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The suspended particles/materials arise due to decaying vegetation of swampy areas which exist largely in the form of colloidal suspension.

The dissolved gas found in water supplies consists of air (oxygen and nitrogen), carbon dioxide, hydrogen sulfide and methane. Surface water contains the largest amount of dissolved oxygen and lesser concentration of carbon dioxide and hydrogen sulfide. Methane, carbon dioxide and hydrogen sulfide may occur in significant concentration in ground water.

The soluble organic compound in water supplies is growing daily due to rapid industrial synthesis. The organic pollutants entering water supplies by way of sewage and industrial discharge are surfactants (synthetic detergents), phenol, lignin and tannin.

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2.1 Introduction

The chemical composition of water sample generally consists of four types: soluble minerals dissolved gases, soluble organic compounds and suspended materials.

The list of soluble minerals is extensive. However the common cation in soluble minerals is Calcium, Magnesium and Sodium coupled with the anions bicarbonate, sulfate and chloride.

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related minerals. The organic constituents may be of composed of microorganisms and finely divided animals and vegetables substances of various degrees of complexity.

The removal of the soluble phases from water samples is important for a reliable result. The soluble phases was removed by a commonly approached method such as filtration, centrifugation etc.

2.2 Location of sampling sites.

Keeping in mind the over all objective of the study and the sample to be collected, all possible types of representations of the area, the locations of all the potable water sources were noted by mapping the area using a topo sheet on 1:50000 scale. A large number of spring and well water sources were identified and samples collected seasonally in summer (June-August) and winter (January-March) starting from January 2005 to July 2008 for four continuous years. Samples were collected seasonally from 20-30 locations each for every season from seven districts (Kohima, Dimapur, Mokokchung, Tuensang, Wokha, Lumami under Zunheboto, Tseminyu and Ungma) covering mainly the urban areas of Nagaland.
Map showing the locations of water sources collected for analyses

fig.1. Kohima

fig.2. Dimapur
fig 3. Mokokchung

fig 4. Wokha
fig 5. Tuensang

fig 6. Tseminyu sub-division under Kohima
fig 7. Lumami under Zunheboto
2.3 Methodology for collection of spring and well water samples.

2.3.1 Sampling

The collection of the sample is an important phase of the analyses. A sensible collection of sample technique was observed to guarantee a sample that presents a true picture of the stream or well that is being examined.

The relevant factors for any sampling technique are (a) frequency of sample collection (b) total number of samples (c) size of each sample (d) sites of sample collection (e) method of sample collection (f) data to be collected with each sample, and (g) transportation and care of samples prior to analysis. The collection of representative samples was insured by adequately flushing a service line until the water reaches a constant temperature, before actual collection was attempted. Ground water sample collection was done with prior pumping to obtain a sample that reflects the main body of water. This ensures that the composition of the sample is identical to that of the water body from which it is collected and the samples share the same physiochemical characteristics with the sampled water at the time and site of sampling. Analysis of physiochemical characteristics such as pH, conductivity, temperature, total dissolved substances and dissolved gases of water samples was collected in a clean plastic container of 1L capacity. The entire container was tightly capped and the stopper, whenever necessary was replaced in such a manner so as to entrap as little air as possible.

It was ensured that the samples for analyses of physiochemical characteristics such as pH, temp, electrical conductivity, TDS etc was determined as quickly as possible on the spot, using water quality testing kits (eutech model cyperscan, Singapore) in order
to get an accurate result. In some unavoidable cases, the samples were carefully brought to the laboratory for analysis using pH meter and conductometer.

The water samples under examination was collected seasonally (January-March) and (July-September) every year from various parts of the different districts of Nagaland for four consecutive years i.e 2005-2008.

2.3.2 Preservation of sample

There can be a change in physical and chemical composition when the time and analyses of water sample is prolonged. Some changes are -aluminum, chromium, copper, lead and zinc may be lost through adsorption or ion exchange with the walls of container. Iron and manganese may precipitate as a sediment or dissolve from the turbidity, depending on the redox potential of the sample. Sodium, silica and boron may be leached out of a glass container. Changes in the pH, alkalinity, and carbon dioxide can induce the precipitation of calcium carbonate thereby lowering the values of calcium and total hardness. Microbiological activity can change the nitrate-nitrite-ammonia balance, decrease the phenol content, and reduce sulfate to sulfide. Colour, odor and turbidity may increase, decrease or change in quality. Due to these considerations the analyses of water sample was undertaken within 12-48 hour of collection. However when the analysis was to be postponed for some unstated reason beyond the stated time limits, the sample was pretreated or fixed to preserve the samples.

To preserve the dissolved oxygen balance, the sample was preserved by addition of, in quick succession a 0.7 mL conc. H₂SO₄ and 1 mL NaN₃ (2g per 100ml) well below the liquid surface and the bottle is well stoppered to prevent the access of air.

The trace heavy element was preserved by acidified with conc. HCl to a pH of about 3 to minimize precipitation and adsorption on the wall of the container.
Some pictures of water sources taken for analysis

fig 1. Precious water

fig 2. How safe is this water

fig 3. Unprotected Stream