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ORIGINAL ARTICLE

Physico-Chemical Analysis of Soil and Water Wetland in Bhuj  
Taluka of Kachchh Region

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ABSTRACT

Human impact on wetland ecology is always major factor of any type of disturbance in wetland. Threats to rice fields mainly stem from inappropriate water management, introduction of invasive alien species, agricultural fertilizers, pesticides, and land use changes are also affected factors on the biodiversity of wetland ecosystems. Because of human Pressure on the wetland of Bhuj taluka these wetlands are majority affected and polluted by the human activities in or surround to the wetland area. There is also the responsibility of public that save wetland and make them clean and beautiful by save them from the pollutants In this paper, we examined the Physico-chemical properties of soil and water Wetlands in bhuj taluka of kachch region. The soil and water collected from different wetland area during February to march 2016 and analysis of physico-chemical characteristics .The various physico-chemical parameters such as pH, Electrical Conductivity, Calcium, Magnesium , Total Hardness ,Potassium, Sodium, chloride, Texture, COD, BOD, DO, Total organic carbon TDS,TSS,TS were analyzed.

**KeyWord:**-Physico-chemical analysis, Wetland, Agricultural, Fertilizers, Biodiversity, BOD, COD

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INTRODUCTION

The word "wetland" come use in mid-20th century, and the first time use of this word in the publication "Wetlands of the United States [1]. Before this wetlands were referred by many common terms such as swamp, marsh etc. that developed in the 19th century and before. However wetland share a few attributes common to all forms, i.e. Hydrological structure the dynamics of water supply, throughput, storage and loss is most fundamental to the nature of a wetland system. Wetlands are the most important ecosystem on the earth. It is one of the crucial natural resources.

Wetlands are also known as "the kidneys of the landscape" and "ecological supermarkets". Inland wetland in others term provide food, water resources, sustain biota, give aesthetic view and allows vegetation propagation. They provide habitat for animals and plants and many contain a wide diversity of life, supporting plants and animals that are important part of food chain.

Forested wetlands are generally known as swamps. The upper level of these swamps is determined by high water levels, which are negatively affected by dams. Some swamps can be dominated by a single species, such as silver maple swamps around the Great Lakes. Others, like those of the Amazon Basin, have large numbers of different tree species. Examples include cypress (Taxodium) and mangrove. Fish are more dependent on wetland ecosystems than any other type of habitat. 75% of the United States' commercial fish and shellfish stocks depend solely on estuaries to survive [5].

Most nutrients, such as sulfur, phosphorus, carbon, and nitrogen are found within the soil of wetlands [2]. Biogeochemical processes in wetlands are determined by soils with low redox potential. Wetland soils are identified by redoxymorphic mottles or low Chroma, as determined by the Munsell Color System.

Submerged wetland vegetation can grow in saline and fresh-water conditions. Some species have underwater flowers, while others have long stems to allow the flowers to reach the surface.

Diversity of flora and fauna is high in the wetlands of Gujarat. A total of 3, 23 species of wetlands of India are endemic or globally threatened, and at least 30 of them are from Gujarat. Of 114 endemic wetland plants of India, 11 are found in the wetlands of Gujarat.

The paper elaborates the habitat diversity of wetlands in Gujarat, India, the floral and faunal diversity of each ecosystem, the major industrial and development pressures posed by the mangroves and coastal ecosystems. Thus indicates the significance and necessity for wetland habitat conservation.

**MATERIALS AND METHODS**

**Preparation of soil sample:** - Allow the soil samples to air dry for 4-5days.crush the soil samples and sieve them. Take 100gm sieved soil sample and add 200ml distilled water into it. Keep that sample in shaker for 24hrs.After 24hrs filter the samples and using them for analyzing the physico-chemical characterization.

**Methods for water sample collection:** - Samples intended for chemical analysis must be collected during normal operating hours, 15 to 30 cm below the surface of the water or, where a reservoir is less than 30 cm deep, halfway between the surface of the water and bottom of the reservoir. For the collection of sample from surface a plastic, bucket, jug, or bottle (glass or polyethylene) may be used. Sample from the bottom of shallow water can be collected by lowering a closed glass or polyethylene bottle to the bottom, opening and closing it there by hands, and taking it out. Collection of water sample for analysis is taken from three random micro sites from one major site.

a).Method for collection of DO, BOD: - Collect surface water samples in narrow- mouth glass stopper BOD bottles of 300mL capacity with tapered and pointed ground- glass stoppers and flared mouths .Avoid entering or dissolving atmospheric oxygen. In sampling from a line under pressure, attach a glass or rubber tube to the tap and extend to bottom of bottle. Let bottle overflow two or three times its volume and replace stopper so that no air bubbles are entrained.

