ISSN 2454-1168

CONFLUENCE

S.B.M.S.College Research Journal

Vol - I : No. - I
2014

CONFLUENCE

S.B.M.S.College Research Journal

Vol - I : No. - I

2014

Editors :
Dimbeswar Saikia
Dr. Chittaranjan Das

Publisher
Principal, S. B. M. S. College
Sualkuchi, Kamrup, Assam

Confluence
Vol-I, No.-I
: Research Journal of S. B. M. S. College, Sualkuchi, Kamrup, Assam
Jointly edited by Dimbeswar Saikia, Dr. Chittaranjan Das and
published by Principal, S. B. M. S. College, Sualkuchi
E-mail : collegesbms@gmail.com,
Website : www.sbmscollege.org

Year of Publication : 2014

ISSN 2454-1168

Price : Rs. 200/-

Printed at
Printworth
Kamakhya Gate
Guwahati-781009
Ph. : 98640-45196

Preface

Configuring 'Confluence'

'Confluence' refers to an intellectual stretch and stride in case of the esteemed faculty members of S.B.M.S. College, Sualkuchi, Kamrup, Assam. It is indicative of a target to be achieved sometime in future only after a long endeavour. The paths will be built with diligence, by sincere intellectual activities and the mission might sink if there is lack of consistency. 'Confluence' is committed to play a role of path-finder in academic and intellectual discourses. It also refers to the body of inspiration, guiding force in one's long voyage of academic pursuit.

Divergent streams of thought and views sometime strive to meet for the welfare of the human race, as we know that all our thoughts and ideas emerge out of the necessity to find out better means for the existence of our own self and our neighbourhood. There has been moment of crises which are evident from the annals of human civilization; these have made scrupulous people more conscious about the need of streamlined thought, innovative ideas and methodical and scientific study of it. It is the basis on which groups of likeminded people emerge and these groups seem relentless to carry out whatever agenda they have at their disposal for human welfare.

It may be a drop, but it has its own worth if unites with other drops to form an ocean. S.B.M.S. College has also a long history of work culture and thought culture. Research is not a new thing to its learned teaching faculty and other stakeholders. It is worth-mentioning that the thought which emerged in the work and research of one of the faculty members could draw the attention of Amartya Sen, a renowned economist and social scientist, with international acclaim.

S.B.M.S. College has a dynamic, dedicated group of faculty. This is an enthusiastic lot and it strives to assert itself through contributions to the thought process and to the academic discourses

of the contemporary world. The ever changing scenario of education keeps this group very much active, creative and innovative in order to carry forward the intellectual mission. In other words, 'Confluece' can become the intellectual indicator of this group.

This is the maiden publication towards research writing. This will cover diverse fields, humanities, social science, pure and applied science. The institution has two streams, Arts and Science, so, the journal has to welcome research papers from both streams. Therefore the journal has to be heterogeneous in character. There is provision to consider research papers from guest faculties also.

At present, there is a committee for the journal and there is a proposal to appoint a Review Committee for the later issues. Regarding publication, opinion of the expert will be final. For this issue the editors have requested research papers from the faculty members which were at par with the decision of the journal committee. However, the editors or the journal committee can no way be held responsible for any unauthorized, unacknowledged entry regarding research papers contained in this issue.

For this issue the response of our learned faculty members is overwhelming. They seem to be very keen in research writting. The present principal namely, Dr Dipesh Ch. Bhagabati is the publisher and he is a constant source of inspiration for this venture. This is the brain-child of the Teachers' Unit of the college and this Unit entrusted upon us the job of editorship. We offer our sincere thanks and gratitude to each and every one behind this project.

