

Kobe University UNESCO Chair  
Summer Program on Gender and Vulnerability  
in Disaster Risk Reduction Support

# Climate Change: Impacts, Mitigations, and Adaptations

Lu, Jin-Long

@ Gadjah Mada University, Indonesia, 2019

# Climate vs. Weather

Weather is the changes we see and feel outside from day to day.

Climate is the usual weather of a place; it can be different for different seasons or places. → Average weather



# Climate change, what is it?

- A significant long-term change in the average weather of a city, a region, or Earth.
  - Could be a change in average annual rainfall. Or, could be a change in average temperature for a month or season. *Source: NASA, What is climate change?*

*There was no (less) rain last year.*

*We just experienced the warmest winter on record.*

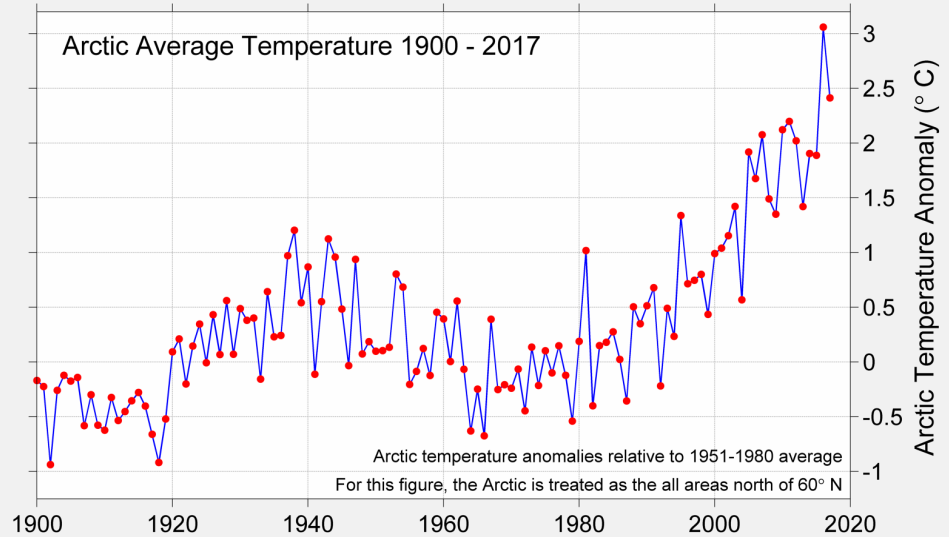
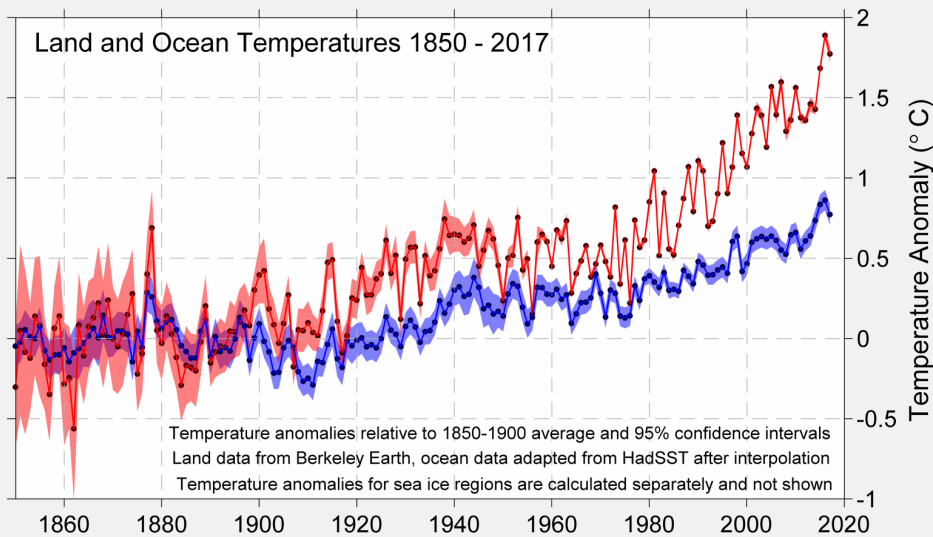


# Our climate is changing...

- One of the evidence is ...