**Physico-chemical Analysis:** pH, Electrical conductivity , Soil Texture , Total Organic Carbon Cl-, Total Hardness, Total Solids, TDS (Total Dissolved Solids), Total Suspended Solids, BOD, COD methods adopted from Saxena [3] and Nollet [4].

**SELCTION OF STUDY AREAS**

Ratnal Lake, Kukma Lake Kukma Om Temple Lake, Rudramata dam, Desalsar Lake, Vandhay Lake, Kodki Lake, Mirzapar, Dahisara selected for study.

**RESULT AND DISCUSSION**

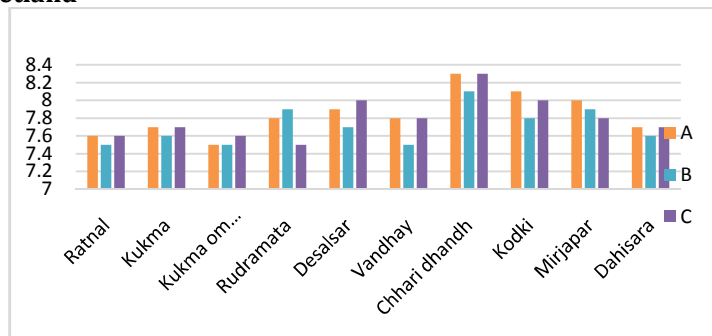
**Physico-chemical parameters of Soil & water of wetland**

The soil and water collected from different wetland area during February to March 2016 and analysis of physico-chemical characteristics .The various physico-chemical parameters such as pH, Electrical Conductivity, Calcium, Magnesium , Total Hardness ,Potassium, Sodium, chloride, Texture, COD, BOD, DO, Total organic carbon TDS,TSS,TS were analyzed.

**Physico-chemical parameters of Soil wetland**

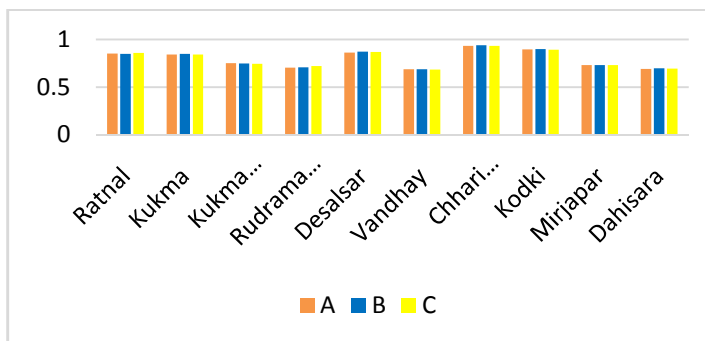
**pH**

The Average result of ph values in different wetlands of bhujtaluka is 7.7.The highest ph value recorded in chharidhandh wetland is 8.2. The minimum value of ph is recorded in kukmaom Temple Lake is 7.5 [Fig.1]



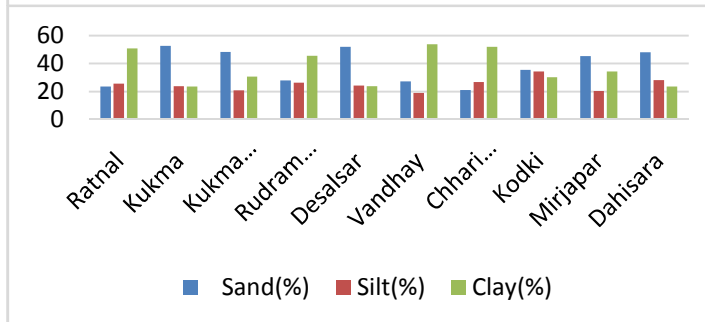
**Electrical conductivity (µs)**

The Average result of EC values in different wetlands of bhujtaluka is 0.796µs/cm. The Maximum EC value recorded in chharidhandh wetland is 0.93µs/cm. The minimum value of EC is recorded in Rudramata is 0.71µs/cm. [Fig 2]



