

# Adaptation to the threats of climate change

## Water supply & Drainage

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## Climate change

- The most challenging environmental issue of the 21<sup>st</sup> Century.
  - Emissions resulting from human activity
  - IPCC reports global mean surface temperature increase by 0.6 deg.C in last 100 years
  - Expected global mean sea level rise of 0.6 m by 2100.
  - Affect hydrological cycle- increased intensity and frequency of precipitation
  - Floods and Droughts

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## NATIONAL WATER SUPPLY & DRAINAGE BOARD

• Access to safe drinking water	77.6%
• Access to piped water	33.6%
• Hand pump and tube wells coverage	10%
• Number of Water supply schemes	308
• Staff per 1000 connections	7.6
• Non Revenue water	32.1%
• Total annual water production	424 MCM

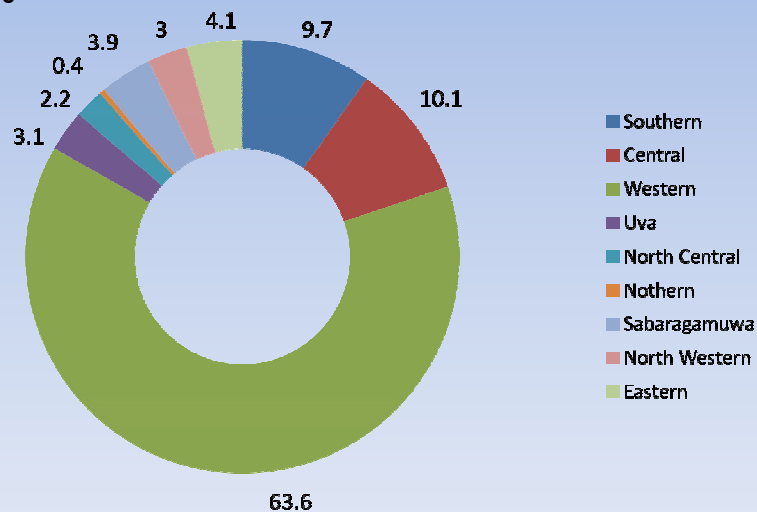
### Western province water supply

- Fed by Ambatale, Labugama, Kalatuwawa and Kaluganga
- Western province supply is 63.6% of All island water production
- This abstraction is about 2% of the Kelani and Kaluganga Run off to the sea