## Increasing temperature!

Source: Berkley Earth



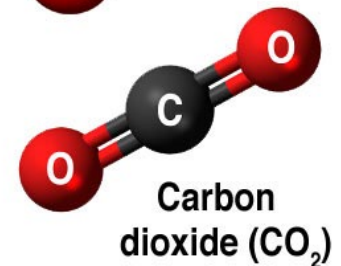
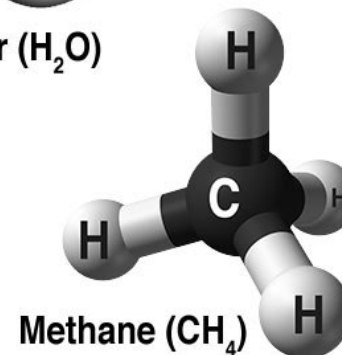
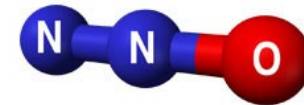
# But, how come?

- Why the climate is getting warmer (and warmer)?

The natural greenhouse gases (GHGs) are changing due to increasing human activities.



Nitrous oxide ( $\text{N}_2\text{O}$ )



# What can GHGs do?

- The Greenhouse Effect

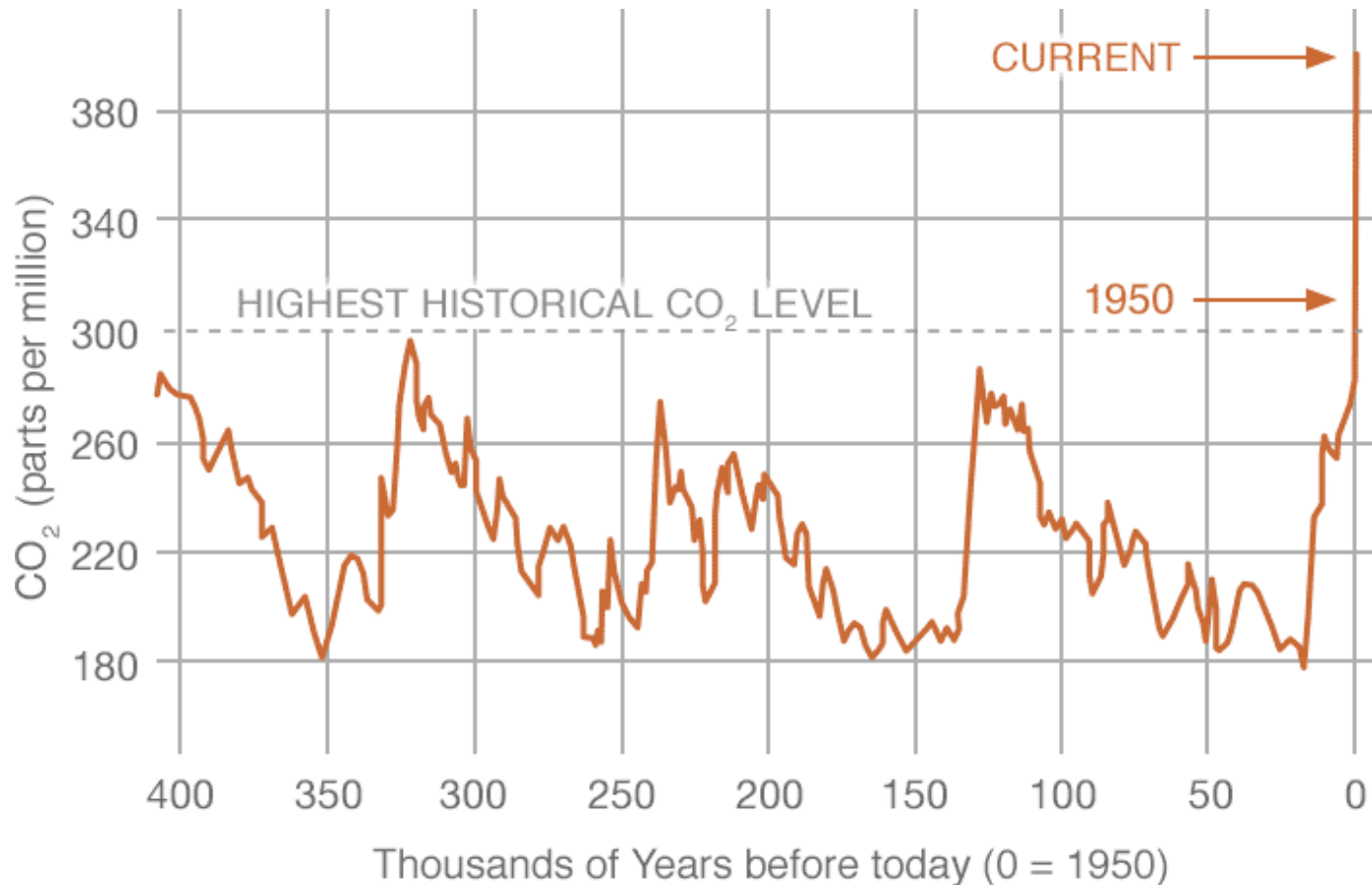
Sunlight reaches the Earth,  
some energy is reflected back into space.  
Some is absorbed and re-radiated as heat.

