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Property Analysis of the Drinking Water Supply in Baglung Bazaar

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Abstract

The study objective is to evaluate the current drinking water quality in Baglung Bazar. In this investigation, the physio-chemical characteristics of water samples were assessed using tried-and-true techniques. To gauge the degree of bacterial contamination, the total number of *coliforms* was measured using a conventional membrane filtering method. Random water samples were taken and examined from a number of locations close to Baglung Bazar. The mean water sample's temperature was 22.3°C. Maximum and minimum temperatures were reported in S_6 (24.7°C) and S_{10}, respectively (18.9°C). In filtered water samples, the pH was found to range from 7.29 to 8.1, which is within the acceptable range at the time of the study. The S_7, S_3, and S_8 taps' electrical conductivity measurements showed minimum and maximum values of 70 S/Cm and 145 S/Cm, respectively. All of the samples were within the 20 to 35 mg/L range for hardness. The iron readings typically recorded ranged from 0.10 to 0.35 mg/L. The $S_{2,}$ S_4 and S_8 contained the highest concentrations (0.30 mg/L and 0.35 mg/L, respectively). It was found that none of the samples in the current investigation contained Arsenic. Out of 10 sources examined, six (60%) were *Coliform*-free, while 40 (40%) were determined to be contaminated with total *Coliform.* The results of the investigation back up the claim that the drinking water in Baglung Bazar is currently unsatisfactory and unsafe for direct consumption. To prevent the spread of waterborne diseases, drinking water must be frequently tested and cleansed before use.

Keywords: Water quality, physico-chemical parameters, total coliform, Baglung Municipality

Introduction

For all types of life on earth, water is one of the most valuable natural resources. It is said to be crucial for all living things' survival and for carrying out their bodily tasks correctly. One of the key functional elements of the terrestrial ecosystem, water quality is crucial to the health and nourishment of the water system. However, it has been discovered that these water sources could be contaminated, which means that they might offer contaminated water that is unfit for use in homes and for drinking. These bodies of water have a wide range of characteristics based on their location and surrounding conditions. The chemical, physical, and biological content of water determines its quality, which varies with the season and geographic location. Water supplies have become contaminated by substances including bacteria, viruses, heavy metals, nitrates, and salt as a result of improper handling and disposal of human and animal waste, industrial discharges, and excessive use of the planet's finite water supplies. It is nevertheless possible for naturally occurring concentrations of metals and other chemicals to be hazardous to human health, even in the absence of sources of anthropogenic pollution. Freshwater contamination spreads over 80% of all infections in underdeveloped nations, and it is responsible for the daily deaths of 25,000 people. Estimates place the death toll from cholera, dysentery, and other water-borne illnesses at 2.2 million (UNESCO, 2007). Anthropogenic activities including inappropriate tire disposal, e-waste disposal, and other waste material disposal could worsen biochemical contamination in groundwater. The use of pesticides, fertilizers, and paints containing metal also has a substantial impact on the perspective of groundwater pollution. Even at low concentrations, several types of dyes from the textile, paper, food, and cosmetic sectors are posing a hazard to both aquatic and human life (Lima et al., 2007). So it has grown to be an important precedence to guard the surroundings that such shades be eliminated from water systems. In latest years, a range of techniques, such as adsorption, precipitation, air stripping, flocculation, reverse osmosis, and ultra-filtration, have been utilized to put off coloration from cloth effluent (Robinson et al., 2001). Due to their sufficient cost separation capabilities under visible light, silver-based compounds like AgI, AgBr, Ag_2CO_3, Ag_3VO_4, Ag_3PO_4, etc. are frequently used in current semiconductor photo catalysis to eliminate natural effluents (Pant et al., 2016; Pourabbas et al.*;* 2008, Bai et al.*;* 2013; Liu et al.*,* 2012). Semiconductor photo catalysts have gained attention recently as a cutting-edge technique for removing different dangerous organic contaminants from wastewater. Because of their exceptional qualities, including ease of availability, long-term chemical and thermal stability, non-toxicity, resource abundance, and cost effectiveness, a variety of semiconductors, including TiO_2, CeO_2, ZnO, CdS, Bi_2WO_6, etc., have been widely used (Fujishima et al.*,* 2006;

Pant et al., 2013; Lin et al., 2013; Pant et al., 2014). Using a one-pot hydrothermal process, a highly photo catalytic Ag_3PO_4/MoS_2 composite was successfully created. The composite photo catalyst made of Ag_3PO_4 and MoS_2 demonstrated exceptional photo catalytic activity. This finding can be expanded upon in the future to create high-performance photo catalysts, which hold promise for applications in the reduction of environmental pollution and the production of energy Saud et al. (2017).

