CHAPTER- 1.0 INTRODUCTION

Man has been interested in ecology since he appeared on the earth as he always wanted to know about the environment in which he was living so that he may adopt himself according to the habitat or modify the environment for his better and smooth living. World population is increasing at an alarming rate. To meet its food supply every possible avenue should be largely explored. The high yielding varieties of food grain has already brought the “green revolution” in India. However, with the growing pressure on the arable land, to increase food production, agriculture has to be supplemented with fish culture / aquaculture.

Aquaculture in recent years has become one of the major avocation of farmers, entrepreneurs, educated and uneducated, young and aged people of India. India primarily an agrarian country is endowed not only with three oceans but with plenty of fresh water aqua resources in the form of upland streams, rivers, lakes, reservoirs etc. There are nine major river systems in the country—Ganges, Brahmaputra and Indus in North; Mahanadi, Godavari, Krishana, Cauvery in the uplands of western ghats at east coast; Narmada, Tapti and the Mahanadi in Vindhyas and Satpura at west coast. In India, fresh water resources are estimated to have an area of about 1.37 million hectares while the total length of Indian rivers and their tributaries is about 27.359 km (Jhingran, 1975) which offer great potentialities for fisheries development.

Most of the Himalayan rivers make their modest beginning in the higher Himalayas. The Himalayas are drained by sixteen major
rivers, namely the Indus, the Jhelum, the Chenab, the Ravi, the Beas, the Satluj, the Yamuna, the Ganges, the Kali-Sharo, the Karnali, the Gandok, the Kot, the Tista, the Raidak, the Manas and the Brahmaputra. Out of 16 rivers, eight major rivers namely the Indus, the Jhelum, the Chenab, the Ravi, the Beas, the Ganges, the Yamuna originate from the north-west Himalayas. As they move downwards from north to south, the main river bed also receives water from a large number of “hill streams” i.e. lateral water inlets, which are as important as the main rivers. These streams/rivers have been classified into four types namely A, B, C, and F (Rosgen, 1996 and Armantrout, 1998 a & b) which differ from each other in the characteristics of substratum, stream bed substrate, depth, particle-size, water flow, current, abiotic and biotic factors etc. The stream ‘A’ type occurs at high altitude and support very little fish life. The ‘B’ type commonly seen in the valley, support a variety of fish. ‘C’ type streams have marginal fish species because of shallow water and sandy basin. ‘F’ type streams are transitional and exhibit maximum fish diversity. These streams may be snow-fed, rain-fed or receive under ground water. The rivers and streams constitute about one thousandth of total inland surface area and carry about 37,000 cu.km. of water to sea annually. These rivers and streams are immense source of fresh water fish production provide breeding ground for adults and feeding ground for juvenile of most of the riverine fishes in the Himalayas. The overall ecology of most of the Himalayan rivers directly or indirectly depends upon the ecology of these streams. The ecology of rivers and streams varies considerably from one section to the other, from one season of the year to the other and from one
part of the globe to the other in a number of features like basin, altitude, water current, geomorphology, flora and fauna etc. Nevertheless their ecology has a special feature of its own, quite different from that of lakes, ponds, backwaters, swamps etc.

River water habitat may be classified, i) Lotic- (Latin Lautus, to wash) moderately running water habitat e.g. brooks, rivers and streams ii) Rapids – are the regions where water is shallow but flows with great velocity such as the water falls of a stream iii) Pools – are the regions where water is deep but flows with weak velocity and iv) Lentic- (Latin Lentus, sluggish) is standing water habitat e.g. lakes, reservoirs, ponds, swamps and marsh.

Two very contrastingly different ecological zones are also recognized along the length of a river system- the rhithron and the potamon. The rhithron extends from source to a point where temperature never exceeds 20°C. Oxygen concentration is constantly high, current is fast and turbulent, bottom is hard (rock, stone or gravel) deprived of silt, a true plankton is lacking and fauna is stenothermic and practically characteristics of running water. The potamon is the region beyond rhithron in which the mean temperature lies above 20°C, Oxygen concentration may at times become alarmingly low, current is slow with tendency to become laminar; bottom is soft (sand, mud and loose matter) and rich in silt.

Himachal Pradesh is unique as it blessed with four important rivers viz., Beas, Satluj and Ravi and Chenab originating from glacier, rumbling and swirling along the rugged mountains passing through awesome gorges, alternating with pools and fairy rapids. These linearly flowing rivers having maze of tributaries and branches dissect
many climatic zones in their downward drift and harbour one of the richest game and cold water fish fauna of the country like world famous mahseer, array of cat fishes and trout. Each year a large number of anglers both from home and abroad visit the state in the pursuit of fishing and practice age-old art of angling with varying degree of success. Beside, the major rivers there are several natural and man made lakes, reservoirs and small ponds dotted throughout the region harbouring different indigenous and exotic species of fish. The known fisheries resources of the state are 3,000 kms of riverine length, 40,000 ha of reservoirs, 800 ha of village ponds and 750 ha of high altitude lakes. Out of total 3,000 kms of riverine resources, 600 kms length have been categorized as trout zone. Due to its topographical advantage in the shape of network of rivers, spreading reservoirs, fast flowing cold water and harbouring wide array of temperature, sub-tropical climate is suitable for the special type of the fish. From the point of fisheries, the state can be divided into two zones, i) the upper mountaineous zone- is suitable for trout fishery, ii) sub-mountaineous zone- contributes to the other variety of food fishes.

River Beas (Vedic Arjiki and Sanskrit Vipasa), which has been taken up for the present study, is one of the main river of Himachal Pradesh. River Beas is important not only from the angle of fisheries, ecology, irrigation and power generation but is equally important so far as its historical and religious aspects are concerned. It has been named ‘Beas’ on the name of great Indian thinker and writer of the Mahabharta, ‘Maharishi Vyas’, who meditated on the right of Rohtang Pass, from where this river originates. On both the banks of river
Beas many places, which are symbols of ancient civilization, have dwelled and prospered namely Manali, Naggar, Katrain, Raison, Patlikulah, Kullu, Bhunter, Aut, Pandoh and Mandi. It originates from southern slope of Rohtang Pass (Beas Kund) at an elevation of 4062 m. It traverses down through the districts of Kullu, Mandi, Hamirpur and Kangra and enters plains of Punjab near Pong village and takes its course downwards to merge in river Satluj near Harike. The river receives a number of tributaries both on right and left banks during its downward drift of over 470 km. In Kullu district, its main tributaries on the east are the Parbati, the Spin and the Malana nala and the Solang, the Manalsu, the Sujain, the Phojal and the Sarwari streams in the west. At Bajaura it enters Mandi district, which is situated, on its left bank. In Mandi district the tributaries of river Beas of north side are the Hansa, Tirthan, Bakhli, Jiuni, Suketi, Panddi, Son and Bather. In Kangra, Binwa, Neogal, Banganga, Gaj, Dehr and Chakki tributaries from the north join it. The water of the river Beas has been diverted at Pandoh (Mandi district) through a big tunnel to join the Satluj. The northern and eastern tributaries of the river Beas are perennial and snow fed. Its flow is maximum during monsoon months. The river, its tributaries and anabranches harbour wide array of fishes including exotic trouts, schizothoracids, (snow trout) cobitids, Lesser Barils, catfishes, loaches and other hill-stream fishes. A large number of anglers and professional fishermen earn their vocation by fishing in the river Beas as well as its tributaries.

However, in recent years there is decline in the fish catches of river Beas attributed to number of factors including ecological erosion, dam construction, silt deposition, pollution and above all