Sincerely Yours
Editors
Dimbeswar Saikia
Dr Chittaranjan Das

Contents

Śaṅkaradeva's Neo-Vaiṣṇavite Movement and New Social Structure of Assam

Banti Borah
Associate Professor
Department of Philosophy
S.B.M.S.College

ABSTRACT:

Śaṅkaradeva was the propagator of the neo-Vaiṣṇavite faith of Assam which was a part of great Vaiṣṇava movement of India. Assam was fortunate to have a versatile personality like Śaṅkaradeva in the fifteenth century who was able to give a new social structure of Assam. Before the advent of Śaṅkaradeva the socio-political and religious conditions of Assam were very poor where religion had lost its' true meaning and significance. Through his *Eka-śaraṇa-nāma dharma*, the religion of self surrender to one, who is Viṣṇu or Kṛṣṇa, Śaṅkaradeva was able to bring a remarkable changes in different fields of Assamese life and culture. By abolishing rites, rituals and crude religious practices, Śaṅkaradeva tried to give a simple form of religion with devotion as the cardinal feature to bring individual as well as social uplift. As a religious reformer, a humanist, a socio-cultural activist Śaṅkaradeva will remain as an indispensable part of Assamese life. In this paper, an attempt is made to show the prevailing social conditions of mediaeval Assam and Śaṅkaradeva's contributions in giving a new social platform to all sections of the society.

Key words: Vaiṣṇavism, Śaṅkaradeva, Neo-Vaiṣṇavite movement

Objectives of the study:

- To make a general account of Vaiṣṇavite movement of India.
- To make a study of Neo-Vaiṣṇavite movement of Assam.

- To give an analysis of Śaṅkaradeva's Philosophy.
- To show the prevailing social conditions of Śaṅkaradeva's Assam.
- To establish Śaṅkaradeva as a religious reformer of Assam and a pragmatic philosopher.

Methodology: Analytical and Comparative study

Sources of the Study:

Primary Sources - Some Original Works of Śaṅkaradeva

Secondary Sources-

(i) *Charit-Puthi* (Compiled and Edited)
(ii) Some Research Works done on the Bhakti Movement of India
(iv) Relevant books on Vaiṣṇavite Movement and Neo-Vaiṣṇavite Movement of Assam
(iv) Relevant Journals

Introduction:

The Neo-Vaiṣṇavite movement with devotion *(bhakti)* as its cardinal feature was started in India in the mediaeval period. But Vaiṣṇavism had existed before that and had been a living force in the Gupta period. The Gupta kings were all the champions of the religion of Vāsudeva. The germs of the Vaiṣṇavite cult may be traced back to the Vedic period. Vaiṣṇavism being a part of Hinduism worships Viṣṇu or one of his incarnations (usually Kṛṣṇa or Rāma) as the Supreme God. Intense faith in a personal God is the chief characteristic of Vaiṣṇavism which distinguishes itself with the Vedāntic thought that one God or Brahman is the substratum of everything. Viṣṇu, who is eternal Brahman of the Upaniṣads, according to Vaiṣṇava preachers, is originally a Vedic God.[1] In later times Viṣṇu is identified with Nārāyana, the Supreme. Vāsudeva Kṛṣṇa of the *Mahābhārata* is also identified with Viṣṇu-Nārāyana. So, in Vaiṣṇava dharma, Viṣṇu is variously known as Kṛṣṇa, Nārāyana, Hari, Rāma etc.

Vaiṣṇavism got a new form at the later period when it was mostly associated with the concept of Bhakti or devotion to personal God. In the two great works *Mahābhārata* and *Bhāgavata-Purāṇa*, Vāsudeva-Kṛṣṇa is regarded as the son of Daivaki, who is nothing but Supreme God and represent Him as the founder of the religion surcharged with devotion which is called the Bhagavata, Satvata or Vaiṣṇava religion.