Water Quality Parametres

According to the needs of one or more biotic species and/or any human need or purpose, water quality is a measurement of the state of the water (Tchobanoglous et al., 1985).

Physico-chemical Parametres

Chemical parameters determine inorganic matter and soluble organic salts in water. The ability of drinking water contaminants to have negative health consequences over long periods of time is the main source of concern; contaminants with cumulative toxic properties, such as heavy metals and carcinogens, are of particular concern (WHO, 1994).

Temperature

Temperature is one of the critical parameters of water, and its effects on chemical and biological reactions in aquatic organisms are critical. It is critical in determining parameters such as pH, conductivity, gas saturation levels, alkalinity, and so on. A rise in water temperature causes chemical reactions to accelerate, microorganism growth to accelerate, gas solubility to decrease, and tastes and odors to intensify (Trivedy & Goel, 1986). In comparison to warm water, the temperature ranges between 7°C and 11°C have a nice taste (WHO, 1994). Temperature influences palatability, viscosity, solubility, odors, and chemical reactions (APHA Standard Methods for the Examination of Water and Wastewater 2005).

pH

The pH of drinking water from any source should be between 6.5 and 85 (Trivedy & Goel, 1986). A pH of less than 7 may cause corrosion and encrustation in the distribution system, whereas chlorine disinfection is less effective if the pH of the water exceeds 8.0 (WHO, 1993). The pH of water influences treatment processes such as coagulation and disinfection with chlorine-based chemicals. Changes in the pH of source water should be investigated because it is a relatively stable parameter in the short term and any unusual change may indicate a major event (Payment et al., 2003).

Electrical Conductivity

The electrical conductivity (EC) of water is a measure of a solution's ability to carry or conduct an electrical current (Tchobanoglous et al., 2003). The presence of inorganic dissolved solids such as chloride, nitrate, sulfate, and metal anion or cation influences water conductivity (Trivedy & Goel, 1986).

Water contamination may also increase the conductivity of the water, so a sudden change in conductivity is an indicator of water pollution. Because conductivity is strongly affected by temperature, it is normally reported at 25°C (Tchobanoglous et al., 2003).

Total Hardness

For consumer aesthetic acceptance as well as for practical, financial, and operational reasons, drinking water hardness is a crucial factor. In order to address these issues, many hard waters are softened utilizing a variety of appropriate technologies, which will have a substantial impact on the mineral makeup. Local factors (such as water quality problems, piping materials, and corrosion) will determine which conditioning system is most suitable (WHO 2010).

Iron

Although they have no physiological significance, iron promotes undesirable bacterial growth ("Iron bacteria") in the water and distribution system, resulting in the formation of a slimy coating on the pipes (Chatterjee, 2001). When drinking water is oxidized, the ferrous salt of iron precipitates as ferric hydroxide, whereas groundwater may contain iron (II) in various concentrations without turbidity, but when pumped directly from a well, turbidity and color may develop in the piped system at iron levels above 0.05 - 1 mg/l (WHO,1993).

Arsenic (As)

It enters the drinking water supply primarily through the dissolution of naturally occurring minerals and ores. Pesticides, chemical fertilizers, and industrial discharges are all anthropogenic sources of arsenic. Arsenic concentrations in the Terai region of Nepal have been found to be high. Digging tube wells is the most straightforward and immediately achievable option for water in Nepal's rural sector. Arsenic is most commonly found in shallow aquifers, those less than 150 meters deep. Even the symptoms/signs and other observable symptoms become visible only after several years of water consumption. Arsenic in drinking water can be a significant cause of health problems in some areas. The NDWQS, 2005 recommended a guideline value of 0.05 mg/l.

