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STUDIES OF ECOLOGICAL PRODUCTIVITY OF THE MACROPHYTES IN DAMOAR RIVER AREA, JHARKHAND, INDIA

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ABSTRACT:

The present paper deals with ecological productivity of the macrophytes in damodar river basin .Net Primary Productivity is the rate of storage of organic matter in plant tissues in excess of the respiratory utilization by plants during the measurement period. Daily and annual net primary productivity of the dominant macrophytic vegetation were determined during 2016-2018. *Alternanthera philoxeroides* exhibited the highest daily net primary productivity with values ranging from 0.4 to 2.10 gm^{-2} day^{-1} in the first year(2016-2017) and 0.7 to 2.14 gm^{-2} day^{-1} in the second year(2017-2018). *Echinochloa stagnina* recorded daily net productivity values ranging from 0.14 to 2.2 gm^{-2} day^{-1} in the first year and 0.4 to 1.72 gm^{-2} day^{-1} in the second year. *Ceratophyllum demersum*, the present values varied from 0.10 to 1.52 gm^{-2} day^{-1} in the first year and 0.04 to 1.82 gm^{-2} day^{-1} in the second year. The daily net production of all species (combined) varied from 0.02 to 6.12 gm^{-2} day^{-1} and 0.14 to 8.40 gm^{-2} day^{-1} in the first and second year respectively. The total annual net production of all species (combined) varied from 680.64 to 890.13 gm^{-2} yr^{-1} and 701.49 to 838.45 gm^{-2} yr^{-1} in the first and second year respectively.

KEYWORDS:

PRIMARY PRODUCTIVITY, DAMODER BASIN, BIOMASS, MACROPHYTES.

INTRODUCTION

In the present study, primary productivity of the aquatic macrophytes of Damoder River was assessed for the dominant species in all the different study sites on daily, monthly and annual basis for two consecutive years. The various findings for the entire study period are presented herewith along with the discussion in the light of the numerous works done in the various wetlands within and outside India. The Net Primary Productivity (NPP) is the rate of storage of organic matter in plant tissues in excess of respiratory utilization (R) by the plants during the measurement period (Odum, 1971). Jordan (1985) reported that productivity of an ecosystem is vital and indispensable for ecosystem analysis as the same integrates the cumulative effects of the various physiological processes and interactions occurring simultaneously within the ecosystem. Long and Hutchinson (1991) have also defined it as the net rate of gain of organic carbon by the vegetation over a given time interval. Primary productivity is the measure of the rate at which biomass or organic matter is produced by the primary producers per unit area (Mackenzie et al., 2001). According to Odum and Barrett (2008) the primary productivity of an ecological system is the rate at which radiant energy is converted to organic substances by the photosynthetic and chemosynthetic activity of the producer organisms. The aquatic resources have been till date the potential source of organic production for the entire living organisms. Many ecologists of the world have laid emphasis on the importance of the primary productivity as an important functional attribute of the biosphere because of its controlling effects on the rate of multiplication and growth of the living organisms of the ecosystem (Westlake, 1963). The International Biological Programme (IBP) of the UNESCO has paid due attention on the assessment of Primary Production of the diverse freshwater ecosystems of the Biosphere under the section on Productivity of freshwater communities (PF). Thus, the study of the net primary productivity of the freshwater macrophytes has become necessary to assess the functioning as well as dynamics of the aquatic bodies.

MATERIALS AND METHODS

The present investigation was carried out in Damoder river located in Ramgarh District, Jharkhand. The Net Primary Productivity of the different dominant macrophytes has been assessed both on monthly and daily for a period of two years from January, 2016 to December, 2018. The annual primary productions of the individual species as well as total species were also assessed for each site during the study period. For the present study, the river was divided into four study sites representing as Site I, II, III and IV which are named as ramgarh, giridih, dhanbad bokaro respectively. Collections of macrophytic plants samples were done on monthly regular intervals from the four study sites

RESULTS AND DISCUSSION

The variations in net primary production of the different study sites in the first and second year of the study period . The monthly net production of 'other species' ranged from 1.39 to 55.39 gm^{-2} $month^{-1}$in the first year and 1.25 to 36.22 gm^{-2} $month^{-1}$in the second year. The monthly net production of all species (combined) varied from 0.96 to 183.09 gm^{-2} $month^{-1}$ and 4.60 to252.67 gm^{-2} $month^{-1}$ in

the first and second year respectively (Fig. 2 and Fig 3). During the whole study period, *Alternanthera philoxeroides* exhibited the highest daily Net Primary Productivity with values ranging from 0.14 to 2.10 gm^{-2} day^{-1} in the first year and 0.08 to 2.16 gm^{-2} day^{-1} in the second year. The maximum monthly net primary production was recorded by *Alternanthera philoxeroides* with values ranging from 4.56 (site II) to 63.46 gm^{-2} $month^{-1}$ (site IV) in the first year and 2.64 (site III) to 65.05 gm^{-2} $month^{-1}$ in the second year. This was followed by *Echinochloa stagnina* with values ranging from 1.73 to61.02 gm^{-2} $month^{-1}$ and 1.09 to 52.80 gm^{-2} $month^{-1}$ in the first and second year respectively.

CONCLUSION

Daily and annual net primary productivity of the dominant macrophytic vegetation were determined during 2016-2018. The daily net production of all species (combined) varied from 0.02 to 6.12 gm^{-2} day^{-1} and 0.14 to 8.40 gm^{-2} day^{-1} in the first and second year respectively. The total annual net production of all species (combined) varied from 680.64 to 890.13 gm^{-2} yr^{-1} and 701.49 to 838.45 gm^{-2} yr^{-1} in the first and second year respectively.

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