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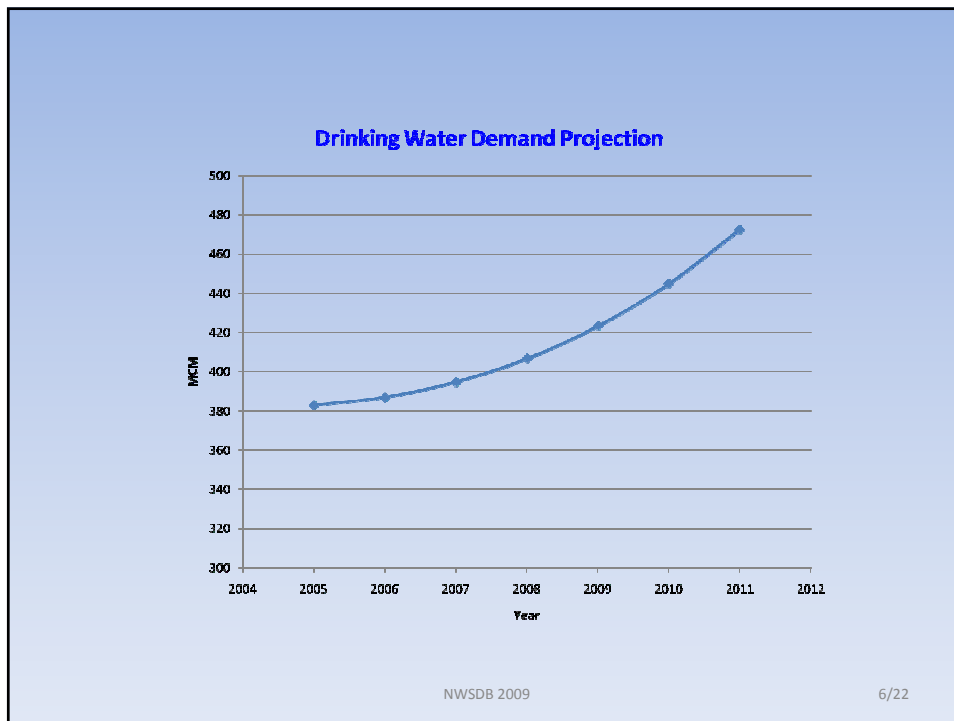
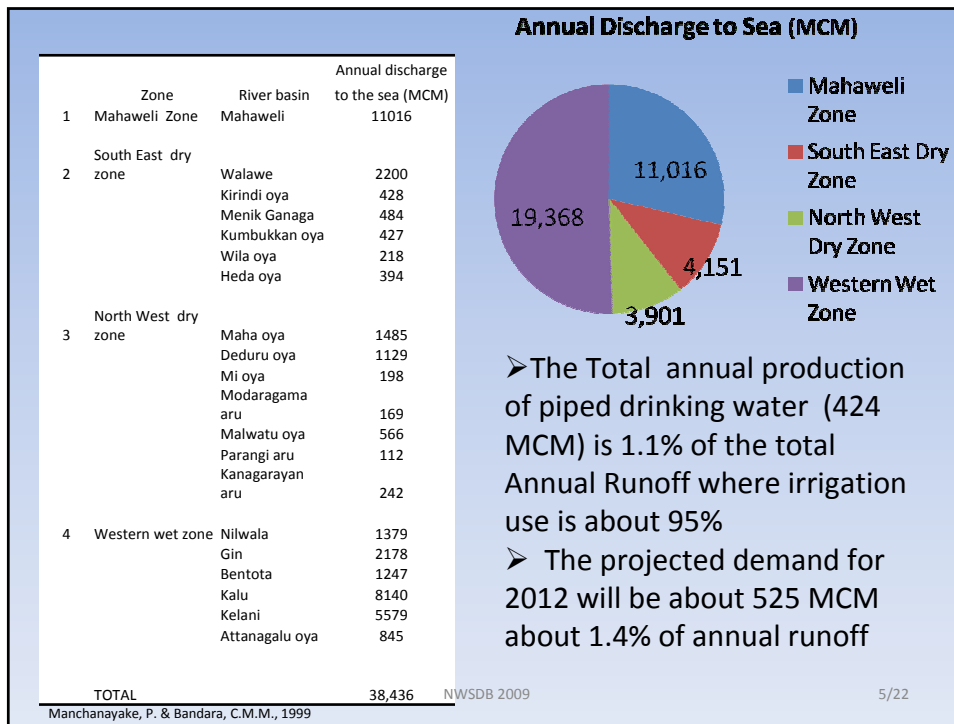
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Detail of 424 MCM piped drinking water production on Province basis in 2007- Values in %



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### Trends of Rainfall in Sri Lanka over the Last Century

Table 4: Results obtained from a linear fit by regression analysis.

