



A Study on Existing WATSAN Condition of Two Tea Gardens in Maulvibazar

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Abstract: In Bangladesh, the area around Sylhet is a traditional tea growing zone. Sylhet is not only plays an important role in the socio-economic development of Bangladesh but also important for ecological balance of the country. However, the water supply and sanitation (WATSAN) condition of tea garden area especially for workers is not environmentally sound. Moreover, there is not enough number of tube wells to get water for drinking purposes and even no provision of municipal water supply. The income of tea garden workers is poor around BDT 3000-4000 per month; 80% people were illiterate, 58% people were getting improper (shared among many workers) latrine facility. The drinking water was observed free from faecal coliform and arsenic contamination but the concentration of iron was high. This study reveals that both the tea garden people are deprived from proper latrine facility, water supply system, waste management and housing facilities. Sustainability of water supply and sanitation system must be considered for achieving good health for all and keep the environment healthy for smooth economic development.

Key words: Water supply system, Sanitation condition, Waste management, Tea garden, Sylhet

1. Introduction

Water is absolutely essential for life. Man uses water not only for drinking and culinary purposes but also for bathing, laundering and other domestic purposes. The main sources of water supplies in Bangladesh are surface waters of rivers, reservoirs, lakes, canals and ponds, and groundwater in shallow and deep aquifers. Rainwater is also an alternative source of good potential for water supplies in Bangladesh (Ahmed and Jahan, 2008). Accessible supply of adequate amount of safe water and proper sanitation are basic needs and essential components of primary health care. Human beings suffer from different types of water-related diseases, both quality and quantities of water are important in the spread of these diseases. Health problems related to the inadequate of water supplies are significant in developing countries (Ahmed and Rahman, 2000).

Bangladesh has around 164 tea gardens which produces approximately 60 million kilogram of tea annually from about 53259 hectares of land. Nearly 358,550 workers are employed on the tea estates of which over 75% are women (Saha, 2010). However, existing water supply and environmental sanitation condition of tea garden area is very poor. Moreover, the water they use for drinking and other domestic purposes is below the permissible water quality standard. Keeping this view in mind the WATSAN condition of two tea gardens within Maulvibazar, Sylhet were designed to check.

2. Description of study area

The study was performed in Bilashchara Tea Garden under Bangladesh Tea Research Institute (BTRI) and Lakhaichara Tea Garden under Finley Tea in Balisera valley circles at Sreemangal in Maulvibazar district of Bangladesh. The Bilashchara tea garden was established in 1957 with an area of 263.26 ha, whereas the Lakhaichara tea garden was very large and established in the

British period with an area of 3500 ha. Maulvibazar is located in the Sylhet division and situated on the left bank of Manu River with 24.4778° N 91.7667° E and 360 km from the capital city Dhaka. It is bounded by the Sylhet district on the north and also by the Khasia, Jainta hills of India; Kachhar and Karimgonj district of India on the east and south; Hobigonj district on the west. The area is located in the flood plain of the Meghna River. Besides, there are a lot of hills and elevated lands around the area.

3. Methodology

WATSAN conditions of the tea gardens were partly examined by questionnaire survey, which includes based on visualization of sanitary facilities and interview with the garden workers, staffs and their family members. Samples of drinking and surface water was also collected and subsequently tested for different parameters (i.e., Turbidity, Iron, Arsenic, pH, Eh, COD, BOD₅, TDS, DS, SS). The tests were performed according to the standard method (APHA, 1998) by taking the facilities from the laboratory of Civil and Environmental Engineering department of the Shahjalal University of Science and Technology, Sylhet.

4. Results and Discussion

4.1 Drinking water sources and its quality

Ground water is the main source of drinking water in the tea gardens. There were 3 tube-wells, 1 deep tube-well found in Bilashchara tea garden and 32 tube-wells and 12 wells (locally named as 'Kua') found in Lakhaichara Tea Garden. The drinking water of tube well, deep tube well and well were collected in random basis in sealed bottles and tested after brought to the laboratory. Table 1 shows the test results. From the table it was observed that, the drinking water was free from faecal coliform and arsenic contamination, but the concentration of iron is a bit high according to the Bangladesh Standard.