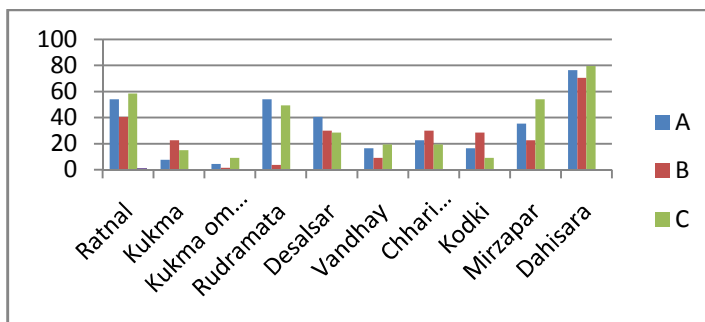
**Soil Texture**

The soil texture of bhujtaluka wetland are Average 38.143% of sand, 24.982% silt, and 36.875% clay Present in surround area of wetland. The highest percentage of silt content recorded 34.26% in Kodki and low percentage of soil silt content showed 19.03% in Vandhay lake. The minimum and maximum clay in Vandhay Lake & Desalsar Lake is 53.77% & 23.65% respectively. The maximum sand content showed 52.6 in Kukma Lake. The minimum sand content showed 21.07% in chharidhandh. Here, the soil samples recorded clay > sand > silt. [Fig3]



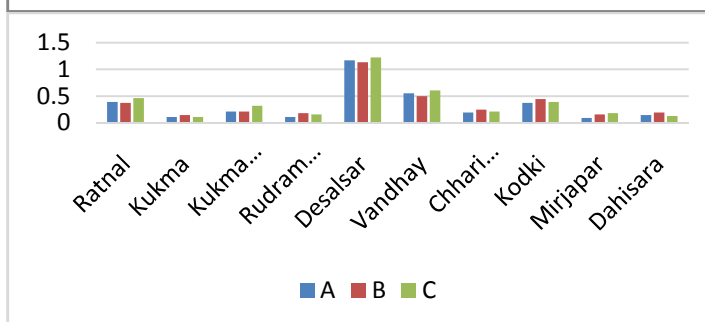
**Total Organic carbon (mg/l)**

The Average result of Total Organic Carbon Present in different wetlands of Bhujtaluka is 32 mg/l. The highest Total Organic Carbon Present in Dahisara Lake is 75 mg/l. The minimum Total Organic Carbon Present in Kukma Om Temple Lake is 9.5 mg/l. [Fig 4]



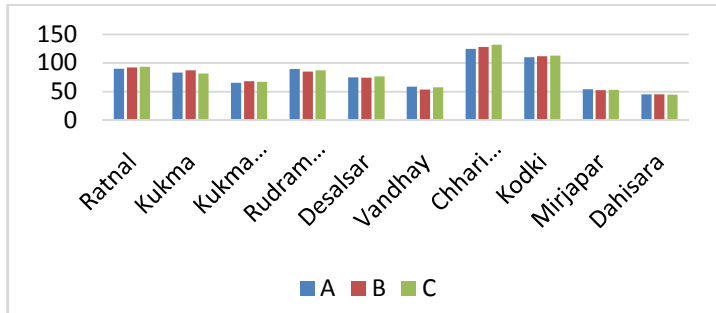
**Chloride (mg/l)**

The Average result of Chloride values in different wetlands of bhujtaluka is 0.356 mg/l. The highest Chloride value recorded in Desalsar Lake is 1.117 mg/l. The minimum value of Chloride is recorded in kukma Lake is 0.118 mg/l. [Fig 5]



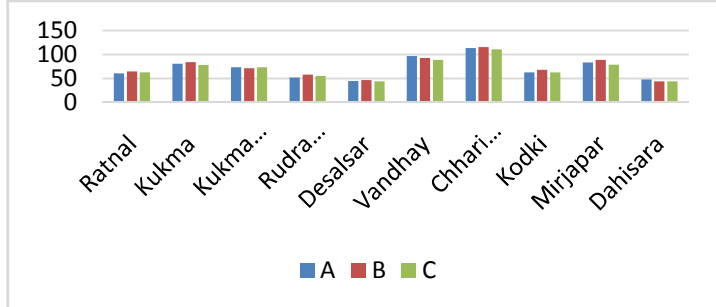
**Alkalinity (mg/l)**

The Average result of Alkalinity values in different wetlands of bhujtaluka is 99.8 mg/l. The highest Alkalinity value recorded in Mirzapar Lake is 159.86 mg/l. The minimum value of Alkalinity is recorded in kukma Lake is 56.8 mg/l. [Fig6]