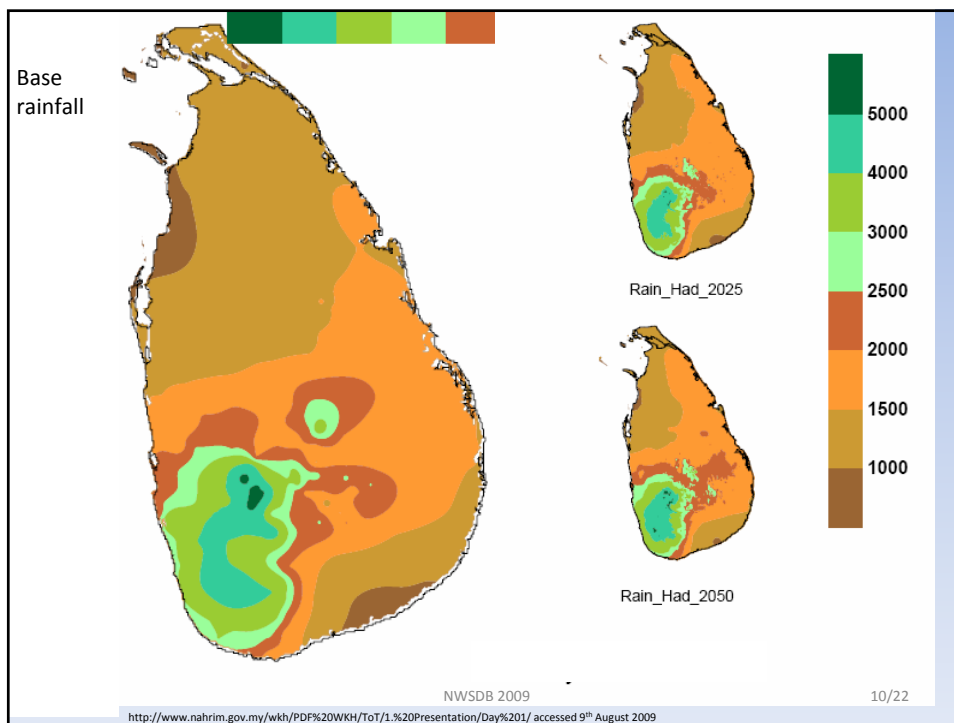
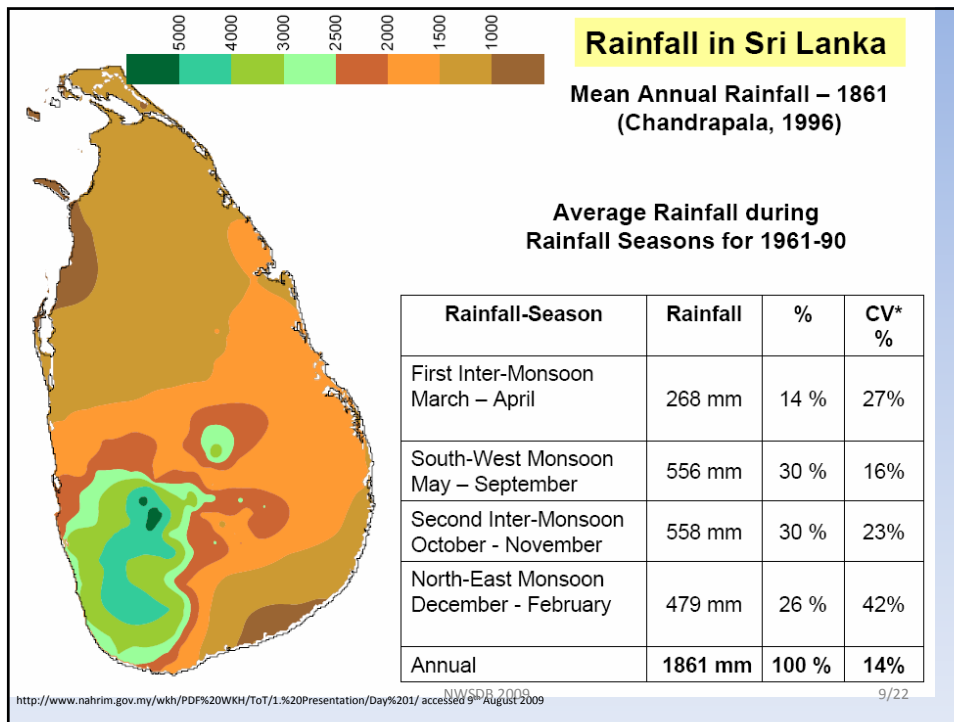
Station	Long Range (Last century)			Short Range (Last 50 years)		
	Slope	Significance of t	Trend Exist	Slope	Significance of t	Trend Exist
1 Colombo	3.15	0.01	Yes	-6.36	0.15	No
2 Nuwara Eliya	-4.87	0.00	Yes	-5.31	0.09	No
3 Rathnapura	-0.76	0.50	No	-0.59	0.89	No
4 Kandy	-2.88	0.00	Yes	-6.75	0.02	Yes
5 Anuradhapura	-1.19	0.10	No	-5.68	0.08	No
6 Diyatalawa	-0.83	0.41	No	-5.30	0.04	Yes
7 Galle	0.82	0.42	No	-10.45	0.01	Yes
8 Badulla	-2.22	0.02	Yes	-3.03	0.39	No
9 Puttalam	0.29	0.67	No	-1.60	0.66	No
10 Batticaloa	0.63	0.50	No	-11.16	0.03	Yes
11 Kurunegala	0.11	0.99	No	-0.92	0.82	No
12 Trincomalee	0.65	0.51	No	-7.48	0.23	No
13 Mannar	0.05	0.94	No	5.82	0.15	No
14 Jaffna	0.17	0.87	No	4.95	0.34	No
15 Hambantota	1.09	0.12	No	-3.41	0.38	No

•100 yr – Colombo up by 3.15 mm/yr- N’Eliya & Kandy down by 4.87 & 2.88 mm/yr

•Last 50 years – decreasing trend in 13/15 stations

### According to UK Hadley Centre for Climate Prediction and Research model, HadCM3 Scenarios A2 and B2 of Intergovernmental panel of Climate Change (IPCC) Special Emission Scenario report for the 2050s :

