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Urban Water Conservation in a Changing Climate: The Impact of Temperature and Precipitation on Urban Household Water Consumption

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Abstract

Nowadays, water has become a limited and crucial resource, and the demand and consumption of water are increasing day by day due to rapid population growth and urbanization. Therefore, understanding the factors that influence household water consumption is crucial for effective water resource management. While previous research in Sri Lanka has primarily explored socioeconomic and demographic factors, the impact of environmental variables such as temperature and precipitation has been relatively overlooked. This study aims to fill this knowledge gap by investigating the relationship between climatic factors and household water consumption patterns in the country. The effect of temperature and rainfall on the monthly average water consumption of fifty household units selected by judgement sampling in the Jinthupitiya Grama Niladhari Division of Colombo was assessed. The main objective was to identify the temporal variation in water consumption. Time series analysis was used to identify the temporal variability of water consumption in the study area, and multiple regression analysis and the Pearson correlation coefficient were used to identify the relationship between climatic variables and water consumption. As a result of statistical analysis, Pearson's correlation coefficient revealed that there is a negative correlation between rainfall and water consumption ($r=-0.04$, Sig. 0.78) and a positive correlation between temperature and water consumption ($r=0.285$, Sig. 0.09). Considering the effect of climate on water consumption, it can be recognized that a clear decrease in water consumption is shown in the months with high rainfall and an increase in water consumption is shown in the dry months with low rainfall, and also a higher temperature shows an increase in water consumption during dry months. However, due to the rapid population growth in urban areas, the demand for water is increasing, and providing a supply that meets the demand will be a challenge in the future. As the intensity and frequency of hydrological extreme events may increase due to the impact of climate change conditions in the future, a major water crisis may arise. Therefore, the need for sustainable water management has been highlighted today. For that, it is more effective to refer to household water management and conservation strategies with a broad community participation approach.

Keywords: *Household water consumption, Precipitation, Temperature, Population growth, Sustainable water management*