REVIEW OF LITERATURE

The subject Indigenous Knowledge is very vast and extensive. The literature on this aspect with regard to Nagaland and inhabiting tribal community indeed is scanty. The subject matter encompasses huge parameters, to mention the significant ones, comprise characterization of significant areas of conservation, indigenous methodologies based upon traditional concepts and advanced to monitor, enumerate and evaluate the various components of biodiversity, categorizing the threatened indigenous knowledge (IK), systematic surveys of IK, how it evolves, study and share benefits of IK inclusive of ethnobiological knowledge of indigenous communities vis-à-vis conservation of biodiversity and various genetic resources, emerging newer trends and their application and integration with a view to widening and orienting the horizon of the existing knowledge, networking on biodiversity and development of inter-institutional support for the cause of biodiversity conservation.

Therefore, it becomes necessary to survey the published and unpublished Government reports, Vedic literature, travelogues and diaries, anthropological and ethnological accounts, literature on indigenous knowledge, ethnobiology inclusive of ethnobotany and ethnozoology, Newspapers and general magazines. Hence, the literature screening has been categorized into the following:

Indigenous knowledge on Natural Resource management with special focus broadly covers

i. Indigenous practices vis a vis Natural Resource Management
ii. Indigenous practices vis a vis agricultural system
iii. Indigenous practices pertaining to Medicinal and aromatic plants
iv. Indigenous practices pertaining to biodiversity conservation
v. Community based biodiversity conservation interfaced with indigenous knowledge.

2. Ethnobiology: To ascertain the accounts and records on various fauna and flora, their usefulness, publication of economic botany and zoology, the relevant journals and ethnobiological literature were consulted to ascertain the local uses of plants and animals and their parts.
3. Non-Ethnobiology aspects:
   i. Old and obsolete literature: In some of the ancient literatures, we often found records mentioning about plants and animals that have been associated with life and civilization. Such old records which have been discovered recently provide useful data about the use of plants and animals. We have a huge heritage of Vedic literature and some documents like *Materia Medica*, which contains very important and useful data on medicinal plants and animals.
   ii. Botany and ethnobotany aspects: Such literature on botany and ethnobotany contain vast information about plants and use of their parts that are incorporated in ethno-medical usage of plants. Methods and tools of ethnobotanical research are having far reaching effect on the allied sciences especially useful for ethnozoological research.
   iii. Others: Historical accounts, anthropology, sociology, ethnology, folk literature, Government reports, Gazetteers, travelogues, Newspapers and general magazines are useful sources for ethnobiological research.

   In accordance with the above broad areas of coverage in the research, attempts have been made to map out the existing literature considering the parameters of works dealing with diverse issues and their contextual differences; it has been considered more appropriate for a thematic presentation together with highlighting the individual works. The works which have been ascertained are arranged in the following paragraphs, and classified in accordance with their contextual origin.

2.1 Evolution of Traditional Knowledge

   As the evolution of civilization grew progressively, men became more and more intelligent and the knowledge and wisdom were translated and preserved in the form of signs, symbols, inscriptions, paintings and carvings on clay tablets and stones. Such information of various world civilization such as Assyrian (4000 BC), Sumerian (3500 BC), Indian (3500 BC), Chinese (3000 BC), Egyptian (2500 BC) etc. were recorded in ancient manuscripts. The inscriptions of Sumerian Clay Tablet referred about plant remedies, which are regarded as the world’s oldest “Medical Text Book”. From these clay tablets we can study the uses of several plants as medicine of which Ergot (*Claviceps purpurea*), Deadly Night Shade (*Atropa belladone*), Ephedra (*Ephedra simca*) etc. are important (Sinha, Rajiv K. 1996).
Atharvaveda (2000-1000 BC) of India is considered the oldest available record containing valuable information of medicinal plants (Shah 1981). Atharvaveda recounts about 2000 plants having medicinal properties (Maheshwari, 1987). Even the legendary Puranas, like Brahma Purana and Vayu Purana of pre-vedic period, mention medicinal plants of which, Sanjivani, now identified as *Selaginella bryapteris* by Dixit (1982), was known to be resurrection plant to restore life after death. Tulsidas the Ramayana has reference of this plant in connection with resurrection of Lakshmana when Ravana killed him (Sinha, Rajiv K., 1996).