Microbiological Testing of Drinking Water

Organic matter has a direct relationship to *coliform* contamination in water. *Coliform* bacteria are regarded as an important indicator of human health water quality (Seo et al., 2019). *Escherichia coli* and/or thermo tolerant fecal *coliforms* are recommended by the WHO as indicator organisms for the potential presence of fecal contamination and water-borne pathogens. Fecal indicator organisms have primarily been used to measure drinking water quality as it is not practical to test water for all known water-borne pathogens to assess its safety (Tallon et al., 2005). The most frequent sign of fecal contamination is *coliphage,* particularly *E*. These viruses meet the requirements for an ideal indicator of microorganisms, *E. coli* with an RNA genome or F+ RNA. The etiology of water-borne infections shows that viruses and parasite protozoa are more likely to be the common causative agents than bacteria (Jofre et al., 2016).

Literature Review

With the exception of conductivity (42.10%), turbidity (62.10%), and iron (82.10%), the majority of the samples' physicochemical characteristics were found to be within the WHO's permissible range, according to Shrestha 2002). In contrast, de Queiroz et al., discovered that familiarity with water source characteristics (taste, odor, and color) influences consumer preferences and risk perception, and Rupani et al., discovered that a change in water taste was associated with an increased risk of gastrointestinal symptoms (Queiroz et al., 2019, and Rupani et al., 2016). According to a study of Minnesotan households' perceptions of water by Ocher et al., higher manganese concentrations were linked to greater concern about the taste, odor, or color of the water, but 54% of respondents whose well water had Mn concentrations above 300 micrograms per liter (g/L) were not particularly concerned about those factors (Escheret et al., 2021). Jayana et al. (2009) assessed the status of drinking water quality of Madhyapur-Thimi. The Physicochemical analysis of 105 water samples comprising 50 (47.61%) wells, 45 (42.82%) tap water and 10 (9.52%) stone spouts showed that pH (1.9%), conductivity (34.28%) and Turbidity (16.19%) of water samples had crossed the permissible guideline values as prescribed by WHO and national standard. All samples contained nitrate values within the WHO permissible value as well as national standard but hardness (2%), chloride (2.85%), iron (26.66%), ammonia (11.42%), and arsenic content (1.90%) crossed the WHO guideline value but none of the water samples crossed the national standard for Arsenic.

Warner et al. (2008) collected water samples from over 100 different locations in Kathmandu and tested them for contamination from sewage, agriculture, or industry. Total *coliform* and *Escherichia coli* bacteria were found in 94 and 72%, respectively, of all water samples. For the purpose of public health, the drinking water quality in the Kathmandu valley has always required to be investigated. To evaluate the quality of the valley's drinking water, a research was conducted. In the Kathmandu valley, 132 drinking water samples were randomly taken from 49 tube wells, 57 wells, 17 taps, and 9 stone spouts. The microbiological properties of the samples were identified. The WHO drinking water guideline value was surpassed in 82.6% and 92.4% of the drinking water samples, respectively, based on total plate count and *coliform* count. The 238 isolates of enteric bacteria discovered throughout the study included Escherichia coli, Enterobacter spp, Citrobacter spp, 6.3% Pseudomonas aeruginosa, 5.4% Klebsiella spp, 4.0% Shigella spp, 3.0% Salmonella typhi, 3.0% Proteus vulgaris, 3.0% Serratia spp, and 1.0% Vibrio cholera (Prasai et al., 2007).

Bajracharya (2007) had reported the bacteriological evaluation of water samples, which was,published the presence of complete *coliform*in90.35% of complete samples (tube well- 97.37%, tap-73.68% and stone spout-100%). Ten exclusive sorts of enteric microorganism have been remoted from the complete contaminated samples. Among the isolates, *Citrobacter spp* (26.22%) was once observed to be most observed by means of Escherichiacoli (25%), Enterobacter spp (20.73%), Shigella spp (8.54%), Proteus vulgaris (7.93%), Pseudomonas aeruginosa(3.66%),Salmonella paratyphi (3.05%), Klebsiella spp (2.44%), Proteus mirabilis (1.83%) and Salmonella typhi (0.61%).