- Maximum annual potential soil moisture deficit is predicted to increase significantly in the dry zone
- In 2050 there will be a increase in the rainfall during the South West monsoon but the North East monsoon rains decrease
- 10% decrease of annual runoff with respect to base line 1961-1990 in Dry Zone.
- In wet zone the annual runoff is expected to increase by 40% to 100% causing  
 land slides and floods  
 Silva, C.S. (2009)



## Rainfall in Mahaweli Zone

- Annual rainfall is reducing during past century in the upper watershed area by 39.12%
- This reducing trend will proceed at 16.6 % reduction during next 21 years
- As Sri Lanka mainly depend on water resources for energy production, national policy on this topic shall be put forward

Shantha, W.A and Jayasundara, J.S.M.B.

[www.stabilisation2005.com/posters/Shantha\\_WWA.pdf](http://www.stabilisation2005.com/posters/Shantha_WWA.pdf)  
accessed 09<sup>th</sup> August 2009

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## Summary of few predictions on rainfall / runoff

Jayawardena , <i>et.al.</i> 2005	Wijesekera, S., Chandrapala ,1996	Silva, C.S. 2009	Shantha, W.A. and Jayasundara, J.S.M.B. (2005)
Sri Lanka rainfall	Sri Lanka rainfall	Sri Lanka rainfall runoff	Mahaweli zone
Last 100 yrs <b>reduction</b> Colombo 3.15 N'Eliya 4.87 Kandy 2.88 (mm/yr)	Wet zone rainfall <b>increase upto 2050</b>	40-100% <b>increase</b> of Wet zone annual runoff in 2050	Rainfall <b>reducing</b> during past 100 yrs in upper water shed by 39.12%
Last 50 yrs <b>Decreasing</b> R/F trend in 13 out of 15 stations island wide	Dry zone rainfall <b>increase upto 2050.</b>	10% <b>decrease</b> of dry zone annual runoff with respect to 1961 -1990 base line in 2050	The <b>reducing</b> trend will continue at 16.6% next 21 yrs
Actual	Model	Model	Actual

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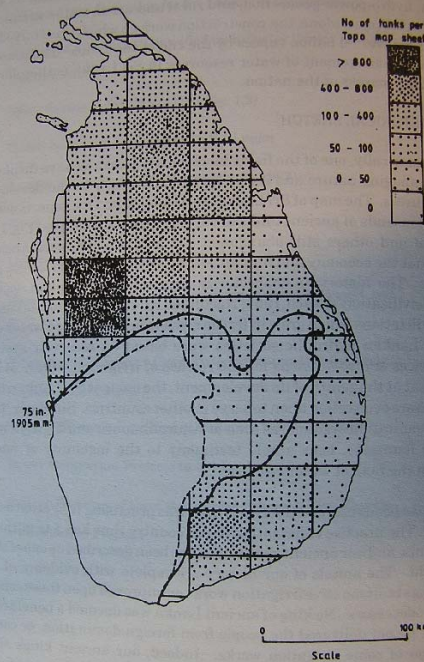
## Threats to water sector due to climate change

- Rain fall variations (floods and droughts)
- Increased salinity in the coastal belt water
- Soil erosion
- Soil moisture reduction due to evaporation
- Water quality problems
- Ground water depletion

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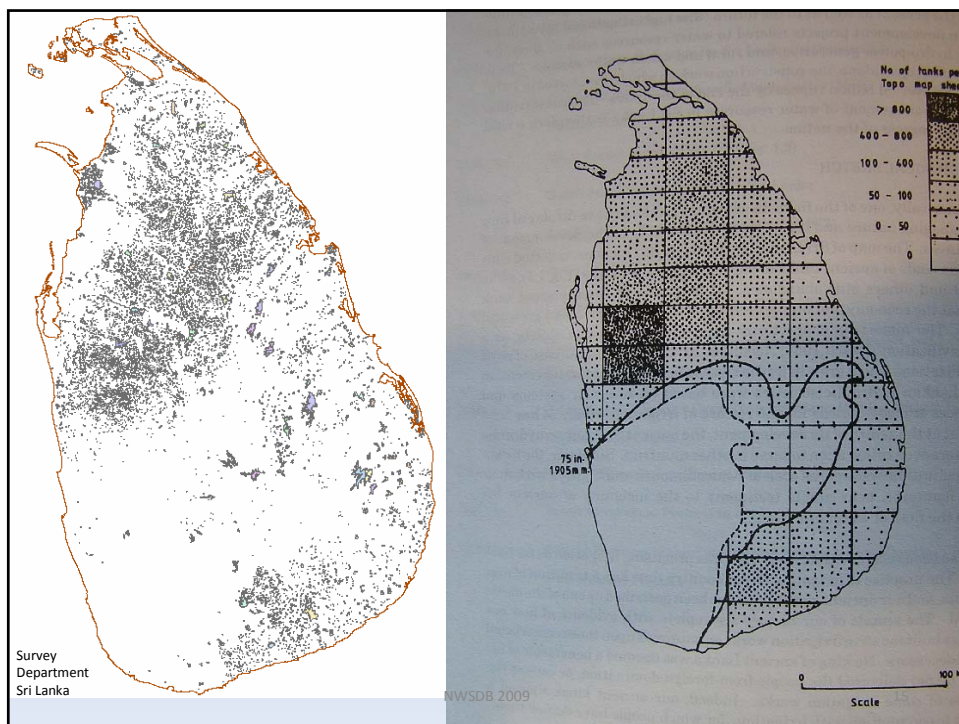
**Distribution of  
dry zone tanks  
(in use and  
abandoned)**