In post vedic period, many legendary figures of Indian medicine like Charaka, Sushruta, Vagabhatta, Nagarjuna, Attreya, etc. worked on medicinal plants and animals which were recorded in Vedas. These works were Charaka’s “The Charaka Samhita” (100 AD), the oldest available Ayurvedic classic recording about 230 types of animal substances; Vagabhatta’s the Ashtanga Hridayam Samhita (800 AD) recording about 67 types of animal substances; Sushruta’s the Sushruta Samhita (800-900 AD) recording about 225 types of animal substances; Chakrapani Dutta’s the Dravyaguna Sangrah (1060 AD) recording about 165 types of animal substances; Madhava’s the Madhavadrayaguna (1250 AD) recording about 201 animal substances and Kesava’s the Suddhamantraprakasa recording about 199 types of animal substances (Unnikrishnan, 1998).

Ortus Sanitalis meaning ‘Garden of Health’ written in 1491, by an unknown author in Latin was published at Mainz and it was used as ‘Text Book of Medicines” in England. De Historia Stirpium by Funchs in 1542 and A New Herbal by Turner in 1551 gave some true scientific accounts of medicinal plants (Wallis, 1967).

The history of ethnobotanical study in India is about four centuries old when Os Coloquis was written by Garcia da Orta and published in 1563 giving an account of indigenous medicinal plants of India, but without using the term ethnobotany (Rao, 1996). While living in Goa he studied native drug shops, learnt the ways of the local physicians, discussed treatments with Persian physicians and his record resulted publication of this book (Burkill, 1965).

After a long span of time, scientific study of Indian indigenous drugs was reinitiated in the last century when, A Catalogue of Indian Medicinal Plants and Drugs (Flemming, 1810); Materia Medica of Hindoostan (Ainsile, 1813); The Indigenous Drugs of India (Dey, 1896), Bazar Medicines and Common Medicinal Plants of India (Waring, 1897) and Indian Medicinal Plants (Basu, 1918) were published, but the momentum gained with the publication of Indigenous Drugs of India (Chopra, 1933) and revision of Basu’s (1918) Indian Medicinal Plants, by Kirtikar and Basu in 1935.
2.2 Indigenous Knowledge and Tribes

The Indigenous Knowledge (IK) is “the knowledge that the people in a given community have developed over time and continue to develop”. It is a local knowledge unique to every culture or society that provides basis for local-level decision making in agriculture, health care, food preparation, education, natural-resource management and a host of other activities in communities. Indigenous Knowledge commonly held by communities rather than individuals is tacit knowledge and therefore difficult to codify is embedded in community practices, institutions, relationships and rituals providing problem solving strategies to the communities. Learning from IK, by investigating first what local communities know and have, can improve understanding of local conditions and provide a productive context for activities designed to help the communities.

The Indian sub-continent is inhabited by over 53 million tribal populations belonging to over 550 tribal communities that come under 227 linguistic groups. They inhabit varied geographic and climatic zones of the country. Their vocation ranges from hunting – gathering, cave–dwelling nomadic to societies with settled culture. Forests have been their dear home, and totally submitted themselves to forest settings; their relationship with the forest was in total harmony with nature. They utilized natural resources without disturbing the delicate balance of the eco-system. Living close to nature, the tribal communities have acquired unique knowledge about the use of wild flora and fauna most of which are not known to the outside world.

The tribal communities have acquired unique knowledge about the use of wild flora and fauna, hence the plants and animals influenced the intellectual and material culture of men and their references have appeared in ballads, tales, folklores, songs, legends, myths, rhymes, riddles and proverbs of ancient time. There are tribes who retain their traditional customs and way of life shrouded in mystery of little known myths and folklore. Indigenous people of a particular region have an intimate knowledge of many aspects of their surroundings and their daily lives to maintain their environment in a state of equilibrium. The tribals gathered fruits, leaves, meat, fish and even insects for their food, medicine, ornaments and clothing. The importance of plants and animals thus, was realized by the early men during the course of their struggle for existence. This experience accrued into a system of knowledge and grew into an integral part of their culture and passed down orally from one generation to another (Sinha, Rajiv K., 1996). This rich knowledge system if subjected to scientific scrutiny could benefit the humankind in many ways.
2.3 Ethnobotanical Study

During the last quarter of the 19th Century, extensive studies have been intensified on plants relating to medicines, foods, dyes, fabrics etc. used by primitive and aboriginal people, in their day to day lives and their ways of such uses with different concept and approach have been made which eventually coined the origin of term “Ethnobotany”.

An American botanist, Power in 1875, used the term “Aboriginal Botany” in his description of plants used for medicine, food, textile, fabrics and ornaments by the Neeshenan Indians of the Bear River of California. The French botanist Rochebrune (1879) used “Ethnographie Botanique” for the study of useful plants from archaeological sites. However, both the terms could not find universal acceptance. It was Harshberger (1895) of the University of Pennsylvania, who suggested the terminology ‘Ethnobotany’ while addressing the University of Archaeological Association on 4th December, 1895 to describe the plants that have been used by primitive and aboriginal people and published a paper entitled “Purpose of Ethnobotany”. Harshberger (1896) defined the term “Ethnobotany” in describing the culture and tradition of the tribes who use the plants for food, shelter and clothing and the term was widely accepted. Ethnobotanical aspects were investigated by Fewkes in 1896 in Mexico who followed first Harshberger’s suggestion to adopt the term “Ethnobotany” for the title of a paper entitled “A Contribution to Ethnobotany”.