The seed of Vaiṣṇavism in South India was sown by the Ālvārs, who were the earliest Brahmin messengers to the South flourished between sixth to

ninth centuries. The collection of the hymns of these Ālvārs, consisting of four thousand verses, is called Nalayira-divya-prabandham and is placed side by side with the Veda.[2] Viṣṇu with all his avatāras, and particularly the Kṛṣṇa avatāra, was the object of their deep veneration. They used to adore idols of Viṣṇu of different forms, although the mode of worship was mainly confined to recitation of his names and contemplation of his forms. They gave emphasis on the emotional side of bhakti. Śhri-Vaiṣṇava Āchāryas came after the Ālvārs who united jñāna and karma with bhakti or devotion for realising God. Their object was to reconcile the Vedas, the Upaniṣads and the Gītā with the Tamil *Prabandham*.[3] Nāthmuni was the first āchārya. Yamunāchārya, the grandson of Nāthmuni, laid the foundation for all the doctrines that are now ascribed to Rāmānuja.[4]

There were four *sampradāyas* known as *Śhri, Brahma, Rudra* and *Sanakasampradāya* headed by Rāmānuja, Madhva, Vallabha and Nimbārka respectively. Rāmānuja expounded the theory of Vishiṣṭādvaitavāda (Qualified Non-dualism) where Madhvāchārya expounded Dvaitavāda or (Unqualified Dualism). Āchārya Vallabha's theory is known as Shuddhādvaitavāda (Pure Non-dualism) and Āchārya Nimbārka expounded the theory known as Bhedā-bhedavāda or Dvaitādvaitavāda (Dualistic Monism). All other current minor sects are said to have been included in these four sampradāyas. Rāmānuja tried to explain Vaiṣṇava philosophy from Vedāntic standpoint. In his Vedānta-Saṇgraha, an elaborate essay on the teachings of the principal Upaniṣads, he attacked the interpretation of Śaṅkarāchārya of the very famous passage of the *Chāndogya Upaniṣad*, namely '*Tattvamasi*' or 'That thou art' and also Śaṁkarāchārya's doctrine of Māyā. According to Rāmānuja, Viṣṇu or Nārāyana alone and the only one who can be so named and so identified. Rāmānuja advocates a personal deity possessed of all attributes capable of giving liberation to devotees. Rāmānanda, who established a sect at Varanasi, brought the message of Bhakti to northern India. Gradually, through the dedicated works of Ruidās, Jayadeva, Kabir, Nānak, Mirābāi, Vallabhāchārya, Surdas, Tulsidās, Śaṅkaradeva, Chaitanya and other saints, this religious movement permeated the Indian society and a gradual shift occurred in Hinduism itself where from the domain of rituals, emphasis was getting directed towards "bhakti", i.e., towards establishing a personal God.

The official name of Śaṅkaradeva's Neo-Vaiṣṇavite movement is *Eka-śaraṇa-nāma-dharma* or *Mahāpuruṣia dharma*. Like other Vaiṣṇava cult both Śaṅkaradeva and Chaitanyadeva did not feel the need of *Vedanta Sutra Vāsya* in propagating neo-Vaiṣṇavite movement. Śaṅkaradeva accepted *Bhāgavata-*

purāṇa and *Gītā* as the principal scriptures to construct his philosophy. Due to the emphasis on *Bhāgavata-Purāṇa* his religion is also called Bhāgavata dharma. After studying innumerable scriptures Śaṅkaradeva gave this monotheistic religion. It cannot be denied that Śaṅkaradeva's philosophy has similarity with the advaita vedanta of Śaṁkarācārya. But he maintained a gap with the Absolute monism of Śaṁkarācārya as well as Qualified monism of Rāmānuja. Alternately it can be said that he tried to combine both advaitavāda and bhaktivāda in order to make his religion more effective for the common people. By giving emphasis on *saguṇa sākara* worship of God Śaṅkaradeva tried to lift the illiterate people; to give them the way to *nirguṇa* Brahman. Mādhavadeva also described God as *nirguṇa*, devoid of adjuncts (*upādhirahita*) and of the nature of effulgence (*jyotirŭpa*) but recommended Kṛṣṇa for devotion.

