EIACP NAGALAND

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Editorial

No living thing can survive without water and it is essential for survival. As the global human population grows, so too do the demands for water. At the same time, human activity and climate change are disrupting natural water cycles, putting freshwater ecosystems under pressure. Poor water management, pollution, infrastructure development and resource extraction further aggravate the negative impacts on our freshwater systems.

Water is fundamental to life on our planet, but this precious resource is increasingly in demand and under threat. Ensuring the quality of water is one of the great global challenges of the 21st Century. Clean fresh water is necessary for drinking and sanitation, providing for our crops, livestock and industry, and creating and sustaining the ecosystems on which all life depends on.

Water quality is influenced by natural phenomena. However, most oceans, lakes and rivers are affected sometimes to a dramatic extent by human activity. Water pollution can simply mean the contamination of water sources by substances which make the water unusable for drinking, cooking, cleaning, swimming, and other activities like irrigation etc. Knowing the quality of water becomes an important method. This issue highlights the water quality monitored in four major rivers namely Dhansiri & Chathe at Dimapur, Dzu at Kohima and Milak at Mokokchung, where 18 stations are monitored on a monthly basis for the year 2022.

Water Samples Analysis at Nagaland Pollution Control Board Laboratory

EIACP (Environmental Information, Awareness, Capacity building and livelihood Programme) is a project of the Ministry of Environment Forests and Climate Change, Govt. of India

EDITORIAL TEAM:

INTRODUCTION:

Water is one of the most important and basic natural resources. It is not only one of the most essential commodities of our day-to-day life, but the development of this natural resource also plays a crucial role in economic and social development processes. While the total amount of water available in the world is constant and is generally said to be adequate to meet all the demands of mankind, its quality and distribution over different regions of the world are uneven and cause problems of scarcity and suitability. It is therefore imperative that man develops, uses, and manages this scarce commodity as rationally and efficiently as possible. In order to execute this task, accurate and adequate information must be available about the quality of this natural resource under constantly changing human pressures and natural forces.

Water quality monitoring is one of the first steps required in the rational development and management of water resources. In the field of water quality management, there has been a steady evolution in procedures for designing systems to obtain information on the changes in water quality. The monitoring comprises all activities to obtain information with respect to the water system.

WATER QUALITY:

Water quality is a complex subject, that involves the physical, chemical, hydrological, and biological characteristics of water and their complex and delicate relations. From the user's point of view, the term "water quality" is defined as "those physical, chemical or biological characteristics of water by which the user evaluates the acceptability of water". For example, drinking water should be pure, wholesome, and potable. Similarly, for irrigation dissolved solids and toxicants are important, for outdoor bathing pathogens are important and water quality is controlled accordingly. Textiles, paper, brewing, and dozens of other industries using water, have their specific water quality needs.

What is monitoring?

Monitoring is a process to periodically collect, analyse, and use the information to actively manage performance, maximize positive impacts, and minimize the risk of adverse impacts.

Water Quality Monitoring:

Water quality monitoring is an important aspect of overall water quality management and water resources development. A well-planned and well-managed water quality monitoring system is required to signal, control, or predict changes or trends of changes in the quality of a particular water body so that curative or preventive measures can be taken to restore and maintain ecological balance in the water body. Monitoring is essential for the successful implementation of environmental legislation: to ensure that standards and criteria set by CPCB/SPCBs/PCCs are maintained on a continuing basis.

Water-quality monitoring is used to detect present, continuing, and developing issues, as well as to evaluate compliance with drinking water regulations and safeguard other water-related activities.

Background

- Water Monitoring Day was proclaimed by America's Clean Water Foundation (ACWF) as a global educational outreach program in 2003.

- It points out the importance of water monitoring and an awareness of water pollution issues as well as the problems that come from overusing and misusing water.