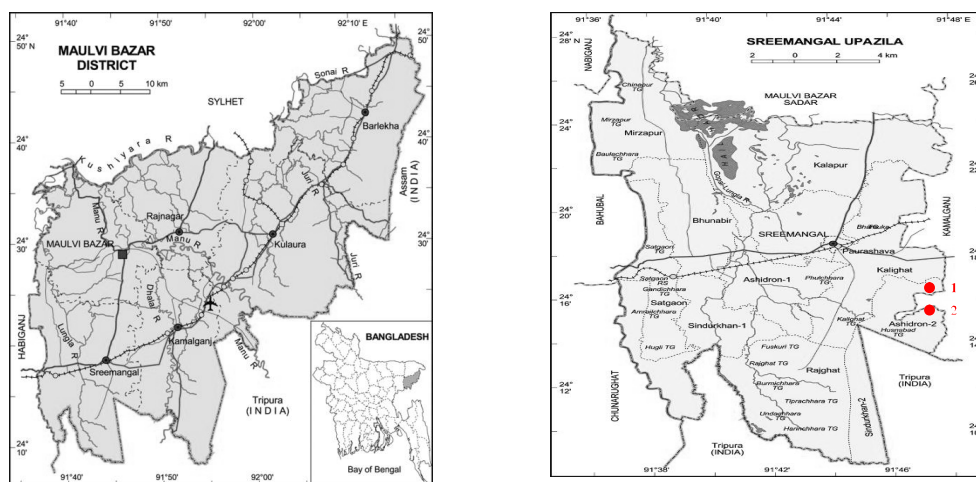


Figure 1. Map of Maulvibazar district (left panel) and sreemangal upazila (right panel) locating two tea gardens by solid circles (1 and 2)

4.2 Surface water quality

Surface water is the main source of irrigation in the tea gardens. There were 4 ponds, 1 lake/large pond observed in the Bilashchara tea garden and 2 ponds and a Stream in Lakhaichara Tea Garden. Water samples of different ponds and natural drain (locally called as chara) were collected from the gardens by sealed bottle and tested for different parameters and the test results are shown in Table 2 with bar charts in Fig 2. The surface water quality was observed a bit poor compared to ground water.

Most of the measured parameters (i.e., pH, E_h , COD, BOD₅, TDS, DS, SS and Turbidity) exceed the standard value. But people of tea garden use surface water for bathing, cooking, washing and other household purposes which is unhealthy and should be avoided. Improper sanitary practices of people greatly contributed to the quality deterioration of surface water sources. Provision of enough tube well or safe water sources is necessary to improve the situation.

Table 1. Drinking water quality collected from different tube-wells and wells from the garden area

Study area	Sample	Turbidity (JTU)	Iron (mg/L)	Arsenic (mg/L)	Faecal coliform (N/100 ml)	Bangladesh Standard			
						Turbidity	Iron (mg/L)	Arsenic (mg/L)	Faecal coli form
Bilash chara	TW 1	4.71	1.53	0	0	10	0.3-1.0	0.05	0
	TW 2	4.92	0.98	0	0				
	DTW 1	3.87	1.10	0	0				
Lakhaic hara	TW 3	3.98	1.75	0	0	10	0.3-1.0	0.05	0
	TW 4	4.12	1.63	0	0				
	W 1	8.72	0.15	0	0				

