

Chapter: 1

Introduction

Bangladesh has achieved third position in inland water capture fisheries and fifth position in freshwater culture fisheries (FAO, 2018). Generally, freshwater aquaculture is practiced in pond, lake and other waterbodies. In Bangladesh, most of the lakes are not under aquaculture practice; Foy's lake is one of them. Foy's lake is a man-made freshwater lake, situated in Pahartali, Chattogram, Bangladesh. It was created in 1924 by constructing dam across the stream of lake in the south eastern part. This lake was created to provide water to the residents of railway colony. Now, this 320-acre catchment area of Foy's lake out of any aquaculture activities but sometimes illegal fishing is done by adjacent habitant. So, it is very important to bring about Foy's lake under aquaculture system. Primary production in an aquatic ecosystem is one of the main concerns for fish production. Primary productivity, in ecology, the rate at which energy is converted to organic substances by photosynthetic producers (photoautotrophs), which obtain energy and nutrients by harnessing sunlight, and chemosynthetic producers (chemoautotrophs), which obtain chemical energy through oxidation. Primary productivity of a waterbody helps to get knowledge about trophic status and assessment of productivity potential of fish in the ecosystem (Rathod and Chavan, 2016). In primary production, solar energy turns into chemical energy. Primary production can be determined as the amount of organic matter produced by plants by using solar energy in given area in a given period of time (Odum, 1971). Primary productivity of a waterbody is the expression of its biological production.

In a waterbody, generally three groups of organisms are dominant namely plankton, nekton and benthos, among these plankton has immense importance on aquaculture which influences fish production. The name 'plankton' is derived from Greek word 'planktos' means drifter or wanderer and it was first coined by Victor Hensen in 1887. Plankton are the diversified group of organisms found in water that are unable to swim against current and they are the microscopic organism that forms the base of food chain and food web in all aquatic ecosystems. Most of them are very small, some are microscopic that cannot be seen in naked eyes with exception of some large animal like heteropods, tunicates and some medusae.

Directly or indirectly, phytoplankton is the basis of primary production in all aquatic ecosystems. Phytoplankton abundance indicates the production status of waterbodies either qualitative or quantitative whether it is oligotrophic or eutrophic one. Therefore, a clear concept about phytoplankton abundance is a prerequisite for fish production.

Zooplankton is a microscopic organism that is the structural component of food chain and food web in all aquatic ecosystems. Secondary production of aquatic ecosystem directly or indirectly depends on zooplankton. They also play a significant role in indicating water quality, plankton abundance and productivity of a waterbody. Zooplankton not only trigger fish production but also helps in bio remediation of heavy metals and toxic elements (Akther *et al.*, 2016). They also play an effective role in nutrient and energy recycling with their surrounding environments. They are inhabitant of euphotic zone of aquatic waterbody like ponds, lakes, rivers and oceans. Zooplankton is an important food item of omnivorous and carnivorous fishes (Alam *et al.*, 1987). The larvae of carps mostly feed on zooplankton because they provide adequate amount of protein required for the growth and development of different organs. Zooplankton is an ideal food source of brood fish (Roy *et al.*, 2010). So, it is thought to me, this study is so much important for these reasons.

Primary production largely depends on Physico-chemical properties of water like temperature, dissolve oxygen, alkalinity, pH, free CO₂, nitrate, phosphate etc. Fishes are mostly dependent on water temperature, pH, dissolved oxygen, free CO₂, alkalinity and some other salts for growth and development (Nikolsky, 1988). The physico-chemical factors of water and soil have some effects on plankton periodicity (Haque, 1978).

Primary productivity was not carried out ever in such an important waterbody like Foy's lake. So, determination of primary productivity of Foy's lake is very important for fisheries science.

Objective of the study:

1. Determination of primary productivity.
2. Determination of water quality parameters in relation to primary productivity.