ADAPTION TO THE THREATS OF CLIMATE CHANGE - AGRICULTURE

B.V.R. Punyawardena

Head / Climatology
Natural Resources Management Center
Department of Agriculture
Peradeniya

WHAT ARE THE RESPONSE OPTIONS AVAILABLE ?

Do Nothing ■ Adapt ■ Mitigate

- **Mitigation**
  - Reduce the GHG emission
  - Increase the sequestration
    - Should we worry about it ?
      - Being a non-annex I country
- **Adaptation**
  - strategies/actions that may follow
    - to reduce the vulnerability to CC
    - take the advantage of new opportunities
      - CO_2 FERTILIZATION, CDM

- **Our approach**
  - Follow the adaptation strategies to reduce the degree of vulnerability to CC;
    - Should deliver the goods even without climate change
  - Reduce the GHG emission as much as possible, but, not at the expense of our development goals;
  - Take the advantage of new opportunities like CDM options.
- How we could achieve these objectives in the agriculture sector ?

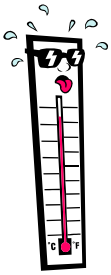
Impacts of climate change on agriculture

Through

Change of Rainfall Regime

Increased Temperature

Sea Level Rise



Are we really vulnerable ?

- All most all of our crops belong to C_3 group
  - Optimum temperature for photosynthesis
    - 15 - 30 ^{0}C
  - Frequent occurrence of high temperature stress for crop growth
    - *Ehela Pussa* during Yala season
  - Pollen desiccation in almost all crops
  - Rapid drying up of irrigation tanks
- Highly dependent on rainfed agriculture
  - Variability of seasonal rains has increased
    - Drought damages
    - Flood damages
  - trans-basin diversion of major rivers is still dependent on seasonal rainfall
  - Minor tanks highly depend on the seasonal rainfall

Are we really vulnerable ?

- Contamination river water by sea water due to back flow from the sea
  - During dry weather conditions
- Sea level rise may aggravate the problem

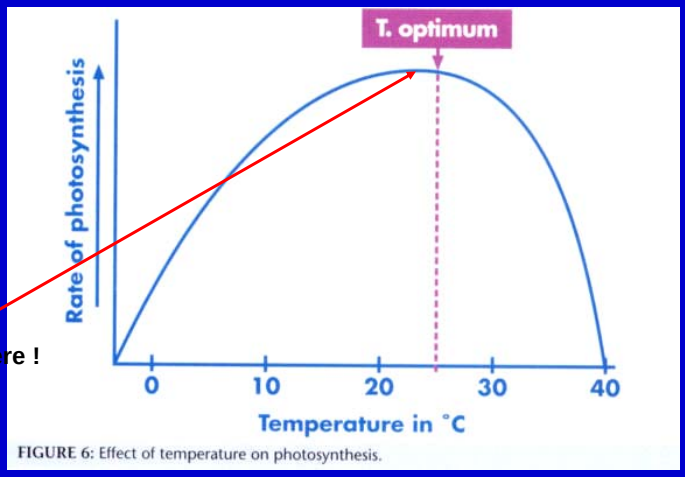


FIGURE 6: Effect of temperature on photosynthesis.

We are here !

Change of rainfall regime

- No particular trends at most places
- But, variability is increasing

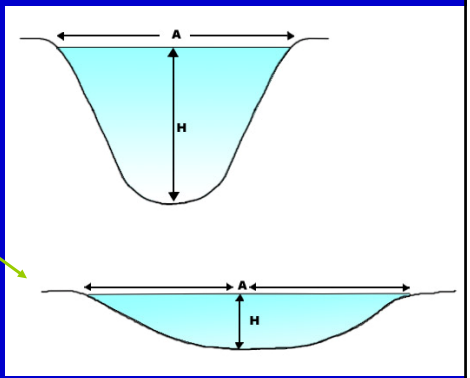
CV of seasonal rainfall

Season	1931-1960	1961-1990
FIM	23%	27%
SWM	21%	16%
SIM	22%	23%
NEM	31%	42%
Annual	11%	14%