Śaṅkaradeva's Neo-Vaiṣṇavite faith relies on monotheism i.e., devotion to a single, supreme God, Viṣṇu or Kṛṣṇa. It gives emphasis on self-surrender to the supreme God Sri Kṛṣṇa who is the creator, preserver and destroyer of the world. Restrictions are shown in worshipping minor gods and goddesses on the ground that they are nothing but the partial manifestations of supreme God Viṣṇu or Kṛṣṇa. In his famous book '*Kirtana-Ghoṣā*' Śaṅkaradeva describes the twofold aspects of God and there he says that as indeterminate God is not comprehensible, devotees including the gods (devas) worship and adore His beatific form as Nārāyana.[5]

Bhakti (devotion) plays an important role in Śaṅkaradeva's philosophy. He believes that bhakti has tremendous force in bringing a close relation between God and devotee. In various works of the sect e. g., the *Bhakti-ratnāvali,* the *Bhakti-ratnākara*, the *Bhakti-pradipa*, the *Nāma-Ghoṣā*, the *Bhakti- viveka*, the *Saraṇa-samhita* etc. the different aspects of *Bhakti* have been dealt with.[6] 'Absolute self surrender to the Lord' and 'a Feeling of ecstatic joy in serving Him' are the two characteristics of bhakti. Though Śaṅkaradeva says about nine modes of bhakti yet *śravaṇa* and *kīrtana* are popularly recognised as the best. In his *Kirtana-Ghoṣā* he narrates how Ajāmila, a sinful brahman, went to the abode of Viṣṇu when at his death-bed he remembered his son Nārāyaṇa. Lakshminath Bezbarua in his book 'The Religion of Love and Devotion' writes: "The eka saraṇa of the Gitā superimposed upon the idealism dāsya-bhakti with sat-sanga or companionship with bhaktas of the Srimadbhāgavata and the Hanumāntikastha, i.e., the unwavering and firm devotion and allegiance to one and the only one God as of Hanumān to Rāmchandra, is the main plank of Śaṇkara's creed."[7]

Origin of the Problem:

The neo-Vaisnavite movement of Śaṅkaradeva and the uplift of the society are the two sides of the same coin. So, in order to discuss the new social structure of Assam it is necessary to give an account of prevailing socio-political and religious situation of mediaeval Assam. There is no doubt that Śaṅkaradeva's advent as a religious reformer was a need of that time. The aim of this article is to show the adverse scenario of Sankaradeva's religious movement and his dedication to bring new life and culture to the Assamese society.

Discussion and Result:

Before Śaṅkaradeva's arrival, Assam showed a picture of diverse shades and grades of culture. The majority of the people belonged to non-Aryan tribes and they had distinct manners, customs and religious beliefs. The political condition was unstable due to the conflicts for supremacy of power amongst different group of Hinduism. Different sects like *Śaivism , Śaktism* or *Tāntric Vaiṣṇavism* were the dominating religious forces of ancient Kamrupa. The *Kalika-purāṇa* and *Yogini-tantra* have mentioned several places sacred to God Śiva and there still exist many Śaiva temples in Darrang and Kamrup districts, some of which have been in existence at least since the time of the composition of the *Kālika-purāṇa.* Śiva appears in the *Yogini- tantra,* as in the earlier *Kālika-purāṇa,* oftener as a *Bhairava* than as a normal deity; and he could therefore, be adored with extreme left-handed *(vāmācāra)* practices.[8] J.P.Rajkhowa writes that at the Śiva temples 'Nat' or dancers were picked up to offer their dances for propitiation of Śiva and in reality these girls were subjected to the sexual exploitation by the powerful masters of the temples.[9] The non-Aryan tribes like Kacharies also practised a form of primitive Śaivism by sacrificing buffaloes, he-goats, pigeons, ducks, cocks, rice and liquor. Bāthau-brāi, the god of Bodo-Kacharis, can be equated to Śiva of the Hindu. Śaṅkaradeva's father Kusumbara, who had no issue till an advanced age, is said to have worshiped Śiva for a son.[10]