Subsequently, different workers defined the subjects and greatly enhanced the scope of making it an interdisciplinary science for holistic approach to man-plant relationships (Rao 1996). Schlutes (1962) defined ethnobotany as ‘the study of the environment’. Alcorn (1984) stated that ‘it is the study of contextualized plant use’. Jain (1987b) stated as ‘the total natural and traditional relationship and interactions between man and his surrounding plant wealth’. Wickens (1990) distinguished ethnobotany from economic botany by considering it as ‘the study of useful plants prior to their commercial exploitation and eventual domestication’. It includes the use of plants by both tribal and non-tribal communities without any implication of primitive and developed societies.

The last part of the 19th century saw the virtual origin of revolution of the term Ethnobotany in the scientific study and it has received overwhelming attention in several parts of the world, especially in the United States and the Latin American countries. The outcome is publishing volumes like The Folklore plants (Dyer, 1889), Ethnobotany of the Coahuilla Indians (Barrows, 1900), Notes on Jamaican Ethnobotany (Beckwith 1927), Ethnobotany of the Thomson Indian of British Columbia (Steedman, 1930), Ethnobotany of Western Washington (Gunther, 1945) etc. The scope of ethnobotany was much

As far as ethnobotany in India, the Guidelines and Tools of Research in Ethnobotany relevant to traditional medicine, Bodding (1925, 1927) undertook the studies of Santal medicine and connected folklore on the medicinal practices of the tribals of Bihar and Bengal. Elwin’s (1943) work on the medicinal practices of the Maria Gond tribes of Bastar in Madhya Pradesh is another milestone. Ahluwalia (1952), published a scientific paper on medicinal plants of Kangra Valley. Later, Janak Ammal (1954), initiated the organized study and research in “Indian Ethnobotany”. She studied subsistence food plants of certain tribes in South India in order to explore better prospects of Dioscoreas in India (Janaki Ammal, 1955). Biswas (1956) who followed the above process and studied certain medicinal plants of Darjeeling and Sikkim Himalayas.

Janaki Ammal was followed by Dr. S.K. Jain and his associates who carried out organized ethnobotanical studies in Central India (Jain 1963a, 1963b, 1963c, 1963d, 1964b, 1965a, 1965b, 1981a, etc.) and later, in North-East Region (NER) and other parts of India (Jain and De, 1964, 1966, Jain et al, 1977, Jain and Dam, 1979, Jain and Borthakur, 1980).

Since 1960, ethnobotanical research in India has been intensified at different regional offices of Botanical Survey of India (BSI), research centres like Regional Research Laboratory (RRL), Jammu, Central Drug Research Institute (CDRI), Central Institute of Medicinal and Aromatic Plants (CIMAP), National Botanical Research Institute (NBRI), Lucknow and Central Council of Research in Ayurveda and Siddha (CCRAS), New Delhi as well as in several University Centres throughout the country (Binu et al., 1992). The mission attracted many workers who contributed their support in bringing out many volumes, namely Glimpses of Indian Ethnobotany (Jain 1981b) which is the first book dealing with Indian ethnobotany, Bibliography of Ethnobotany (Jain et al., 1984), A Manual of Ethnobotany (Jain 1987a), Methods and Approaches in Ethnobotany (Jain 1989), Tribal Medicine (Chaudhury et al, 1989), Contribution to India Ethnobotany (Jain 1990), Dictionary of Indian Folk-medicine and Ethnobotany (Jain, 1991) Ethnobotany in India (Maheshwari et al., 1993), Cross Cultural Ethnobotany of
North-East India (Saklani and Jain 1994), Medicinal Plants of Manipur (Sinha, S. C, 1996) and Ethnobotany in Human Welfare (Jain 1996).

Subsequently, under the leadership of Jain, an organization, “Society for Ethnobotanists” was formed on 20th November, 1980 to promote the “Ethnobiological Science” in India in particular as well as in the world in general. These activities ultimately culminated in the establishment of an autonomous institute, the “Institute of Ethnobiology” in 1995 with its Headquarter in NBRI, Lucknow.

