

# Climate change: Challenges and Opportunities in Sri Lanka

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# Country Description





Madurai

Delft Island

Mannar Island

Gulf of Manar

Sri Lanka

Colombo

Image NASA  
Image © 2007 TerraMetrics  
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Pointer 7°52'39.14" N 80°15'10.39" E elev 267 ft

Streaming ||||| 100%

Eye alt 381.33 m

- **Size**
  - 65,610 km
    - 435 km - maximum length
    - 240 km – maximum width
- **Population**
  - About 20 millions
  - Density
    - 344 persons/km<sup>2</sup>
- **Economics & industrial development characteristics ( 2006)**
  - % contribution to the GDP
    - Agriculture → 12.3 %
    - Industry → 28.2 %
    - Services → 59.5 %

- Climate
- Tropical monsoonal
  - Rainfall
    - 800 mm to over 5,000 mm
  - Temperature
    - on average 27 °C at lowlands
    - reduction of temperature at 5 – 6 °C/ km
      - mountainous regions
        - » average → 15 °C
    - 3 climatic zones
      - Dry zone, Intermediate zone & Wet zone

# Climatic zones of Sri Lanka

## Average temperature

Dry zone → 28 °C

Intermediate zone → 24 - 26 °C

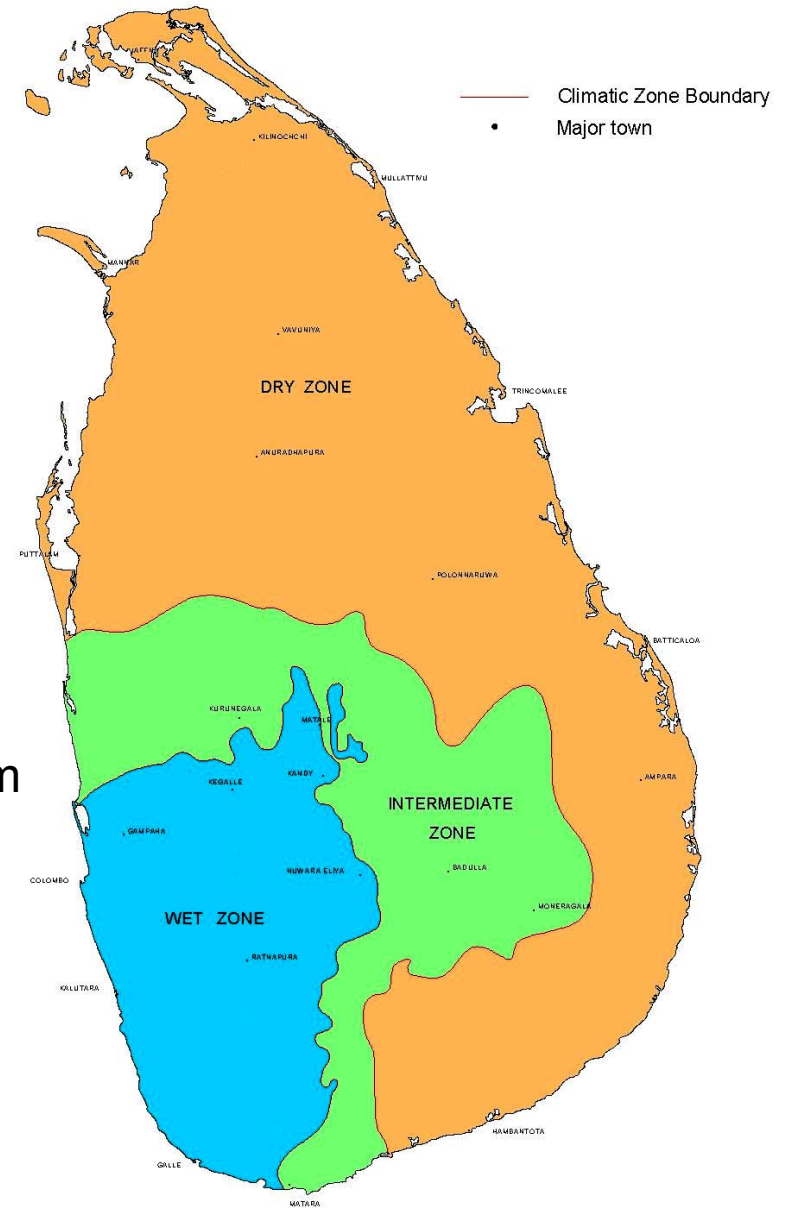
Wet zone → 24 °C

## Average Rainfall

Dry zone → < 1,750 mm

Intermediate zone → 1,750-2,500 mm

Wet zone → > 2,500 mm



# Climate change

- Slow & continuous rise of ambient temperature
- Increased frequency of extreme weather events
  - High variability of rainfall
    - More Floods
    - More Droughts
  - Tornado-type winds, lightening, Cyclones
  - Etc.
- Sea level rise