Purpose of Water Quality Monitoring:

Monitoring water quality is important in our sea, our rivers, on the surface, and in our ports, for both companies and the public, as it enables us to assess how they are changing, analyze trends, and to inform plans and strategies that improve water quality and ensures that water meets its designated use. There are several indicators determining water quality which include dissolved oxygen, turbidity, bioindicators, nitrates, pH scale, and water temperature. Five major purposes of water quality monitoring are as follows:

- Monitoring water quality helps to identify specific pollutants, certain chemicals, and the source of pollution.
- Identifying trends, short and long term in water quality.
- Environmental planning methods: water pollution, prevention and management.
- Compliance with international standards.
- In emergencies, water quality monitoring is a necessity.

NATIONAL WATER QUALITY MONITORING PROGRAMME (NWMP).

Water quality management is performed under the provision of the Water (Prevention and Control of Pollution) Act, 1974. The National Water Quality Monitoring Programme (NWQMP) facilitates the evaluation of the nature and extent of pollution and the effectiveness of pollution control measures, water quality trends, and prioritization of pollution control efforts. Water quality monitoring is therefore an imperative prerequisite in order to assess the extent of maintenance and restoration of water bodies. The water quality monitoring is performed with the following main objectives: -

- ➢ To assess the nature and extent of pollution control needed in different water bodies or their part
- ➢ To evaluate ate effectiveness of pollution control measures already in existence
- ➢ To evaluate water quality trends over a period of time
- ➢ To assess the assimilative capacity of a water body thereby reducing the cost of pollution control
- ➢ To understand the environmental fate of different pollutants
- ➢ To assess the fitness of water for different uses
- ➢ Rational planning of pollution control strategies and their prioritisation

Water Sampling and analysis at Bangla Fishery

The Nagaland Pollution Control Board in collaboration with the Central Pollution Control Board under the National Water Monitoring Quality Programme (NWMP) monitors 28 stations in Nagaland, comprising 4 major Rivers (18 stations) namely Dzu in

Kohima, Dhansiri & Chathe at Dimapur, and Milak at Mokokchung on a monthly basis and the Groundwater source (10 stations) from Kohima, Dimapur and Peren is monitored on a half-yearly basis (April and October).

The Board follows the Monitoring Protocol as recommended by the Central Pollution Control Board. Apart from field observations, 22 Core and General Parameters (physicochemical) on a monthly basis and an additional 8 parameters of Trace Metals on a half-yearly basis are measured/analysed at the Nagaland Pollution Control Board Laboratory.

Additionally, to provide long-term biological data reflecting the quality of surface waters, biomonitoring has been initiated under NWQMP to assess the health of rivers and streams by evaluating the composition of resident biological communities. It involved monitoring of 3 stations in 3 rivers namely Dzu in Kohima, Dhansiri at Nagaland- Assam border Dimapur, and Chathe at Medziphema, Dimapur in January, April, and October.

Water Sampling and analysis at Dzucha Ru (River) and Dzuna Ru (River)

Water Sample collection and analysis at Dhansiri & Dzucha River

DETAILS OF THE NATIONAL WATER QUALITY MONITORING PROGRAMME (NWMP) STATIONS IN NAGALAND

Sl No	Station Code	District	Type	Latitude	Longitude	Location	Monitoring frequency
1.	1796	Dimapur	R	25°53.21′	93°44.15′	Full Nagarjan, Dimapur	M
2.	1797	Dimapur	R	25°54.77′	93°44.58′	Bridge Near Purana Bazaar, Dimapur	M
3.	1798	Dimapur	R	25°55.66′	93°44.832′	Near Check Gate (Dimapur-Khatkhati Road)	M
4.	1799	Dimapur	R	25°54.22′	93°40.90′	Town Boundary Bridge (Diphu Road) Dimapur	M
5.	1800	Dimapur	R	25°55.28′	93°43.49′	Nuton Bosti, (Naga Cemetery) Nagaland	M
6.	1928	Dimapur	R	25°557.11′	93°45.46′	Nagaland- Assam Border, Dimapur, Nagaland	M
7.	1929	Dimapur	R	25°46.13′	93°49.00′	Chathe at Medziphema, Dimapur, Nagaland	M
8.	1930	Kohima	R	25°39'24.11″	93°11'13.2″	Dzu In Kohima, Nagaland	M
9.	2886	Dimapur	L	25°53.818′	93°45.253′	Pudumpukhuri, Near Nh-29, Dimapur	M
10.	2887	Dimapur	L	25°54.469′	93°45.279′	Bangla Fishery, Dimapur	M
11.	2888	Dimapur	R	25°51.897′	93°46.917′	Chathe River Near CIHSR, Dimapur	M
12.	2889	Kohima	R	25°41.052′	93°02.424′	Dzudza Ru (Hydro) in Kohima, Nagaland	M
13.	2890	Kohima	R	25°42.53′	94°06.09′	Sano Ru (Below New Secretariat) in Kohima	M
14.	2891	Kohima	R	25°39.493′	94°07.814′	Dzucha Ru in Kohima, Nagaland	M