Most of the heat is absorbed by the greenhouse  
gases and reflected in all directions, warming  
the Earth.



# Carbon Dioxide (CO<sub>2</sub>)

CO<sub>2</sub> level: 413.9 ppm in June 2019!



# What's the consequence of getting warmer climate?

- Melting polar ice and glacier
- Rising sea levels
- Causing severe droughts
- Longer fire seasons





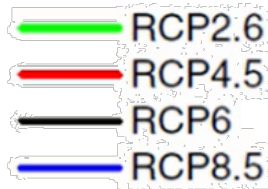
# There're more ...

- Extreme weather event
  - Hot, cold, wet, dry
- Water scarcity
- Ecological crisis
- Disease
- Enormous property loss

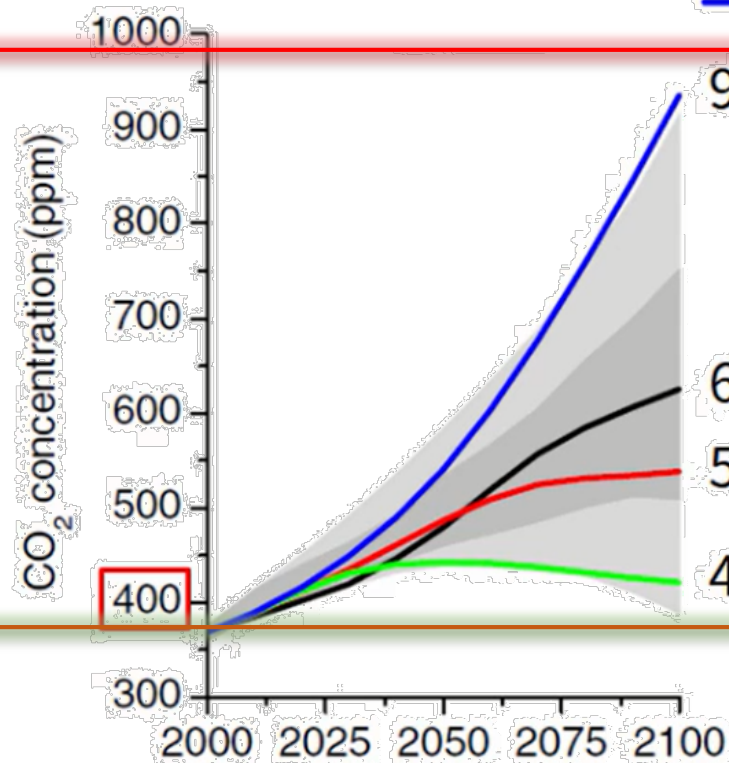


# The future is in our hands

Source: IPCC 5<sup>th</sup> Assessment Report



**+5.4°C**



936ppm ← Do nothing!

670ppm

538ppm

421ppm ← Do something!