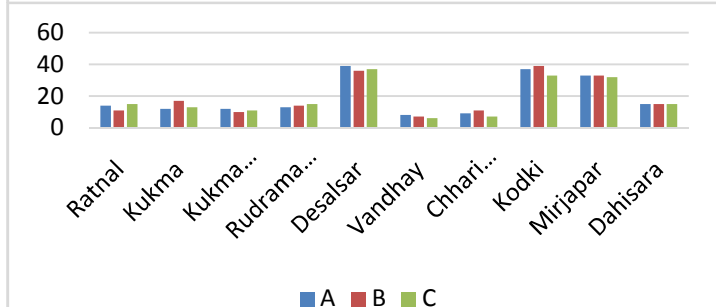
**Sodium (ppm)**

The Average result of Sodium values in different wetlands of bhujtaluka is 71.63 ppm. The highest Sodium value recorded in Chharidhandh wetland is 113 ppm. The minimum value of Sodium is recorded in Desalsar Lake & dahisara lake is 45.33 ppm. [Fig 7]



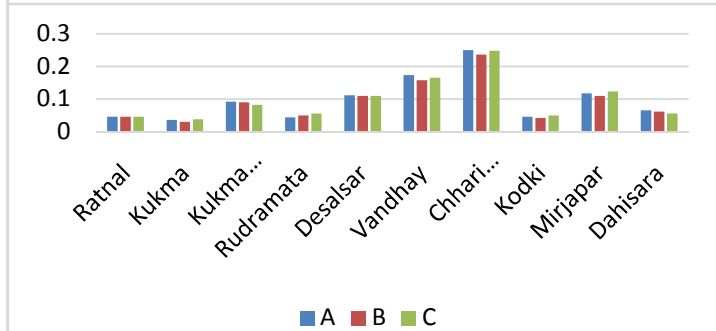
**Potassium (ppm)**

The Average result of Potassium values in different wetlands of bhujtaluka is 18.96 ppm. The highest Potassium value recorded in Desalsar Lake is 37.33 ppm. The minimum value of Potassium is recorded in vandhay Lake is 7 ppm. [Fig 7]



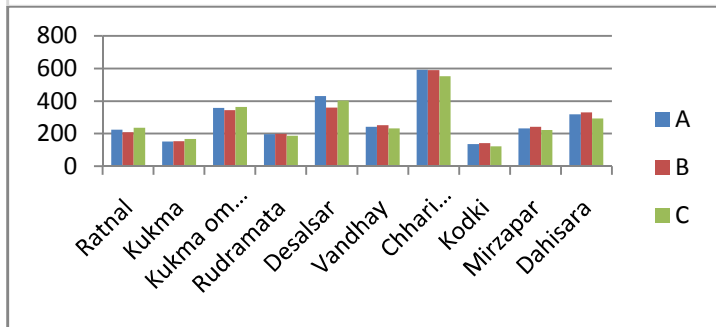
**Calcium (mg/l)**

The Average result of Calcium values in different wetlands of bhujtaluka is 0.096 mg/l. The highest Calcium value recorded in Chharidhandh is 0.244 mg/l. The minimum value of Calcium recorded in kukma Lake is 0.034 mg/l. [Fig 8]



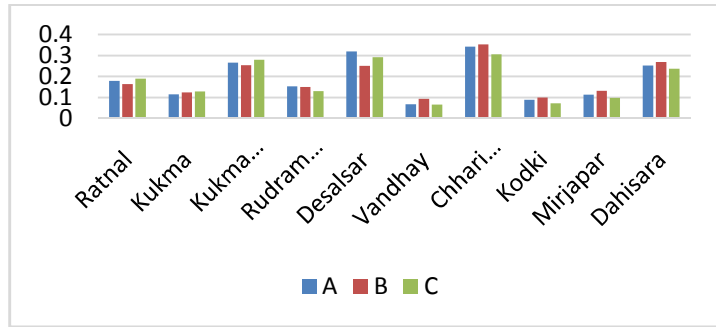
**Total Hardness (mg/l)**

The Average result of Total Hardness values in different wetlands of bhujtaluka is 282 mg/l. The highest Total Hardness value recorded in Chharidhandh Wetland is 578 mg/l. The minimum value of Total hardness is recorded in Kodki Lake is 132 mg/l. [Fig 9]