15.	2892	Kohima	R	25°39.494′	94°07.798′	Dzuna Ru in Kohima, Adjoining New Kmc, Swm Site	M
16.	2893	Kohima	R	25°39.517′	94°07.806′	Dzucha Ru (Confluence of Dzucha & Dzuna)	M
17.	2894	Mokok-chung	R	26°39′45.6″	94°39′45.6″	Milak River at Tuli, Mokokchung, Nagaland	M
18.	2895	Mokok-chung	R	26°43′15.0″	94°37′12.4″	Milak River at Paper Nagar, Tuli, Mokokchung	M
19.	2896	Kohima	W	25°40.64′	94°06.91′	Borewell at Kohima Village In Kohima, Nagaland	H
20.	2897	Peren	W	25°4′09.7″	93°32′43.6″	Borewell at Kamdi Bazar, Peren, Nagaland	H
21.	2898	Dimapur	W	25°45′41″	93°36′01.6″	Openwell at Doyapur Dhansiripar, Dimapur	H
22.	2899	Dimapur	W	25°47′11.5″	93°37′35.9″	Borewell at Dhansiripar, Dimapur	H
23.	2900	Dimapur	W	25°52′10.8″	93°44′06.1″	Openwell at Toulazouma Village, Dimapur	H
24.	2901	Dimapur	W	25°52′57.7″	93°44′36.7″	Open Well at Lungwiram Village, Dimapur	H
25.	2902	Dimapur	W	25°52′00.6″	93°42′55.6″	Borewell at Thahekhu Village, Dimapur	H
26.	2903	Dimapur	W	25°53′32.8″	93°42′37.6″	Open Well at Signal Angami Village, Dimapur	H
27.	2904	Dimapur	W	25°55′11.5″	93°43′29.9″	Open Well at Naga Cemetry, Dimapur	H
28.	2905	Dimapur	W	25°53.757′	93°43.203′	Borewell at Signal Point, Dimapur, Nagaland	H

Note : R - River; W - (RING WELL & BORE WELL); L - Lake; M - Monthly; H - Half yearly

Central Pollution Control Board Guideline Values for Classification of Inland Surface Water:

CLASS OF WATER	DESIGNATED BEST USE	CRITERIA
A	Drinking water source without conventional treatment but after disinfection	pH: 6.5 to 8.5 Dissolved Oxygen: 6mg/l or more Biochemical Oxygen Demand: 2mg/l or Total Coliform: 50MPN/100ml
B	Outdoor bathing (Organized)	pH: 6.5 to 8.5 Dissolved Oxygen: 5mg/l or more Biochemical Oxygen Demand: 3mg/l or Total Coliform: 500MPN/100ml
C	Drinking water source with conventional treatment followed by disinfection	pH: 6.5 to 8.5 Dissolved Oxygen: 4mg/l or more Biochemical Oxygen Demand: 3mg/l or Total Coliform: 5000MPN/ml
D	Propagation of wildlife and fisheries	pH: 6.5 to 8.5 Dissolved Oxygen: 4mg/l or more Free Ammonia: 12mg/l
E	Irrigation, industrial cooling and controlled waste disposal	pH: 6 to 8.5 Electrical Conductivity: Max. 2250mhos/cm Sodium Absorption Ratio: Max. 26 Boron: Max. 2mg/l