Śaktism was also a dominating force up to the advent of neo-Vaisnivism. It was mentioned in the *Kālika-purāṇa* and *Yogini-tantra* that Śakti in her different forms was worshipped in different temples. But the centre of Śaktism had been the shrines dedicated to Kāmākhyā situated in Guwahai. Another temple namely Jayantesvari of Jayantiāpura located in Jayantia hills was there, where human sacrifices also performed along with animal sacrifices. Besides Kāmākhayā, Śakti in her different forms like Ugratara, Mangalcandi, Siddheswari, Bhairavi, Cāmunda, Burhi Gosāni, Dirgheswari etc were worshipped in different places. All these facts showed the dominance of Śakti worship at the time of

Śaṅkaradeva. Both the chief scriptures of Assam Śaktism, the *Kālikā-purāṇa* and the *Yogini-tantra*, belong to the 'left-hand' school of Śaktism, and enjoin blood sacrifices and various esoteric rites.[11] B. Kakati in his book "Mother Goddess Kamakhya" writes: "The land was infested with itinerant teachers of the Vāmācāra Tāntric schools with their insistence on the philosophy of sex and palate. Among religious rites, the most spectacular were bloody sacrifices to gods and goddesses amidst deafening noises of drums, cymbals, night-vigils, virgin worship and the lewd dances of temple women."[12] Even the great Śaṁkarāchārya had to go back defeated because Śaktism was too deeply rooted in ancient Kāmrupa.[13]

Tāntric Vaiṣṇavism was also prevalent before Śaṅkaradeva in some places like Haygriva- Mādhava of Hajo, where the system of worship and the various mantras are in practice as given in the *Brahma Purāna*. Dr M.Neog gives an account as given in the *Yogini tantra* about the origin of the stone image of Haygriva Mādhava of Hajo, in the light of the story of the wooden icons of Kṛṣṇa, Balabhadra and Subhadrā of the great Jagannātha temple at Puri. The other form of tāntrism was Buddhist form of Tāntrism that was prevelant at the time of Śaṅkaradeva. Dr M.Neog had described about the encounter of Śaṅkaradeva with some Buddhist magicians *(baudhamatiya tatakiya)*. He explained that Vajrayana Buddhism admitted the five M's (makaras) as indispensable for the votary and held that the seeker of salvation should enjoy Prajnaparamitā or perfect truth that resides in every woman.[14] They claimed themselves as devotees of twelve gurus *(bāra-guru)* and in practice made no discrimination as regards caste, creed and sex rules in their conducts of life. These Hindu and Buddhist form of Tāntrism with various forms of ceremonials were popular at the time of Śaṅkaradeva and Bhakti had no special place as a form of religion. As a result, religion had lost its' true significance and was used as a means of exploitation by a section of people. So, Śaṅkaradeva played an important role in bringing unity among the masses. His appearance can be treated as a Copernican Revolution. It was possible through emotionalized religious teachings and performing arts which cumulatively worked on people. Unlike other great mediaeval saints Śaṅkaradeva was not interested in professing a school of thought. Rather he can be recognized as a social and religious reformer. Man was the centre of his movement and religion was the means to achieve the development of the human being.