**Magnesium (mg/l)**

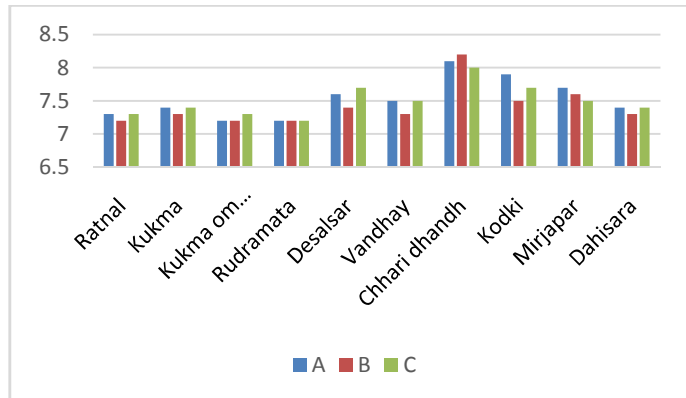
The Average result of Magnesium values in different wetlands of bhujtaluka is 0.185 mg/l. The highest Alkalinity value recorded in Chharidhandh wetland is 0.333 mg/l. The minimum value of Magnesium is recorded in Vandhay Lake is 0.075 mg/l. [Fig 10]



**Physico-chemical parameters of water of wetland**

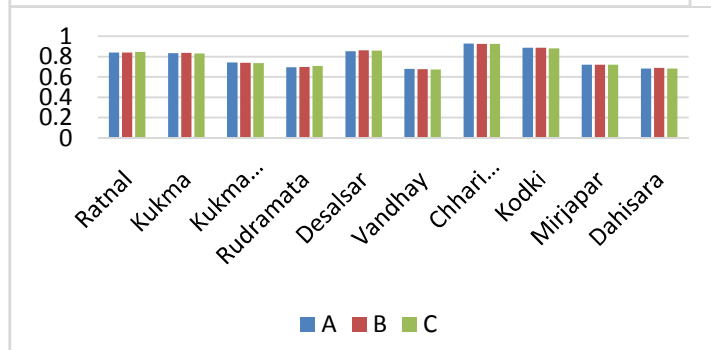
**pH.**

The Average result of ph values in different wetlands of bhujtaluka is 7.4. The highest ph value recorded in chharidhandh wetland is 8.1. The minimum value of ph is recorded in Rudramata dam is 7.2. [Fig 11]



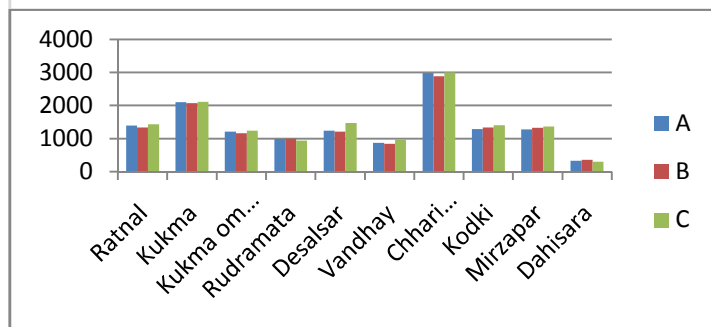
**Electrical conductivity (µs)**

The Average result of Ec values in different wetlands of bhujtaluka is 0.786µs/cm. The highest EC value recorded in chharidhandh wetland is 0.92µs/cm. The minimum value of Ec is recorded in Vandhay lake is 0.67µs/cm. [Fig 12]



