

Diversity of Bryoflora of Dimna Lake of Jamshedpur, Jharkhand

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Abstract- The present paper deals the bryophytes diversity of Dimna lake of Jamshedpur. We studied patterns of species richness, diversity, community composition and ecology of bryophytes of the site.

During study a total of 22 species belonging hornworts, liverworts and moss were recorded. The results showed that *Riccia glauca* L. and *Marchantia palmata* Ness. having 100% frequency followed by *Anthoceros laevis* L. and *Targionia hypophylla* L. having 60% frequency. Lowest frequency was found in *Fissidens anomalus* Mont 20% and *Conocephalum conicum* (L.) Lindb. 20%.

The floristic composition of that sites was taken by using nested quadrat method. 5 quadrats were laid randomly in the area. In each quadrat, the data was recorded.

In conclusion, water resources and aquatic biodiversity are intimately interrelated and interdependent. It is generally understood that water quality and habitat quality affect the composition, diversity and therefore health of aquatic ecosystem.

Keywords- Bryophytes, Hornworts, Liverworts aquatic diversity, Species richness.

I. INTRODUCTION

Dimna lake is an artificial lake in Jamshedpur, which is situated at around 13 km. from the city. It covers about 5.5 square kilometres. Around 1,861 acres were acquired under the land Acquisition Act of 1894 for the dam. This lake lies at the foot hills of Dalma Mountain ranges. The lake is the only source of drinking water for Jamshedpur town. During the monsoon, the reservoir gets filled up in the rain water.

Bryophytes are small, non-vascular plants, such as mosses, liverworts and hornworts. They play a vital role in regulating ecosystems because they provide an important

buffer system for the other plants, which live alongside and benefit from the water and nutrients that bryophytes collect.

Bryophytes are also very good indicators of habitat quality as many plant species in this group are sensitive to levels of moisture in the atmosphere, which are lower in disturbed habitats because there is less shade. These species are often inconspicuous elements of the macrophyte vegetation in mountain streams.

Aquatic bryophytes are a common but often overlooked component of a wide variety of stream ecosystems. Although stream environments present a number of challenges for bryophyte reproduction and survival.

II. MATERIALS AND METHODS

The study area lies between latitudes 22°48' 16.5" and 22°57' N and longitude 86°12' 10.35" and 86°26' 30" E of that site.

Data analysis:

The survey in rehabilitated site was conducted during the summer (May), rainy (August) and winter season (January) of 2012 – 2014 to ascertain the floristic composition of that site using nested quadrat method.

Abundance/Frequency (A/F) ratio:

Abundance and frequency ratio gives an idea of the patterns of species distribution. This ratio indicates distribution patterns of a species as regular (<0.025), random (0.025 – 0.05) and contagious (>0.05).

Dominance Index:

It was calculated as –

$$C = \sum (ni/N^2)$$

Where, ni is number of individuals in one species.

N is total number of individuals of all species.

Richness Index:

This is measure of number of species in a community. It was calculated as –

$$D = \frac{S - 1}{\ln(N)}$$

In (N)

Where, D is Margalefs index,
S is number of species,
N is total number of individuals,
ln is natural long.

Table-1 : Annual variation in physicochemical characteristics of Dimna Lake at Jamshedpur

Parameters	2012			2013			2014		
	Winter	Rainy	Summer	Winter	Rainy	Summer	Winter	Rainy	Summer
Water Temperature (°C)	13.66	16.52	23.38	13.33	19.46	21.48	14.40	20.50	27.34
Depth (m)	0.854	2.564	0.694	0.834	2.836	0.734	0.826	2.544	0.730
Transparency (m)	0.748	0.506	0.582	0.682	0.528	0.594	0.654	0.524	0.606
Conductivity (μ.mho/cm)	47.45	47.34	51.38	52.43	83.44	68.61	44.57	93.55	38.61
pH	7.35	7.08	7.22	7.35	7.18	7.27	7.42	7.16	7.28
Total dissolved solids (mg/l)	105.5	105.6	120.6	108.6	169.5	115.6	111.0	173.0	123.5
Dissolved oxygen (mg/l)	8.31	7.80	7.78	8.43	7.93	7.02	8.63	8.16	7.51
Dissolved CO ₂ (mg/l)	0.528	0.634	1.048	0.678	0.666	1.032	0.574	0.652	1.086
Nitrate (mg/l)	0.208	0.149	0.105	0.228	0.165	0.127	0.239	0.179	0.133
Phosphate (mg/l)	0.037	0.023	0.030	0.042	0.025	0.039	0.045	0.027	0.045
Sodium (mg/l)	0.548	0.640	1.070	0.644	0.740	0.848	0.646	0.848	1.220
Potassium (mg/l)	0.730	0.840	1.034	0.720	0.820	0.900	0.748	0.830	1.040
Sulphate (mg/l)	0.360	0.400	0.450	0.340	0.440	0.540	0.440	0.550	0.620
Ammonia (mg/l)	0.240	0.242	0.366	0.280	0.358	0.436	0.358	0.370	0.454
Total hardness (mg/l)	62.37	54.55	50.79	59.60	60.31	52.37	54.40	45.07	41.46

Note- The average values are the mean of the observations taken during three years of study.

