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Chapter 16

Assessment of Surface Water Quality of Raniganj Community Development (CD) Block, Asansol Sub-Division, Burdwan District, West Bengal

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ABSTRACT

In developing countries like India, availability and quality of surface water is one of the main issues. Present study aimed to assess and compare the surface water quality. Water samples were collected during post-monsoon season from major ponds, situated at major residential areas of six gram panchayets under Raniganj Community Development (CD) Block for their physico-chemical analysis *viz.*, color, pH, temperature, turbidity, Electrical Conductivity (EC), TDS, total hardness, total alkalinity and to assess the microbiological quality *viz.*, MPN, and *E. Coli* in order to identify the contamination problems and suggest appropriate solutions. Color of the samples in pond water is slightly grey in appearance are highly turbid in nature which may due to contamination of water by the pollutants. pH in all samples are within the minimum and maximum tolerable limits. The parameters like alkalinity, TDS, turbidity, and total hardness contents in some samples are alarming. The EC of almost all samples are beyond the acceptable limits. MPN values were found excessively high and in two samples, *E.coli* was found.

Keywords: Surface water, Physico-chemical analysis, Microbiological quality

Introduction:

Water is the most vital resources for all kinds of life on the earth and essential for the sustainability of the earth's ecosystem. Fresh water resources which is prime natural resource a basic human need and a precious natural a set are used for various purposes, *viz.*, household, agricultural, recreational, and environmental activities. In developing countries like India, inadequate water supply is still one of the major challenges. Tyagi *et al.* (2013) and Jain *et al.* (2010) reported that about 90% of the rural population depends for their regular water demand upon the surface water sources. Shivaprasad *et al.* (2014) mentioned that there has been a remarkable enhance in the demand for fresh water in the last few decades may due to rapid growth of population and the accelerated rate of industrialization. Asansol subdivision contains 4 community development blocks, namely, Barabani, Jamuria, Salanpur, and Raniganj. Raniganj block which is located 99 km from Bardhaman, the district headquarters; consists of six gram panchayats, *viz.*, Amrasota, Egra, Ratibati, Ballavpur, Jemeri and Tirat. The present study has been conducted to determine the concentration of physico-chemical constituents and microbiological status of drinking water

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Chapter 18

Assessment of Heavy Metal Pollution in Surface Water of Ajay River, West Bengal

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ABSTRACT

In the aquatic environment, heavy metal contamination has attracted global interest due to its great quantity, persistence and their toxicity. It is regarded as a global crisis with a great share in countries like India. This study aims to investigate the spatial and seasonal variations in concentration of heavy metals in the surface water of Ajay River. Surface water samples from Ajay River of West Bengal were collected for two seasons, winter and summer of 2015-2016 to examine the concentration of eight heavy metals, *viz.*, Cadmium, Chromium, Copper, Iron, Lead, Manganese, Nickel, and Zinc using Atomic Absorption Spectrophotometry as per APHA (2005) guideline. For this study, four sites were selected along Ajay River, out of which two stations are situated within Burdwan district and other two stations are under Birbhum district. The maximum mean concentration of Fe (175.967 µg/l) was observed in summer, Mn (85.655 µg/l) in winter. Cd (16.545 µg/l) and Cr (921.855 µg/l) exhibited their maximum during the winter season. The concentration levels of certain heavy metals *viz.*, Cd, Cr, Pb, Ni are alarmingly high in all the considered sampling stations.

Keywords: Ajay River, Heavy metal, Spatial variations, and Seasonal variations

Introduction:

Pollution is continuously becoming a serious problem due to continuous increase of demographic and urbanized expansion and the increased weight for inhabitants of the cities. Rivers in urban areas play an important role in carrying of manure discharges and runoff from agricultural fields and streets, industrial and municipal wastewater, which are responsible for river pollution (Samarghandi *et al.*, 2007; Al Obaidy *et al.*, 2010). Among the inorganic contaminants of the river water, heavy metals are getting importance for their non-degradable nature and often accumulate through tropic level causing a deleterious biological effect (Jain, 1978). Heavy metals are inorganic elements essential for plant growth in traces or very minute quantities. They are toxic and poisonous in relatively higher concentrations (Kar *et al.*, 2008). They can cause danger to human health by being integrated in the food chain (Wogu and Okaka, 2011). The significant sources of heavy metals in the urban areas that negatively influence the environment are few natural processes and mainly anthropogenic activities (Vanek *et al.*, 2005). Human activities have led to accumulation of toxic metals in the natural environment (Karbassi and Bayati, 2005) and the extensive exploitation of natural resources has led to increased pressure on aquatic ecosystems (Brraich and Jangu, 2015). Anthropogenic activities like mining, ultimate disposal of treated and untreated waste effluents

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Chapter 21

Characterization of Microbial Diversity in Different Soil Conditions of Purulia District, W. B.

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ABSTRACT

Microbes account for most of the diversity of life on our planet. There are several kinds of microbes than plants, vertebrates and insects combined. Microbes have been around for billions of years. They have adapted to nearly every environment on earth and can just eat anything including metal, acids, petroleum, and natural gas all of which are toxic to us. The Convention on Biological Diversity (CBD) defined the soil biodiversity as the variation in soil life, from genes to communities, and the ecological complexes of which they are part *i.e.*, from soil microhabitats to landscapes. Soil organisms are extremely variegated in terms of morphology, quantity and life style. Present study aims to investigate the microbial diversity in different soil conditions of Purulia district, West Bengal mainly by two methods *viz.*, the direct observation and counting, and the functional assays which include different biochemical techniques. For this study four different soil samples (S1, S2, S3, and S4) from four different sites were selected and their physical characteristics were recorded followed by serial dilution (up to 10^{-13}) and plating on Nutrient Agar plates. Colony characteristics study along with microscopic observation of the growing colonies was performed followed by different biochemical techniques like oxidase test, catalase test, and MRVP (Methyl Red-Voges Prausker) test. All the isolated soil bacteria showed MR +ve and V. P. –ve except those contained in 10^{-13} dilution of S1; 10^{-11} and 10^{-13} dilution of S2; 10^{-9} and 10^{-13} dilution of S3; and 10^{-5}, 10^{-7}, 10^{-13} dilution of S4 thereby indicated the diversifying nature of microbes in soil.