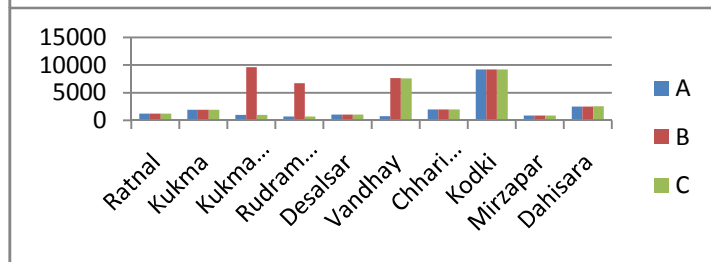
**Total Solids (mg/l)**

The Average result of Total Solids Present in different wetlands of bhujtaluka is 1382.00mg/l. The highest Total Solids Present in Chharidhandh wetland is 2956.67mg/l. The minimum Total Solids Present in Dahisara Lake is 330.00 mg/l. [Fig 13]



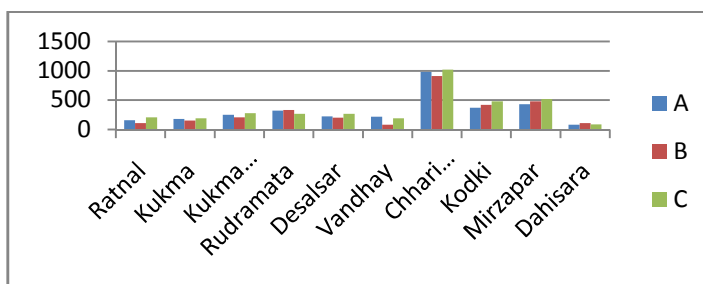
**Total Dissolved solids (mg/l)**

The Average result of Total Dissolved Solids Present in different wetlands of bhujtaluka is 3056.33mg/l. The highest Total dissolved Solids Present in Chharidhandh Wetland is 1981.00mg/l. The minimum Total Dissolved Solids Present in Dahisar Lake is 2506.66 mg/l. [Fig 14]



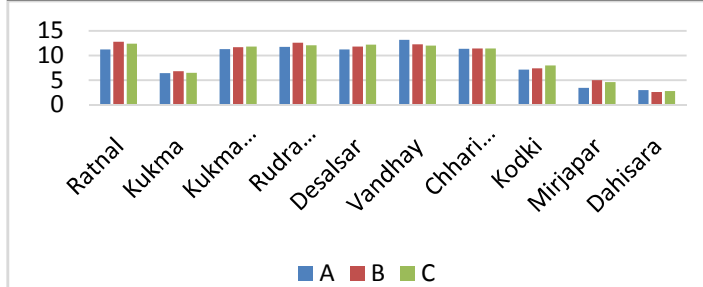
**Total Suspended solids (mg/l)**

The Average result of Total Suspended Solids Present in different wetlands of bhujtaluka is 324.40mg/l. The highest Total Suspended Solids Present in Chharidhandh is 970mg/l. The minimum Total Suspended Solids Present in Dahisara Lake is 93.33mg/l. [Fig 15]



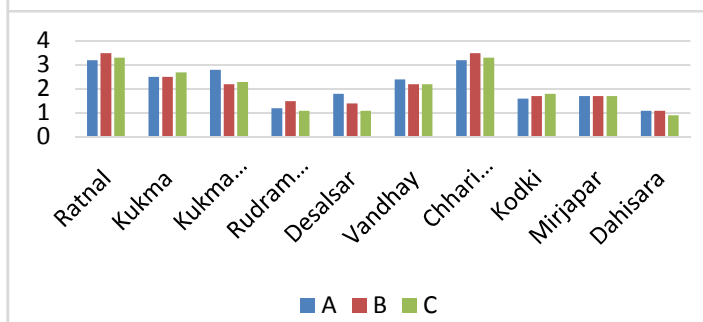
**Dissolved Oxygen (mg/l)**

The Average result of Dissolved Oxygen in different wetlands of bhujtaluka is 9.27 mg/l. The highest Dissolved Oxygen in Vandhay Lake is 12.48 mg/l. The minimum Dissolved Oxygen in Dahisara Lake is 2.8 mg/l. [Fig 16]



