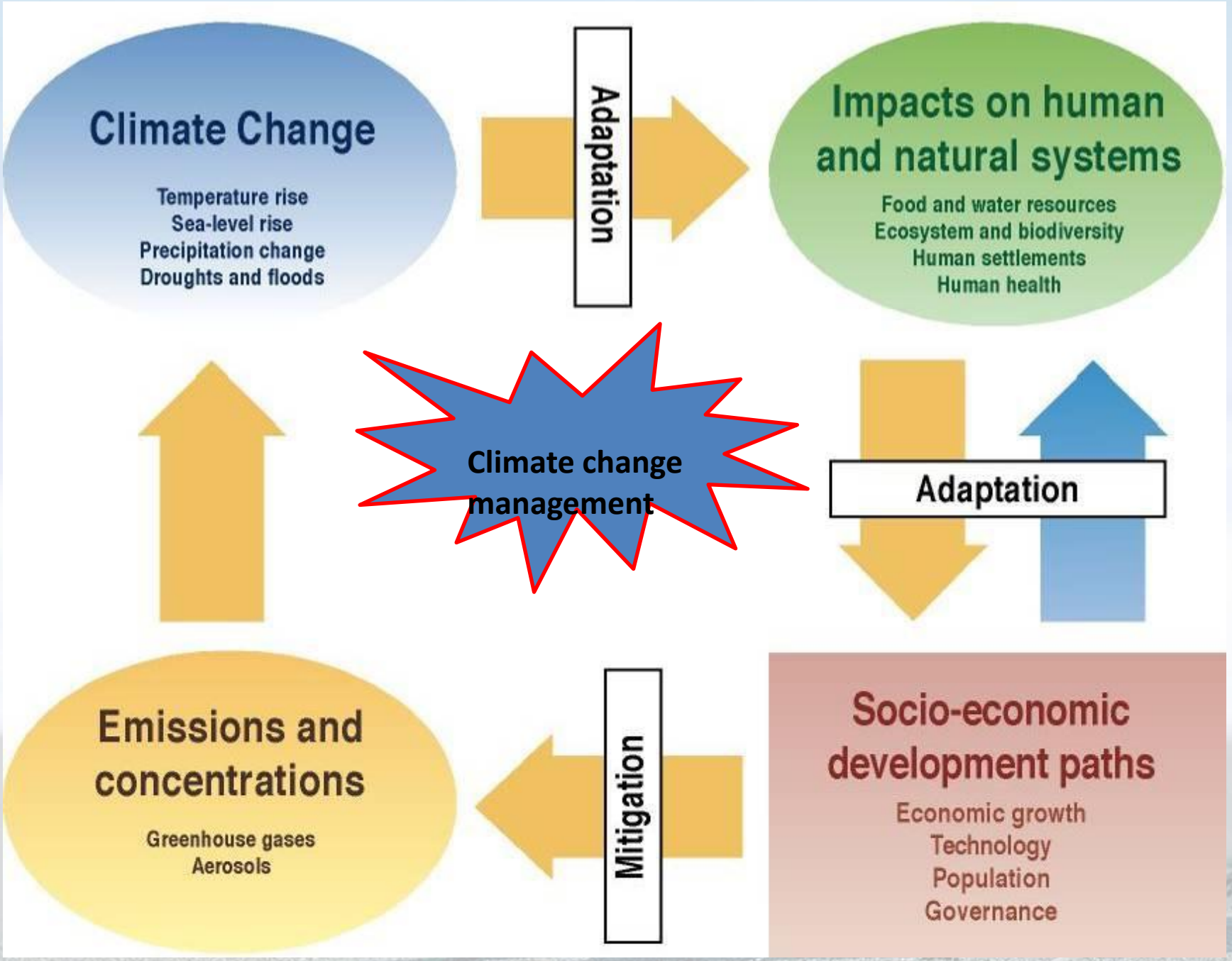
- **Enteric Fermentation and CH4 emissions**
  - **Increase production efficiency**
    - **Decrease the number of animals**
    - **Decrease the time they are emitting methane**
  - **Increase nutrition**
- **Decreases the amount of methane produced**

Mitigation Options

- **Manure Management and CH_4 and N_2O emissions**

  - Be mindful of temperature, moisture levels, time of storage, and other factors that lead to higher emissions

