HISTORICAL SKETCH AND PRESENT STATUS OF ICHTHYOGRAPHY
Fishes in general and freshwater fishes in particular, possess the advantage of being steady animals in reference to particularly their zoogeographical aspects, except for some few species which are euryecious. The freshwater fishes are necessarily confined to the inland lotic and lentic systems of the continents of the world. Fish distribution and their zoogeographical significance has therefore been studied by several workers primarily with an aim of constructing checklists for different places enabling Palaeodistributional pattern in larger regions and continents and to possibly predict and identify the evolutionary and radiation centres.

The criteria of zoogeographical divisions as a cause related to the effect of distribution of fish have since long been studied (Gunther, 1880; Berg, 1912, 1932, 1948-1949; Banarescu, 1960). Similarly, such general studies but with Palaeogeography as the criteria were carried out for different groups of fish in various climatic zones of the world (Myers, 1949; Schaeffer, 1956, 1969, Romer, 1966; Nelson, 1969 a, b, c; Patterson, 1975; Wiley, 1976). Simultaneously, works were carried out on specialised groups of fishes like Ostariophysi and its distributional pattern (Regan, 1922), Zoogeography of freshwater fishes (Darlington, 1948, 1957), fish classification based on their zoogeographical importance from fish faunal studies (Beaufort, 1951), Teleost taxonomy and zoogeographical studies (Banarescu, 1964, 1968b, 1975) and a further extension on Ostariophyisan classification and distribution (Greenwood et al, 1966). Mc Allister, (1968) and Mc Dowall (1973b) extended
the idea of distribution of fishes and their zoogeographical importance based on taxonomical works. It was Cracraft (1974) and Croizat et al (1974) who could be attributed the earliest in fish historical biogeography who gave evidences based on continental drift, thereby identifying centres of origin and distributional patterns of biota. Simultaneously, the effect of zoogeographical barriers in the distribution and dispersal of fish was shown by Briggs (1974b). Immediately, thereafter, for a couple of years and a little more, fish distributional aspects in relation to zoogeography was carried out in individual groups like the phylogeny and zoogeography of Salmoniform fishes (Rosen, 1974), modern Siluroids and their zoogeographical distributional patterns (Goseline, 1975), early biogeographic history of Ostariophysan fishes (Novacek & Marshall, 1976) and fish fauna in old lakes with their zoogeographical significance (Banarescu, 1977).

Though such general studies or individual groups of important fishes were carried out and dealt with on general zoogeographical aspects, two works of such a total zoogeographical nature are those of Mc Dowall (1978) who laid down the generalized tracks of dispersal and other criteria in fish distribution, and Briggs (1979) who gave the idea of radiation and evolution along with the zoogeographical significance by an indepth study of one particular group namely the Ostaryophysan fishes. All the works mentioned above to a very large extent cover the entire globe as it were, but the subject of
fish zoogeography have primarily been established on regional orientation and thereafter in a general understanding of larger areas. Such works necessitates taking up a review, on the major fish zoogeographical divisions of the earth.

The Neotropical fish fauna was studied as early as 1909 and 1928 by Eigenmann who revealed the similarities between the South American and African fish fauna. He also worked on the freshwater fishes of Chile and showed their distributional patterns. Thereafter Jordan et al (1930) worked on the fish fauna of Central America, while Schultz (1944) on Venezuelan cat fishes, Schaeffer (1947, 1952) on the Cretaceous and Tertiary fish of Brazil, identified enough evidences along with the present freshwater fishes for a possibility of land connection across the South Atlantic. Goseline (1944, 1972) followed the work of Eigenmann to further the knowledge of similarities between South American and African fishes. Hubbs (1953) worked on the Panama and Equador fish systematics and distribution while a similar work on South American freshwater fish fauna was done by Gery (1969). Roberts (1972) did a comparative study of the Congo and Amazon basin fishes while Geisler et al (1975) and Fink & Fink (1979) did an extensive and intensive survey respectively on the ecology and systematics of the Amazon fish fauna.