Manchanayake P.  
and Bandara C.M.M.  
(1999)

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## Proposed adaptation measures

- Refurbishment of ancient tank system
  - Retain more water
  - Feed ground water aquifers
- Wet zone
  - Preservation of marshy lands which will make the water flow slow
- Trans basin diversions
- Dedicated drinking water storage tanks for the wet zone .
  - Studies on Attanagalu oya, Kelani Ganga, Kaluganga and Maha oya are in progress
- Catchment preservation to reduce soil erosion and improve soil moisture retention
  - Avoid “pine tree” plantation
  - Avoid expansion of Tea plantation
  - Pollution control by providing better sanitation, avoiding industrialization
  - Preservation of natural forest in the hills
  - Implementation of traditional means of soil erosion control



## Proposed adaptation measures Contd.

- Restrictions on land use to reduce run off coefficient
- Implementing soil conservation techniques
- Popularizing rainwater harvesting as a tool for overcoming droughts and deceases such as chronic renal failure.
- Ground water improvement with small scale treatment

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## MAJOR GAPS RELATED TO SECTOR

### WITHIN THE ORGANIZATION

- Lack of overall understanding on climate change phenomena
- Lack of staffing/facilities on water resources and water quality monitoring
- Reluctance to initiate new programs due to lack of budget

### NATIONAL LEVEL

- Lack inter organizational initiatives and coordination
- Lack of integrated water resource assessment and planning
- Lack of adequate environmental quality assessment and strong pollution control mechanism

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## SUGGESTIONS TO OVERCOME THE GAPS

- Inter agency expert panel to discuss climate change effects and adaptation measures based on water sharing among stakeholders. This panel should meet frequently to solve problems encountered by different agencies.
- Creation of information centre on climate change effects with the objective of creating and sharing data among stake holder organizations.
- Detailed studies based strategies to prioritize water utilization among irrigation, power and drinking water needs

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## SUGGESTIONS TO OVERCOME THE GAPS

### Contd. ..

- Independent manpower development strategy to achieve the objectives of data collection, processing and producing information on climate change effects. Separate funds shall be available for implementation this kind of activity.
- Development of land use policy to cover protection of cascade tank system, protection of water storage low lying lands and marshes.
- Policies such as citing of industries, rain water policy etc. are also important

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# Thank You

## References

1. Manchanayake, P. and Bandara, C.M.M. (1999), Water Resources of Sri Lanka, National Science Foundation, Colombo.
2. Jayawardena, H.K.W.I., Sonnandara, D.U.J. and Jayawardena, D.R. (2005), Trends of Rainfall in Sri Lanka over the Last Century, Sri Lankan Journal of Physics, Vol.6 (2005) 7-17.
3. De Silva, C.S. (2009), Impact of Climate Change Predictions on Food Production in Sri Lanka and Possible Adaptation Measures, Abstracts of the National Symposium on Promoting Knowledge Transfer to Strengthen Disaster Risk Reduction & Climate Change Adaptation, BMICH, Colombo, p7.
4. Wijesekera, S. ,IWRM as a tool for Adaptation to climate change  
<http://www.nahrim.gov.my/wkh/PDF%20WKH/ToT/1.%20Presentation/Day%201/>  
accessed 9<sup>th</sup> August 2009.
5. Survey Department, Sri Lanka.
6. Corporate Plan 2007-2011, National Water Supply & Drainage Board