### 2.4 Ethnobotanical Study in Northeast India

After Jain’s initiation, ethnobiological research got further impetus in North eastern region of India. Borthakur (1976, 1980, 1981) studied ethnobotany of tribes of Karbi-Anglong of Assam, Rao and Neogi (1980) recorded 65 plan species used by the Khasi and Garo tribes of Meghalaya as medicine, food, fish poison, etc. Rao and Jamir (1982, 1990) studied ethnobotany of Ao and Angami Naga tribes of Nagaland, Barua and Sharma (1984) enumerated 25 medicinal plant species used by Bodo tribes of Assam giving details of the part used and methodology of treatment, Singh and Singh (1985) recorded 30 wild plant species used by indigenous people of Manipur as vegetable and allied purposes, Jamir (1989, 1990, 1997) studied ethnobotanical aspects of medicinal and other useful plants from Nagaland used by various tribes of Nagaland, Changkija (1991) worked on ethnobotanical study of Mokokchung and Tuensang districts of Nagaland, Borthakur (1996a) enumerated 155 edible plant species from forests that were sold in markets of Assam, Gogoi and Borthakur (1996) studied ethnic plant classification and nomenclature of Tai Khamtis of North eastern region, Islam (1983, 1984, 1996) studies certain ferns and wild plants used as vegetable and ethnobotany of certain underground parts like rhizomes, tubers, bulbs etc. of different plants used by aboriginal tribes and other indigenous peoples of different localities of the North eastern region, Singh (1996a) studied on plants used in medico-sexual purposes by Meitei community in Manipur recording 20 plants species, Singh (1996b) also dealt on ethnobotanical observation on traditional and crude method of preparation of Chaorak (a local wine) by the tribals of Tripura, Singh H.K. et al., (1996) studied on indigenous bio-folklore and practices and their role in biodiversity conservations in Manipur; Singh, Jalal, (1996) enumerated 65 plant species of ethnobotanical importance used by the Mishing tribes of Jorhat district of Assam; Singh and Singh (1996) dealt with the superstition in botanical folklore of 18 indigenous plant species with reference to culture of Meitei community of Manipur; Lalramnghinglova and Jha (1997) studied ethno-medicine of Mizoram dealing ethno-
mineral products, ethno-medico-botany, ethno-medico-zoology and ethno-veterinary plants used by ethnic communities of the State and Singh et al; (1997) studied ethno-medico-botany of Tripura dealing with 30 medicinal plant species used by the Tripuri tribes etc.

The wild plants are used for all kinds of requirements and there is enormous germplasm which can be profitably employed to improve the modern cultures and some wild plants can be adopted as future food, fibre, and oil plants to meet the increasing demand. In this context, it is not only essential to conserve this wealth of information but also to apply modern bio-chemical and agricultural techniques to determine the utility of adaptability of the most useful among them to meet modern requirements. Further, with the adaptation of wild indigenous germplasm and its improvement, the socio-economic and industrial development of the backward and tribal communities can be achieved without changing their food habits and their local cottage industries (Mithree 1990). The aspect of conservation or balanced use of resources by early man, which existed in abundant measure, but was not adequately observed, understood and appreciated is now receiving attention and emphasis and as elucidated by Jain and Mitra (1991), steps to include tribal economy include organized collection of plant products, on the spot conversion into transportable products and small cottage industries which can ultimately bring about social and economic uplift of the people. The native folks have learnt to utilize indigenous plants in various ways and much of this wealth is preserved as unwritten Materia Medica. In recent years this knowledge is slowly fading (Gupta 1986). Rao (1990) has enumerated 125 plant species used by the ‘Ao’ and ‘Angami’ tribes of Nagaland and the preliminary study revealed the uses of 28 medicinal plants, 57 wild edible plants and 36 plants of miscellaneous uses. Megonietso and Rao (1983) and also Rao and Jamir (1982) have carried out some ethno-botanical studies in Nagaland.

Any ethno-botanical inquiring into the traditional botanical knowledge (TBK) of extant people is dependent on the effective application of a number of key anthropological and botanical methodologies. Anthropological field techniques including participant observation and structured surveys permit the collection of both quantitative and qualitative data related to plant use and subsistence practices, while orthodox plant taxonomic methods are crucial to any accurate ethno-botanical investigation (Cotton 1996). The field work for ethno-medico-botanical survey is to be followed by laboratory work for phyto-chemical survey of the presence of alkaloids. Although plant alkaloids have been isolated and studied for over 150 years, only about two per cent of all recorded plant species has been tested for alkaloids and even fewer of the isolated compounds have
been carried out to full elucidation of the structures (Maheswari, 1986). Maheswari (1983) has highlighted the importance of ethno-ecology and is of the view that indigenous knowledge and perceptions could usefully be incorporated into development planning and environmental management.