Source: Dept. of Meteorology

- **Reduced water availability in tanks**
  - Increased evaporation losses
  - Rapid drying-out of irrigation tanks

Most of the tanks



Minor Irrigation schemes in Sri Lanka

(National Atlas, 2007)

District	No. of Tanks*	% of the total tanks	Major Rainfall Season
Anuradhapura	2,333	21%	SIM, NEM
Kurunegala	4,192	37%	SWM (weak), SIM, NEM (weak)

***Total: 11,257**

- We have a long record of managing the weather / climate related events
- But, additional adaptation measures are required to cushion the shock of CC
  - Regardless of the scale of the mitigation measures
  - May take place over next 2-3 decades
- Vulnerability to CC likely to exacerbate
  - Poverty
  - Conflicts
  - Unequal access to resources
  - Trends in economic development
  - Food insecurity
  - etc.

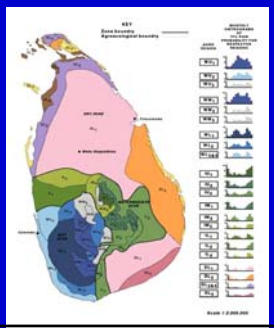
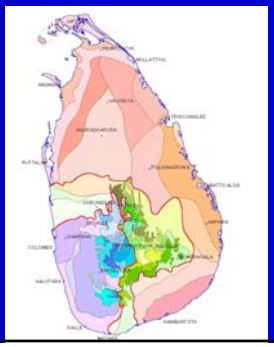
Adaptation responses in agriculture to change of rainfall and thermal regimes

- Upland annual crop cultivation in the DZ to be transformed to perennial fruit crop cultivation with intensive irrigation management practices;
- Promote on-farm soil and moisture conservation;
- Rain water harvesting - *domestic* and *on-farm;*



….contd

– Crop recommendations based on the agro-ecological suitability of the area;
– Promote micro -irrigation (drip, sprinkler etc.);

….contd.

- Breeding for short age varieties;
- Strengthen the breeding program for
  - drought resistance;
  - high temperature resistance;
  - pest and disease resistance;
- Use of Crop Wild Relatives for abiotic and biotic stresses
- Provision of quality seed and planting materials;
  - through government and private sector participation
- Awareness programs on CC – farmers / officers
- Emphasize the need of timely weather forecasts
  - Regionally based
- Educate farmers/officers to be weather sensitive

….contd.

- Policy reforms
  - Implementation of the Soil Conservation Act (1996) with new regulations;
  - Strict enforcement of Seed Act (2003) and Plant Protection Ordinance (1999)
  - Strict enforcement of NEA (1987) and other related acts and ordinances;
  - Expedite the finalization of national land use policy;
  - Adequately address the issue of climate change in all agriculture related policies and make sure that it has to be continued irrespective of the regime;
  - Provision of easy credit schemes;
    - for soil and moisture conservation practices;
    - micro-irrigation;
    - storage and processing;

….contd.

- Large scale drainage improvement projects in the LCWZ;
- Marginal agricultural lands to be converted to forests;
- Effective marketing strategy.
  - If financially sound, less vulnerable

- **Response strategies in the water sector that are directly related to agriculture**

  - Program to improve the water use and conveyance efficiency;
    - Rehabilitation of irrigation canal network;
  - Re-use of drainage water, if suitable;
  - Use of tail water recovery pits for lift irrigation wherever possible;
  - Rehabilitation of minor tanks;
    - Mostly silted
  - Feasibility studies of trans-basin diversion of major rivers ??? ;
  - Develop guidelines for rational use of ground water.

Adaptation - Sea Level Rise

- Look for alternative land uses;
  - Tolerant pasture
    - Livestock
    - Bio-Diesel
  - Salt tolerant tree crops
    - Timber/Fuel
  - Shrimp culture
  - Cottage industry
- Intensify the rice breeding program for salt tolerance;
- Switch back to traditional varieties (Pokkali) with “Forward contract agreements”;
- Strengthen existing sea defense structures;
  - expensive ??

YOU CAN HELP TO STOP GLOBAL WARMING/CLIMATE CHANGE

Thank you !!!