STUDIES ON THE DISSOLVED NUTRIENTS AND PRIMARY PRODUCTIVITY OF KADALUNDI RIVER, KERALA, INDIA

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ABSTRACT

Studies on the dissolved nutrients and primary productivity of Kadalundi river, Kerala, India, were carried out during July 2016 to June 2017. In three stations maximum the maximum level of nitrate was reported in the month of July. The maximum level of phosphate was reported in station-A and station-B in March but station-C reported maximum level of phosphate in the months of February, March and April. The maximum level of silicate was reported in station-A and station-C in August and in station-B in the month of July. The maximum gross primary productivity ($gC/m^3/3hr$) of station-A and station-B in the month of May but in station-C is in April. The maximum net primary productivity ($gC/m^3/3hr$) of station-A and station-B in the month of November but in station-C is in April. The maximum community respiration ($gC/m^3/3hr$) of station-A and station-B in the month of May but in station-C is in January.

Keywords: Dissolved nutrients, Primary productivity, Kadalundi river, Kerala, India.

INTRODUCTION

The quality of water is one of the most important factors. The water provides shelter for several aquatic organisms like bacteria, algae, protozoa, viruses and other microorganisms. The aquatic microorganisms and their activities are of great importance in many ways that directly or indirectly affect the health of aquatic organisms, humans and other animal life. A plentiful supply of clean water is essential for the need of human beings, other animals and plants. The parameters like, dissolved nutrients such as nitrate, phosphate, silicate etc. are depending on the growth of water organisms. The river water is used for several purposes such as irrigation, industries, bathing and drinking purposes. River water also a valuable sources of productivity. The regular monitoring of water also helps the aquatic ecosystem from further deterioration by Kutty (1987). The studies on physico-chemical characteristics of river water of Ganga in middle Ganga plains have been reported by (Leena Singh and Choudhary, 2013).

MATERIALS AND METHODS

The dissolved nutrients and phytoplankton productivity of Kadalundi River, Kerala, the experiment is started from First July 2016 to 30th June 2017. The areas selected for the study were three different stations of Kalalundi river estuary. The stations are Heros Nagar (Station-A), Palakkal (Station-B) and Keezhayil (Station-C). Kadalundi-Vallikkunnu Community Reserve has been constituted as per G.O. (MS) No. 66/2007 F & WLD dated 17.10.2007 under Section 36(c) of Wildlife Protection Act 1972. It is located on the Western side of the Northern Kerala, in Kozhikode and Malappuram districts on the river mouth of Kadalundipuzha spreading in the estuary. River Kadalundi is originated from Cherakambam mala which is 1160 M. MSL and situated in Eastern side of Malappuram district and flowing westward nearly 130 Kms. Kadalundi River is one of the four most important rivers flowing through Malppuram and Kozhikkode district of Kerala. The total extent of the Community Reserve is 153.8415 ha. The water samples were taken every month for the study and it continued up to 12 months. During the time of sampling, to determine silicate ammonium molybdate solution and 1:1 sulphuric acid solution was used. Standard phosphate solution, ammonium molybdate solution and stannous chloride solution and spectrophotometer were

used for determination of phosphate. The estimation of nitrate is by using naphthalamine, hydrochloric acid and spectrophotometer. The estimation of primary productivity by dissolved oxygen using light and dark bottle method as described by Gaarder and Gran (1927). The primary production was estimated by observing the post-incubation changes in dissolved oxygen concentrations in the water collected from the sampling site in light and dark bottles following the method of Gaarder and Gran (1927).