# Climate change in Sri Lanka

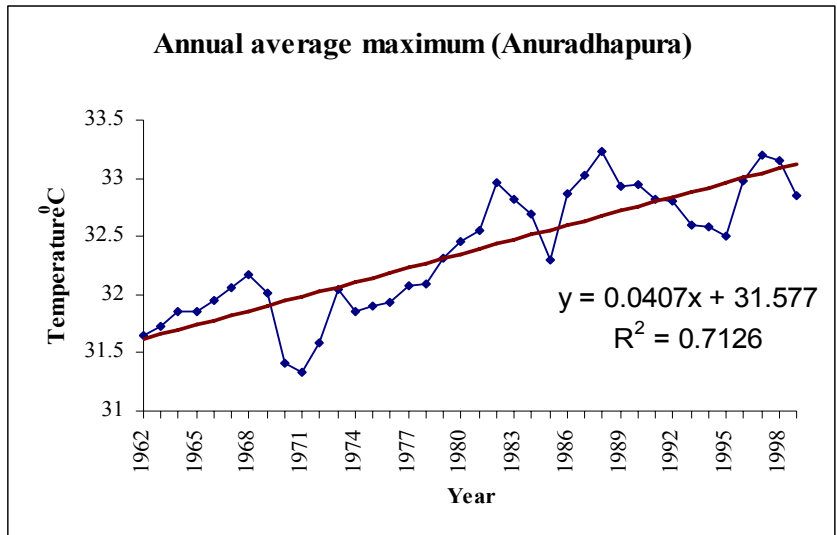
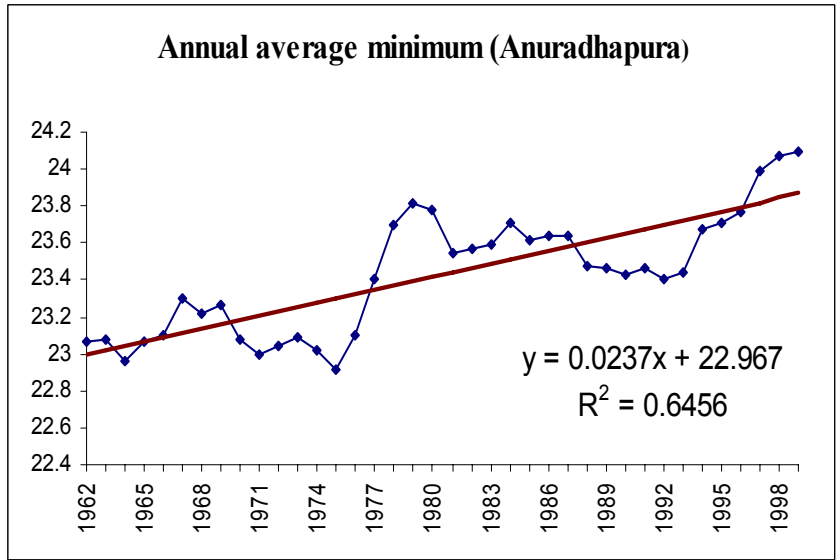
## Trends of air temperature (1961-1990)

<b>LOCATION</b>	<b>SLOPE – °C/year</b>	<b>r<sup>2</sup></b>
Ratnapura	0.0175	0.88
Badulla	0.0217	0.85
Kandy	0.0185	0.72
Nuwara Eliya	0.0146	0.56
Colombo	0.0164	0.67
Hambantota	0.0104	0.81
Anuradhapura	0.0364	0.79
Kurunegala	0.0173	0.42
Jaffna	0.0180	0.61