The social condition of the mediaeval Assam was also very poor. The lower sections of the society were dominated by the higher classes. The

Brāhmanical priests gave more emphasis on Vedic rites and rituals. They were very much concerned with their social supremacy they occupied in the society and tried to keep it up by dominating the weaker sections. Religion became the monopoly of the privileged few. Caste and class distinction were most dominating factors in religious matters. As a religious reformer, Śaṅkaradeva's prime aim was to abolish these distinctions among masses. This problem was so deep in different parts of India that some of the mediaeval Vaiṣṇavite saints like Kabir, Nanak and Dadu made an open challenge to caste system. But there is no evidence to show that Śaṅkaradeva and his followers tried to do away or interfere with caste regulation.[15] Nanak believed that caste is nonsense and those who love God, love everybody. Śaṅkaradeva also had faith on the spirit of "love". Śaṅkaradeva not only tried to give equal value to all human beings but also all the creatures of the world. As a strict monotheist, he believed in one God and jiva and jagata as His creations. In *Kīrtana Ghoṣā* he writes:

tumi paramātmā jagatara iśa eka
eko vastu nāhike tomāta vyatireka
tumi posu paksi surāsura taru tṛna
ajñānata mudhajane dekhe bhinna bhinna[16]

(Thou art the Supreme self, the only Lord of the Universe. There is nothing real except Thee. Thou art all beasts, birds, gods and demons, trees and herbs. People, because of their ignorance, look at these in a sense of difference.)

But he was not trying to bring this radical change by challenging the prevailing religious and social codes and conduct of his time. In keeping his mind the chaotic socio-political and religious condition he had to move carefully in propagating his religion. He was deeply concerned with the prevailing social evils that were current in the name of religion and tried to wipe off them. Śaṅkaradeva, therefore, tried to give a religion which can uplift an individual and able to bring mutual understanding among different groups of people. He kept no place for Vedic rituals like homes, yajñas and animal sacrifices that were common in śākta form of Hinduism. The economically backward classes and socially downtrodden became the victims of such ghostly practices. In Śaṅkaradeva's opinion there is no need of Vedic rites and rituals. He writes:

Tapa japa sannyāsa parama mahādane
Napāwe sānkhya yoga tattvajñāne[17]

"My friend, I am beyond the reach of meditation, japa, renunciation, great charity, yoga and profound knowledge."

Mādhavadeva in his *Nāmghoṣā* says: "The indwelling Hari moves far away from him who places faith in rituals. But one who makes it religion to hear and recite Hari's name attains Kṛṣṇa even if he is not freed from the ego." Although Śaṅkaradeva does not encourage karma or the Vedic rites, provision has been left for karma mainly for citta-suddhi, in the early stages of a devotee. But in the higher stage, a true devotee realises this as meaningless and looks upon all the creatures of the universe as manifestations of God and gives them equal value.

Śaṅkaradeva's religion can be treated as a challenge to Brāhmanical Hinduism. Vivekānanda had all praise of Hinduism; but he was also very critical of the dogmas and alubius role of priests. Will Durant has rightly said, "Christ had brought the kingdom of God nearer to earth; but he has been misunderstood, and in place of God's kingdom, the kingdom of priest has been established among us."[18] All the Vaiṣṇava reformers gave emphasis on the fact that everyone has the equal right of worship. Śaṅkaradeva also spoke about the equality of all at the spiritual level. Spiritual realization, for him, should not be the monopoly of a socially privileged few. He gave the equal status of a Brāhmin and a Candāla at the spiritual domain. He is of the opinion that a candāla with devotion to Viṣṇu Kṛṣṇa is superior to a Brāhmin without devotion. The simplicity of his religion and disinterestedness to the caste system were the two main points which attracted the common people to participate his religion.

As a part of social upliftment, Śaṅkaradeva was also able to bring a change in the field of education. The monarch of Kāmarupa, encouraged education by introducing 'tol' or chatra-sali, the residential school, where Brahmin scholars coming from different parts were get admitted and learned Sanskrit grammar, the epics, the purāṇas and the other religious books. The Kāyasthas, had ofcourse training in their vocation under an expert professional. By establishing the *Satra* institution Śaṅkaradeva took the responsibility of enlightening the people through their *ṭols*. All the important satras used to maintain and are still maintaining regular band of scholars whose duty was to impart education, especially in respect of ancient lores and scriptures. Moreover, this type of education included physical, mental, moral and spiritual knowledge. "The various Satrīā-dances like *Sūtradhārī, Cāli, Ojāpali, Naṭuā, Rāsanṛtya, Kṛṣṇa-nāch* and others are the special contributions of *Satra* Institution.[19] Mādhavadeva himself took initiative for enlightening their disciples. According to Dr S. N. Sarma, like the Christian monastery of the mediaeval times a Satra was a religious centre, a school and library.[20]