Faunal works on fish have been extensively done in the Holarctic Region beginning with the works of Heckel (1843, 1845) on fish systematics of Europe, Asia and Africa. Girard (1859)
studying the fish fauna of Mexican and the United States' boundary, identified the faunal limits between the two countries. Freshwater fishes of U.S.A. (Jordan, 1928), fish fauna of U.S.S.R. and adjacent countries (Svetovidov, 1945, 1952; Berg, 1948-1949), distributional pattern on Turcomenian loaches (Nikolsky, 1947), fish distribution based on hydrographic history of Western United States (Hubbs & Miller, 1948), zoogeographical positioning of fish fauna of Near-East and Perimediterranean regions (Kosswig, 1955, 1973), Texas fish distributional patterns (Hubbs, 1957), Romanian fish studies (Banarescu, 1957), origin and affinities of Western North American fishes (Miller, 1959), systematics and zoogeography of Poiciilid fishes (Rosen & Baily, 1963) were regional studies or on special fish groups. Miller (1965) worked on Quaternary fishes of North America, Miller (1966) and Myers (1966) on the geographical distribution of Central American fishes while Willock (1969) did similar works on the Missouri fishes in Canada. The Pliestocene and Recent fishes of the Holarctic along with their distributional pattern was done by Ross (1970). Thereafter, highly regional studies were carried out, like the systematics and distribution of Carassius from Danube (Hensel, 1971), the distribution history of South Appalachian fishes (Jenkins et al., 1972), fish fauna of Oligotrophic glacial lakes in Europe (Toivonen, 1972), geographical variations in cobitid fishes from Europe (Banarescu, et al. 1972) and zoogeography of Euromediterranean fish fauna (Banarescu, 1973). The late seventies were works of similar nature though with greater
clarity like the zoogeography of Maryland fishes (Lee, 1976), ichthyofauna of Central Kazagistan rivers (Dukravets & Biryukov, 1976), freshwater fishes of Netherlands (Nijssen & de Groot, 1976), Percid systematics and zoogeography (Collette & Banarescu, 1977), and the classical works on percid fishes in relation to Palaeographical and ecological succession of reproductive guilds (Balon, et al. 1977). One of the latest works from these regions is that of Lee et al. (1980) on North American freshwater fishes and their distribution.

The Ethiopian and Madagascan Regions fish faunal works could be traced to Steindachner (1870) and Günther (1880) on the fish fauna of Senegal and affinities of African freshwater fishes with Oriental Regions including India, respectively as the earliest studies. Since then distribution, systematics and affinities of African freshwater fishes (Boulenger, 1905, 1909-1916), the relationships of Nile fish fauna with African fishes (Nichols, 1928b) and Gongo fish faunal systematics and their distribution (David & Poll, 1937), were carried out. Limnological studies of African Lakes in relation to fish fauna was done by Worthington (1937), and continued by Trewavas (1949) who worked on African Cichlid fishes, their origin and evolution. The extensive Palaeontological studies of African fishes was initiated ten years later and continued till the mid seventies (Greenwood, 1959, 1972a, b, 1974; Greenwood and Patterson, 1967). During the same time works were carried out on Madagascan fish fauna (Arnoult, 1959, 1963) on Gambian and Volta fish fauna (Daget, 1960, a, b) on the relationships between drainage
basins and freshwater fishes of South Africa and their
distribution (Jubb, 1964, 1967), on the Central African and
Zambesi fish faunal systematics and distribution (Bell-Cross,
1965, 1972), on the systematics of African Bagrid fishes
(Jayaram, 1966b), on the Kafue and Middle Zambesi river fish
fauna and their barriers (Bell-Cross, 1967), on the relation­
ships of African Percid and Badid fishes (Barlow, et al, 1968)
and on the composition and ecological aspects of Crater Lakes' 
fish (Trewavas et al, 1972). A total analysis of the geographi­
cal distribution of African freshwater fishes was carried out by
Poll (1973) and Roberts (1975). Balon (1975) around the same
time did an indepth study on Lake Kariba eels and identified the
distributional aspects. Later holistic studies were those of
Bowmaker et al, (1978) who did an extensive work on the
biogeography and ecology of South African freshwater fishes.
The distribution of fish fauna and the possible nature of
separation due to the barrier of Kapaclaira Falls between Malawi
Lake and Zambesi river was shown by Tweddle et al, (1979).

