Temperature and salinity profiles for the period 1992-2010 from global temperature and Salinity Profile Programme (GTSPP) and chlorophyll data from SeWiFS were analyzed to observe the intra annual variability of the mixed layer and associated changes in the production of Chlorophyll in the Bay of Bengal. Productivity is considered to be less in the Bay of Bengal compared to its counterpart the Arabian Sea. This may be attributed to the presence of strong upper stratified layer in the Bay of Bengal. But coastal rim of the Bay of Bengal show considerable amounts of productivity all along the year and enrichment in the productivity is also observed in the vicinity of East India Coastal Current (EICC). Chlorophyll blooms occur in the Bay of Bengal is mainly due to the coastal upwelling, tropical cyclones and run off from the rivers. The EICC distributes these blooms all along the coast depending on its direction of flow. The EICC flows equator ward during November to January with peak in December which brings low saline and nutrient water from north to south which augment the production all along the coast. During April and May the EICC is almost towards north, which may cause upwelling all along the east coast which extends up to 120 km from the coast. Summer monsoon is the most productive season with maximum chlorophyll content of 4.5 mg/m³ in the month of August and an average of 2 mg/m³ extending up to 220 km from the coast. This enhancement may be attributed to the river discharge associated with summer monsoon rainfall. Cyclones occurring in the month of October and November also enhance the chlorophyll in the Bay of Bengal.