Nām-ghar, a mini form of *Satra* institution, also played a most important role in bringing unity among various sections of people. It became an indispensible part of assamese life at the time of Śaṅkaradeva and even today it keeps its own respectable position. It is at once a village prayer hall, village court and village theatre. It is also a platform for Pañchāyat Rāj which Śaṅkaradeva was able to introduce in the fifteenth century. In a sense, *Satra* and *Nām-ghar* are the symbol of love and bond of unity. Bhāratavarsa was glorified as a holy place and the atmosphere of this land was praised as comfortable for spiritual upliftment.[21]

Śaṅkaradeva was a humanist and a true believer of ethical virtues. Like Gandhiji he deeply believed that social welfare is possible only through the mental and ethical development of the individual. In the thought system of Sankaradeva, the human person is understood as a complex structure who is to be studied from different perspectives.[22] Śaṅkaradeva thought that every person is gifted by ethical virtues like love, kindness etc. and he should cultivate them. For him, a true religious person is pure in heart and a morally good person who can overcome his narrow selfish desire. Śaṅkaradeva, therefore, gave emphasis on *jīvan-mukti* or liberation at one's own lifetime which is possible through devotion and cultivation of the ethical virtues. He writes:

Viṣṇumoi dekhe yito samaste jagata
Jivante mukuta howai achira kālata[23]

"He who sees Viṣṇu everywhere in the universe attains release even when alive"

"The service of humanity is the service of God" has been the motto of Vaiṣṇava reformers. Śaṅkaradeva advised his disciples not to hate anybody. As Śaṅkaradeva strictly prohibited the worship of other gods and goddesses, it may be a point of objection that he was against other sects who were not members of Vaiṣṇavite cult. But though the followers of Neo-Vaiṣṇavism were against some religious behaviours, but in actual life they were totally tolerable to the other sects. Śaṅkaradeva believes that all creatures are coming from the same source and they should be respected on their own right. He, therefore, writes:

Kukkura srigāla garddarvaru ātmarāma
Jānia sabāko pori koriā pranāma[24]

"Even the souls of dogs, foxes and asses are verily God and with this in mind, they should be respected (saluted)"

Śaṅkaradeva makes use of language, literature, art and culture in propagating his religious faith. The Bargeet, Bhāonā and Ankia-bhāonā are great cultural contributions from Śaṅkaradeva which indirectly helped in educating the illiterate masses. The mediaeval saints and social reformers used the regional languages with a view to bring their messages.

Conclusion:

Finally, it can be said that not a single aspect of assamese life left behind which was not influenced by Śaṅkaradeva's pragmatic thought. Śaṅkaradeva's Neo-Vaiṣṇavite movement is not only a religious faith but also a way of life. Mahatma Gandhi also has observed: "You cannot divide social, political and purely religious work into watertight components. It (religion) provides a moral basis to all other activities, which they would otherwise lack, reducing life to a thing of sound and fury signifying nothing."[25] Śaṅkaradeva tried his level best to bring harmony among different groups of people by abolishing superstitions, magical practices and selfishness of then assamese society through his *eka śaraṇa nāma dharma*. It is due to his unchallenged versatility, Assam is still remaining as the land of Śaṅkaradeva. We can conclude with the remarkable words of Dr. B. Kakati: "Śaṅkaradeva had given Assam a new life, letters and a state. Rulers have come and gone and their kingdom perished in the dust, but Śaṅkaradeva's state endures and broad in the general heart of men his power survived."[26]