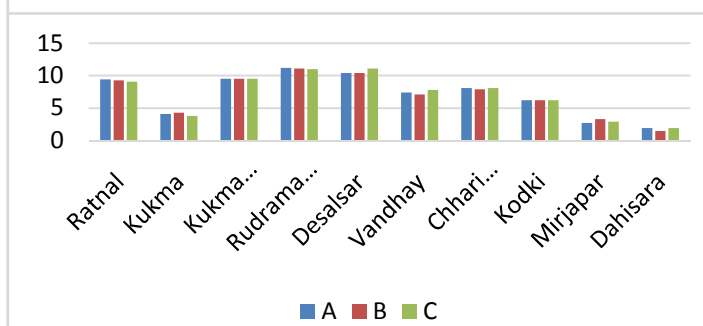
**Biological Oxygen Demand (mg/l)**

The Average result of Biological Oxygen demand in different wetlands of bhujtaluka is 2.10 mg/l. The highest Biological Oxygen Demand in ChhariDhandh is 3.33 mg/l. The minimum Biological Oxygen Demand in Dahisara Lake is 1.03 mg/l. [Fig 174]



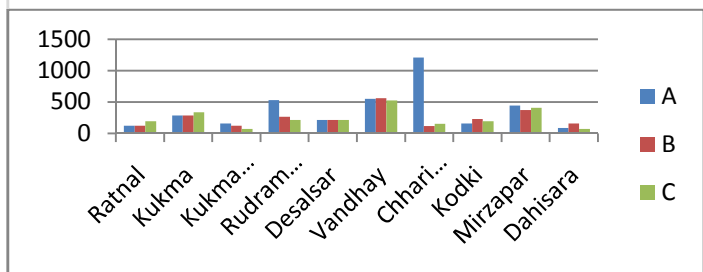
**Chemical Oxygen Demand (mg/l)**

The Average result of Chemical Oxygen demand in different wetlands of bhujtaluka is 7.09 mg/l. The highest Chemical Oxygen Demand in Rudramata Dam is 11.1 mg/l. The minimum Chemical Oxygen Demand in Dahisara Lake is 1.76 mg/l. [Fig 18]



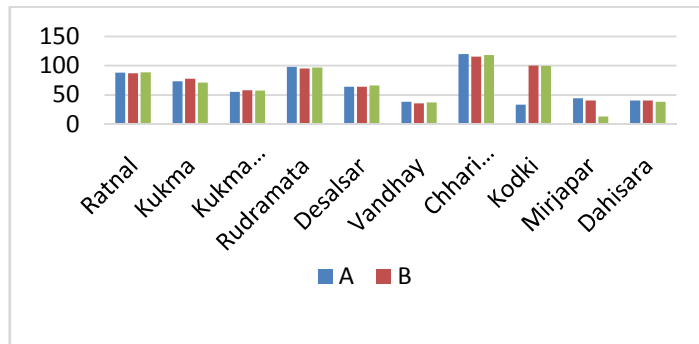
**Chloride (mg/l)**

The Average result of Chloride values in different wetlands of bhujtaluka is 286.43mg/l. The highest Chloride value recorded in Chharidhandh is 492.67mg/l. The minimum value of Chloride is recorded in Dahisara Lake is 106.00mg/l. [Fig 19]



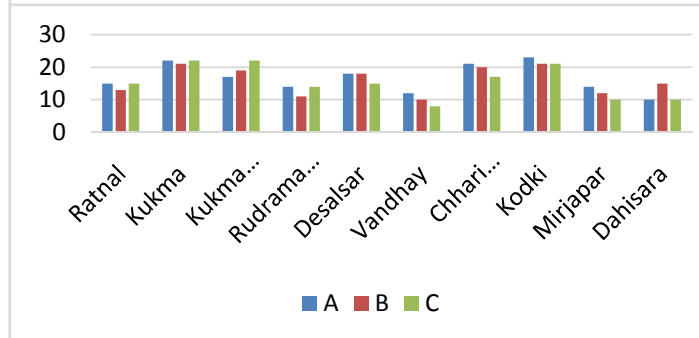
**Alkalinity (mg/l)**

The Average result of Alkalinity values in different wetlands of bhujtaluka is 68.58 mg/l. The highest Alkalinity value recorded in Chharidhandh is 117.8 mg/l. The minimum value of Alkalinity is recorded in Mirzapar Lake is 32.63 mg/l. [Fig 20]



