Biodiversity Congress 2017: Biomonitoring of selected freshwater bodies using diatoms as ecological indicators

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Abstract

Lakes supply water for irrigation, drinking, fisheries, etc., and thus have significant economic and recreational value. In limnetic ecosystem, water quality is influenced by physical, chemical and biological factors. Freshwater communities are considerably sensitive to environmental variables. The algal flora constitutes a vital link in the food chain and its productivity depends on water quality at a given time. Diatoms, especially are of utmost importance, as they're the potential indicators of water quality thanks to their sensitivity and powerful response to several physical, chemical and biological changes. Occurrence of diatom communities in selected water bodies of Goa along side physico-chemical parameters are studied for a period of two consecutive years and therefore the data has been used in bio-monitoring. Using OMNIDIA GB 5.3 software, Louis Leclercq IDSE/5 index springs and therefore the level of degradation thanks to organic and antropogenic pollution has been acknowledged . Findings showed differences due to the season in physico chemical parameters and diatom population. The decent variety of diatoms was extensively high in Syngenta, Lotus and Curtorim lakes when contrasted with Khandola lake. Gomphonema parabolum, Navicula halophila, Navicula microcephala, Navicula mutica were showing natural contamination in all water bodies. Amphora ovalis, Stauroneis phoenicenteron, Synedra ulna were showing antropogenic contamination at Syngenta, Lotus and Curtorim lakes while Navicula rhynococephala was demonstrating antropogenic contamination at Khandola lake. Biomonitoring has been demonstrated to be fundamental and consequently the significance of diatoms as biological markers of water quality has been focused.

Freshwater people group are a lot of touchy to ecological varieties . Phytoplankton elements impact trophic levels and movability of water for human employments. Monitoring of water quality with regards to physical and chemical parameters reflects instantaneous measurements while, biotic parameters developed during the recent years have served as a superb tool in the area of

pollution studies and provides better evaluation of environmental changes [4]. Diatoms are potential indicators of water quality due to their sensitivity and strong response to physico-chemical and biological changes .Juttner et al. studied environmental changes using diatom assemblages, relationship between diatoms and therefore the water chemistry parameters. According to him fluctuation of diatom species to varied environmental changes are often early warning towards freshwater ecological problems. Their sensitivity to small changes in water quality makes them powerful indicators. Several studies on diatoms as bioindicators of pollution are administered earlier. Biological monitoring is a fast and cost-effective approach for assessing the effects of environmental stressors, making it an essential tool . Various indices are developed for monitoring pollution in water bodies. One of the only and effective water quality index, utilizing diatom population is IDSE/5-the index of Saprobity-Eutrophication. This index is obtained from the OMNIDA GB 5.3 software which indicates the standard of water in terms of organic pollution also as anthropogenic eutrophication. The design of OMNIDA Software for computation of diatom indices has facilitated the utilization of diatom based biomonitoring. The software may be a comprehensive data base having an inbuilt ecological data for 13,000 diatom species. Present study discusses diatoms as indicators of water quality of selected water bodies using Louis-Leclercq Diatomic Index of Saprobity-Eutrophication (IDSE/5) and therefore the quality of water in terms of organic pollution as well as anthropogenic eutrophication.

Two water bodies each from North Goa (Syngenta Lake and Khandola Pond) and South Goa (Lotus Lake and Curtorim Lake) were selected for the study from January 2014 to December 2015 on monthly basis. Water samples were collected within the early hours as daily vertical migrations of organisms occur in response to sunlight and nutrient concentrations from the surface near the landward margins. Physicochemical parameters such as pH, temperature, nitrates and phosphates were analysed using standard procedures [15]. For phytoplankton study one litre of water sample was collected in sterile plastic bottles (three replicates were taken) and Lugol's solution (0.7 mL/100 mL of sample) added immediately for sedimentation. The bottles were subsequently left undisturbed for 24 h. The phytoplankton fixed and settled at the bottom of the containers after decanting the supernatant fluid were collected and preserved in bottles containing 4% formaldehyde. Identification of diatoms was finished by altered Lackey's drop technique. Measurements were estimated utilizing micrometry strategy and

photomicrographs were taken utilizing Nikon DS Fi 2 camera. Various taxonomic guides were consulted [17-20]. Each taxon was codedwith acronyms as per the rules of OMNIDA GB 5.3 software. Diatom species counts were entered into diatom database and index calculation tool, OMNIDIA version 5.3. The output of the software provides many metrics of water quality through the indices and ecological characteristics. The Louis Leclercq IDSE/5 index was calculated through this software. Seven biological marker esteems given by Van Dam et al. were determined for chosen water bodies utilizing the OMNIDIA GB 5.3 programming and were utilized for understanding of results. These qualities show the conditions required for development and endurance of diatoms. These incorporate pH, saltiness (H), nitrogen uptake (NU), oxygen requirements (OR), saprobity (SP), trophic state (TS) and dampness (M) and furthermore decide the water quality. Each parameter is measured on a scale of 1-7. OMNIDIA is additionally wont to compute degradation (D) using IDSE/5 Louis Leclercq index for organic pollution (OP) and anthropogenic eutrophication (AE).Syngenta Lake is within the premises of M/s Syngenta Agro Chemicals at Corlim Tiswadi taluka located on the banks of Cumbarjua canal. Khandola pond is situated between 15.50N Latitude 73.90E Longitude of Marcela. It is a source of irrigation to areca nut plantation in surrounding areas. Lotus Lake is situated between 15.20N Latitude and 73.90E Longitude, Lake is polluted and has abundant growth of aquatic weeds. Curtorim lake is Situated between 15.20N Latitude and 74.00E Longitude. All four water bodies differ in dimensions, size, nutrients concentration, nature of aquatic life, usage and level of human disturbance. From the results it is concluded that there deterioration of water quality of the water bodies undertaken for the study.