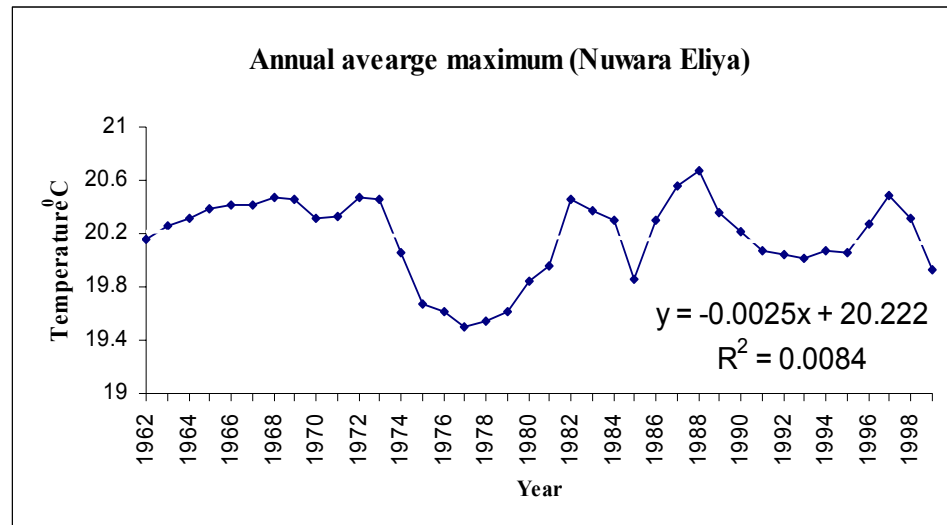
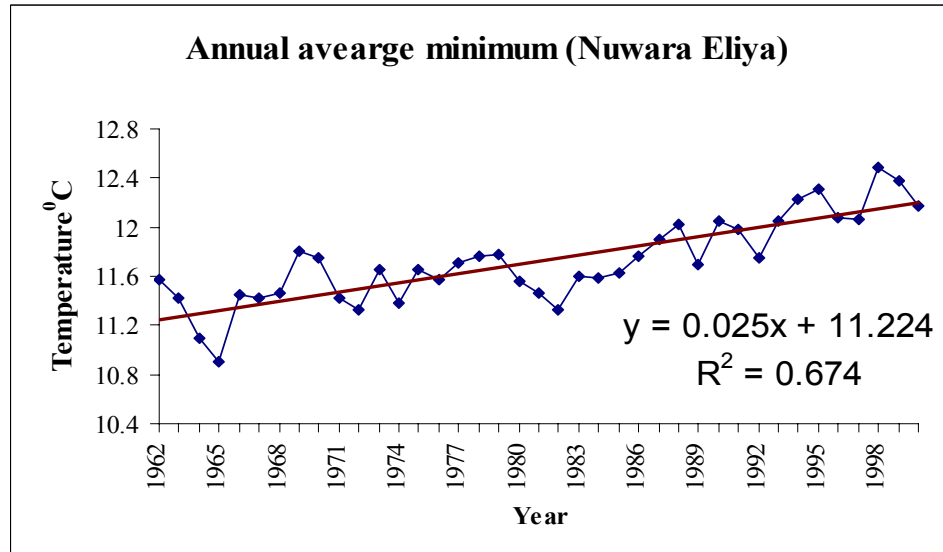
Chandrapala & Fernando, 1995



# Temporal changes of ambient temperature in the Low country of Sri Lanka



# Temporal changes of ambient temperature in the Up country of Sri Lanka



# Variability of rainfall in Sri Lanka

SEASON	CV (1931- 60)	CV (1961- 90)
Northeast monsoon	31 %	42 %
First Inter-monsoon	23 %	27 %
Southwest monsoon	21 %	16 %
Second Inter-monsoon	22 %	23 %
Year	11 %	14 %

Source: Department of Meteorology

## Recent years:

- Variability of all seasonal rainfall has increased
- But, annual rainfall remains closer to the average

# Challenges of Climate Change

- Power sector

- ↑ rate of evaporation from hydro-power reservoirs
  - 39% of the National power demand
  - Conflicting demand issues in dual-purpose reservoirs;

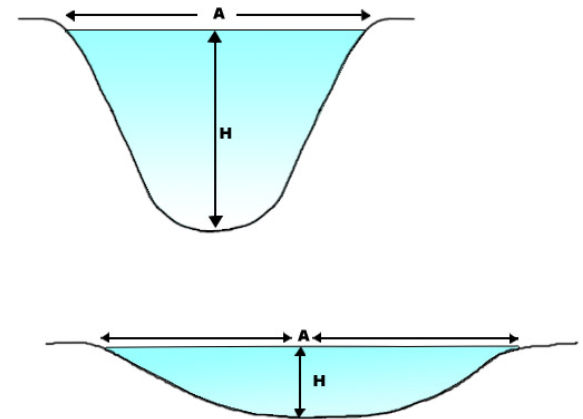


- Increasing demand for air conditioning and ventilation
  - More & more GHG emissions
- Reduced efficiencies in thermal plants, industrial installation and engines
  - More & more GHG emissions

## Contd... Challenges of Climate Change

- **Agriculture sector**

- Increased frequency of soil moisture stress in upland crops
- More droughts
- More floods
- Reduced water availability for irrigation
  - Surface
    - 103 river basins (7 rivers carry 50% of annual runoff)
    - 80 major tanks (fed by both Summer & Winter monsoons + IMs)
    - > 11,250 minor tanks (fed by Winter monsoon + IMs)
    - 12,353 anicuts (Summer monsoon + IMs)
  - Ground water
    - Only 10% of annual rainfall
  - Salt water intrusion in coastal belt



## Contd... Agriculture sector

- Pollen desiccation
  - High spikelet sterility in rice
- Reduced productivity of high-value crops
  - Vegetables & Potato
- Increased Pest & Disease outbreaks and their range
- More land degradation
  - Soil erosion & Salinization
  - Reduces per capita land availability
- Yield Reduction
  - Quantity
  - Quality

