Chapter - 2

STUDY AREA
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2.1 ARUNACHAL PRADESH AND UTTARAKHAND

2.1.1 Arunachal Pradesh

Arunachal Pradesh is a state of India, located in northeast India. Arunachal Pradesh borders the states of Assam and Nagaland to the south, and shares international borders with Bhutan in the west, Myanmar in the east and the People's Republic of China (PRC) in the north. Arunachal Pradesh, the land of 'Dawn Lit Mountain' covering an area of 83,743 km² situated in the extreme North Eastern part of India has huge potential with its enormous lotic and lentic water bodies. Arunachal Pradesh extends from the snow covered Himalayas to the Brahmaputra plains. It is located between 26° 30' and 29° 30' North latitude and 91° 30' and 97° 30' East longitude. The state drained with network of many rivers and numbers of mountain lakes like PT Tso lake, Mechuka lake, Mehao lake and Ganga lake have formed potential resources for mountain fishery based eco-tourism. All these network of rivers are habituated by unique sport fishes like Mahseer, Indian trout, snow trout and carps. The diverse ecological habitats formed due to variations of climate and altitude with massive mountain picturesque along with natural biological diversity and cultural diversity of various mountain tribes make it one of the few states in India endowed with an array of tourism resources. Arunachal Pradesh means "land of the dawn-lit mountains". It is also known as "land of the rising sun" in reference to its position as the easternmost state of India.

2.1.2 High Altitudinal Lake

The Tawang district of Arunachal Pradesh has got 12 numbers of lakes. The upper Siang district with 11 lakes placed in second. Besides, some other lakes have been reported from scattered region, like Mehao lake (10.6 ha area and 1640 msl altitude) and Sally lake (2.5 ha area and 435 msl altitude) in
Lower Dibang Valley District (Laskar and Pujen, 2004 and 2005), Lake Mechuka in West Siang and Lake Geker Sinyi (Ganga Lake) in Papumpare district. Few lakes are located near the roadside and the many are located at some trekking distance. This types of lakes will give a multidimensional importance as angling, scenic beauty, hill trekking etc. Boating and angling are among the plays' preferred by almost every tourist in a lake. For angling the fish resources have to be developed in the subjected lake. The suitable sport fishes are to be enriched in these lakes.

2.1.3 River and Reservoir

The most important of all the rivers at Arunachal Pradesh is Brahmaputra. This river, along with a few other major rivers and their tributaries form the river system of this north-eastern state of India. Most of the rivers coming down from hills and mountains, criss-cross the region and have a combined length of approx 2000 km. Major perennial rivers of Arunachal Pradesh are the Kameng, Lohit, Subansiri, Dikrong, Kamla (Ranganadi), Siang, Siyom, Tirap and their tributaries. A reservoir covering an area of 10-15 ha approximately has been constructed as a dam over the river Kamla (Ranganadi) of lower Subansiri district of Arunachal Pradesh. The reservoir mentioned above has recently been handed over to the state fishery department for initiating commercial fishery activities. There are many big tanks available in all the nine districts of Arunachal Pradesh.

2.1.4 Fish Diversity

Fish fauna of lower stretch of river Siang is comprised of 36 species belonging to 12 families. Ichthyofauna shows great affinities with fishes of Himalaya (Tor spp., Schizothorax richardsonii etc.), Assam (Sperata aor, S. seengala, Mystus cavasius) and other North-Eastern states (Schistura spp. etc.). Family Cyprinidae is largest, represented by 14 species while each of the families likes Anguillidae, Synbranchidae, Belonidae, Psilorhynchidae and
Clariidae, each represented by single species. *Labeo pangusia*, *L. gonius*, *Neolissocheilus hexagonolepis*, *Schizothorax richardsonii*, *Wallago attu*, *Sperata seengala*, *Mystus cavasius* are abundant species of lower stretch of Siang. They inhabit mainstream while other species like *Barilius* spp., *Schistura* spp. *Puntius* spp. and *Glyptothorax* spp. prefer to inhabit tributaries. A total of 21 species were recorded from the Rana Ghat, proposed dam site in Siang river and near Along in Siyom river. *Chagunius chagunio*, *Labeo pangusia*, *L. gonius*, *Neolissocheilus hexagonolepis*, *Puntius ticto*, *P. sarana*, *Monopterus chuchia*, *Xenetodon cancila*, *Psilorhynchus balitora* were most common in lower stretch. *Chagunius chagunio* accounted for 24% of total catch, followed by *Labeo pangusia* (13%), *Neolissocheilus hexagonolepis* (8%) and *L. gonius* (6%). In the upper ends of project areas, *Schizothorax richardsonii*, *Labeo gonius*, *Garra naganensis*, *G. tirapensis*, *Barilius shacra*, *B. tileo*, *Glyptosternum annandeli* accounted the major fish catch. *Schizothorax richardsonii* and *Labeo gonius* were predominant species of this zone accounting for 27% and 24%, respectively of total fish catch. The species like *Barilius shacra* and *B. tileo* inhabited the tributaries (Vishwanath et al., 2011).