III. RESULTS AND DISCUSSION

Data analysis which was undertaken to examine the structure composition indicated that in Dimna lake, *Riccia glauca* L., *Marchantia palmata* Nees. and *Riccia fluitans* L. were still a dominant species among bryophytes having frequency of 100% and *Dumortiera hirsute* (Swagr.) Nees, *Fissidens anomalus* Mont, *Conocephalum conicum* (L.) Lindb. showed lowest frequency of 20%.

Table 2, presents that *Riccia glauca* L. and *Marchantia palmata* Nees. are dominant species having IVI

value of 24.49 and 26.17. It also reveals that highest richness index with its value 9.417 and 9.092.

The minimum IVI found *Fissidens anomalus* Mont is 2.30 and lowest richness index is 0.000, followed *Conocephalum conicum* (L.) Lindb. 2.36 and 0.000.

In the selected area 22 species were found which are also used in pharmaceutical products, in horticulture, for household purposes, and are also ecological important. Their potential in the biomapping of atmospheric precipitation is also enormous.

Table-2 : Structural Attributes and Richness Index of the Bryophytes of Dimna Lake

Sl. No .	Name of Species	Frequency	Relative Density	Dominance Index	IVI	Richness Index
1.	<i>Riccia glauca</i> L.	100%	12.01	0.0156	24.49	9.417
2.	<i>Marchontia palmata</i> Nees.	100%	11.60	0.0148	26.17	9.092
3.	<i>Riccia fluitans</i> L.	100%	7.53	0.0061	8.43	5.845
4.	<i>Marchantia linearis</i> L. hm. & Lindb.	80%	5.90	0.0038	13.23	4.546
5.	<i>Ricciocarpos natans</i> (L.) Carda	80%	4.68	0.0024	12.56	3.572
6.	<i>Marchantia paleacea</i> Bertal	80%	4.49	0.0033	13.61	4.221
7.	<i>Riccia huebeneriana</i> Lindb.	80%	0.81	0.0001	8.86	0.487
8.	<i>Funaria hygrometrica</i> Hedw.	60%	1.83	0.0004	9.26	1.299
9.	<i>Anthoceros lacvis</i> L.	60%	1.82	0.0003	8.87	1.182
10 .	<i>Targionia hypophylla</i> L.	60%	0.24	0.0005	7.00	1.624
11 .	<i>Riccia crystallina</i> (L.) Raddi.	60%	1.22	0.0002	7.98	0.812
12 .	<i>Cyathodium cavernarum</i> Kunz.	40%	2.03	0.0004	6.05	1.461
13 .	<i>Polytrichum juniperinum</i> Hedw.	40%	1.83	0.0004	6.69	1.299
14 .	<i>Anthoceros angustus</i> Steph.	40%	1.42	0.0002	5.60	0.974
Sl. No .	Name of Species	Frequency	Relative Density	Dominance Index	IVI	Richness Index
15 .	<i>Bazzania trilobata</i> (L.) Gray	20%	0.40	0.0000	2.75	0.162
16 .	<i>Pellia epiphylla</i> (L.) Corda	20%	2.44	0.0006	4.47	1.786
17 .	<i>Fissidens involutus</i> Wilson ex Mitt.	20%	1.22	0.002	3.38	0.812
18 .	<i>Hypophila involuta</i> (Hook.) Jaegar.	20%	0.20	0.0000	2.48	0.000
19 .	<i>Plagiochasma appendiculatum</i> Lehm. & Lindb.	20%	5.70	0.0035	7.89	4.384

20	<i>Dumortiera hirsuta</i> (Swaegr) Nees	20%	1.22	0.0002	3.31	0.812
21	<i>Fissidens anomalus</i> Mont	20%	0.20	0.0000	2.30	0.000
22	<i>Conocephalum conicum</i> (L.) Lindb.	20%	0.20	0.0000	2.36	0.000



Fig.-1



Fig.-2



Fig.-7



Fig.-3



Fig.-4

Photographs showing of Bryoflora of Dimna Lake
PLATE - II

Photographs showing of Bryoflora of Dimna Lake
PLATE - I

IV. CONCLUSION

The information generated from this study is the first attempt to assess the ecological condition of perennial streams of the lake. This study has demonstrated that such an assessment is practical and that it can provide the information necessary to assess the current baseline ecological condition.

In addition the data generated in the form of memoir are essential. So that this information may be used as the decision maker for conservation and effective utilization of water bodies.

The results indicate that the site is currently the richest and most diverse aquatic flora in general and bryoflora in particular found in that area.

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