Water Quality Assessment of Public Wells of Madhyapur Thimi Municipality

A Dissertation
Submitted to Central Department of Environmental Science
for partial fulfilment of the requirements for the
Master's Degree in Environmental Science

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LETTER OF RECOMMENDATION

This is to certify that Ms. Sarita Shrestha has prepared this dissertation entitled **"Water Quality Assessment of Public Wells of Madhyapur Thimi Municipality"** for partial fulfillment of the requirement for the completion of Master's Degree in Environmental Science and she has worked satisfactorily under our supervision and guidance.

This dissertation work embodies her own work and is in the form as required by Central Department of Environmental Science, Tribhuvan University.

We therefore recommend the dissertation for approval and acceptance.

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Declaration

I, Sarita Shrestha, hereby declare that the work presented herein is genuine work done originally by me and has not been published or submitted elsewhere for the requirement of a degree program. Any literature data works done by others and cited within this dissertation has been acknowledged and listed in the reference section.

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ABSTRACT

Madhyapur Thimi Municipality with an area of 11.47 sq. km is situated exactly in between Kathmandu, Lalitpur and Bhaktapur and has total population of 47751(CBS 2001). Important physico-chemical parameters were studied monthly over the period of eight months from February to September 2006 and microbiological parameters were studied for the month September. The physico-chemical features such as pH, electrical conductivity, total dissolved solids, dissolved oxygen, free carbondioxide, total alkalinity, total hardness, calcium, magnesium, chloride and phosphate vary significantly from sites 1 to 20 whereas the monthly variation of only water temperature, pH, dissolved oxygen, free carbondioxide, total alkalinity, nitrate and phosphate were significant over the investigation period. The Nitrate-nitrogen content of all Well water samples were found within WHO limit during the investigation period. The iron content of Sites 1 (Kumhalachi), 2 (Bahanani), 4 (Gungachiwa), 9 (Tigani), 11 (Tahanani), 12 (Bhulankhel), 13 (Bramhanani), 15 (Tachutole), and 16 (Bamune tole) crosses the WHO limit for iron content. The maximum iron content was found in site 11 in the month June during the investigation period. Similarly, the electrical conductivity of sites 2 (Bahanani), 3 (Dhwakasi), 4 (Gungachiwa), 5 (Kasmatuthi), 8 (Nachutole), 9 (Tigani), 10 (Lokanthali), 11 (Tahanani), 12 (Bhulankhel), 13 (Bramhanani), 14 (Tulanani), 15 (Tachutole), 16 (Bamune tole), 17 (Parsikomarga), 18 (Gachen marga), 19 (Shiva tole) and 20 (Chode marga) crosses the WHO limit for electrical conductivity. The maximum electrical conductivity of 2330 µS/cm was found in site 9. From MF Test all Well waters contained faecal coliform per 100 ml of water sample greater than 300. So, all Wells are contaminated with faecal coliforms. But from MPN Test, out of 10 sites in which MPN Test were performed maximum coliforms were found in site 20 (1600/100ml) and minimum were found in site 7 (2/100 ml). All the well water samples gave positive completed coliforms test confirming the detection of coliform bacteria in the water sample, indicating the faecal contamination of water except site 7. Thus, all well waters are considered as nonpotable from microbial point of view. Necessary treatment should be done before drinking such water

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ABBREVIATIONS AND ACRONYMS

amsl	Above mean sea level
APHA	American Public Health Association
$CaCO_3$	Calcium carbonate
CBS	Central Bureau of statistics
CDES	Central Department of Environmental Science
Cl^-	Chloride
CO_2	Carbondioxide
CO_3^{--}	Carbonate
d.f.	degrees of freedom
DHM	Department of Hydrology and Meteorology
DO	Dissolved Oxygen
ENPHO	Environment and Public Health Organisation
Fe	Iron
GWRDP	Ground Water Resource Development Project
HCO_3^-	Bicarbonate
i.e.	that is
IUCN	International Union for Conservation of Nature and Natural Resources
JICA	Japan International Co-operation Agency
Mg/L	Milligrams/Liters
µS/cm	MicroSimens/centimeter
M ha-m	Million hector meter
MLD	Million Liters per Day
MOEST	Ministry of Environment, Science and Technology
MPN	Most Probable Number
NO_3^-– N	Nitrate - Nitrogen
NO_3^-	Nitrate
NTU	Nephelometric Turbidity Unit

NWSC	Nepal Water Supply Corporation
OH^-	Hydroxide
P	Phosphorus
PO_4^{---}	Ortho –Phosphate
ppb	parts per billion
TDS	Total Dissolved Solids
UDLE	Urban Development Through Local Efforts
UNEP	United Nations Environment Program
UNESCO	United Nations Educational, Scientific and Cultural organisation
USA	United States of America
USPH	United States Public Health
VDC	Village Development Committee
WHO	World Health Organisation