Projects aimed at sustainable development depend on economic viability, social acceptability and ecological sustainability; for example – where forest clearance proves, in short term to be more profitable than more sustainable activities, then forest clearance is likely to proceed (Godoy et al., 1993); equally, where non-timber plant products (NTFPs) prove a commercial success, problems of over harvesting are likely to ensue (Cunningham, 1993). For the long run it is thus imperative that economic returns from sustainable activities are maximized and effective controls over rates of extractions are developed (Cotton, 1996).

Such ethnobotanical accounts serve as very useful guide for ethnozoological study. One can adopt the method of investigation and presentation of data of ethnobotanical study in ethnozoological investigation.

2.5 Ethnozoology Reports

Though the records on the uses of animal and animal parts for medicines, food, ornaments, rituals and other religious belief are very ancient, there is no mention of the terminology “ethnozoology” till eighties. There are many volumes that describe the uses of animal and parts and some important volumes are Materia Medica of Hindoostan (Ainsile, 1813); The Mammals of India (Jerdon, 1874); Fauna of British India including Ceylon and Burma. Mammal (Blandford, 1888-1991); The Indigenous Drugs of India (Dey, 1896); Handbook of Sericulture (Mukherjee, 1899); Outlines of Economic Zoology (Raese, 1942) and Handbook of Indian Animals (Preter, 1947). The Wealth of India, Raw Material Volume I to XI contain a wonderful account on the use of the plants and animals with their chemical ingredients arranged in alphabetical order.

Accounts of the uses of animals, animal parts and related anthropogenic activities appearing in anthropological literatures, serve as important secondary sources for Ethnozoological study. Some important workers, who recorded the uses of animals and products or parts by the tribal communities of Bhuttianah and Harriyana Peter (1866); Thomson (1867) on Baiga tribes; Man (1885) on aboriginal inhabitants of Andaman Islands; Peal (1896) on eastern Nagas of the Tirap and Namchik areas; Elwin (1944) on the traps used by Kuttaia Khond tribes of Rajasthan; Bose (1964) on Onge tribes of Little Andaman; Ali (1973) on the tribes of Madhya Pradesh; Rao et al, (1989) on the Onge
tribes of Little Andaman Islands; Sarkar (1994) on semi-nomadic tribes (Birhor) of Bihar; and Bagchi (1994) on health, food habits and nutritional scenario among the tribal communities in the Islands of India.

Many authors who studied the uses of animals and their parts as foods, medicines, ornaments and other uses by tribal communities have published such findings in anthropological and scientific literature appear to be of ethnozoological character in nature. Subramanian (1934) on the collection and uses of termite as foods in South India; Mathur (1954) worked on insects and other animals which are used for human consumption in India.

In India, the ethnozoological research began by constituting the All India Coordinated Research Project on Ethnobiology (AICFR). Inter-organizational panel for food and agriculture of the Indian Council of Agricultural Research (ICAR) had its meeting convened in 1976 under the Chairmanship of Dr. M.S. Swaminathan. As per the resolution of the meeting, an expert team of working group with Dr. T.N. Khushboo as its chairman was constituted to examine the current status of ethnobiological studies of tribal communities and to submit its report on how the tribal communities use biological resources could be conserved and utilized for socio-economic improvement of the tribals as well as the country. Accordingly, the working group prepared a proposal for setting up the AICRPE in 1981 under the UN programme “Man and Biosphere” which became operational in 1982 in about 24 research institutes and centers in India (Anon, 1994a).

Indian sub-continent is so rich in natural ethnobiological wealth and tribal communities use these in diverse ways for meeting various requirements, the working group felt the necessity for study on the tribal knowledge system of utilizing animal wealth. Sensing the necessity, the working group included the study in ethnobiological research discipline under the term “Ethnozoology”. The task was entrusted primarily to the Zoological Survey of India (ZSI); (Anon, 1994a).