The earliest works on the Australian and New Zealand
Regions could be traced to Gray (1842) who did a systematic
study of New Zealand freshwater fish fauna, followed by Ramsay
& Ogilby (1887) on similar studies from New Guinea. It was Weber
& Beaufort (1911-1962) who probably initiated in addition to
systematics, the distribution and zoogeography of the Indo­
Australian Archipelago fishes followed by Phillipps (1926a, b),
on the origin and distribution of New Zealand fishes. Hills
(1934), pointed out the importance of Tertiary fishes from Southern Queensland in his Australian fish faunal studies while Iredale & Whitley (1938) partitioned Australia into fish faunal regions. Thereafter regional works on specialized fish faunal groups and their studies were undertaken either in terms of their systematics or on aspects of zoogeography and distribution both in the larger areas of New Zealand and Australia (Stokell, 1950, 1955, 1972; Allen, 1956; Whitley, 1959; Munro, 1964, 1967; McDowall, 1964, 1966, 1973a; Burnet et al. 1969). With this in background the present status and knowledge of New Zealand fish fauna was worked out by Hopkins & McDowall (1970) and on the systematics and distribution of fishes in Australian rivers by Lake (1971, 1975). Once again works on fish faunal studies were done in smaller areas to make an indepth study of the present day fishes and with the help of their affinities and distribution to trace the origin and evolution for that region or for a specialized group of fish (Frankenberg, 1974; McDowall & Whitaker, 1975; Berra et al. 1975; Roberts, 1978).

For the present work it was ideal to trace the literature for the Sino-Indian (Oriental) Region to a large extent and in part to the South-West Pacific Region also. Since the present work is a region within the sub-continent of India, therefore necessitates to identify works first to the Oriental Region excluding India and to deal the latter in greater detail. When so done, general Oriental works, confined to specialized groups of fishes without regional basis have been done by Regan

In addition to the above, extensive works on systematics, distribution, ecology and ichthyography have been carried out on general Oriental fishes (Bleeker, 1849a, b, 1852, 1853, 1865 and 1873), Malayan fishes (Cantor, 1849), fish fauna of Sitang river (Blyth, 1860), fishes from China, Yantze Kiang and Afghanistan (Gunther, 1873, 1888, 1889), Afghanistan, Burma and Ceylon fishes (Day, 1880, 1889), Siam freshwater fishes (Sauvage, 1883), Cochin-Chinese and Cambodian fishes (Tirant, 1865), Burmese and Palestine fishes (Vignierrera, 1890, 1926), Borneo fishes (Vaillant, 1893, 1902), fishes of Southern Shan states and Borneo (Boulenger, 1893, 1894), Celebes and Borneo fishes and an attempt into insular zoogeography of South East Asian islands (Weber, 1894, 1895, 1911). The twentieth century in this region began not only with works on systematics but greater stress was laid on the distributional aspects, their origin, and affinities based on studies for some particular region, or for specialized groups of economically important fishes, their genera, and species (Volz, 1903, 1904, 1906; Popta, 1905, 1906; Regan, 1905a, b; Lloyd, 1908; Chaudhuri, 1908, 1911,
Kim, 1974). The late seventies were indepth studies on the systematics, distribution and affinities of Arabian Peninsular fishes (Banister & Clark, 1975), studies on the Chinese cat fish *Macrones sinenses* (Jayaram & Boeseman, 1976) and systematics and distribution of Pakistan fishes (Mirza & Hameed, 1975; Omar & Mirza, 1975; Sheri & Seied, 1975; Ahmad et al, 1976; Mirza & Awan, 1977; Mirza & Nijssen, 1978). Regions still not touched and certain important groups of fishes were taken up thereafter like the Southern Iraq fishes (Al-Daham et al, 1977), Sisord fishes of Nepal (Yonzon, 1977), *Puntius* species from Ceylon (De Silva & Kartmoulder, 1977), cobited loaches of a new sub family *Vallaintellinae* from South East Asia (Nalbant & Banarescu, 1977), Iran fishes (Coad, 1980a), their distribution and the factors governing it (Coad, 1980b).