TW=Tube well, DTW=Deep tube well and W=Well

Table 2. Surface water quality of the study area

Tea garden	Sample	pH	Eh	COD (mg/L)	BOD ₅ (mg/L)	TDS (mg/L)	DS (mg/L)	SS (mg/L)	Turbidity (JTU)
Bilashhehra	P1	6.62	17	8.7	5.0	410	290	120	13.07
	P2	6.80	18	7.2	4.0	350	270	80	12.99
	P3	6.65	23	7.5	4.8	320	250	70	14.8
	P4	6.92	21	6.5	5.1	310	250	60	14.31
	P5	6.54	19	6.8	5.2	380	290	90	14.1
	P6	6.75	23	7.3	4.3	460	390	70	14.5
Lakhichara	P1	7.02	30	7.5	5.8	490	410	80	14.7
	P2	7.01	25	7.8	5.5	310	260	50	13.1
	P3	6.9	24	6.9	6.2	400	310	90	13.5
	S1	6.57	22	7.1	6.5	-	-	-	12.3
	S2	6.64	23	7.6	5.9	-	-	-	12.8
	S3	6.78	24	7.11	6.4	-	-	-	13.2
Average		6.77	22.42	7.334	5.4				13.614

P=Pond, S=Stream

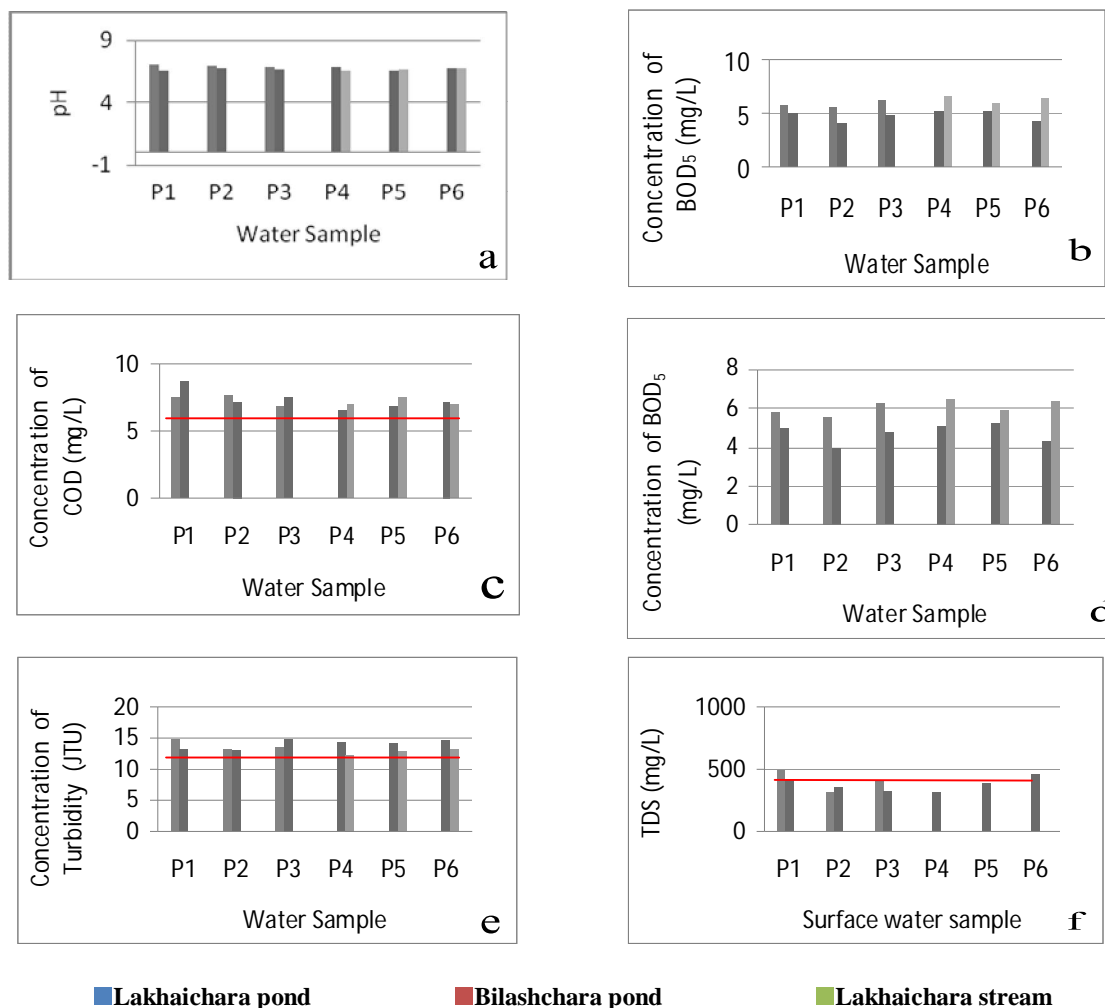


Figure 2. Shows pH (a), Eh (b), COD (c), BOD₅ (d), Turbidity (e), TDS (f) of surface water samples of two tea gardens. Red solid line represent Bangladesh standard.

4.3 Survey Reports

To assess the WATSAN condition of the tea gardens, a comprehensive questionnaire survey was conducted among the garden workers, staffs and their family members mainly to assess different parameters (i.e., drinking water sources, quality of water, availability of water, sanitary facilities, types of latrine, availability of latrine, solid waste management practices, disposal of solid wastes, facility of municipal dustbin etc). The survey results are displayed in Fig 3.

4.3.1 Economical status