RESULTS

The maximum level of nitrate was reported in three stations in the month of July. The minimum level of nitrate was reported in station-A and station-C in March (0.36mg/l and 0.46mg/l). In station-B minimum level nitrate was observed in December (0.38mg/l). The maximum level of phosphate was reported in station-A and station-B in March but station-C reported maximum level of phosphate in the months of February, March and April. The phosphate level is BDL (Below detection limit) in the month of June. The maximum level of silicate was reported in station-A and station-C in August and in station-B in the month of July. The station-A and station-B minimum level of silicate was reported in April but in station-C minimum level silicate was reported in March. The dissolved nutrients noted in (Table 4, 5 and 6). The maximum gross primary productivity ($gC/m^3/3hr$) of station-A and station-B in the month of May but in station-C is in April. The minimum gross primary productivity ($gC/m^3/3hr$) of three stations was reported in June. The maximum net primary productivity ($gC/m^3/3hr$) of station-A and station-B in the month of November but in station-C is in April. The minimum net primary productivity ($gC/m^3/3hr$) was reported in June. The maximum community respiration ($gC/m^3/3hr$) of station-A and station-B in the month of May but in station-C is in January. The minimum community respiration ($gC/m^3/3hr$) was observed in December in station-A and station-B. In station-C minimum community respiration was reported in February.

Monthly variations of dissolved nutrients in different stations of Kadalundi River from July, 2016 to June, 2017

Table: 1. Station-A

Months	Nitrate (mg/l)	Phosphate (mg/l)	Silicate (mg/l)
Jul.	1.62	0.02	6.32
Aug.	1.56	0.02	6.88
Sep.	1.42	0.03	5.86
Oct.	1.30	0.03	4.28
Nov.	0.96	0.05	4.10
Dec.	0.84	0.04	3.12

Jan.	0.38	0.03	2.02
Feb.	0.44	0.04	1.26
Mar.	0.36	0.06	1.20
Apr.	0.64	0.03	1.12
May	0.82	0.03	2.36
Jun.	1.52	BDL	6.20

BDL: Below Detection Limit

Table: 2. Station-B

Months	**Nitrate (mg/l)**	**Phosphate (mg/l)**	**Silicate (mg/l)**
Jul.	1.56	0.02	6.20
Aug.	1.14	0.04	5.56
Sep.	0.89	0.02	5.42
Oct.	0.56	0.05	4.32
Nov.	0.44	0.04	3.66
Dec.	0.38	0.03	1.98
Jan.	0.46	0.04	1.67
Feb.	0.50	0.04	1.24
Mar.	0.52	0.06	1.18
Apr.	0.54	0.04	1.16
May	0.48	0.05	2.18
Jun.	1.38	BDL	5.20

BDL: Below Detection Limit

Table: 3. Station-C

Months	**Nitrate (mg/l)**	**Phosphate (mg/l)**	**Silicate (mg/l)**
Jul.	1.82	0.02	6.64

Aug.	1.70	0.04	6.84
Sep.	1.42	0.04	5.86
Oct.	1.20	0.04	4.20
Nov.	0.84	0.03	3.98
Dec.	0.72	0.02	2.66
Jan.	0.56	0.05	1.48
Feb.	0.60	0.06	1.26
Mar.	0.46	0.06	1.22
Apr.	0.48	0.06	1.32
May	0.86	0.08	1.70
Jun.	1.62	BDL	5.40

BDL: Below Detection Limit

Monthly variation of primary production in different stations of Kadalundi River from July, 2016 to June, 2017

Table: 4. Station-A

Months	Gross Primary Production (G.P.P) ($gC/m^3/3hr$)	Net Primary Production (N.P.P) ($gC/m^3/3hr$)	Community Respiration (C.R) ($gC/m^3/3hr$)
Jul.	0.974	0.526	0.448
Aug.	0.708	0.496	0.212
Sep.	0.792	0.564	0.228
Oct.	0.840	0.596	0.244
Nov.	1.018	0.786	0.232

Dec.	0.804	0.642	0.162
Jan.	0.888	0.546	0.342
Feb.	0.844	0.423	0.421
Mar.	1.079	0.546	0.533
Apr.	1.174	0.662	0.512
May	1.464	0.652	0.812
Jun.	0.558	0.302	0.256