  - Give livestock easily digestion feed to control manure contents


Climate Change
Temperature rise
Sea-level rise
Precipitation change
Droughts and floods
Adaptation
Impacts on human and natural systems
Food and water resources
Ecosystem and biodiversity
Human settlements
Human health
Climate change management
Adaptation
Emissions and concentrations
Greenhouse gases
Aerosols
Mitigation
Socio-economic development paths
Economic growth
Technology
Population
Governance

(IPCC, 2002)

LDD Research activities

1. Soil carbon sequestration:

- soil and water conservation measures
- land use patterns
- land managements
- chemical and organic fertilizers application

2. GHG emission from agriculture areas:

- rice in lowland
- crops in upland
- fruit trees and trees in highland

Soil carbon dynamics in incorporation of corn stubble residues Thailand

Soil carbon dynamics and carbon dioxide emission in different ecotypes of vetiever grass plantation

LDD Development Activities

- **Campaign on *crop residues management* by incorporate into *soil for carbon sequestration* (mitigate global warming project)**

- **Implementation on *soil and water conservation measures* and trees plantation in target areas (mitigate global warming project)**

- **Implementation on *soil and water conservation measures* and reduction slash-and-burn farming (mitigate global warming project)**

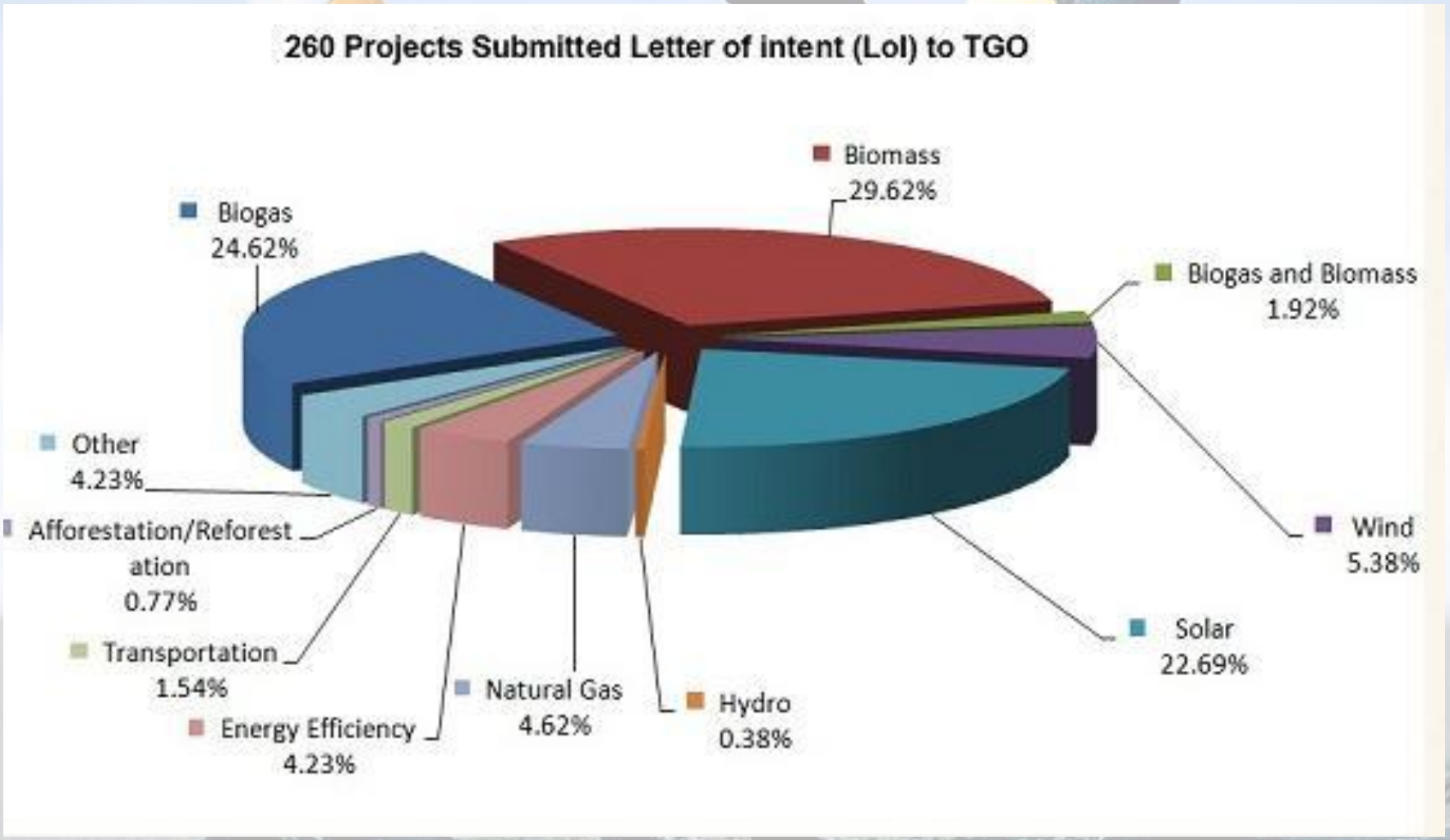
Campaign on crop residues management by incorporate into soil for carbon sequestration