2.1.5 Fishing and Angling

Arunachal Pradesh is also one of the best places to go for fishing & angling in the east. The state is bisected by the Lohit river and a number of smaller streams, all of which offer plenty of opportunity for reeling in some of the biggest fish likely to catch. The abundance of water and the simplicity of the sport have helped the sport to grow in Arunachal Pradesh. Arunachal Pradesh offers numerous possibilities to catch fish especially trout and Mahseer. Angling and Fishing in Arunachal Pradesh is a favorite sport in the area. The excitement and thrill of Angling and Fishing in Arunachal Pradesh is attracting many to the beautiful rivers and streams in Arunachal Pradesh. The most important place of fishing in Arunachal Pradesh is Pasighat. It offers good opportunities for fishing to the tourists. This place provides the facilities of
fishing in the Siang river. The fishing spots of this place include many places like Bodak, Yingkiong and Siom. The Mahseer being a favourite among anglers, getting a 20-30 kg over here is not uncommon (Vishwanath et al., 2011). The colder water of the higher reaches of Arunachal have the golden and the rainbow trout and anglers can easily enjoy the traditional but effective methods of fishing while trekking in the jungles of Arunachal. The state is bisected by the Lohit river and a number of smaller streams, all of which offer plenty of opportunity for reeling in some of the biggest fish catch. Trout fishing is possible at many locations, Bhalukpong and Tipi on the river Kameng, Pasighat, and Tezu on the river Lohit. The affordable Arunachal Pradesh Angling and Fishing Packages are a blessing for lovers of this sport. Arunachal Pradesh features several spots and locations for a variety of fishes like Trout and Mahseer. Sport fishes like Golden and Rainbow trout also attract fishers for Angling and Fishing in Arunachal Pradesh.

2.2 UTTARAKHAND

Uttarakhand is one of the most beautiful and enchanting region of northern India. It is also known as Dev Bhoomi, the Land of Gods. It extends between 77°34’ and 81°02’E Longitude and 28°43’ and 31°27’N Latitude. The State is spread over 53,483 sq. Km of land, which is 1.67 percent of the country’s total area. The most holy rivers Ganga, Yamuna and scores of other rivers originate in Uttarakhand. In Sanskrit 'Himalaya' means abode of snow, truly characterizing the vast permanent snow fields above the snow line. In the heart of these majestic mountains lies the state of Uttarakhand with Kumaun region in its east and Garhwal in the west. Uttarakhand lies in the Northern part of India amidst the magnificent Himalayas and dense forests. The state is bordering Himachal Pradesh in the north-west and Uttar Pradesh in the South and has international borders with Nepal and China. It is interspersed with rivers, deep valleys, glaciers, alpine meadows and high peaks. The State presents pristine, pure and picturesque environs. Two of the most important
rivers in Hinduism originate in the region, the Ganga at Gangotri and the Yamuna at Yamunotri. These two along with Badrinath and Kedarnath form the Chota Char Dham, a holy pilgrimage for the Hindus.

2.2.1 High Altitudinal Lake

Lakes Nainital, Bhimtal, Naukuchiatatal, Khurpatal and Sattal are situated at an altitude ranging from 1220 to 1937 m, all at latitude 29°N, within a short distance of each other, and within a 25 km radius of the Nainital town. Natural lake has a total area of 300 ha. (Nainital, Bhimtal, Sattal, Naukuchiatatal, Khurpatal, Shyamtal, Deoriatal, Hemkund, Roopkund, Kagbhushandital, Kedartal, Sahastratal etc). All lakes are small, with the largest one, Bhimtal, covering 72 ha. Lake Naukuchiatatal is the deepest, with a maximum depth of 40.8 m. The water of Kumaun lakes is mostly slightly alkaline. The water stratifies in spring and mixes during winter. Mahseer (Tor tor and T. putitora) dominated the catches in Bhimtal and Naukuchiatatal, with 59.5 and 45.0% respectively of the total for the five-year period. Common carp followed, with 34.8 and 31.5% respectively, while in Sattal it formed 22.9% of the total catch. Indian major carps (Labeo rohita, Cirrhinus mrigala and Catla catla), dominated the catches in Sattal with 64.1% of the total. Schizothoracines (e.g. Schizothorax richardsonii) represented 0.73 and 0.95% in lakes Bhimtal and Naukuchiatatal, but were absent in Sattal. Silver and grass carps, introduced in Bhimtal in 1985-86, appeared in catches from that year onwards. The low yield for these lakes seems to result from the lower fishing intensity. As a remedy it has been proposed to regularly stock this lake with fingerlings of mahseer, common carp. Stocking the Kumaun lakes is considered essential for increasing fish yields. In the state of Uttar Pradesh trout transplants of eyed-eggs were successfully hatched in the Garhwal region at Talwari and Kaldhyani hatcheries and produced stocking material for the Pindar, Birehi.