**+0.3°C**



# What can we do?

## Mitigation and Adaptation

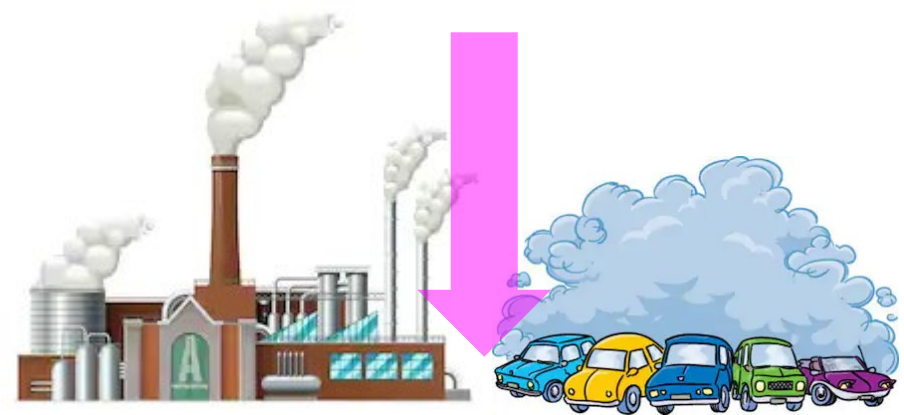
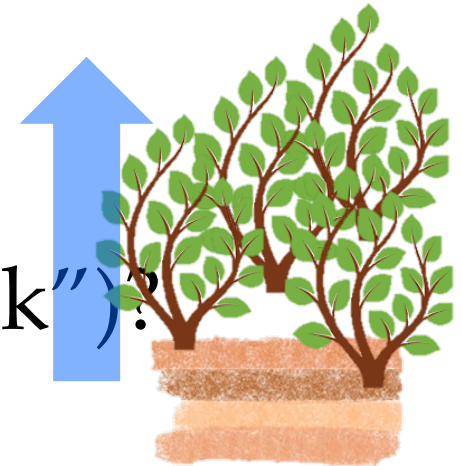
- Mitigation: reducing emissions of and stabilizing the levels of heat-trapping greenhouse gases in the atmosphere
  - The causes of climate change
- Adaptation: adapting to life in a changing climate – involves adjusting to actual or expected future climate
  - The impacts of climate change

~ NASA

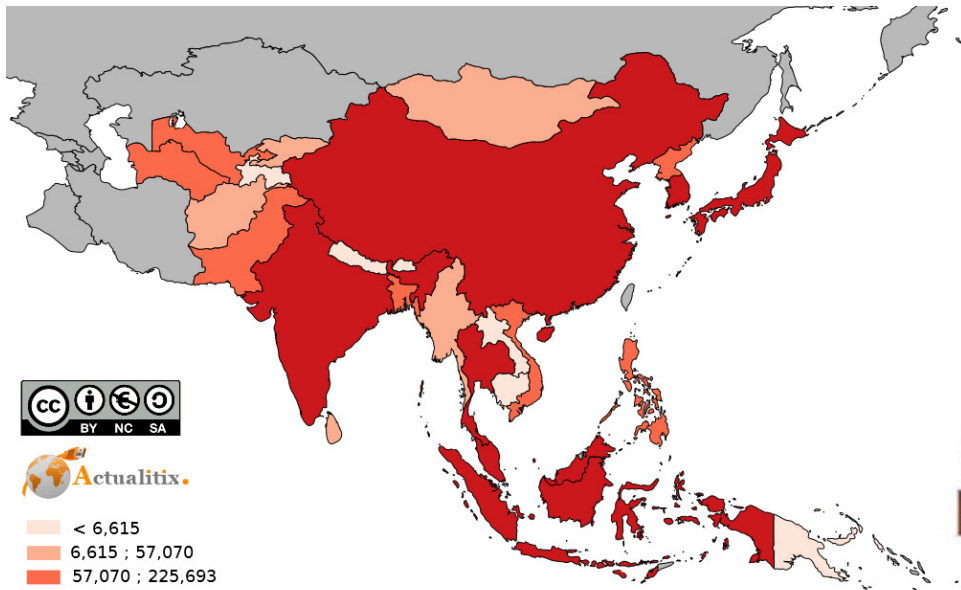


# Mitigation – Reducing the source

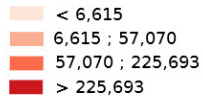
- What/who generates CO<sub>2</sub>?
- What/who captures CO<sub>2</sub> (“sink”)?



Source: shutterstock.com



Actualitix.