Fiscal year 2008 – 2012 : 4,890 hectares

Implementation on soil and water conservation measures and reduction slash-and-burn farming

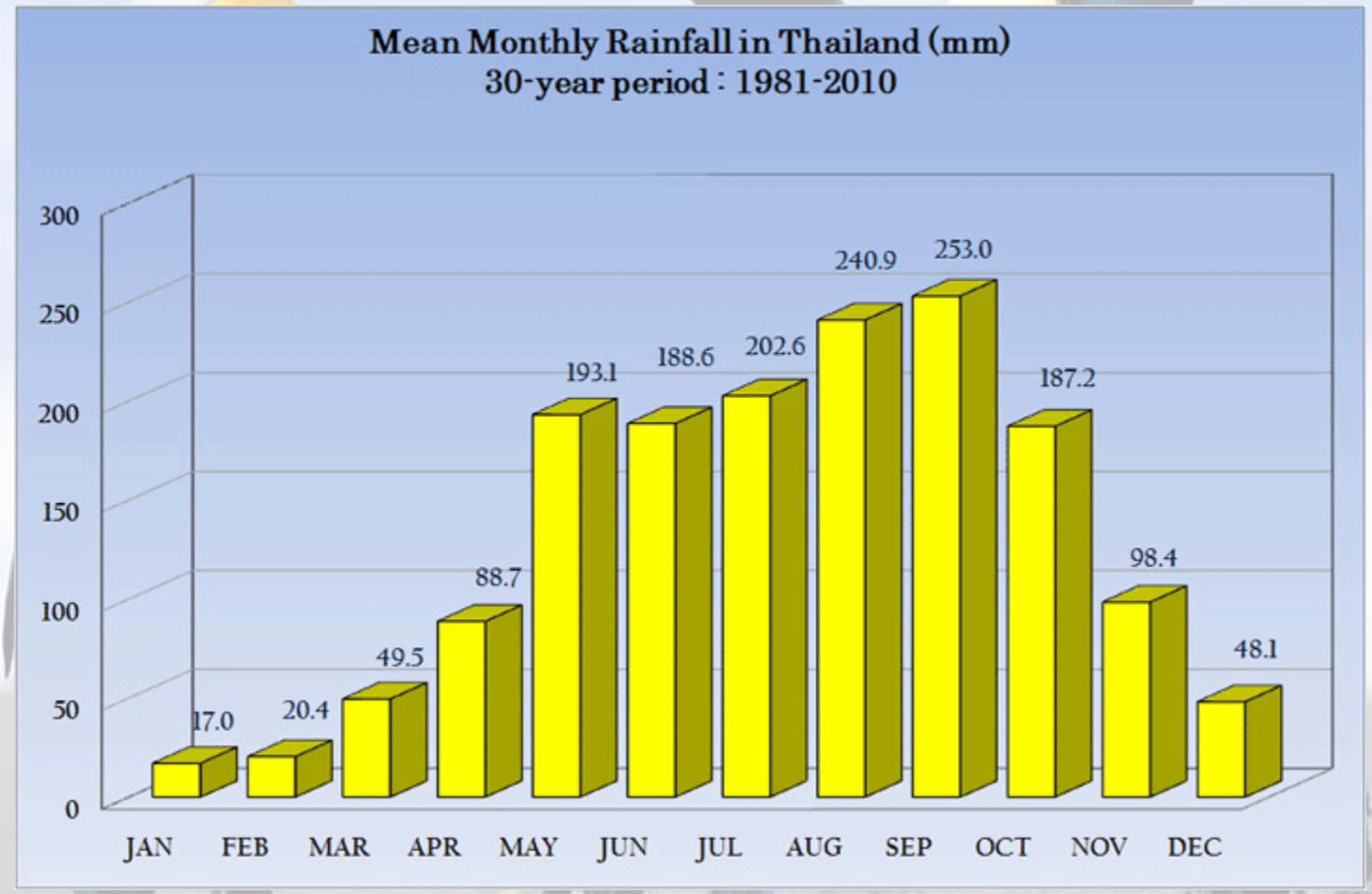
Fiscal year 2010– 2012 : 7,574 hectares

Thailand Greenhouse Gas Management Organization (Public)