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2.2.2 River and Reservoir

The river system of Uttarakhand has a total length of 2,686 km. (River Ganga, Yamuna, Bhagirathi, Alaknanda, Kosi, Ramganga, Gori, Sharda, DhauliGanga, Mandakini, Pindar, Tonnes, Bhilangana, Saryu, Gomti and Kali etc); Reservoir, 20075 ha. (Nanaksagar, Tumaria, Baigul, Dhaura, Haripura, Tehri, Dhaulisanganga and Kalagarh etc). Major glaciers in the state are: Gangotri, Yanunotri, Pinderi, Kafni, Sunderdhunga, Nakuri, Milan, Baldhunga, Poling, Balati, Maiktoli, Kaphini, Namik, Ralam, Bander Punchh, Chorbari Bamak, Dokriani, Doonagiri, Khatling, Nandadevi, Satopnath and Bhagirathi-Khark, Tipra Bamak Glacier.

2.2.3 Fish Diversity

There are 83 species belonging to 39 genera, 12 families and 3 orders have been reported from the state. Out of which, 40 species have food value, 8 species have ornamental value and 5 species have sport value. Further, fishes of the state are categorized as native: Tor putitora, Tor tor, Schizothorax richardsonii, Labeo dyocheilus, Labeo dero, Garra gotyla gotyla, Macrobrachium assamensis (Coldwater prawn) etc, transplanted: Catla catla, Labeo rohita, Cirrhinus mrigala etc. and exotic: Silver carp (Hypophthalmichthys molitrix), Grass carp (Ctenopharyngodon idella) and Common Carp (Cyprinus carpio) and Rainbow trout (Oncorhynchus mykiss) etc. Species being used for culture in the state are: Hypophthalmichthys molitrix, Ctenopharyngodon idella, Cyprinus carpio, Oncorhynchus mykiss, Catla catla, Labeo rohita, Cirrhinus mrigala etc. along with Tor putitora, Tor tor, Labeo dyocheilus, Schizothorax richardsonii etc. (Vishwanath et al., 2011).

2.2.4 Fishing and Angling

Angling is a popular adventure sport that is fast developing in India. Fishing is an important part of the economy of Uttarakhand. Apart from agriculture, industries and tourism, fishing also plays an integral role in the
economy of the State. Some of the important lakes that have helped in the proliferation of the fishing industry are Bhimtal Lake, Roopkund, Naini Lake etc. In fact, the rivers in Uttarakhand also are susceptible towards fishing at Uttarakhand. Some of the rivers that help the fishing industry of Uttarakhand are: Ganga, Yamuna, Bhagirathi, Sharda, Alakananda, Kosi, Ramganga etc. Fishing in the Indian sub-continent offers the angler a variety of sport not available in many parts of the world. Jim Corbett National Park surrounded by rivers like Ramganga, Kosi, Sonanadi, etc, which are full of fishes, fishing and angling have become one of the leading attractions of this Park. In these rivers mahseer is the most available fish. The Golden Mahseer, a sporting fish, is found in large numbers in the rivers of Kumaon and Garhwal. Mahaseer is common name for large scaled, prized fish for angling world over. Mahseer fish once found all along Himalayan foothill Rivers, Now It is found only in Indian Himalayas. Ramganga river, Kosi, Ganga river, Kali river and Nayar rivers have been identified for angling. Angling is done completely on catch and release basis (of fish). In Pancheshwar mahseer conservation have also been exciting site for golden mahseer. Since the site is at the Confluence of Saryu and Kali river it is very ideal for mahseer angling. Angling is being operated in 8 km stretch of Ramganga river, which is started from Ramganga to Marchula. Common fishes on this stretch are yellow mahseer, silver mahseer and black mahseer. Angling for mahseer in Saryu and Kali river in Champawat district, river Nayar at Vyas point in Pauri district, Tons River form Mori to Sandra 3km stretch Ganga- Shivpuri to Kaudiyala 16 km stretch angling trout at Dodital and Assiganga. One of the most popular and successful spots for mahseer can be found in a location called Beas Ghat. Beas Ghat is situated in the foothills of the Himalayas and provides the ideal habitat for the Mahseer. This stretch of the Ganges, offers some of the most quiet and lucrative experiences of fishing in the wild.