

**EVALUATION OF WATER QUALITY OF
COMMUNITY MANAGED WATER SUPPLY SCHEMES
IN SOUTHERN PROVINCE**

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(168889B)

Degree of Master of Science

Department of Civil Engineering

University of Moratuwa

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Dissertation submitted in partial fulfillment of the requirements for the
Degree of Master of Science in Environmental Management

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Declaration

“I declare that this is my own work and this dissertation does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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Abstract

Water is a crucial element that covers two-thirds of the surface area of the earth, and it is one of the main substances in the body of every living being on the earth. Thus clean, safe, and adequate freshwater is important for secure good health. The National Water Supply and Drainage Board (NWS&DB) is the main responsible institution for providing safe drinking water within Sri Lanka. However, NWS&DB is unable to provide safe water to the country's entire population. Therefore, Community Managed Water Supply Schemes (CMWSS) were implemented as a solution for the existing water scarcity issues in rural areas of Sri Lanka. It was revealed that most of the CMWSS in Southern Sri Lanka are supplying raw water without proper treatment. So continuous monitoring, management, and evaluation of water quality in these schemes are essential to supply safe potable water. There are 172 CMWSS in the Galle district, and 10,814 families benefit from those schemes. On the other hand, there are 333 schemes in the Matara district, and 26482 families benefit from these CMWSS. In Hambanthota district, there are 182 CMWSS to provide drinking water for 38157 families. In this study, the water quality of selected CMWSS (71% out of total schemes) in the southern province of Sri Lanka was assessed by applying the Canadian Council Minister of Environment Water Quality Index (CCMEWQI). Altogether, water quality (WQ) of 488 (Galle 172, Matara 172, Hambanthota 144) CMWSS was evaluated under the 14 parameters such as temperature, turbidity, pH, electrical conductivity, total hardness, nitrate, iron, fluoride, *E. coli*, total coliforms, Mn, Pb, As and Cd, using Standards method of American Public Health Association and compared with the Sri Lankan Standards for drinking water (SLS 614 2013). Water Quality Index (WQI) was also developed for each source and rated as Excellent, Good, Medium, Bad, and Very Bad. Developed WQI revealed that none of the CMWSS in the southern province categorized as "Very Bad" quality (0-25). Among 488 schemes in the province, only (2.3%) 11 schemes belonged to the "Excellent" category (91-100) based on this WQI. Majority of the schemes (39.1%) had the WQI between 26-50 and rated as "Bad" and need to have secondary treatment. There were 33.8% of CMWSS that belonged to the "Medium" category (51-74) of WQI and 24.8% in the "Good" category (75-90) which were not suitable for drinking without preliminary treatment. More than half (56.3%) of CMWSS in Hambanthota district were in the 'Bad' category. Therefore, Hambanthota district CMWSS were highly contaminated than those in Galle and Matara districts. It was noted that raw water of (97.7%) 477 CMWSS in the southern province need to be further treated for *E. coli*, total coliforms, conductivity, hardness, iron, fluoride, pH, and turbidity. The questionnaire survey revealed, that 62.6% of consumers used water without any treatment. It is recommended to educate consumers of CMWSS on basic household treatment systems so that they can treat the water before consumption. It is also required to introduce more cost-effective treatment procedures for the consumers as the majority of the household in the southern province monthly income is less than Rs.25,000.

Keywords

Water Quality, CMWSS, Southern Province, WQI, Drinking Water

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List of abbreviations

Abs	Absorbance
APHA	American Public Health Association
BOD	Biological Oxygen Demand
CBO	Community Based Organization
CCME	Canadian Council of Ministers of the Environment
CKDU	Chronic Kidney Disease Unknown
CMWSS	Community Managed Water Supply Schemes
COD	Chemical Oxygen Demand
DO	Dissolved Oxygen
DS	Divisional Secretariats
EC	Electrical Conductivity
EDTA	Ethylene Diamine Tetra Acetic acid
GN	Grama Niladari
GPS	Global Positioning System
IQ	Intelligence Quotient
MDG	Millennium Development Goals
MOH	Medical Officer of Health
NGO	Non-Governmental Organization
NSFWQI	National Sanitation Foundation Water Quality Index
NTU	Nephelometric Turbidity Units
NWS&DB	National Water Supply and Drainage Board
OWQI	Oregon Water Quality Index
RWSS	Rural Water Supply and Sanitation

SLS	Sri Lanka Standards
SLSI	Sri Lanka Standards Institute
UNICEF	United Nation International Children’s Emergency Fund
US EPA	United States Environmental Protection Agency
UV	Ultra Violet
UWQI	Universal Water Quality Index
WAWQI	Weight Arithmetic Water Quality Index
WBBS	Water Board Bulk Supply
WHO	World Health Organization
WQI	Water Quality Index