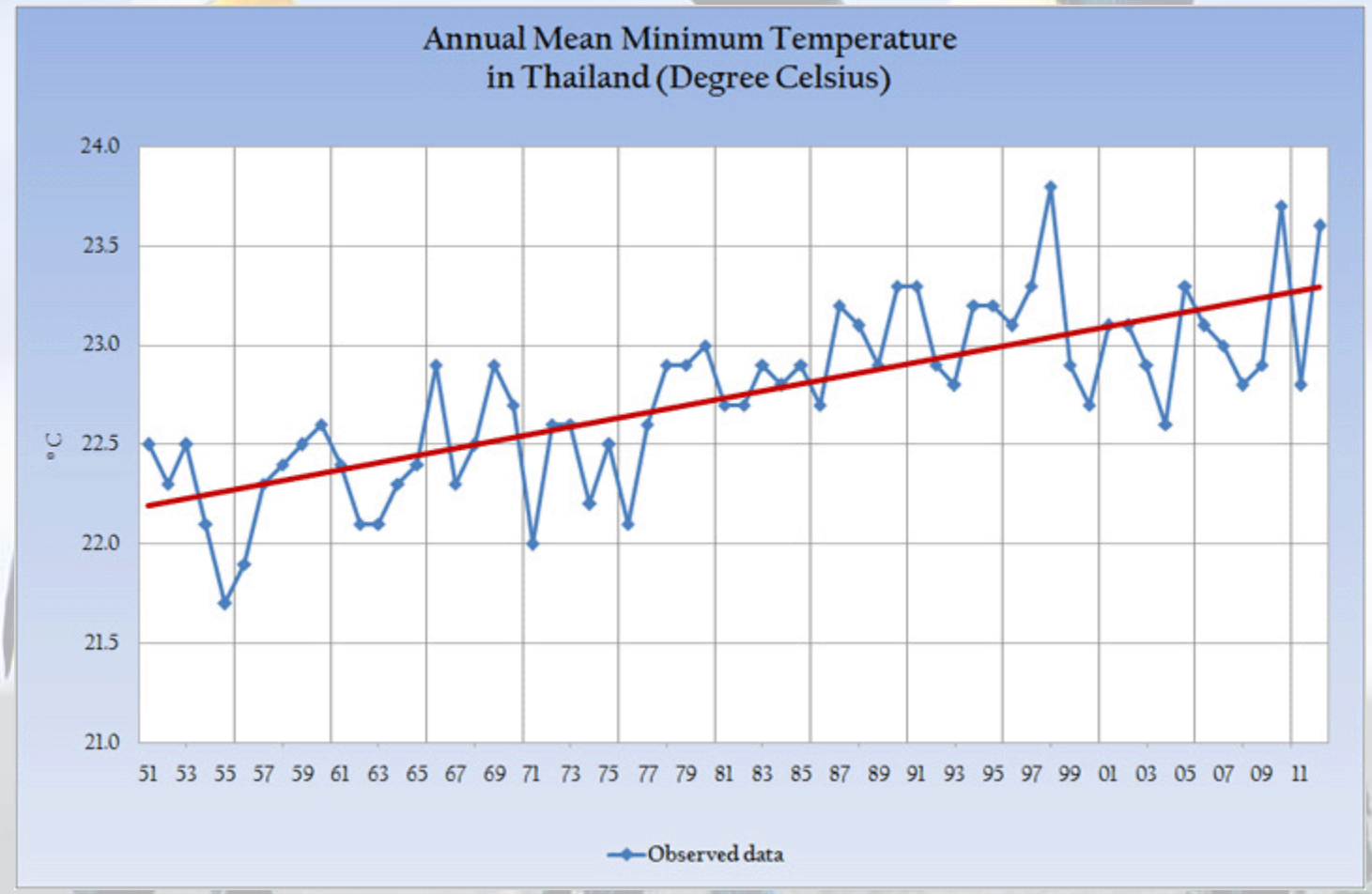
Thank you for your attention

Mean Monthly Rainfall



Thai Meteorological Department

Annual Mean Minimum Temperature



Climate Change Scenarios in Thailand

Climate change scenario – annual average minimum temperature.

Region	Current climate	Future climate (average during 2045-2065)		
		Upper range	Lower range	Median
Northern mountain and valley	20.43°C	26.46°C	23.80°C	24.82°C
Central plain and Chao Phraya River basin	23.74°C	28.46°C	26.74°C	27.67°C
Western region	21.72°C	26.40°C	24.66°C	25.56°C
Mekong River corridor	21.98°C	27.12°C	24.94°C	25.82°C
Northeastern plateau	22.55°C	27.59°C	25.44°C	26.50°C
Eastern region	23.84°C	28.43°C	26.49°C	27.53°C
Lower gulf of Thailand coast	23.79°C	28.02°C	26.53°C	27.22°C
Lower Andaman coast - Phuket	23.93°C	27.92°C	26.50°C	27.33°C

Thailand Climate

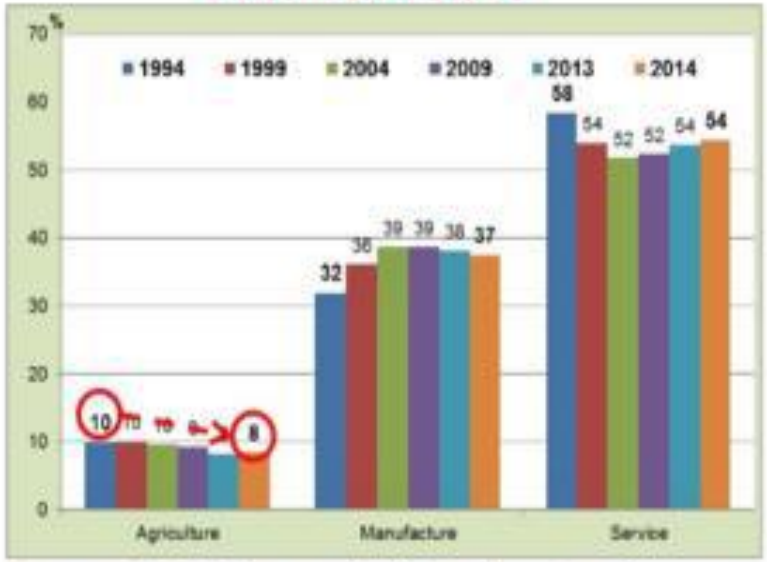
- Locating near the equator
- Tropical climate , savanna or pririe
- The south and the eastern tropical are monsoon climate
- The average temperatures between 19-38 degrees Celsius
- The influence of Southeast and northeast

- **Climate change, global warming and the greenhouse effect refer to the same global environmental problem.**
- **Increasing climate-related catastrophes such as drought, floods, storm surges, heat waves and wild fires were frequently experienced by many countries during the past few decades.**

Importance of agricultural sector

Thailand's development has been generally based on agricultural production

GDP by Sectors



Share of GDP in agricultural sector has been decreasing.

- Agricultural production accounts for only 8% of GDP in 2014.
- However, the agricultural sector still has an important role to play in the country's production structure.

LABOR: The agricultural sector is mainly supported by smallholders , about 1/3 is presently employed in agriculture.

LAND: 133 million rais or 41% of total land is engaged in agricultural sector.

- 68 million rais or 50% is accounted for paddy area,
- 30 million rais or 23% is accounted for other croplands.

EXPORT: Although its GDP share has decreased substantially, it still accounts for 30% of total exports by value, and agricultural imports remain very small.