***MPN – Most Probable Number**


Spot Analysis of river water samples at different locations in Nagaland

NWMP Report showing Average Values of different parameters during the year 2022

Sl No		STATION CODES																	
		Dhansiri River (Nagarjan Dmr)	Dhansiri River (Purana Bazar, Dmr)	Dhansiri River (Kushiabill, Dmr)	Dhansiri River (Diphu Road, Dmr)	Dhansiri River (Lingrijan Bdge, Dmr)	Dhansiri River (Near Khatkhati Dmr)	Chathe River, (Medziphema, Dmr)	Dzu River, Dzu Bridge, Khm	Lake Near NH 29, Dmr	Lake, Bangla Fishery Dmr	Chathe River, Near CIHSR, Dmr	Dzuza Ru, Hydro, Khm	Sano Ru New Secretariat Khm	Dzucha Ru Khm	Dzuna Ru Khm	Dzucha Ru (Confluence)	Milak River Tuli, Molachang	Milak River Paper Nagar, Tuli
	Parameters	1796	1797	1798	1799	1800	1928	1929	1930	2886	2887	2888	2889	2890	2891	2892	2893	2894	2895
1.	Dissolved Oxygen (mg/l)	6.57	6.55	5.87	5.35	2.96	5.83	6.27	5.96	5.3	5.67	6.37	6.85	6.56	6.48	6.31	6.22	6.36	6.55
2.	pH	7.68	7.68	7.5	7.6	7.47	7.35	7.75	8.23	7.1	7.35	7.5	7.76	7.91	7.95	7.85	7.63	7.93	7.85
3.	Conductivity (µS/cm)	163.2	176.2	182.8	154.1	203.7	13	134.5	352.3	106	149.7	122.6	103.3	507.2	182.1	205.6	225.8	127.2	115.8
4.	BOD (mg/l)	1.75	2.22	2.28	1.58	5.01	2.82	2.16	2.33	2.16	2.14	1.94	1.43	2.4	1.62	1.51	1.76	1.35	1.51
5.	Nitrate-Nitrogen (mg/l)	0.78	0.68	0.71	0.86	1.03	0.78	0.90	1.13	1.45	0.82	0.71	1.02	2.01	0.99	1.63	2.17	0.91	0.63
6.	Turbidity (NTU)	43.06	41.95	4.35	62	45.73	48.28	91.03	19.93	8.39	4.49	37.13	34.04	15.61	6	6.39	5.88	10	7.58
7.	Phenolphthalein Alkalinity (mg/l)	1.58	1.5	2	1.83	0	2	0.66	10.33	0.33	0.33	0	0.66	7.83	0	0	0	0	0.33
8.	Total Alkalinity (mg/l)	90.67	108.7	92	100.8	104.3	93.67	66.5	135.2	65	72.17	61	60.75	149	60.92	74.17	65.75	49.83	52.58
9.	Chloride (mg/l)	4.32	5.34	7.32	6.42	11.83	8.98	3.86	8.04	6.78	9.36	4.3	2.68	12.1	4.78	4.08	4.72	2.4	2.54
10.	Chemical Oxygen Demand (mg/l)	46.67	41.83	34.08	28.33	55.42	36.08	35.33	36.5	40.83	35.33	31.5	28.5	36.58	21.25	21.25	23.17	17.92	18.25
11.	Ammonia Nitrogen (mg/l)	0.16	0.66	0.29	0.17	1.88	0.35	0.08	0.30	0.10	0.06	0.17	0.18	0.70	0.09	0.11	0.12	0.11	0.12
12.	Total Hardness (mg/l)	81	83	75	66.17	70.67	68.33	58	147.3	53.83	60.17	58	52.5	145.8	84.5	72.5	64.33	64.17	63.67
13.	Calcium Hardness (mg/l)	37	40.5	43.17	32.83	40.5	39	27.5	84.17	22	29.17	28	23.5	90	45.83	34	36.5	35.83	38
14.	Magnesium Hardness (mg/l)	10.74	10.45	7.86	7.84	7.60	7.14	7.36	15.6	7.76	7.56	7.32	7.07	13.62	9.42	9.38	6.45	7.05	6.34
15.	Sulphate (mg/l)	19.73	22	23.13	23.91	24.69	22.48	25.07	31.88	16.58	14.8	23.39	24.61	27	31.86	28.47	29.71	17.81	16.48
16.	Total Dissolved Solids (mg/l)	81.68	87.6	91.21	76.89	101.7	91.29	67	172.4	53.21	74.29	58.35	52.01	246.3	90.97	102.6	121.2	59.51	57.84
17.	Total Suspended Solids(mg/l)	0.18	0.17	0.16	0.14	0.18	0.16	0.21	0.09	0.11	0.10	0.15	0.17	0.2	0.09	0.08	0.07	0.07	0.07
18.	Phosphate (mg/l)	0.33	0.2	0.17	0.24	0.30	0.22	0.34	0.08	0.42	0.26	0.19	0.33	0.16	0.14	0.06	0.05	0.09	0.21
19.	Boron (mg/l)	0.04	0.04	0.04	0.06	0.04	0.04	0.08	0.04	0.04	0.03	0.04	0.04	0.04	0.02	0.03	0.03	0.03	0.03
20.	Potassium (mg/l)	4.3	5.04	4.4	3.8	8.34	4.3	3.09	3.76	6.21	7.65	4.26	3.2	6.35	2.5	2.8	3.03	3.66	3.73
21.	Fluoride (mg/l)	0.10	0.10	0.13	0.21	0.22	0.14	0.21	0.16	0.15	0.019	0.11	0.22	0.11	0.07	0.07	0.08	0.08	0.11
22.	Cadmium (mg/l)	0.02	0.02	0.008	0.009	0.04	0.01	0.02	0.007	0.02	0.009	0.02	0.02	0.01	0.009	0	0	0	0
23.	Copper (mg/l)	0.16	0.2	0.07	0.12	0.28	0.14	0.09	0.28	0.27	0.26	0.14	0.2	0.57	0.06	0.04	0.03	0.01	0.01
24.	Chromium (mg/l)	0.06	0.05	0.03	0.05	0.15	0.03	0.01	0	0	0	0	0	0	0	0	0	0	0
25.	Nickel (mg/l)	0.31	0.48	0.23	0.16	0.75	0.13	0.12	0.04	0.04	0.02	0.05	0.03	0.04	0.03	0.02	0.03	0.01	0.01
26.	Zinc (mg/l)	0.6	0.5	0.5	0.2	0.26	0.55	0.28	0.64	0.17	0.17	0.18	0.14	0.36	0.25	0.09	0.06	0.16	0.17
27.	Iron (mg/l)	0.78	0.75	0.86	3.2	1.65	0.55	0.23	0.20	0.33	0.26	0.6	0.18	0.28	0.25	0.26	0.18	0.12	0.17
28.	Arsenic (mg/l)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