Subedi (2021) had reported due to a lack of specific chemical substances and tremendous lab equipment, solely a small element of natural contaminants had been examined, whilst all microbiological species had been now not examined. Iron ranges in all of the samples had been greater than the WHO-permitted restriction for ingesting water (0.3 ppm), with bore nicely water having the best levels. This used to be due to the fact to corrosion of the iron tubing used in the bore properly station and the presence of iron-containing substances in the properly environment of water quality from Pokhara.

Pant et al. (2016) had observed that heterotrophic micro organism had been current in each and every single pattern of tap water and 87.5 % of the samples of bottled water. 55.3 % of the samples of faucet water examined high-quality for complete *coliform*s, in contrast to 25% of the exams of bottled water sample from Dharan water sample. Despite the fact that they had been identified in 21.1% and 14.5% of the samples of faucet water, respectively, fecal *coliform*s and fecal *streptococci* had no longer been found in any samples of bottled water. Each type of tap water (100%) and bottled water (54.2%) had pH levels that fell within an incredibly narrow range.

Thapa reported in Damak, one of the new issues with drinking water is the presence of arsenic, which can lead to cancer and skin diseases. Arsenic is primarily dissolved into drinking water sources by naturally occurring minerals and ores. The results of the current analysis indicated that not all of the samples had arsenic at detectable levels. 0.01 mg/l is the preliminary recommendation value (WHO Standard value). 0.05 mg/l was recommended as the recommendation amount by the NDWQS-2005.

Aryal et al. (2010) reported that a quantity of *coliform* existing in most of samples however there was once absence of *E. coli* from Myagdi district. While most of the tested waters have been discovered to be greater range of *coliform* organism especially in faucet water, which is not used to be now not secure for drinking.

Maharjan et al. (2018) reported that there was once a main microbiological difficulty with the dealt with water for the reason that the whole *coliform* reminiscence in 66% of the water samples used to be greater than the encouraged amount. More than 92% of water samples from jars, 77% of tanker samples, and 69% of samples of filtered water contained a complete variety of *coliform*s that had been as soon as massive as the NDWQS. *Coliform* microorganism has been additionally current in 20% of the bottled water. In 16% and 21%, respectively, of the whole examined water samples, iron and ammonia concentrations had been discovered to be above authorized limits. In the previous location, samples of tanker water had ammonia and iron instructing that had been extended in 35% and 15% of the samples, respectively, while samples of filtered water had the same parameters accelerated in 23% and 19% of the samples, respectively. The daily NDWQS suggestions were at odds with this.

Tonog and Poblete (2015) reported the bacteriological property all sampling are positive for fecal *coliform*s in drinking water supply in the Phillipines. This implied that all water sources are no longer impervious for drinking. This quit end result confirmed that the rationale of most loss of life in these three barangays was due to hazardous eating water.

Yuan et al. (2020) reported the frequent annual carcinogenic dangers for Cr in eating water have been estimated to be between 3.14 E -05 and 7.90 E-05 for adults and children, respectively. Similar to this, it used to be determined that the frequent annual carcinogenic dangers for as in eating water for adults and children had been the difference of 4.43 E-07 and 1.11 E-06, respectively.

Battu and Reddy (2009) reported Escherichia coli, Pseudomonas aeruginosa, and Staphylococcus aureus had been diagnosed as the microorganisms in drinking water from Jeedemetla, Hyderabad, India. Water samples from various sources had been analyzed bacteriologically, and the outcomes published that the faucet water from the municipal device used to be protected to drink whilst the water from cellular carriers and the area's groundwater have been not.

Berg et al. (2001) reported arsenic poisoning in Vietnam ground water because of the excessive stages of arsenic determined in the tubewells (48 percentage above 50 g/L and 20 percentage above one hundred fifty g/L), there may additionally be a large hazard of continual arsenic poisoning for a number of million human beings who drink untreated groundwater.