SAFETY NET: The agricultural sector is the unofficial social safety net which helps absorb the newly unemployed during the crisis by providing job opportunities in farmland

Impact of climate change in Thailand

- Water resources and fresh water ecosystems
- Food security
- Coastal areas , oceans and fisheries
- Forest resources
- Biodiversity
- Health

Water resources and fresh water ecosystems

- Alter the amount of precipitation
- Evapotranspiration
- Leading to changes in river flows, ground water recharge, catchments, soil moisture, water temperature and water quality.

Food security

- Loss of crop yields related to climatic events such as droughts, floods and storms amounted to over 50 billion Baht
- Crop yield responds to growing temperature, by which high production generally occur at the optimum temperature range of 22-27 ^{o}C.

Coastal areas , oceans and fisheries

- Rising sea levels, high waves and severe storm

  surges are the expected result of changing climates.
- The population dynamics of the ocean ecosystems and fish production.

Forest resources

- **Plant communities are highly sensitive to changes in climate conditions**
  - **increase in CO2 concentration**
  - **amount of rainfall**
  - **light intensity and exposure period**

Biodiversity

- **Thailand is identified as a biological hot spot as it is rich in biodiversity while the management requires more attention (Myers et.al, 2000).**

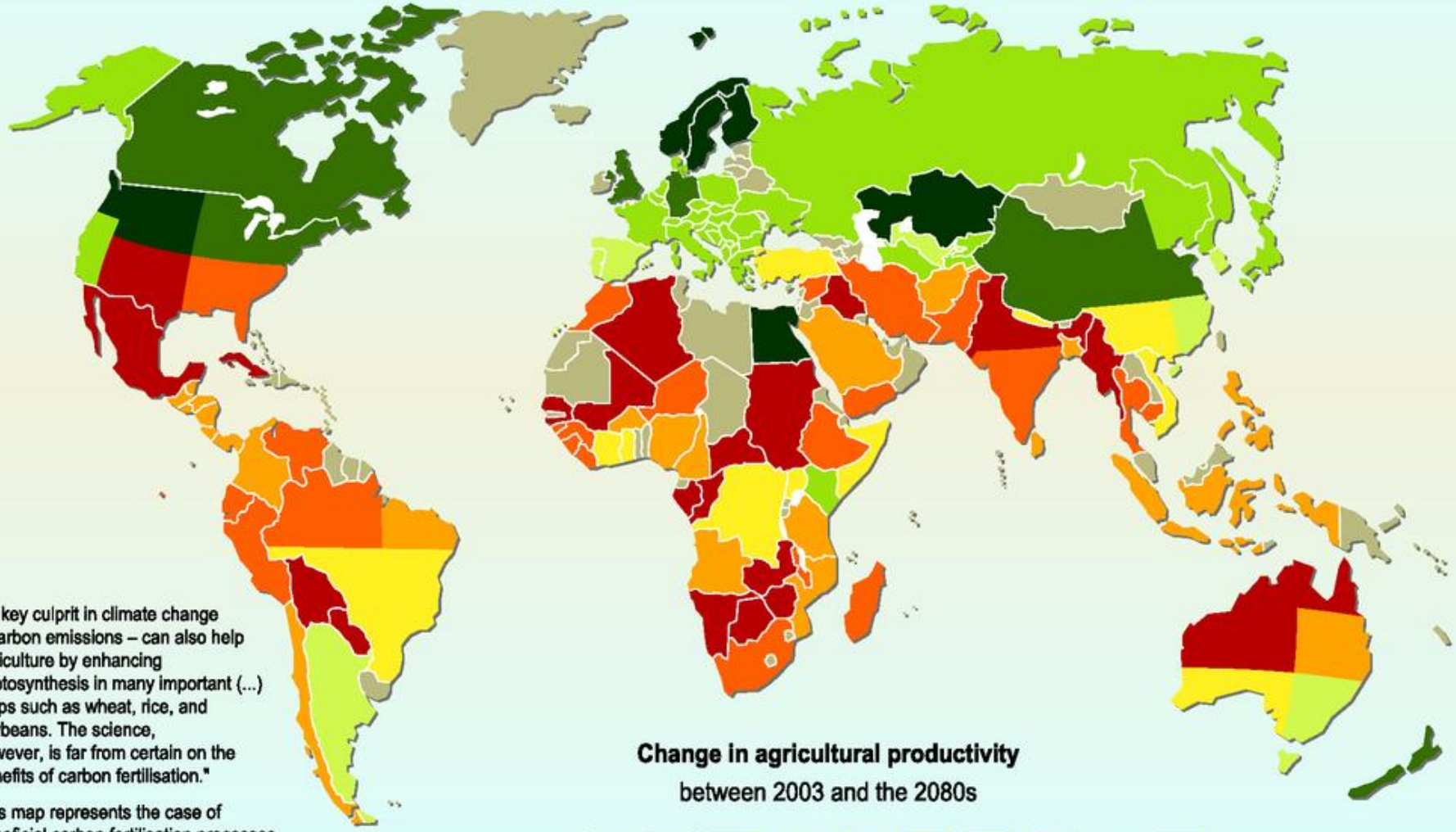
Health

- **Extreme temperature and heat waves have negative effect on human health, especially in young and senior citizens and those who suffer from respiration and cardiovascular diseases.**

Livestock Production

- Enteric methane, methane, Co2, N2O
- High water used
- High Energy use from transportation, Food industry, package, cooking, and preservation
- Waste -----64% ammonia

Projected impact of climate change on agricultural yields



* A key culprit in climate change – carbon emissions – can also help agriculture by enhancing photosynthesis in many important (...) crops such as wheat, rice, and soybeans. The science, however, is far from certain on the benefits of carbon fertilisation."

This map represents the case of beneficial carbon fertilisation processes.

Source: Cline W., 2007, *Global Warming and Agriculture.*

Diversification of agriculture in Thailand

Agriculture is highly diversified and specialised, different geography conditions

Northern Region

- Mountainous area

North-eastern Region

- Plain area / low rainfall and

Southern Region

- Coastal

Central Region

- Plain area / Irrigated area

Farms and the Environment

- **Water Pollution**
  - **– Animal waste from factory farms has more polluted of river and contaminated groundwater**