In order to assess the income level, 20 families from each study area were surveyed. Figure 3(a) shows that monthly income of 2-5% family is very low (1000-2000 BDT), 10-20% family is moderately low (2000-3000 BDT), 40-50% family is below average (3000-4000 BDT), 30-35% family is average (4000-5000 BDT) and few people (3-5%) having above 5000 BDT. Due to poor income level, it is difficult for them to give proper attention on hygienic practices.

4.3.2. Education Status

Survey result shows that education status of the study area is also very poor. Figure 3(b) depicts that a major portion of garden people (65-80%) are illiterate and 20-35% people did not cross even primary level of education. Not a single worker was found who studied in high school since they have to fight for their livelihood from very early age. They do not have any chances to utilize their skill in intellectual level and interact with educated people. As a result they are highly lacking of proper knowledge on sanitary practices.

4.3.3 Sanitation Condition

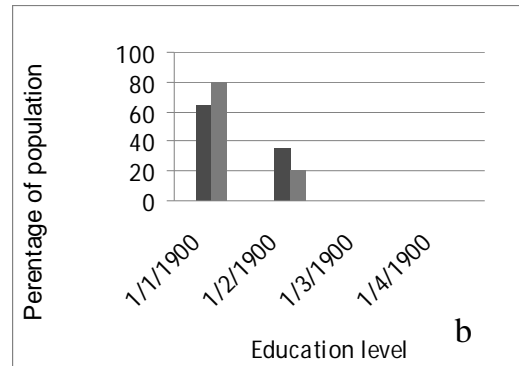
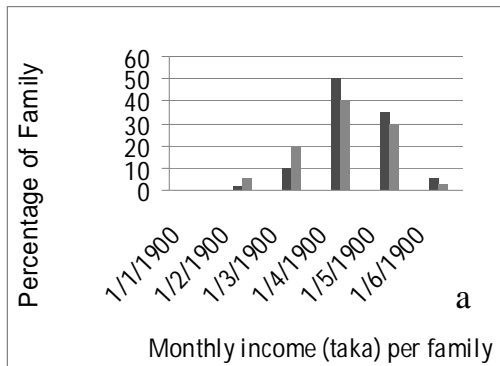
Sanitary condition of tea garden is miserable and inhuman. Children faces are generally disposed to nearby water bodies or throwing in the jungle. Sometimes faces are also washed under tube wells or thrown in the yard. The problem is acute with female residents who have to wait in a queue for long time for defecation, or use a neighbor latrine if available. Figure 4(a) shows that almost half of the people do not have any proper latrine facilities. It is observed that many people are using a single

latrine as shown in figure 4(b). The figure reveals that at least 10 persons use one latrine and sometimes the number of user increased to 40.

