The present investigation was undertaken to obtain baseline information on aquatic insects, in certain man-made freshwater ecosystems, to recognise their academic and applied importance. It is known that most of these insects spend their immature life in water with their adult life in the terrestrial environment. Invariably these immature stages are the extended part of their life history. Therefore, in any evaluation of the impact that changes in environment have on aquatic ecosystems, the role of these insects is to be considered, as their immature stages often comprise a high proportion of the biomass in freshwaters. It is well known that any rehabilitative or management strategy characterized by a high probability for success in fish growth, must rely on fundamental knowledge of the intricacies of freshwater ecosystem structure and function. However, the present paucity of information on the general ecology of aquatic insects in the region under consideration was the major imperative for undertaking the present study.

The results of the present study when collated seem to possess some salient features, which in turn are identified for detailed investigations at a future date. One emerging fact was that density in numbers as far as all the insects are concerned was inversely proportional with altitude wherein these systems are located. Generally, the density increased from higher altitude towards the foot of the hills. It was always the reverse order when biomass was considered. This phenomenon was true even when the insects were categorized into major orders like Hemiptera, Coleoptera and Odonata with a few exceptions. Hemiptera was usually seen to be the dominant group, with Ephemeroptera and Odonata following closely behind.
In general, the seasonality of occurrence of these insects had an autumn or early winter peak, though Hemiptera, Ephemeroptera and Odonata possessed summer peaks at the foot hills. The higher altitude Ephemeropteran and Dipteron forms, usually had an early winter or late spring maximum. It was also seen that the magnitude of fluctuations in biomass generally followed the rise and fall of density fluctuations. Rarely the peaks showed a time lag of more than a month. Among the physico-chemical factors recorded, all the factors more or less exhibited a spring or summer maxima and winter minima, with pH dominating on the acidic side at higher altitude, while being alkaline at lower elevations at the foot hills. Even though there existed a constancy of fluctuations in the physico-chemical parameters of the different habitats, yet they did not seem to affect the biotic component in the same way. Thus, order Hemiptera seemed largely to be affected by temperature and rainfall, with rate of colonization enhanced by their migration and ability to fly faster. Order Ephemeroptera though did synchronise with temperature fluctuations in an inverse pattern, yet seemed largely to be controlled by the amount of detritus and life history periodicity. In case of Odonata, Coleoptera and Diptera, the physico-chemical parameters appear to have very little influence on the population dynamics over the seasons. For these last groups of insects the submerged and emergent vegetation, detritus and the suitability of substrate had greater impact than the variation of the abiotic factors.

Despite these general observations, when a linear correlation and multiple correlation analysis were performed for the various orders of insects and the abiotic factors, it was seen
that at higher altitudes, Ephemeroptera and Diptera had negative correlation with most of the factors. Nevertheless, Odonata and Coleoptera showed positive significant relationship with temperature, the former at the foot hills and the latter at higher altitudes. The multiple correlation analysis showed that only members of the order Odonata have correlation with the abiotic factors at all the sites, while Coleoptera, Diptera, Hemiptera and Ephemeroptera showed only in one or two stations.

In identifying the build up of population by migration and colonization, the light trap experiments helped in determining the critical time. It was shown by the present investigations, that maximum catch invariably occurred in the monsoon season, concurrent with reports elsewhere that rainfall influenced the dispersal rate most. However, in addition to monsoon peak, there was a smaller pre-winter peak. While the major monsoon peak could be attributed to the search of food and habitat for reproduction, the small winter peak is probably for selection of suitable habitats for survival during this adverse period. In any case, the maximum dispersal always seemed to occur just before midnight irrespective of seasons and at both order and familial levels. Hemiptera seemed to be more attracted to light than Coleoptera and possibly this be attributed to the greater flying ability of the members of Corixidae.

The present study took into account, not only the migration to suitable habitats, but also the rate of colonization and hence artificial substrates were utilized for this purpose. It was seen that in both the substrates employed, all the five major orders were represented; generally the total insects were more i
Littorella than Rotala rotundifolia. This probably could be attributed to the greater surface area and the far richer dense cover the latter weed provided. The highest colonization in both Littorella and R. rotundifolia was seen to be from the order Ephemeroptera at Station 3; at Station 4 ephemerids exceeded in number in Littorella, while Odonata was more in R. rotundifolia. At the generic and specific levels, it was seen that most insects colonized the artificial substrates primarily to exploit the accumulation of inorganic and organic detritus and the periphyton on these mats. It had been shown that the seasonality of insects in these artificial substrates synchronized very closely to the seasonal studies of natural populations. This evidence unequivocally proves the suitability of such artificial substrates for population measurements. Such substrates are ideal as there is very little disturbance to the system or to the natural vegetation present.

Since one of the objectives of the present study was also to identify the role played by aquatic insects in fish cultural practices, experiments were conducted using the dragonfly nymph (Orthetrum sp.), which was a potential predator. It was estimated that the satiation time for a single nymph was about 40 minutes and it took 85 seconds to consume an individual prey. The predator capacity of these nymphs was quite high and amounted to nearly 16 spawn of Cyprinus carpio. The nymphs were found to regain maximum appetite every 24-36 hours after deprivation of food. However, a decline in 'predatory efficiency' was shown after 10 minutes of feeding. It was also shown that the time required for capture and consumption of a single spawn was less in the high prey densities than in low prey densities. This aspect of the present study
identified at least one of these potential predators and offers quantitative data for further investigations.

Finally, in addition to the different aspect of study already presented, an overview of insect population and species composition of the inland waters in the North-Eastern Region of India was attempted at different altitudes. This was undertaken primarily to identify the aquatic insects and their seasonality in both natural and man-made habitats. A very clear pattern of difference emerges in the total number of species being always higher in the altitudes than at the foot hills. However, in terms of abundance, a definite increase in trend is seen as one goes from altitude to lower elevations. There were also differences in species composition, between the high and low altitudes. Further, irrespective of altitudes, some species occur more in summer and other in winter.

It may be concluded that the data presented here on various aspects of the biology of aquatic insects from North-Eastern India, had hardly provided a bird's eye view of the magnitude of the problem. It becomes necessary and imperative to take up detailed investigations on each of these aspects. Such an attempt is already undertaken and the work is in progress on a long term basis.