With the general Oriental Region considered it was felt to treat the sub-continent of India and North-East India in particular for literature related to the present work. It was better to identify and separate general taxonomic and systematic works for both these regions before going into the works of zoogeography or its affinities in relation to fish fauna either for India as whole or North-East India in particular. With the exception of a few overlaps it was seen that most of the Indian works have begun primarily with systematics, identification of faunal lists, preparation of check lists of fishes in a particular region without any distributional aspects mentioned other than the place of collection and locality where collections were made. Some of the important papers of such systematic nature
The earliest of such studies for North-East India could be traced to McClelland (1842) who worked on the fish fauna from Assam and Khasi Hills followed by De (1910) who recorded 154 species of fish from the then Eastern Bengal and Assam. Chaudhury (1912, 1913) recorded new species from hill streams of northern Manipur and adjoining hills. An intensive study was initiated by Hora (1921a, b) when he listed fishes from Manipur and Naga Hills, 38 species of fishes from Darjeeling and N.E. Burma, the peculiarities of torrential fishes from Khasi Hills, description of 8 fish species from Siju caves Garo Hills (Hora, 1924a), a new species in 1925 again from Garo Hills (Hora, 1925a). Mukerji (1934) recorded 26 species of fish from Naga Hills and Burma while Hora (1935a) described 9 species from Darjeeling and Upper Burma with particular reference to Neomacheilus. During the same year Hora & Mukerji (1935) recorded 44 species from Naga Hills and in the subsequent year, Hora (1936e) revealed that the total fish species of Naga Hills was 49. The North Bengal region was covered by Shaw & Shabbeare (1938) recording as many as 431.
species while Hora et al. (1939) showed the variation of morphometric characters of *B. ticto* from North-East and Peninsular India. Hora & Gupta (1941) supplementing the work of Shaw & Shebbeare described fishes from Siliguri and Kalimpong. Menon (1952) and Menon (1954a) did an extensive survey of Manipur fishes while Sehgal (1956, 1959) listed fishes of Assam, Khasi and Jaintia Hills. A record of 121 fish species from Brahmaputra river was shown by Motwani et al. (1962). Higher in the altitudes in the Kameng district of Arunachal Pradesh, Jayaram (1963) and Jayaram & Mazumdar (1964) recorded 19 fish species. The systematic position of the genus *Salmostoma* was worked out by Banarescu (1968a) on species from North East India, Burma and Peninsular India. Banarescu & Nalbant (1968) described 8 cobitid species from various districts in Assam while Malhotra & Suri (1969) recorded 14 fish species from the Mokokchung district of Nagaland. Jayaram (1971a) recorded *Pimelodus chandaramara* (Hamilton) nearly 150 years after Hamilton from North Bengal region. Yazdani (1971), Yazdani (1972) and Pillai & Yazdani (1974) worked on Channid fishes, Mastacembeloid and cobitid species respectively from Assam and Meghalaya. Dey (1975, 1976) recorded 51 species of fish from the Pagladiya river in Assam while Yazdani & Talukdar (1975) recorded a new species of *Puntius* from Khasi & Jaintia Hills. Dutta and Sen (1976) worked on the fishes belonging to the genus *Labeo* from Assam. Yazdani (1977) created a new family *Pillaiidae* while Talwar et al. (1977) recorded a second new species of the same family from Assam and Meghalaya. Jayaram & Singh (1977) working on the collections of fishes from North Bengal reported 96 species while Dutta (1977) reported the
existence of 48 species from Tripura.