4.3.4 Defecation practice

Defecation practices was found extremely poor in both the gardens and shown in Fig 4(c). Around 20% people defecate near the natural drains of Bilashchara tea garden; 45% people uses unhygienic latrine and 35% people uses sanitary

latrine. Without improving the sanitary condition, the people of gardens will suffer severe health problems. Figure 4(d) also shows similar issues for Lakhaichara tea garden. Higher percentage of people (30%) compared to Bilshchara are defecate near natural drains; 50% people uses unhygienic latrine and 20% people use sanitary latrine. It is also observed that most of the women prepare and serve food for their family members without proper cleaning of their hands



■ Lakhaichara Tea garden

■ Bilashchara Tea garden

Figure 3. Economical (a) and educational status (b) of the study areas.

4.3.5 Source of water

The source of water used for different purposes are shown in Fig 5. It is found that in Bilashchara Tea Garden, 60% people use tube-well water and 40% people use deep tube-well water for drinking; 10% people use tube-well water, 50% people use deep tube-well water, 40% people use pond water for washing; 80% people use tube-well water, 15% people use deep tube-well water and 5% people use pond water for cooking; 80% people use pond water and 20% people use deep tube-well water for bathing; 70% people use tube-well water, 20% people use deep tube-well water and 10% people use pond water in latrine. Whereas in Lakhaichara Tea Garden, 100% people use tube well water for drinking; 80% people use charra water and 20% people use well water for washing; 60% people use tube well water and 40% people use well water for cocking; 80% people use river water and 20% people use well water for bathing; 60% people use tube well water and 40% people use well water in latrine. No provision for municipal supply water was found in both the gardens.

4.3.6. Location of Tube Wells

The deposition of excreta in pits may pollute water sources, particularly wells, tube wells or ponds if

those are located nearby. The danger of pollution increases if open pits are dig down towards the water table. Figure 5(c) shows that around 80% tube wells were found within 2 meters of garbage chutes. So, most of the tube wells are vulnerable to pollution mainly by leaching. Tube well platforms were also checked as it may help leaching effect from nearby pollutants if platforms are weakly constructed. The observed scenario is alarming as shown in figure 5(d).

Drainage systems of tube wells are satisfactory which may encourage quick breeding of flies or mosquitoes since most of the area are found muddy.

4.3.7 Waste disposal system

Solid waste is found as useless, unwanted and discarded materials within the garden area. Figure 6(b) shows that in Bilashchara; 30% solid wastes are disposed at the charra site, 60% at open area near the house, and 10% at drain. Dustbin was not found in the study area. Figure 6(c) shows similar scenario in Lakhaichara Tea Garden. Surprisingly few waste collection bins are found in Lakhaichara Tea Garden.



