CHAPTER- 3.0 MATERIALS AND METHODS

In the river Beas, selected for the present study, four sampling sites were chosen namely, Bhunter, Kullu, Patlikulah and Manali. All these sites were near the human habitation except Kullu site. Collections were made from these sites at fixed time and almost

remained uniform throughout as for as possible. The collections were made within a restricted range 100 -120 mts.

i) Estimation of Hydrological factors:

The following methodology was adopted to record the hydrological features of the water-

a) Flow of current

Water current (cubic feet/sec.) was calculated by cork floating method. Reading was recorded from 3-4 points, having different depths by placing the cork at the desired spot. Average of all these values was considered as the mean water current of the entire river.

The flow of current was measured by the following formula-

$$R = \frac{WDaL}{T}$$

Where, R = flow volume in cubic feet per second

W = average width of stream / river in feet

D = average depth in feet

a = constant factor for bottom type

(smooth, sand etc. = 0.9; rough rock etc. =0.8)

L = length of stream section measured

T = time in seconds for object to float the

measured distance

b) Depth

Depth is the vertical distance from the bottom to the upper surface layer of water.The river depth was calculated with the help of a marked bamboo stick. It was recorded from atleast 5-6 points having different depths and the average of all these points was considered as the mean depth.

c) Width

The river width was measured with the help of measuring tape. It is a horozontal distance from one bank to another bank.

d) Longitude, Latitude and Altitude (msl)

Longitude, latitude and altitude (msl) were determined with the help of Magellan GPS.

ii) Estimation of Physico-chemical factors:

Fish assemblage depends on the physico-chemical features, hence change in the composition of a fish community often indicate a variation in temperature regime, pH, salinity, solutes, dissolved oxygen, substrate composition etc. Therefore, abiotic factors play a important role in determining fish community and other living

organisms. All water quality parameters were estimated by the standard methods following APHA (1998). The water samples were collected at fortnightly intervals from the four fixed sites of river Beas throughout the period of investigation from December 2002 to November 2004. Water temperature was recorded with a ordinary mercury thermometer by dipping it directly into the water of the river and by exposing the thermometer in air at four experimental sites at different times of the same day. The transparency was measured by "Scale pin head method" (Bright pin fixed at one end of one metre wooden scale (Saha et. al., 1971). Hydrogen ion concentration (pH) of water was determined by a portable "digital pH meter". For dissolved oxygen, unmodified Winkler's method was adopted (Welch, 1948), while carbonate and bicarbonate (total alkalinity) were determined by titration method with N/50 Sulphuric acid using phenolphthalein and methyl orange as indicators.

iii) Analysis of Plankton:

The plankton forms were collected monthly from four selected stretches of the river along with water sample. A plastic mug of two liters capacity was used to draw water and thus for each sample 50 liters of water was filtered through the net of 25 bolting silk having a mouth diameter of 15 cm. Plankton were studied both qualitatively and quantitatively. The qualitative study of plankton was done from preserved specimens. Each sample was preserved in 4% formalin in separate specimen tubes and brought to the laboratory.

For quantitative analysis, a microtransect method as described by Lackey (1938) was followed. The method involved plankton enumeration in one drop of concentrated sample taken on a slide using a standard calibrated dropper. A drop representing a known amount of sample was put under the cover glass and the number of organisms was counted. Three drops were studied from each sample and average number of plankton per sample was drawn and computed per litre basis.

Since, one drop = 0.05 ml

And 20 drops = 1 ml

And if the number of microorganisms per drop = a organisms

Then number of organisms per 20 drops = a x 20 organisms

So, the number of microorganisms per 1000 drops = a x 20 x 1000 organisms.

iv) Analysis of Benthic fauna:

The **macrobenthic fauna** were collected monthly from four selected sites of the river by enclosing one square meter of river bed with square meshed cloth. The bottom stones, gravel and sand were upturned to dislodge the aquatic life. This resulted in collection of all the benthic life in the square meshed cloth. The organisms were hand picked and preserved in 4% formalin and analysed quantitatively and qualitatively (Jhingran et. al., 1988). The identifications of macrobenthic forms were limited up to genera level with the help of standard key (Ward and Whipple 1959; Needham and Needham,