Since then, ethnozoological researches have been taken up by many workers in intensive manner. Authors like Joseph (1988, 1989) on ethnozoology of tribals of Madhya Pradesh and Odisha mainly focused on eleven animal species used for treatment of various types of diseases and ailments; Gaur et al., (1988) on ethnozoology in Garhwal Himalaya recorded 41 animal species of ethnozoological importance; Pushpangadan (1990) on animals and animal products used in local health in India; Dagar and Dagar (1992) on some ethnozoological observations amongst the tribal of Nicobar Islands; Maiti and Ghosh (1992) recorded 76 species of different animals used for tribal medicine, out of which 16 species are invertebrates and 60 species are vertebrates including human being; Joshi et
al., (1993) on uses of insects as food in India; Kalita et al., (1994) investigated variety of insects and their products used as food by different ethnic groups of Assam recording 20 insect species; Sanyü (1994) on Mithun (Bos frontalis) dealing with its significance in social and economic life of the Nagas; Kulkarni et al., (1995) recorded 9 species of wild animal for medicinal use from western Maharashtra; Borthakur (1996b) recorded 9 species of fishes used in the treatment of complaints of women during postnatal period in Assam; Dutta et al., (1996) investigated animals and animal products used in indigenous system of treatment in Assam and recorded about 15 animal species; Ghosh and Maiti (1996) made ethnozoological investigation on 20 animals species and their parts including human products, which have been proved as vital for treating for 21 diseases particularly, tuberculosis, rheumatism, asthma, impotency and paralysis; Pandey (1996) mentioned 8 animal species and the uses of their products in Ayurvedic system of medicines; Sharma (1996) investigated on the drugs of animal origin in Unani medicine.

There is almost no record of works on biological exploration in Northeast India before the Britishers visited the area. The impetus for exploration came with the establishment of British power in the Brahmaputra valley. Griffith (1836) was the first worker on the useful plants of the region with special mention of “Meeshmee Teeta” (Coptis teeta). Robinson (1841) mentioned the trading of Mishmi teeta outside the territory. Hooker (1872-97) worked on British India flora including the Northeast region without mentioning the economic and other uses. Kanjilal et al., (1934-40) worked on flora of Assam mentioning economic importance of the plant species. The above mentioned authors have been the first group who produced a set of primary work on the Flora and their uses. They attempted to compile all the available botanical information from the region. These works are the authentic references for botanical and allied study.

Ethnobotanical studies of Northeast, India

On the other hand, the zoological work in the region comparatively is very less. Blyth (1843) seems to be the first to study the faunal diversity of the state. He studied Langurs of Assam (Northern Assam-Seajulia, Dafla hills, now the Subansiri Districts including Papum Pare district of Arunachal Pradesh; and Northern Lakhimpur). Blandford’s work (1888-1991) contains a good account of mammals of India including Naga hills. The subsequent workers are Wroughton et al. (1912-1919), Honton and Lindsay (1926), Smith (1933-1935), Kurup (1965), Agarwal (1980), Arora (1981), Mehta (1987), Radhakrishnan (1988), Choudhury (1990).

In the context of ethnobiological works in Northeast India, it seems that the ethnobiological research in the region had received impetus after nineteen seventies. RRL
(1976) conducted botanical exploration in Tawang District and collected more than 70 plant species of medicinal, insecticidal and other importance and Raghunathan (1976) led the medico-botanical survey team contains medico-botanical aspects of Indian system of medicines and Homeopathy in the region. Hajra’s (1977) worked on some medicinal plants from Kameng District and Joseph (1977) could gather some information on few medicinal plants used either as oral contraceptive or abortificient by Abors of Siang District. Thothathri and Pal (1978, 1987) worked on medicinal plants from Tirap district and Subansiri District; Tiwari et al., (1978, 1979, 1980, 1984, 1996) on medicinal plants from Tirap, Subansiri and Siang District; Arora (1981) on native food plants of the North Eastern Tribals and recorded 300 plant species. Dutta Choudhury (1985) on herbal medicine and its implication in family planning among the Singphow tribes of Tirap Dsitrict; Haridassan et al., (1995) also recorded 49 species of medicinal Plants of the state highlighting the distribution, habitat, propagation, part used and their uses as well as made an additional list of 475 medicinal plant; Hegde and Ingalhalli (1988) on medicinal uses of orchids of Arunachal Pradesh; Gangwar and Ramakrishnan (1990) investigated medicinal folklore on 171 plant species used by Nishis, Hill Miris, Sulungs and Apatanis; Saklani and Jain (1994) on detailed study of cross-cultural ethnobotany of Northeastern region; and Godbole (1996-97) studied indigenous knowledge in maintaining mountain natural resource management taking a case study on Wancho/Naga community in Tirap district in Arunachal Pradesh.

The above works on ethnobotanical works, though exclusively deal with ethnobotanical aspects, are quite informative and provide necessary guideline for collection of ethnobiological data and documentation.