Barenboim and Kozlova (2018) reported pharmaceutical pollution in Moscow which furnishes one of a kind records on the infection of Moscow's water furnish with drug and medicinal agent metabolites. There is now a method for retrieving and figuring out substance hazard scores.

Fillimonova et al. (2022) reported that ailments of the digestive neurological circulatory pulmonary and skin and pores systems are treated using therapeutic Caucasian mineral waters.

Upadhyayula et al. (2009) reported that a point-of-use (POU) commonly mainly tremendously primarily based definitely absolutely remedy techniques the use of carbon nanotube (CNT) adsorption science may additionally facilitate the doing away with of bacterial pathogens, natural herbal be aware range extent (NOM), and cyanobacterial toxins from water systems.

Coleman et al. (2013) reported that the likelihood of infection with multi-class resistant *E. coli* (3 or greater classes) was once greater on residences with pigs or cattle (OR 5.5) than on these barring these animals, and it used to be additionally greater if the wells have been located on gravel or clay (OR 2.1) as adverse to loam in Canadian contaminated private drinking water.

The Guidelines set up numerical "guideline values" for water elements or extraordinarily perfect minimal necessities for existence like workout in order to shield consumers' health. They may additionally set up "guideline values" for water Table 1 under lists the National Drinking Water Quality Standards (NDWQS)-2062 that have been posted by using the Government of Nepal (GoN).

Table 1

National Drinking Water Quality Standards 2062

S.N.	Parametre	Unit	Max.ConcnLimits
Physical			
1.	Turbidity	NTU	5(10)
2	pH		6.5-8.5
3.	Electrical conductivity (EC)	µS/cm	1500
4	TDS	Mg/L	1000
5	Taste and odour		No objectionable
6	Color	TCU	5(15)
Chemical			
7	Manganese	mg/L	0.2
8	Cadmium	mg/L	0.003
9	Free CO_2	mg/L	-
10	Hardness	mg/L	500
11	Iron	mg/L	0.3
12	Ammonia	mg/L	1.5
13	Phosphate	mg/L	-
14	Nitrate	mg/L	50
15	Arsenic	mg/L	0.05
16	Chloride	Mg/L	250
17	Chromium	Mg/L	0.05
18	Cyanide	Mg/L	0.07

19	Fluoride	Mg/L	0.5-1.5
20	Lead	Mg/L	0.01
21	Sulphate	Mg/L	250
22	Cupper	Mg/L	1
23	Total hardness	Mg/L as $CaCO_3$	500
24	Calcium	Mg/L	200
25	Zinc	Mg/L	3
26	Mercury	Mg/L	0.001
27	Aluminum	Mg/L	0.2
28	Residual chloride	Mg/L	0.1-0.2
Microbiological			
29	Total *coliform*	MPN/100 mL	0(In 95% Samples)
30	*E-Coli*	MPN/100 mL	0
Sources: (NDWQS)-2062			

Table 2

WHO Guideline for Drinking Water Quality

S.N.	Parametres	Unit	Max Limit
1	PH		8.5
2	Turbidity	NTU	<1
3	Electrical conductivity	µS/cm	1500
4	Total hardness	Mg/L	500
5	Iron	Mg/L	0.01
6	Total *Coliform*	Cfu/100 ml	0(95% samples)
7	*E. coliform*	Cfu/100 ml	0(95% samples)

Sources: WHO guidelines for drinking water quality (4th edition)

Methods and Procedures

Study Area

The study region specifically covered four wards out of the Baglung Bazar area's total water supply network (ward numbers 1, 2, 3 & 4). The Kathekhola Rural Municipality, Lekhani, Resha and Vakunde are the three main sources of water supplies for the Bazaar. Additionally, there are more than 6635 houses with more than 25, 000 inhabitants in my study area. Water contamination has become a serious problem, especially in this city region of the Baglung municipality, which is why this study has chosen this location as a study area. Residents are totally reliant on the municipality's water supply. Therefore, it is essential to examine the quality parameters. Additionally, doing so would greatly assist the municipality as a whole in resolving the problems.