Keywords: CBD, MRVP, Catalase, Serial Dilution, Oxidase

Introduction:

The convention on Biological Diversity (CBD) defined the soil biodiversity as the "variation in soil life, from genes to communities, and the ecological complexes of which they are part i.e. from soil microhabitats to landscapes". In other terms, the soil biodiversity represents the variety of life below ground. The concept is conventionally used in a genetic sense and denotes the number of distinct species (richness) and their proportional abundance (evenness) present in a system, but may be extended to encompass phenotypic, functional, structural or trophical diversity. The total biomass below ground generally equals or exceeds that above ground, while the biodiversity in the soil always exceeds that on the associated surface by orders of magnitude, particularly at the microbial scale. A tea-spoon of soil (about one gram) may typically contain billions of bacterial cells (corresponding about ten thousand different bacterial genomes), upto one million individual fungi,

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Evolution of fluctuation and thermal phase transition in nuclei

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The quantum phase transition refers to an abrupt change in the state of a many-body system at zero temperature (T) induced by variation of a non-thermal control parameter. In atomic nuclei, it is connected with the shape transition from spherical to deformed or from axially deformed to nonaxially deformed shapes [1]. Interestingly, the ground state deformation of the nuclei, owing to shell effects, can also be altered by increasing the excitation energy. The thermal excitations weaken the shell effects and act in the direction of decreasing the equilibrium deformation leading to a thermal phase transition from deformed to spherical shape [2]. However, the central issue for a finite system at finite temperature has been the thermal fluctuations present in almost all realms of physics. In the case of atomic nuclei, these fluctuations lead to an average shape which may be completely different from the equilibrium shape. The theoretical calculations based on finite-temperature mean-field theory have been employed to study the nuclear shape transition. These calculations often predict sharp phase transitions at finite temperature even though the sharp phase transition is expected to be washed out due to statistical fluctuations [3] since the nucleus is a finite system. In this scenario, whether the T-driven shape transition will be evident experimentally, still remains an open question. One of the experimental probes to study the shapes and fluctuations of hot nuclei is the giant dipole resonance (GDR) [4, 5]. The GDR strongly couples with the nuclear shape degrees of freedom and hence, in the case of deformation it splits into different components providing direct information about the nuclear deformation. Thus, in order to investigate the long standing question, the thermal phase transition in atomic nuclei, from prolate deformed shape to spherical shape, was studied experimentally by measuring the γ rays from the decay of the GDR in ^{169}Tm ($\beta = 0.3$).

The ^{169}Tm compound nucleus was populated through the reaction ^{4}He + ^{165}Ho at four beam energies 32, 37, 42 and 50 MeV by using the K-130 room temperature cyclotron. The high-energy GDR γ rays were detected at 90° and 125° angles with respect to the incident beam direction by employing the LAMBDA spectrometer [6], arranged in a 7 × 7 matrix, at a distance of 50 cm. The 50-element low-energy γ multiplicity filter [7] was used to estimate the angular momentum (J) populated in the compound nucleus. The filter was split into two blocks of 25 detectors and was placed on the top and the bottom of the scattering chamber. A master trigger was generated when at least one detector each from the top and bottom blocks fired together in coincidence with a high-energy γ ray (> 5 MeV) measured in any of the large detectors in the LAMBDA array. This ensured a selection of high-energy photons from the higher part of the spin distribution free from background. The neutron and the pile-up events in the LAMBDA spectrometer were rejected by time of flight and pulse shape discrimination techniques, respectively.

The high-energy γ ray spectra measured at different beam energies are shown in Fig. 1. It is very interesting to find that the two components of the GDR (around 12 and 16 MeV) are directly visible in the high-energy spectrum at 32 MeV beam energy indicating a large deformation independent of any model. The GDR parameters at different beam energies were obtained by comparing the experimental data with the statistical model calculations (CASCADE). Recently, the collective enhancement effect on the nuclear level density was studied in the same reaction at two beam energies of 28 and 40 MeV [8]. Hence, the same enhanced level densities,

Alokkumar De

Contrary to the increase in knowledge cancer mediated deaths are mounting day by day. Common types that are instrumental in cancer mediated deaths are of lung, liver, colorectal, stomach and breast origin. Conventional treatment strategies like surgery, chemotherapy, radiation therapy, hormone therapy and immunotherapy are proving insufficient to curb and cure cancer. Moreover, these are associated with severe side effects. Newly proposed cancer stem cell theories also have made the treatment more critical. To overcome such alarming situations phytochemicals are being proposed and proven to be an alternative to conventional therapies having minimal or no side effects. From the pool of natural plant defensive thousands of phytochemicals few have been extensively studied and proven to be anticancerous. Among them plant derived glucosides, alkaloids, terpenoids, polyphenols, lignins, sterols, curcuminoids and saponins are significant. They disrupt cancer related cellular signalling pathways finally leading to cancer cell death. They hardly exert any harmful effect to human health. They are effective to all types of cancer and preventive if consumed daily as diet.

Umesh Chandra Halder

Phytopharmaceuticals to Treat and Prevent Cancer

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