  - **– Livestock produce a large of manure each year which is often sprayed onto croplands or left to sit in lagoons**
  - **– Livestock pollution kills fish and contaminates drinking water**

Farms and the Environment

Air Pollution, foul odors, and land degradation are just a few more problems that factory farms and large family farm

Manure pit off a Swine Farm

Livestock Production

- Carbon Sequestration from forage Crop
- Using of manure as fertilizer can reduce carbon emission from chemical fertilizer industry
- Using of manure as biogas can reduce
- Emission from energy used

Affecting of Climate change on farm animal

- Climate change is just additional factor
- Climate change will affect the products and service provided by agriculture biodiversity
- Agricultural biodiversity not yet properly integrated in CC adaptation and mitigation strategies

Affecting of Climate change on farm animal

- No climate change models at breed level- detailed data on breed adaptation traits and spatial distribution are generally not available
- Breed distribution is overlaid by production systems and management
- Breed-level predictions or bio-geographic model for climate change implication ate hardly possible

Breeding for climate change adaptation and mitigation

- Breeding for productivity and feed efficiency under climate change status - RFI - FRI + low methane
- Breeding for disease resistance
- Genetic improvement of forage crop

Carbon Dioxide (CO_2) and feeding livestock

CO_2 is emitted during livestock feed production (including electricity)

Feeding Management

- Oil seed sources had high potential for rumen methane mitigation
- Improved feed quality
- Mangosteen peel-garlic powder pellet supplementation on rumen ecology and methane gas production in beef cattle
- Increasing of level of digestible energy intake and metabolizable energy intake level can reduce methane production

Feeding

Optimised ratio

Housing

Affecting of Climate change on farm animal

- Animal genetic diversity is critical for food security and rural development

  - to select stocks or develop new breeds in response to environment change,including climate change disease, changing market conditions
- Most food demand is expected in developing countries where climate change is projected to have the greatest impact

Farm management

Production efficiency

Adaptation in livestock production

- Production System

Genetics improvement

Adaptation

Mitigation

Waste Management

- Additives (single super phosphate, lime, straw) increased the potential fertilizer value of composted pig manure
- Effect of treating swing manure to survival of bacteria
- Bacteria at Integrated Pig-Fish Farm
- Management for assessment of nitrogen flow from feed to pig manure
- Biogas production

Waste management