Figure 1

Study Area Highlighting Location of Sampling Sites (Sources: Google Earth map)

Table 3

Description of Sampling Sites

S.N.	Symbol in Map	Location
1	S_1	Lamakhet
2	S_2	Sibadhara
3	S_3	Milanchowk

4	S_4	Hallan Chowk
5	S_5	Honkong Bajar
6	S_6	Traffic Chowk
7	S_7	DMC Hostel
8	S_8	Ramrekha
9	S_9	Upallachaur
10	S_{10}	Upper Uppalachaur

Sample Collection, Preservation and Analysis

The analysis of water quality has used a variety of approaches that have been devised and implemented. Using appropriate indices is one of the most efficient methods for researching water quality (APHA 2005).

The decision of the sampling sites and samples to be taken into consideration in this study was influenced by the availability of data, the number of water quality parameters reported on earlier studies that were comparable to this one, the length and continuity of water quality records, and the significance of potential water supply source.

The samples came from tap water and water outlets (which has already been treated by the municipal water treatment system). The water samples were taken at ten different locations within the Baglung Municipality. The Narayansthan Khanepani Upabhokta Sanstha's laboratory, Balewa, Baglung, gathered samples in sanitized plastic bottles for analysis.

Water samples were maintained at 4 °C until they could be further examined for further physio-chemical characteristics to prevent modifications. Throughout the study, substances of the analytical grade were used. All glassware was immersed in a 10% nitric acid solution for at least 24.0 hours before being dried at 60 °C for 4.0 hours before use.

Physicochemical Analysis of Tap Water

The physio-chemical properties of the water samples, including PH and temperature, were measured in situ. As soon as the samples reached the lab, physiochemical and total *coliform* count experiments were run on them.

It was held at 4°C to prevent changes until analysis if quick analysis was not possible. Mid-Falgun is when the study was conducted. Physical parameters (such as pH, temperature, EC, and turbidity) were monitored on-site using the appropriate meters.

Additionally, water samples in one liter plastic bottles were gathered for the chemical parameters. Within 24 hours after receiving the samples at the lab, chemical tests were completed. The drinking water quality kit was used to measure the amounts of several chemical parameters.

Bacteriological Analysis of Water

Water samples for microbiological analysis were received by Narayansthan Khanepani's lab within six hours, where they were examined. The total *coliform* count of all the water samples was analyzed promptly after they arrived at the lab, in accordance with the instructions in Standard Methods for the Examination of Water and Wastewater. The total amount of *coliform*s was counted using the conventional membrane filtering (MF) technique, which is advised by APHA (2005).

The 100 mL of water sample was filtered using a filter membrane with a 47 mm diameter and 0.45 mm pore size. Bacterial colonies on membrane filters were counted using a colony counter on m-Endo agar at 37 °C after 24 hours. This involved counting all colonies that produced shine. All analysis kits and equipment were used in accordance with the thorough operating instructions provided by the manufacturer companies. The American Public Health Association's recommendations for the examination of water and wastewater were followed when doing other methods of water testing.

Following the recommended standard procedures by the APHA, water was sampled and tested. These techniques are regarded as the most accurate and dependable for evaluating water quality and water pollution.

Table 4

National Drinking Quality Standard 2062

S. N.	Parametres	Method	Instruments
Physical			
1.	Temperature		Thermometer
2	Ph		P^H Meter
3.	Electrical conductivity(EC)	Potentiometer method	Conductivity meter
4.	Turbidity	Glass tube Method	Turbidity Meter

Chemical			
5.	Hardness	Kit method	Photometer7100-Palintest
6.	Iron		
Bacteriological			
7.	Total *Coliform*	Membrane Filtration	Millipore, USA
8.	*E-Coli*		Millipore, USA

Sources: NDWQS, 2005

Results

Nearly all physio-chemical parameter values for analyzed tap water samples were discovered to be within the NDWQS-2005. The results of the physico-chemical parameters of Baglung Bazar's drinking water network are displayed in table 5 below.