**Contd...** Agriculture sector

- Recent study on Crop Wild Relatives of Sri Lanka with GEF funds



# Current Temperature regime of CWRs and projected situation in different climatic zones of Sri Lanka

Species	Optimum T range	33-36 °C	32-33 °C	29-31 °C	2100 ← Projection by
		DZ	IZ	WZ	
Oryza spp.	30-33 °C	30-34 °C	31-33 °C	28-30 °C	← Operational T
Cinn. spp.	25-30 °C	N/A	N/A	24-26 °C	← Operational T
Piper spp.	25-30 °C	26-31 °C	30-32 °C	24-27 °C	← Operational T
Vigna spp.	30-35 °C	30-35 °C	30-32 °C	24-28 °C	← Operational T
Musa spp.	25-30 °C	N/A	24-28 °C	24-26 °C	← Operational T



## Contd... Challenges of Climate Change

### • Health sector

- Additional strain from thermal stress in work places
  - Poorly designed work places
    - Garment industry
  - Reduced efficiency and overall productivity
- More vector and water borne diseases
  - Malaria, Dengue, Diarrhea, Lepto Spirosis
- Increased rate of respiratory disorders
  - Dust & Cold waves
- More communicable diseases
  - Skin diseases, Typhoid fever, Hepatitis A / E
- More accidents under extreme weather conditions
  - Traffic, Lightning, Tornado, Landslides, Floods, Cyclones etc.
- Malnutrition
  - Increased poverty level & reduced food production
- Psychological problems
  - Poverty, Loss of close relatives, Increased temperature

- **Transport sector**

- Inundation of roads and rail lines due to
  - Floods, Inadequate road side drainage, Land slides, Rock slides etc.
- Erosion of road sides and rail tracks, and earth and gravel roads
- Cracking on road surfaces and pavements;
- Destruction of turf on road embankments;
- Increased cost of maintenance.

## Contd... Challenges of Climate Change

- **Human settlement / Vulnerable population**

- Dry zone

- Agricultural based community
- Vulnerable to droughts & increased temperature

- Coastal community (1,585 km coastline)

- Sea level rise & Cyclones

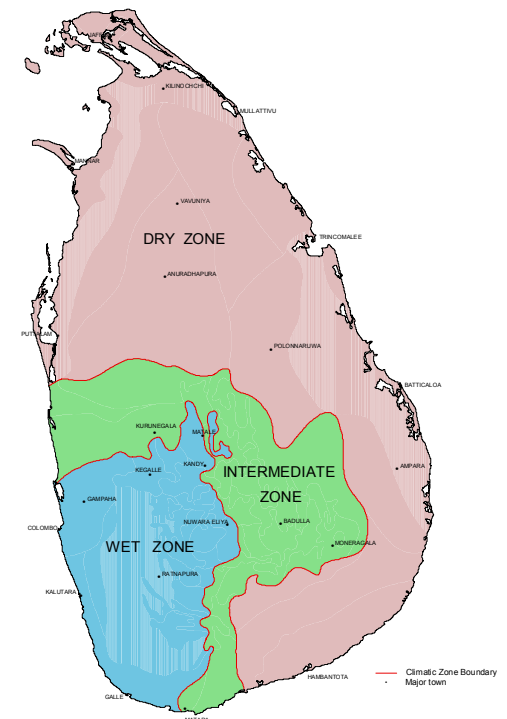
- Urban poor community

- Increased food prices
- Increased disease incidences

- Flood plains

- More & intense floods

- Landslide prone areas



# Opportunities !! ??

- CO<sub>2</sub> fertilization effect ??
- CDM projects ✓
  - Mini Hydro Power projects
  - Aforestation of marginal agricultural lands
- Response strategies
  - Mitigation
    - Being Non-Annex I country, no need to worry too much
      - Will continue to act as good global citizens by adapting Green policies & technologies wherever & whenever possible

- Adaptation

- Investing on this regards may involve some risk
  - Need to go for “No regrets” options
    - Even if the problems of climate change do not occur
      - » They should deliver the benefits
- Some of them may be already in practice without knowing the “Name of climate change”
  - Tolerant varieties for biotic and abiotic stresses
  - Efficient water management techniques
  - Energy saving policies
  - Energy generation through renewable resources
- May need to do some changes to them

- In general

- There should be policy changes in every sector taking the challenge of climate change into account;
- Enactment of relevant acts and ordinances;
- Technological advancement and provision of adequate financial assistance for research;
  - Especially, to increase the food production for growing population under a changing climate
- Protect the arable soil;
- Use the arable land resource rationally and productively;
- Efficient use of water
- Maintenance of food buffer stocks;
  - Local and regional
- Reduce the dependency on fossil fuel



**Thank you.**