Assessment of water quality of stream passing through Bahria University Islamabad for non potable usage

A dissertation submitted to the Bahria University Islamabad in partial fulfillment of the requirement for the Degree of MS in Environmental Sciences

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Dedicated to my beloved parents and my loving husband Mr. Sibt e Ali
who are the source of my inspiration, support, guidance and supervision, and who share my happiness, aspirations and achievements.

ABSTRACT

The present study was conducted to assess the quality of stream water passing through Bahria University and sector E-8 of Islamabad for non potable purposes. To check the suitability of stream water, the quantitative analysis of physico-chemical parameters was conducted. Sampling was done in three different seasons of pre-monsoon, monsoon and post-monsoon. Three sampling sites were selected along the length of stream to check the quantity of parameters like color, electrical conductivity, turbidity, pH, alkalinity, hardness, total suspended solids, total dissolved solids, dissolved oxygen, biological oxygen demand, chemical oxygen demand, and some common ions such as Na^{+}, K^{+}, SO_4^{2-}, PO_4^{3-}, NO_3^{-}, Ca^{2+}, Mg^{2+}, Cl^{-}, CO_3^{2-} and HCO_3^{-}.

The results showed that all the physical and chemical parameters of stream water were within desirable permissible limits except turbidity, total suspended solids, biological oxygen demand and chemical oxygen demand. Average turbidity was calculated to be approximately 3.5 (w/v) percent more than the required limit at all sampling sites. The average amount of total suspended solid also increases from 170 to 215 ppm during monsoon season. Similarly the biological oxygen demand and chemical oxygen demand were found to be a little higher i.e. 107 and 155ppm respectively at second sampling site (Naval Complex). The increase was due to the addition of municipal waste of Naval Complex. This rise in biological oxygen demand and chemical oxygen demand was temporary and their value goes below the permissible limits as the stream flows towards third sampling site i.e. Bahria University.

The physico-chemical characteristics of stream under investigation suggested that there was no harm for using this water for non potable purposes. On the basis of the findings of the research, it is concluded to use the stream water for watering green belts. Further, this stream water can be used as a test project in order to check the suitability of water for landscaping and agricultural irrigation.

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ABBREVIATIONS

APHA	American Public Health Association
BDL	Below Detection Limit
BOD	Biological Oxygen Demand
COD	Chemical Oxygen Demand
DO	Dissolved Oxygen
EC	Electrical Conductivity
EDTA	Ethylene Diamine Tetra Acetic acid
GDP	Gross Domestic Product
MAF	Million Acre Feet
MTB	Methyl Thymol Blue
NTU	Nephelometric Turbidity Unit
NEQS	National Environmental Quality Standards
NGVS	No Guideline Value Set
PCRWR	Pakistan Council of Research in Water Resources
PSQCA	Pakistan Standard Quality Control Authority
SpC	Specific Conductivity
SAR	Sodium Adsorption Ratio
SSP	Soluble Sodium Percentage
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
µS/cm	Micro Siemens per centimeter
ppm	Parts per million
ppb	Parts per billion
mg/L	Milligram per Liter
Mm	Millimeter
µm	Micrometer
K^+	Potassium ion
Na^+	Sodium ion
Mg^{2+}	Magnesium ion

Ca^{2+}	Calcium ion
Ba^{2+}	Barium ion
Cl^{-}	Chloride ion
NO_3^{-}	Nitrate ion
PO_4^{3-}	Phosphate ion
SO_4^{2-}	Sulfate ion
CO_3^{2-}	Carbonate ion
HCO_3^{-}	Bicarbonate ion
$CaCO_3$	Calcium carbonate
KI	Potassium iodide
NaOH	Sodium hydroxide
K_2CrO_4	Potassium chromate
$AgNO_3$	Silver nitrate
HCl	Hydrogen chloride

CONTENTS

Sr. No.	FIGURES	Page

TABLES