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Analysis of Diurnal Air Temperature Range Change in Sri Lanka

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Abstract

Increased atmospheric temperature alone is an insufficient indicator to determine its effects of on agriculture and ecosystems. Diurnal Temperature Range (DTR) has been considered as an appropriate indicator. This is critical in the tropical region where DTR is higher than seasonal range and where short-day plants are grown. This study attempted to ascertain whether there is a change in DTR and its spatial and temporal patterns within Sri Lanka resulted by rapid climate change.

Daily maximum and minimum temperature of stations selected from wet zone (Colombo, Nuwara Eliya,) and dry zone (Anuradapura and Batticalo) were used to calculate weekly means of DTR. According to the climatologists, rapid climate changes have occured after 1950s. Therefore, period from 1911 to 1940 and 1981 to 2010 were selected for comparison. Spatial variation was calculated by comparing average of data from dry and wet zone stations separately. Seasonal variations were calculated comparing averages of four climatic seasons.

Analysis show that there is a reduction in DTR during the compared period in both zones. The highest reduction in the range was observed for the wet zone during the First Inter-monsoon season being -1.31C˚ and the lowest in the dry zone during the Northeast monsoon season being -0.01C˚. This reduction of DTR in both zones is caused by the increase of nocturnal minimum temperature rather than the daytime maximum. Nuwara Eliya demonstrates the highest DTR change in all seasons with the highest (-2.37C˚) in the Northeast monsoon season. A slight increase has been recorded in Anuradhapura (0.18C˚) and Colombo (0.01C˚) in the same season and 0.13C˚ in Colombo in the 2ndInter-monsoon season resulted by higher rate of day-time increased temperature. Higher rate of DTR change in Nuwara Eliya compared to lowland stations in both dry and wet zones suggests increased role of orography in the modification of climate with global climate change resulting increased day time laps rate.

The result of reduced DTR is comparable with results of the simulated model and empirical studies conducted in USA and Australia. Further, the consequence of DTR reduction would reflect negatively on crop yields and ecosystem dynamics. Same process may be true for other tropical mountainous areas and this would be an issue requiring attention of climate change adaptation researchers.

***Keywords*:** Laps rate change, Dry zone, Wet zone, Seasonal variation, Climate change adaptation