All these above have been either the records of species, occurrence of new species or a checklist. The idea of a zoogeographical study with possibilities of affinities from different parts of the world could be traced to Day (1976, 1879, 1885) who showed the presence of Malayan affinities in Indian fish fauna. Günther (1880) and Annandale (1914) revealed the presence of African elements in the freshwater fishes of India with the latter giving evidences of Africa being the centre of origin for Indian freshwater fishes. The distinctiveness in fish fauna on the northern and southern ranges of the Himalayas indicative of a barrier and therefore revealing distributional effects was done by Day (1878a), Stewart (1909) and Hora (1937g, h). Hora (1937a, i), on a detailed study on the Cyprinid genera showed the possible origin and distribution due to possible land connections between India and adjoining countries on character variation in the fish species. The distribution of fishes due to drainage patterns in peninsular India was first revealed by Hora (1938c, d). Further, (Hora 1938e, f, 1940, 1949b, c; Das, 1939; Hora & Nair, 1942) showed the importance of Satpura Ranges enabling Malayan fishes to be in Peninsular India. A similarity between fish species in the Western Ghats of Peninsular India with those of Sumatra and Borneo was shown by Hora (1942). The Malayan elements in the fishes of India and the possible migration of Malayan forms through waves at different periods was substantiated by many works of Hora (1944, 1947, 1948, 1949a,
1950, 1953a, c, 1955a) and Bhimachar (1945). The migration of hill stream fishes to Peninsular India was shown by Hora (1949d, e) as due to glaciations and climatic factors playing a great role in their discontinuity. The Malayan and Indian fish faunal similarities were substantiated to a large extent with the works of Menon (1951a, b, 1955a, b, 1973, 1980), Silas (1952) and Hora (1951a). Hora (1951b) also revealed four Indian fish faunal divisions, confirming these on the distributional peculiarities, (Hora, 1952a) and palaeegeographic patterns (Hora, 1952c). Based on extinct Dipnoi, Ganoid and teleostean fishes, the plaeodistribution of these fishes was shown to have a bearing on the origin of fish fauna of India (Hora & Menon, 1952, 1953). Menon (1954b) described peculiarities in the distribution of the Himalayan fishes, while Hora (1955c) stressed on the importance of tectonics in the distribution of fish. Jayaram (1955a) observed Palaearctic elements in Indian fishes, while Silas (1955) traced the origin of Ceylon fishes to Peninsular India. The evolution of torrential fish fauna progressing with the evolution of the habitat was observed by Hora (1955b). Studies thereafter were confined to zoogeographical affinities of a particular region or that of an individual fish group (Kaushiva, 1951; Mazumdar, 1952; Menon, 1961, 1963; Das & Subla, 1963; Menon & Sen, 1965; Tilak, 1976b; Ravishchandra, 1976; Govind & Raj Gopal, 1977). A final compilation of the Indian fish fauna from both its ecology and biogeographical aspects dealing with the possible routes of migration, centres of origin, evolution and radiation has been extensively reviewed by Jayaram (1974b, 1977d, e).
Though the above deals primarily with the zoogeographical affinities of the Peninsular Indian fishes and to some extent to those of the North East, yet the earliest consideration of North-East India as an important region goes to Hora & Mukerji (1935) and Menon (1954a) who recorded the importance of Chindwin drainage in North-East India. Later, Motwani et al. (1962), observed the commonness of fish species more on the eastern side of the Brahmaputra river than on the west. Mani (1974e) pointed out the importance of North-East as a transitional zone and a gateway along with Jayaram (1974b) who indicated the North-East as an area of rich speciation. However, very little work exist on the status of North-East fish fauna in relation to zoogeographical areas. The works of Pardhasaradhi & Alfred (1979, 1980a) could probably be attributed as the pioneers on these lines, who have pointed out the importance of distributional peculiarities both at specific and generic levels and with the phenomenon of isolation. The latter was extended in some species to show geographical relictness in some areas of the North-East (Pardhasaradhi & Alfred, 1981).

These studies have been confined to ecological or descriptive zoogeography based on the present records or collections of fish species in these areas. In contrast historical zoogeography or palaeogeographical studies have been in sporadic areas with records of fossil fishes in different geological periods. Other than the records of such studies no
one has traced the present day fish fauna to these studies in detail. Works exist on fossils from North Kashmir to North-East India and to the South up to Godavari basin in Peninsular India (Oldham, 1859; Miall, 1878; Lydekkar, 1886; Woodward, 1890, 1909; Annandale & Hora, 1925; Hora, 1937c, d, e, 1938a, g, 1939; Menon & Prasad, 1958; Prasad & Rao, 1958; Menon, 1959; Jain, 1959; Misra & Saxena, 1964; Bakshi, 1972; Shaw & Satsangi, 1974; Sahni & Chhabra, 1976; Khorana & Tirkey, 1977; Yadgiri & Prasad, 1977).

The foregoing review of literature which helps in the understanding of present day species of fish and their distribution, either for geological past or geomorphological present is not very helpful beyond a certain stage. This was primarily due to the reason that animal communities in general and fish communities in particular reach remarkable richness and this is probably the only index of such a diversity whether low or high useful in predicting centres of origin, radiation and evolution. It is ideal, however, to incorporate both these, where species are identified along with their individuals and looked at from a community level for different habitats (Mac Arthur, 1972; Ross, 1972). Such a relationship of species richness with the habitat conceived in terms of multidimensional co-ordinate systems and the various resource gradients both in space and time helping to fit the community in niche-hyper volumes has been detailed and worked out by Mac Arthur (1957). These aspects have since been made as indepth studies in various groups of fauna and flora. The most important works which have left an
impression on the importance of community studies have been on
bird species diversity (Mac Arthur, 1957, 1960, 1964, 1965,
Diamond, 1969; Tramer, 1969), and diversity in lizard communi-
amphibians and reptiles (Inger & Colwell, 1977), on some marine
benthic species (Sanders, 1968, 1969; Hessler & Sanders, 1967),
on foraminiferal assemblage diversity (Parker, 1954; Pielou,
Whittaker & Fairbanks, 1958; Sager & Hasler, 1969), Molluscan
diversity (Green, 1971, Kohn & Leviten, 1976; Aho, 1978)
diversity of fossilforms (Deevey, 1969; Rosenzweig, 1975;
Rosengweig & Taylor, 1980), on steam benthic macro-invertebrates' 
diversity (Wilhm, 1966; Young et al. 1976; Clifford, 1978),
insect species diversity (Whittaker, 1952; Menhinick, 1964;
Stout & Vadermeer, 1975; Hart, 1978), Arthropod species diversity
(Simberloff & Wilson, 1970), Distom communities (Patrick, 1968),
ant communities (Wilson & Taylor, 1967) and on various plant
species diversities (Dahl, 1960; Whittaker, 1965, 1969, 1972;
Whittaker & Niering, 1965; Pielou, 1966a, b, 1969, 1975; Monk,
1967; Daubenmire & Daubenmire, 1968; Mc Naughton, 1968; Peet,
1971; Whittaker & Woodwell, 1969; Auclair & Goff, 1971).