Table 5

Observation Table

	S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8	S_9	S_{10}	Mean Value	Reference Value (NDWQS)
Physical												
Temperature (^{0}C)	23.6	23.3	22.8	23.30	23.2	24.7	22.2	19.5	21.7	18.9	22.3	-
P^H	7.61	8.03	7.36	7.52	8.1	7.31	7.8	7.38	7.29	8.1	7.65	6.5-8.5
Electrical Conductivity (µs/cm)	80	80	70	125	75	80	70	145	75	80	87	1500
Turbidity	B/D	B/D	B/D	B/D	B/D	B/D	B/D	B/D	B/D	B/D	-	-
Chemical												
Total Hardness (mg/l)	30	25	25	30	20	35	30	25	25	20	26.5	500
Arsenic (mg/l)	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	-	0.05
Iron (mg/l)	0.25	0.30	0.15	0.35	0.20	0.10	0.15	0.35	0.15	0.20	0.22	0.3

B/D: Below detection limit, N/D: Not detected

Physico-chemical, the values for the majority of tested parameters for source samples were found to lie below the maximum level of NDWQS-2005. The potential for contamination by microbial pathogens is most pressing, and therefore strict control is required on personal drinking water sources. 10 water samples were analyzed for *coliform* contamination using membrane filtration, 4 of which (40%) were contaminated with *coliform*s, while the remaining 6 (60%) were free of *coliform*s. The majority of water tested, especially tap water, was found to have high levels of *coliform* bacteria and was unsafe for consumption. Table 6 gives the ranges of total *Coliform* found during the entire study. *Coliform* concentrations are expressed in terms of the number of organisms per 100 mL of water as follows: *coliform*s per 100 mL=number of colonies × 100/ml of sample

Table 6

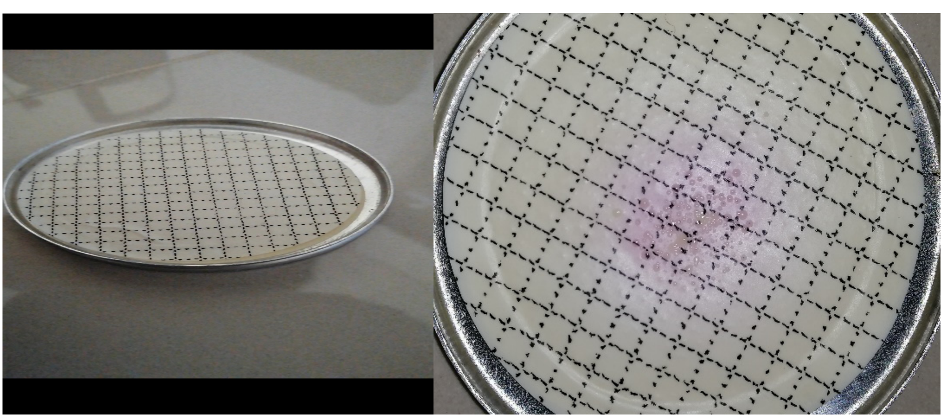
Results of Bacteriological Analysis of Water Samples

	S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8	S_9	S_{10}	Reference Value (NDWQS-2062)
Total *Coliform*	0	140	120	100	0	180	0	0	0	0	0
E. Coliform	0	80	40	70	0	90	0	0	0	0	0

S_2, S_3, S_4, and S_6 were found to be contaminated with total *Coliform*, which exceeds the NDWQS standards (0 cfu / 100 ml) and 4 samples were contaminated from *E. coli* in taps.

Figure 2

Culture of Escherichia coli bacteria (a) Absense of Bacteria (b) Presense of Bacteria



(a) (b)

The presence of harmful viruses, protozoa, and helminths can be found in the water as a result of fecal pollution. The danger of intestinal disease-causing infections is increased by the presence of *E. coli* in drinking water (Obire et al., 2008). Direct sewage or municipal waste discharge into surface waters or in open areas close to water sources may be the cause of microbial contamination in drinking water sources. The presence of *coliform* bacteria in treated water samples has been assumed to indicate that the treatment capacity is insufficient for the water samples. It's possible that contamination in the pipelining system, back siphoning, and interruptions in the water delivery pattern are to blame for the presence of *coliform* bacteria in tap water. Being contaminated with *Coliform* may also be the result of negligence.