The celebrated works include Pemberton’s Report on the Eastern Frontier of British India (1835), who attempted to compile all the available information on the land and people of eastern frontier of British-India; Butler’s A sketch of Assam with some accounts of the Hill Tribes, by an officer (1847) made early description of Abors, Akas, Daflas, Khamtis, Mishmis and Singphos; Dalton’s Descriptive Ethnology of Bendal (1872) gives accounts of Mishmis, Abors, Daflas, Akas and Nagas; Cooper’s The Mishmee Hills (1873) gives account of Mishmi tribes mentioning consumption of edible beetle - a Pentamid bug locally known as Gandhi Pug; Needlam’s Report of a trip in to the Abor Hills, 1884 (1895); gives accounts of Abor tribes; Kennedy’s Ethnological Report on the Akas, Khoas and Mijis and the Monpas of Tawang (1914) and Furer-Haimendoft’s Ethnographic Notes on the tribes of Subansiri region (1947) gives an excellent account of
Apatani tribe and subsequent works are now invaluable source of material for researchers of tribals.

Apart from books, the early British administrators and explorers of the nineteenth century and published in various journals, especially in the Journal of Asiatic Society of Bengal, the important workers are Griffith (1838) on accounts of use of methon and pig during marriage prevalent among the Mishmi tribes and also on Mishmee teeta (Coptis teeta); Dalton (1845b) on account of traps, uses of Mythons (Methon), chicken, pig etc. in propitiating evil spirits; Needham (1886) on traditional prophylactic measures against disease, vivid account on use of squirrel in marriage, and belief in sylvan spirit prevalent among the Padam Abors and Krick (1913) gave an account on the belief in evil spirit causing various diseases and ailments and their propitiating ritual functions; tattooing and indigenous village council system practiced by the Abors.

Similar reference and accounts have also been published in several anthropological journals and literature. Chater (1912) gives account on cane suspension bridge of Abors; Basu (1929) illustrates the cane-work of the Nagas, Mishmis and Abors; Kingdonward (1930b) described the Mishmi custom of human sacrifice at a funeral; Mills (1947) recorded the custom of human head hunting practiced by Mishmi tribes; Sengupta (1952, 1953, 1955, 1956, 1960) gives investigation on dietary habits of the Padam Abor, Minyong Abor, Galong Abor, Panggi Abor and Nocte tribes and nutritive value of tribal beverages of these tribes; Furer-Haimendorf (1954) on religious belief and ritual practices of Minyong Abors; Roy (1956, 1958a, 1958b, 1958c) on weapons of war and chase, dresses, ornaments and decoration, hunting and fishing and domestic animals and their role in the life of Abors; Kar and Gogoi (1993) on health culture and tribal life of Nocte.

After Independence, another spate of literature mostly tribe-specific anthropological studies also emerged under the administrative policy to protect and promote tribal culture based on Nehru-Elwin line of tribal development. To this group the publications of North East Frontier Agency: A philosophy for NEFA (Elwin, 1957); The Art of North East Frontier of India (Elwin, 1958a); Myths of the North East Frontier of India (Elwin, 1958b); India’s North East Frontier in the Nineteenth Century (Elwin, 1959); The Tangsas of the Namchik and Tirap Valley (Dutta, 1959). The first study had been done by the Zoological Survey of India (ZSI) during the phase-I period (1982-88) of AICRPE programme and made ethnozoological investigation of tribal predominated areas in 17 states on India. Accordingly, about 76 species of animals have proved to be the vital source of tribal medicines for treatment of many diseases (Anon., 1983-87, 1994a). Dutta Choudhury (1987), while recording ethnomedicinal aspects of 15 plant species based on
Singhphow tribes, recorded use of ‘chapsike’ (Bile of Bear) for treatment of asthmatic trouble and ‘tumshikan’ (stomach of Porcupine) for treatment of abdominal pain. Maiti (1988) made investigation on ethnozoological aspects of more than 65 tribes in India. Maikhuri and Ramakrishnan (1992), while investigating ethnobiological aspects of 134 plant species used by the Nishing tribe and others, recorded the calorific and protein value of meat of certain animals like Deer, Frog and Snail.

2.6 Ethnobotanical Studies of Nagaland


After independence, many workers have done a spate of similar studies. Among them, though unpublished, the survey works of Thepfulhouvi Angami, a plant collector from Nagaland Forest Department in 1981, is the first of its kind. Rao’s Ethnobotanical Studies in Nagaland (1982) is the first available published work on botany of Nagaland in post-independent era and is followed by Jamir’s Some interesting medico botany used by A0 – A Naga tribe (1989) who worked along the hills and valleys of Mokokchung district. The other important workers are Changkija et al. (1996, 1997, 1999), Deorani et al. on Folk Medicinal Plants of the Nagas in India (1999), Gokhale on Signature of Plants Through the Camera (1998) and Hynniewta Floristic Diversity Conservation Strategies in India (1999) and Deorani’s Medicinal Plants of Nagaland (2007). Deorani (1995) worked on Orchids of Nagaland highlighting their distribution, botany and economic importance. Deorani (2007) gave a vivid account on forest types of Nagaland. Plant Resources of Nagaland by Nagaland Bio Resource Mission (2009) has come up with extensive coverage of floristic wealth on Nagaland.