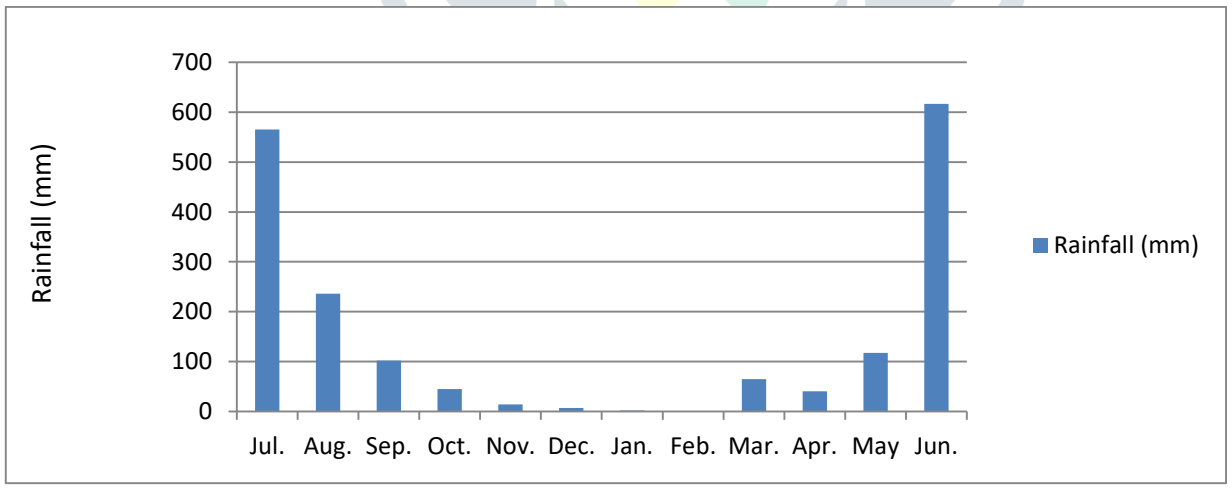
Table: 5. Station-B

	Gross Primary Production (G.P.P) ($gC/m^3/3hr$)	**Net Primary Production (N.P.P) ($gC/m^3/3hr$)**	**Community Respiration (C.R) ($gC/m^3/3hr$)**
Jul.	0.944	0.586	0.358
Aug.	0.724	0.466	0.258
Sep.	0.894	0.684	0.210
Oct.	0.868	0.696	0.172
Nov.	1.012	0.788	0.224
Dec.	0.934	0.786	0.148
Jan.	0.901	0.642	0.259
Feb.	0.838	0.542	0.296
Mar.	1.036	0.648	0.388
Apr.	1.148	0.696	0.452
May	1.387	0.732	0.655
Jun.	0.506	0.242	0.264

Table: 6. Station-C

Months	Gross Primary Production (G.P.P) ($gC/m^3/3hr$)	Net Primary Production (N.P.P) ($gC/m^3/3hr$)	Community Respiration (C.R) ($gC/m^3/3hr$)
Jul.	0.986	0.568	0.418
Aug.	0.968	0.702	0.266
Sep.	1.128	0.856	0.272
Oct.	1.142	0.814	0.328
Nov.	1.275	0.987	0.288
Dec.	1.248	0.964	0.284
Jan.	1.283	0.822	0.461
Feb.	1.052	0.820	0.232
Mar.	1.016	0.654	0.362
Apr.	1.568	1.184	0.384
May	1.337	0.953	0.384
Jun.	0.594	0.358	0.236

Average rainfall recorded during 2016-17 in the study area



DISCUSSION

Studies on the dissolved nutrients and primary productivity of Kadalundi River, Kerala, India, were carried out during July 2016 to June 2017. The water is more polluted rep throughout the year of 2016 to 2017. Study indicates the river pollution largely by anthropogenic performance. Phosphorus is the first limiting nutrient for plant. In fresh water ecosystems, nitrogen and

phosphorous are the most significant nutrients for the growth and reproduction of phytoplankton. The phytoplankton use carbon dioxide, releases oxygen, and converts minerals to a form of animals can use. The enrichment of phytoplankton in the water may change the taste of water. The river showing the much pollution because of dumping the large number of home wastes, coconut husks, plastics and other effluents reached in water bodies, Ali Akshad, M., et al (2017). The three stations more polluted due the presence of human excreta. The station-B and station-C contain the shells of arthropods and mollusks that make the color changes of water. When the more wastes dumped in that time the river water showing more changes in the physical and chemical water quality and results increase in the production of phyto-zooplankton community.

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