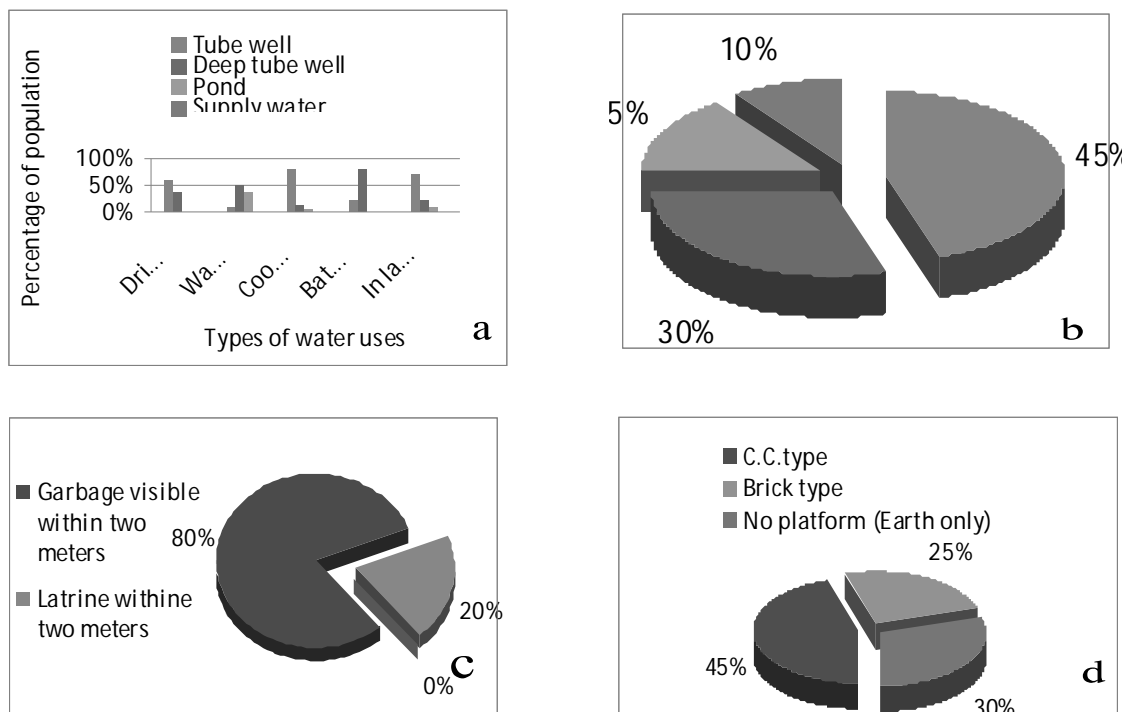


Figure 5. Water using practice at Bilashchara (a) and at Lakhaichara (b) tea garden with tube well conditions (c and d).

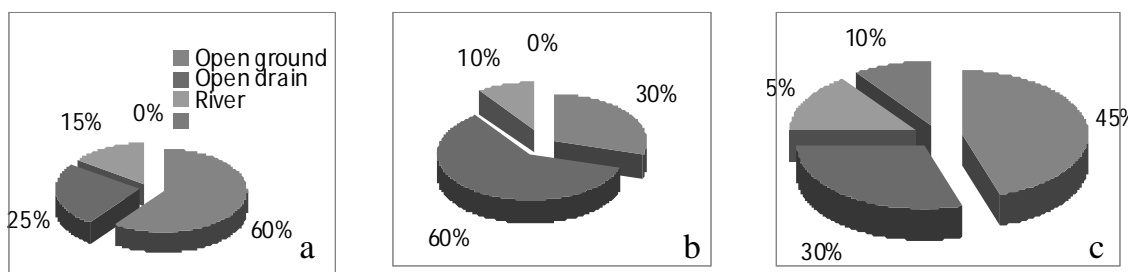


Figure 6. Drainage systems of tube wells (a) with solid waste disposal system at Bilashchara (b) and Lakhaichara (c) tea garden

Conclusion

The existing environmental sanitation condition of tea garden area is very poor. The tea garden people often defecate in open fields, in the bushes near the roads, in the drains or on the riversides. The women folks do not properly wash their hands after defecation and before preparation of food. Proper drainage of waste water; safe, reliable water supply; proper disposal of all human excreta; proper removal of refuse in tea garden area is essential. It is clear that women's participation in sanitation program, community participation in sharing the cost and understanding operation and maintenance, community mobilization for use of safe water and sanitary facilities is indispensable to promote use of safe latrines which should be initiated seriously. Users are advised to locate pit

at least 10 m away from water sources to avoid potential pollution. To avoid any risk of faecal contamination of groundwater, there should be at least 2 m of soil depth between bottom of the pit and the water table surface. The risk of disease transmission should be reduced by using safe water for all purposes i.e. drinking, cleaning of teeth, washing of mouth, hand washing, washing of vegetable and fruits, cleaning of kitchen utensils etc. Due to some limitations we failed to perform the faecal coliform test on surface water sample, which is one of the major drawbacks of this study. Obviously, sustainability of water supply and sanitation system must be considered for achieving good health for all and keep the environment healthy.

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