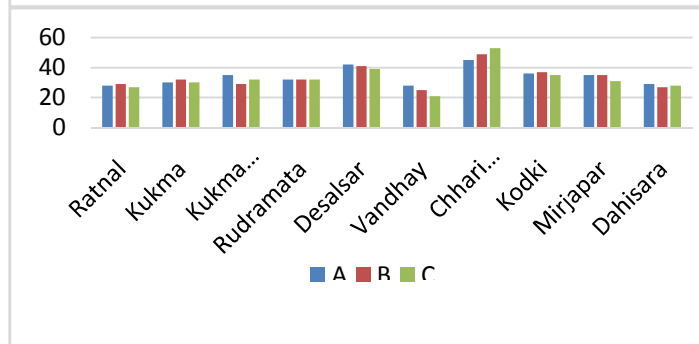
**Sodium (ppm)**

The Average result of Sodium values in different wetlands of bhujtaluka is 16 ppm. The highest Sodium value recorded in Kukma is 21.66 ppm. The minimum value of Sodium is recorded in Vandhay lake is 10 ppm. [Fig 21]



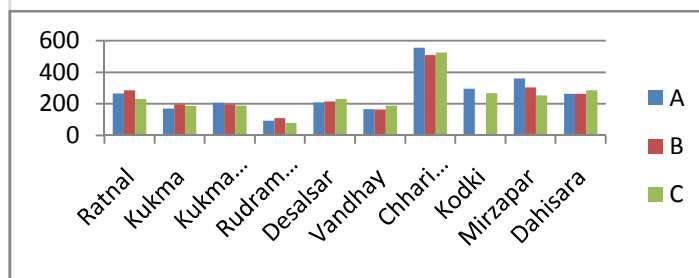
**Potassium (ppm)**

The Average result of Potassium values in different wetlands of bhujtaluka is 33.46 ppm. The highest Potassium value recorded in ChhariDhandh wetland is 49 ppm. The minimum value of Potassium is recorded in vandhayLake is 24.66 ppm. [Fig 22]



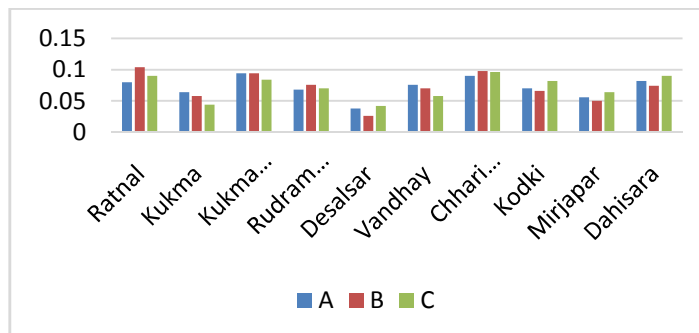
**Total Hardness (mg/l)**

The Average result of Total Hardness values in different wetlands of bhujtaluka is 242.14mg/l. The highest Total Hardness value recorded in Chharidhandh Wetland is 529.33mg/l. The minimum value of Total hardness is recorded in Rudramata dam is 94.00mg/l. [Fig 23]



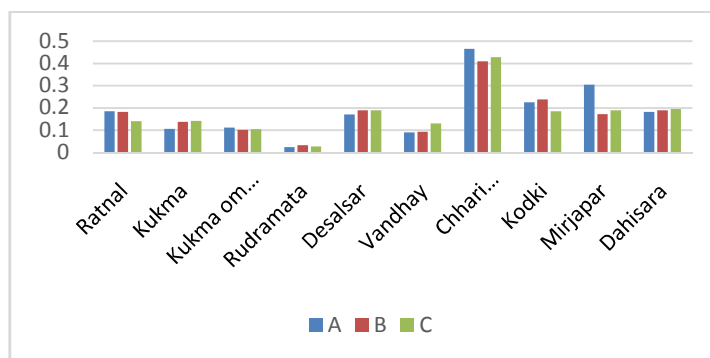
**Calcium (mg/l)**

The Average result of Calcium values in different wetlands of bhujtaluka is 0.071 mg/l. The highest Calcium value recorded in Chharidhandh wetland is 0.094 mg/l. The minimum value of Calcium is recorded in Desalsar Lake is 0.035 mg/l. [Fig 24]



**Magnesium (mg/l)**

The Average result of Magnesium values in different wetlands of bhujtaluka is 0.178 mg/l. The highest Alkalinity value recorded in Chharidhandh wetland is 0.434 mg/l. The minimum value of Magnesium is recorded in Rudramata dam is 0.028 mg/l. [Fig25]

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