Discussion

In order to determine the quality of drinking water, the major objective of this study was to assess the chosen quality criteria of the treated water that was made available in Baglung Bazar. Based on Nepal's national drinking water quality regulations, the quality parameters measurements were evaluated.

The analysis revealed that the water sample's mean temperature was 22.3°C. The temperature of the water varied among the samples, with S_6 recording the highest temperature (24.7°C) and S_{10} the lowest (18.9°C). Particularly in the case of tap water, a number of factors, including but not limited to supply pipe condition (underground or above ground), and distance from reservoir, affect water temperature.

In the range of the standard limit at the time of examination, the pH value for filtered water samples ranged from 7.29 to 8.1. Consequently, the samples of water were all alkaline. Nevertheless, the pH of tap water was within NDWQS guidelines. The public's health may be impacted by the pH range of drinking water, which can range from normal (pH 6.8-8.5) to acidic (pH 7.0) or alkaline (pH > 7.0). The NDWQS guideline is fully complied within all 10 of the water sample.

The total ion content of water is determined via electrical conductivity. Waste water contains salts and other impurities, which makes the water more conductive. Due to the presence of dissolved salts and metallic ions, groundwater generally has a high EC (Prakash & Somashekar, 2006). The electrical conductivity of the S_7, S_3, and S_8 taps was found to range from 70 to 145 S/Cm during the testing period. Although the existence of additional. Ca^{+2} and Mg^{+2} is thought to be the reason for the higher conductivity, this has not been tested. The conductivity levels in each of the selected water samples were around 100 S/Cm. The measured values were within the permitted range of the NDWQS drinking water guideline value.

Water turbidity may result from the mixing of colloidal particles, clay particles, asbestos minerals, organic matter leaching, and residential wastes from many sources. Additionally, manuring practices and agricultural runoff can add to water turbidity (Prakash & Somashekar, 2006).

Water hardness does not have any known negative consequences, although some research suggests that it may contribute to heart disease (Schroeder, 1960). Calcium and magnesium dissolved in water are the main causes of hardness. Industrial wastes and sewage are significant calcium and magnesium sources. The primary effects of hardness are the accumulation of scale and scum as well as the need for more soap to make lather. Although hard water is not thought to be damaging to the general public's health, it can cause issues in commercial settings, including laundry and the water circulation pipes in boilers. The presence of metallic ions, specifically the bicarbonates of calcium and magnesium ions, is what causes the TH in water (Annapoorna & Janardhana, 2015).

The toxicological issues of acute exposure and chronic iron overload are however brought on by excessive iron consumption. Overconsumption of iron (>0.5 g) can result in diabetes mellitus, hormonal imbalances, immune system dysfunction, liver, heart, and lung disorders (Gurzau et al., 2003). In a manner similar to this, high levels of iron cause water to be unappealing due to turbidity, discoloration, metallic taste, and staining of clothing and plumbing fixtures (Kontari, 1998). The range of the iron levels was 0.10 to 0.35 mg/L on average. The S_2 and S_8 showed the highest values, 0.30 mg/L and 0.35 mg/L, respectively. Overall, 3 (30%) groundwater samples exceeded the iron levels recommended by the NDWQS and WHO, which was consistent with earlier investigations (Prasai, 2007; Bajracharya, 2007; Jayana, 2009).

Conclusion

In order to compare various water sources, significant factors like temperature, pH, conductivity, turbidity, total hardness, iron, arsenic, and *coliform* were taken into consideration. The two most worrisome metrics were iron and total *coliform* count. The findings unmistakably demonstrated the declining state of Baglung Bazar's water quality. As a result, the quality of drinking water has decreased, and I have come to the conclusion that treated and tap water are not acceptable for consumption due to inorganic and microbiological pollutants (faces i.e., *E. coli*) that are beyond NDWQS standards. To make water potable, the proper treatment plant should be well scientific, and rigorous adherence to environmental protection laws and regulations is required to preserve groundwater supplies and keep these sources safe from contamination.

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