Keeping in view, the large numbers of indigenous tribals who inhabit the hills of Nagaland and the diversity in their culture, life style and usage of rich faunal wealth of the state, the ethnobiological exploration have paramount importance. Many references appear in anthropological and ethnobotanical accounts, though very useful and informative are scattered here and there. However, the studies conducted so far, cover only a very small fraction of the ethnozoological information that the state possesses. It needs further systematic investigation in order to acquire more information on Ethnozoology and for detailed documentation of the IKS, which can be effectively utilized in the conservation
of biodiversity, sustainable developmental, planning of the tribal economy and ensuring environmental security to the indigenous people and the posterity.


Community-based Conservation of Biodiversity in Nagaland


2.7 Biodiversity Management-Tribal Concepts

The tribal concept of biodiversity and its management is guided by traditionally laid down customs and every member of the society is expected to confirm to it. The fate of the individual and the community at large depends on their relationship with unseen forces, which intervenes human affairs. If men offend them, the mystical power punish by natural calamities. Their perception of nature-man relationship, exploitation and management of various nature elements are uniquely loaded with conservational concerns and successful management strategies.

Nagaland is one of India’s smallest states, where Naga tribes possess spectacular wealth of IK. These are tribes who retain their traditional customs and way of life shrouded in mystery of little known myths and folklore. Indigenous people of a particular region
have an intimate knowledge of many aspects of their surroundings and their daily lives to maintain their environment in a state of equilibrium. However, the tribes are now engulfed in the rising tide of modernization and they are giving up old customs, beliefs, habits and oral traditions on medicines, food and rituals. The habitat where the tribal communities lived and the environment in which their folklores evolved on the uses of wild plants and animals is fast disappearing on account of modernization. Therefore, it is necessary that effective measures are taken to study and document this invaluable knowledge.

Keeping in view, the large number of indigenous tribals those inhabit the hills and plateaus of Nagaland and the diversity in their culture, life style and usage of rich floral and faunal wealth of the state, the ethnobiological exploration have paramount importance. Many references appear in anthropological and ethnobotanical accounts, though very useful and informative are scattered here and there. However, the studies conducted so far, cover only a very small fraction of the ethnobiological information that the state possesses. It needs further systematic investigation in order to acquire more information on ethnozoology and ethnobotany for detailed documentation of the IKS, which can be effectively utilized in the conservation of biodiversity, sustainable developmental, planning of the tribal economy and ensuring environmental security to the indigenous people and the posterity.

The Earth Summit of UNCED, Rio-de-Janeiro in June 1992, declared it is global mandate for Biodiversity Conservation. Green cover, the backbone of plant biodiversity that provide timber, food, fuel, fodder and many other usufructs including a number of medicinal plants of diverse utility have been decreasing alarmingly. The loss of biodiversity is depleting the socio-cultural heritage of rural people especially tribal communities who earn their livelihood from the forest. The forest management may handle scientific management of timber and NTFP yielding of Nagaland species with added preference to multi-purpose forest species including herb, shrubs and tree of economic importance, their propagation, cultural practice and protection.

Nagaland is a small State located in the far flung corner of Northeast India, can be divided into three broad physio-agronomic zones namely i) the lowland foothill; ii) middle ranges and iii) highlands (Deorani, 2007). It is blessed with well-distributed long spell of rain and natural water resources in the tropical, sub-tropical, and temperate areas. Due to geographical isolation and lack of awareness, the people of the region face lot of disadvantages. Micro-Level Management through Participatory micro projects, social forestry and agroforestry programmes should integrate management of natural resources, promotion of forestry outside forest areas, development of appropriate harvesting,
processing, storage and marketing of NTFPs and transfer of technologies approach could be used to address local needs Meru et al., (2007).

The people of the land found to use plant based remedies based on their indigenous knowledge for curing and control of diseases of their agricultural crops, domestic animals and humankind, Bioresources of Nagaland (2008).

SWOL/SWOT analysis is identification of Strengths, Weaknesses, Opportunities and Limitation/Threats for evaluation of any activity/sector. The sustainable development is based on economic viability, social acceptability and ecological sustainability. For example – where forest clearance proves, in short term to be more profitable than more sustainable activities, then forest clearance is likely to proceed Godoy et al., (1993); equally, where non-timber forest products (NTFPs) prove a commercial success, problems of over harvesting are likely to ensue Cunningham, (1993). In the long run it is thus imperative that economic returns from sustainable activities are maximized and effective controls over rates of extractions are developed Cotton, (1996).