CO2 emissions (kt)

Copyright © Actualitix.com All rights reserved

Source : The World Bank - 2011



# Mitigation – Reducing the source → How?

- Education
  - Know/Learn ...
- Efficient
  - Use ... efficiently
- Economic means
  - Cap and trade

Take actions!  
Just enough!  
Less is more!



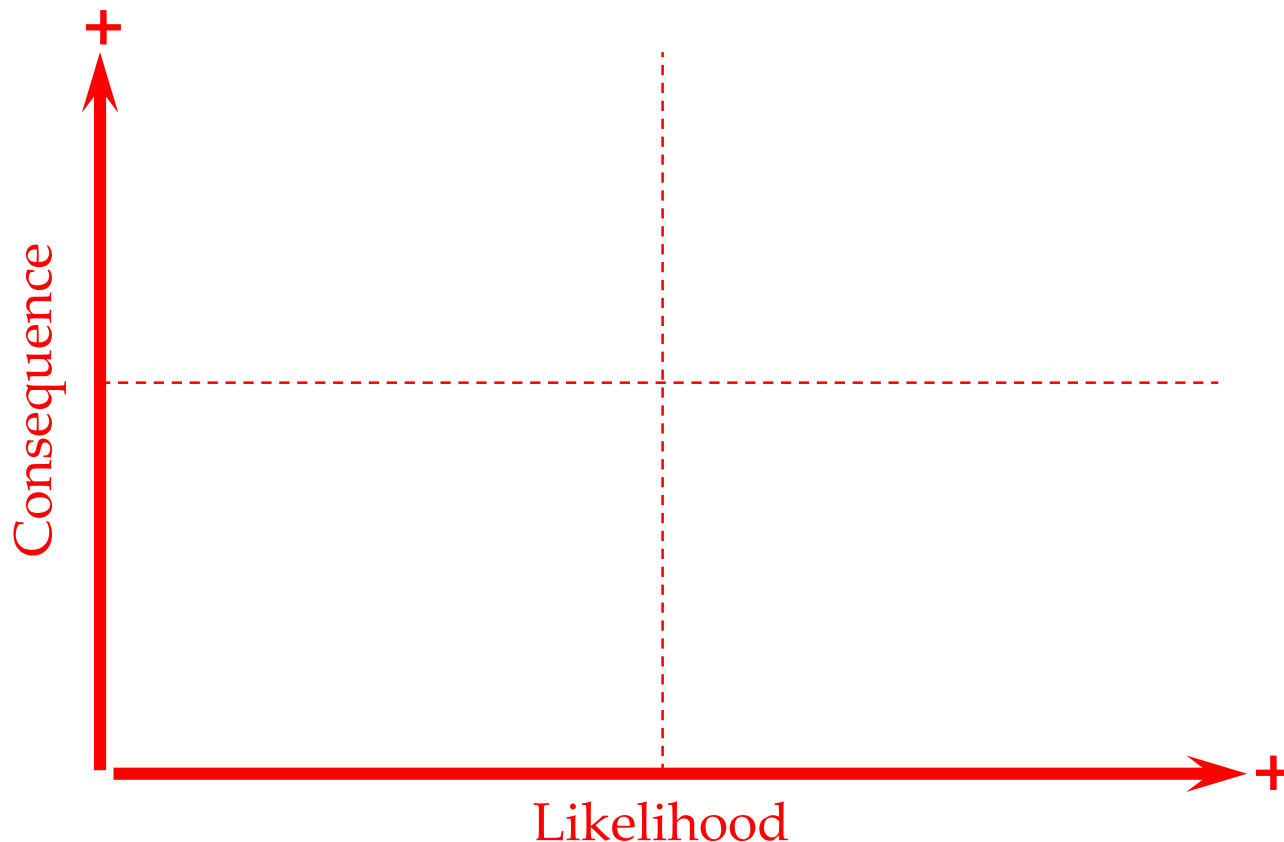
# Adaptation - Adapting to life in a changing climate

- Who is the most vulnerable?



# Adaptation - Adapting to life in a changing climate → How?

- Risk assessment matrix



# Adaptation - Adapting to life in a changing climate → How?

- Extreme disasters/risk management
- Lands and forests management
- Coastline management
- Water/food resource management
- Infrastructure protection/upgrades

Reactivation!

Resilience!

Reduction!