The water quality monitoring data have been analyzed with respect to indicators of the Biochemical Oxygen Demand (BOD). It is one of the most common measures of pollutant organic material in water. The BOD measures the oxygen consumed by microorganisms in the oxidation of organic matter under a specified incubation period. The BOD measures the oxygen consumed by microorganisms in the oxidation of organic matter under a specified incubation period. At Station 1800, Naga Cemetery in Dimapur the highest BOD was reported at 5.01mg/l while the least was analyzed as 1.35mg/l at Station 2894, Milak River in Mokokchung. As stated by the designated best use, BOD should be below 3mg/l however, the discharge of domestic wastewater/sewage mostly in untreated form and the municipal waste thrown directly into the water bodies/nullahs/drains has been identified as a prime source for this contaminates. The other reason for high BOD level may be due to increased runoff from urban, and agricultural fields and decay of organic matter.

Dissolved Oxygen (DO) is the amount present in the water in the dissolved form. It is the basis of the BOD test which is an important parameter to evaluate the pollution potential of wastes. In the same nullah/drain at Naga Cemetery, Dimapur the DO level was found low on an average of 2.96mg/l during 2022. As indicated by the designated best use, DO should be above 4mg/l and contrasting from station 1800 all the monitoring station was recorded above the prescribed standards.