One group of animals which has been dealt with in detail
from aquatic habitats is the fish. Fish community structure and
factors affecting the status of the community, and the diversity
of fish, has been major fields in aquatic ecology as they also form the terminal link in aquatic trophic levels. Diversity with longitudinal distances from the river or stream sources has been worked out in fishes to prove their richness, addition and replacement of species from the source to the mouth of lotic systems (Forbes, 1907; Shelford, 1911; Hutchinson, 1939; Burton & Odum, 1945; Sheldon, 1968; Jenkins & Freeman, 1972; Jenkins et al., 1972; Tramer & Rogers, 1973; Harima & Mundy, 1974; Stauffer et al., 1975; Cashner & Brown, 1977; Swaider, 1977; Horwitz, 1978; Evans & Noble, 1979; Swaidner & Berra, 1979). A similar work on lentic systems has been done and in particular to large standing water bodies like lakes, by Greenwood (1964), and Barbour & Brown (1974). The effect of thermal discharge on the diversity of fishes has been worked out by Hillman et al. (1977) while estuarine fishes and their diversity was shown by Hoff & Ibara (1977). The importance of stream order, zonation, habitats and the general drainage and watershed affecting the diversity of fish fauna have been worked out in detail here and abroad (Trautman, 1942; Kuehne, 1962; Herrel et al., 1967; Vincent & Miller, 1969; Whiteside & Mc Natt, 1972; Hocutt & Stauffer, 1975; Gorman & Karr, 1978; Platts, 1979; Matthews & Hill, 1980; Pardhasaradhi & Alfred, 1980b; Barila et al., 1981). In addition fish community studies and their diversities have been done in reefs (Molles, 1978; Dale, 1978) and in marshes (Kushlan, 1976). The effect of Physico-chemical factors on habitat selection and morphological features and variations in determining fish community structure have been shown by Matthews & Hill (1979) and Gatz (1979a, b).
respectively.

Among the Indian works, Hora (1922a, 1936f, 1938b) showed the importance of substratum as an important factor, while Jayaram & Motwani (1963) identified water quality to be important in either the distribution or community richness of species. The formation of communities and their richness to enable different zones of habitats has been shown by Jayaram (1979).

A step further in understanding the trueness of species richness or species diversity is the phenomenon of evenness apportioned among them. This ratio between the observed diversity index and the maximum possible existence of diversity on a community is an indicator to enable the explanation of a community utilizing the possible ecological niche in that habitat (Pielou, 1975). This is preferably done as a supplement to the poisson distribution enabling the randomness and independency of populations to be reflective of a community structure. Particular ecological niches in addition to their independent dispersal pattern also reveal clumps or patches of populations and is possible to be indicative by the Morisita's Index of aggregation (Morisita, 1959). For our studies in addition to the above to bring about a conclusion in the possible prediction of distribution of fishes, Sørensen's Coefficient of Similarity (Q/S) indicated the lack of amount of diversity enabling the limits of horizontal distribution (Sørensen, 1948).
The present work, since it deals with fishes, the importance of the drainage, the watershed and the gradient involved in the different lotic systems would throw light on a total understanding for development of communities or migrations of fishes by the use of Average Gradient Indices.

A final analysis of all this would help in understanding the present day distribution and patterns of succession in the future colonizing of the lotic systems of North-East India.