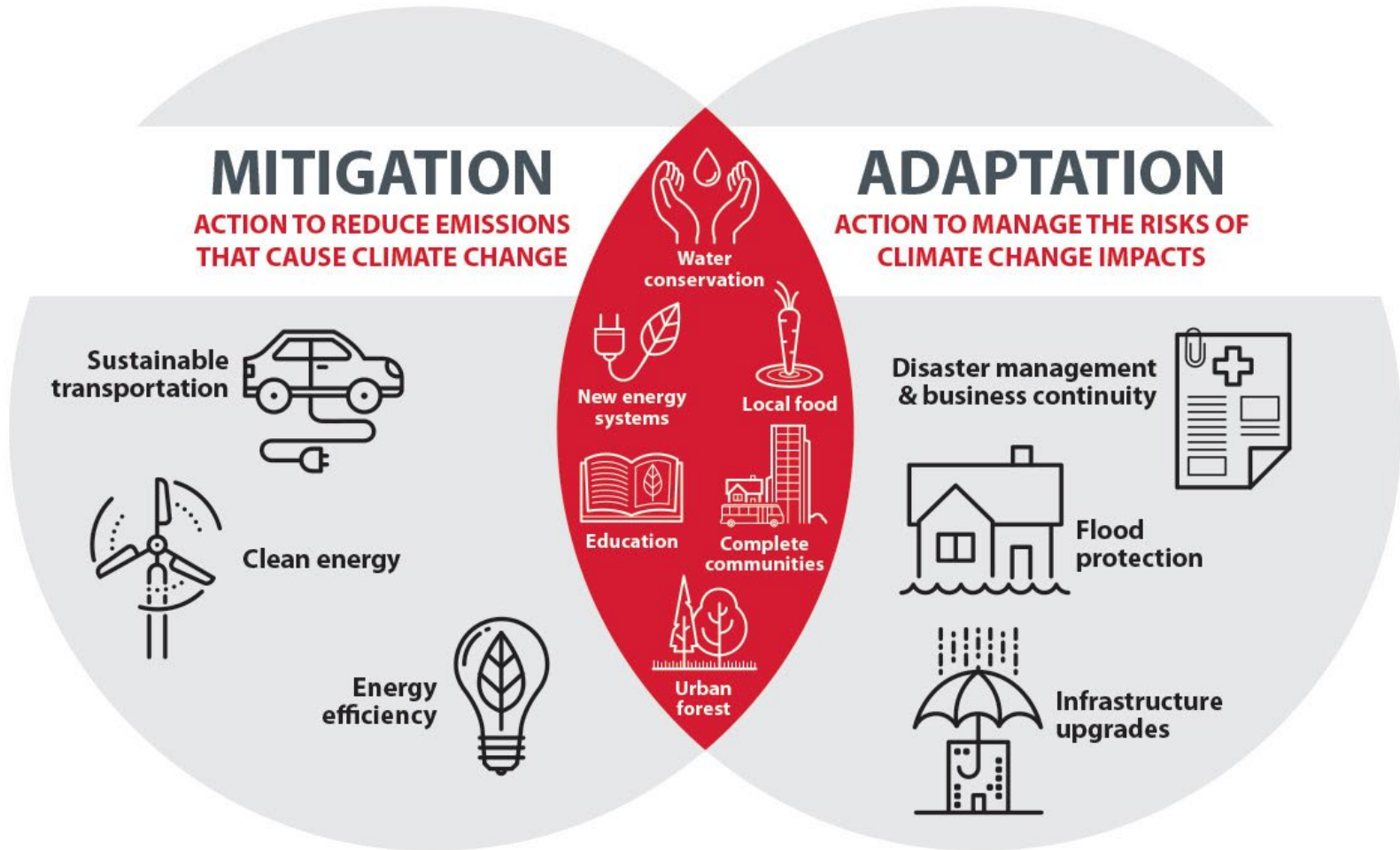


## Maladaptation!

- *Adopting actions that ignore local relationships, traditions, traditional knowledge, or property rights, leading to eventual failure*
- *Adopting actions that favor directly or indirectly one group over others leading to breakdown and possibly conflict*



# Building Climate Resilience



Source: Calgary's Climate Program





國立高雄科技大學  
National Kaohsiung University of Science and Technology

Thank you.