The importance of Waste Water Treatment:

Wastewater is used water. It includes substances such as human waste, food scraps, oils, soaps and chemicals. In homes, this includes water from sinks, showers, bathtubs, toilets, washing machines and dishwashers. Businesses and industries also contribute their share of used water that must be cleaned. Wastewater treatment, also called sewage treatment, is the removal of impurities from wastewater, or sewage before it reaches aquifers or natural bodies of water such as rivers, lakes, estuaries, and oceans. The major aim of wastewater treatment is to remove as much of the suspended solids as possible before the remaining water, called effluent, is discharged back into the environment. The treatment process takes place in a Waste Water Treatment Plant (WWTP), also referred to as a Water Resource Recovery Facility (WRRF) or Sewage Treatment Plant (STP) in the case of domestic wastewater. Pollutants in wastewater are removed, converted or broken down during the treatment process. A by-product of sewage sludge which has to undergo further treatment before being suitable for disposal or application to land.

Treating wastewater is a matter of caring for our environment and for our own health. There are a lot of good reasons why keeping our water clean is an important priority because if it is not clean water, it can carry diseases and harmful bacteria which may have adverse effects on all living organisms and have to be removed to make water safe for all. Clean water in fisheries is critical to plants and animals that live in water. It is critical for wildlife habitats that depend on the shoreline, beaches, and marshes of water bodies, along with migratory water birds that use the water areas for resting and feeding. Therefore, it is important to treat wastewater before it is discharged into natural water bodies like rivers, lakes, ponds etc.

INTERNATIONAL DAY OF CLEAN AIR FOR BLUE SKIES, 7TH SEPTEMBER 2023:

The International Day of Clean Air for Blue Skies is observed annually on 7th September. This day is celebrated in recognition of the fact that clean air is important for the health and day-to-day lives of people. Air pollution is one of the greatest environmental risks to human health and one of the avoidable causes of death and disease globally. Air pollution disproportionately affects women, children, and older persons, and also has a negative impact on ecosystems.

The theme for the International Day of Clean Air for Blue Skies, "Together for Clean Air", highlights the urgent need for stronger partnerships, increased investment, and shared responsibility for overcoming air pollution. Air pollution, indoors and outdoors directly impacts human and ecosystem health. According to WHO, 99% of the global population breathes polluted air.

On 8th September 2023, the Nagaland Pollution Control Board (NPCB) in collaboration with the North East Institute of Social Sciences & Research (NEISSR), organized a workshop on Waste Management & Mission LiFE in commemoration of International Day of Clean Air for Blue Skies.

The programme was chaired by Er. Kevisede Pucho, Asst. Environmental Engineer, NPCB, Welcome address was shared by Fr. Lawrence Khing, Vice Principal, NEISSR and a keynote address was delivered by Er. Aghali A. Swu, Environmental Engineer, NPCB.

Students and faculties of NEISSR along with the Officials and Staff of the Nagaland Pollution Control Board

Er. Kevisede Pucho,
Asst. Environmental Engineer, NPCB

Fr. Lawrence Khing,
Vice Principal, NEISSR

Er. Aghali A. Swu,
Environmental Engineer, NPCB

Ms. Khriehunuo Rutsa,
Programme Officer, EIACP

Ms. Mvudzeviu Shuya,
Scientist 'B', NPCB

Ms. Lashikali Chishi,
Information Officer, EIACP

Technical sessions on different topics such as "Solid Waste Management", "Plastic and E-Waste Management" and "Mission LiFE" was presented by Ms. Khriehunuo Rutsa, Programme Officer, EIACP, Ms. Mvudzeviu Shuya, Scientist 'B' and Ms. Lashikali Chishi, Information Officer, EIACP, Nagaland Pollution Control Board respectively.

The programme concluded by undertaking a Mission LiFE and an hour of discussion and interactions with students and faculties.

Discussion and interaction hour

<u>All queries and feedback regarding this newsletter can be sent to</u>:

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