REFERENCES:

1. *Dutta, Anima, Assam Vaisnavism, 1989, 1st Edition, p. 25, Mittal Publication, New Delhi-110059*
2. *Sharma, Chandradhar, The Critical Survey of Indian Philosophy, 1987, p. 336, Motilal Banarsidass, Delhi*
3. *The Cultural Heritage of India, volume iv, 1956, p. 170, Editor- Haridas Bhattacharyya, Ramkrishna Misson Institute of Culture, Calcutta*
4. *Bezbaroa, Laksminath, The Religion of Love and Devotion, Editor-Maheswar Neog, First combined Edition, 1968, Assam Sahitya Sabha, Chandrakanta Bhavan, Jorhat*
5. *Śaṅkaradeva, Kirtan-Ghosa,vv.2179-2180, J.N.Dutta Boruah, Dutta boruah and Company, College Hostel Road, Panbazar, Gauhati, 1994*
6. *Mukherjee, A.M., Vaisnavism in Assam and Bengal: A comparative Study, edition 1, p. 124-125, published by Sri Asok Kumer Mukherjee, Granthana,Post-Belari, 1996*
7. *Bezbaroa, Laksminath, The Religion of Love and Devotion, edited by Maheswar Neog, p.15, Assam Sahitya Sabha, Chandrakanta Handiqui Bhavan, Jorhat, First Combined Edition: 1968*
8. *Kakati, Dr.Banikanta, The Mother Goddess Kamakhaya, p.22, Third edition: December 2004, Lawyer's Book Stall*

9. *Rajkhowa, Jyoti Prasad, Śaṅkaradeva: His Life Preachings and Practices, p. Published by Ritu Rajkhowa, Narikal Basti, Gauhati 781024, Assam, India, Second edition: February 2012*
10. *Neog, Dr. M., Early History of the Vaiṣnava Faith and Movement in Assam: Śaṅkaradeva and His Times, p.81, Motilal, Banarasidass, 1985*
11. *Ibid, p. 81*
12. *Kakati, Dr. Banikanta, The Mother Goddess Kamakhya; p. 79, Third edition: December 2004, Lawyer's Book Stall*
13. *Dev Goswmi, Dr. Kesavananda, Mahapurusa Śaṅkaradeva, p. Published by Dr. Rafiquz Zaman, IAS, Secretary, Publication Board Assam, Guwahati 781021, Assam, India, First edition: December 2007*
14. *Neog, Dr. M., Early History of the Vaiṣnava Faith and Movement in Assam: Śaṅkaradeva and His Times, p. 88, Motilal Banarasidass, 1985.*
15. *Sharma, Dr. S.N., The Neo-Vaiṣnavite Movement and The Satra Institution of Assam, p. 88, Lawyer's Book Stall, Panbazar,Guwahati-781001*
16. *Śaṅkaradeva, Kirtana-Ghosa, J.N.Dutta Boruah, Dutta boruah and Company, College Hostel Road, Panbazar, Gauhati, 1994*
17. *Sri Sri Sankara Vakyamrit II, Bhagavata Xlll, v.163, Dutta boruah and Company, College Hostel Road, Panbazar, Gauhati*
18. *Gupta, N.L., An Introduction to Eastern ways of Thinking, p.173, Concept publishing Company, A/15-16, Commercial Block, Mohan Garden, New Delhi-110059 (India)*
19. *Goswami, Dr. N. The Philosophy of Śaṅkaradeva an Appraisal, edited by Prof Nilima Sharma p. 297, Srimanta Śaṅkaradeva Sachetan Mancha, Assam, First edition: 2008*
20. *Sharma, Dr. S. N., The Neo-Vaiṣnavite Movement and The Satra institution of Assam, p.223, Lawyer's Book Stall, Panbazar,Guwahati-781001*
21. *Śaṅkaradeva, Bhakti- Ratnākara xxxii, p. 218 (Ed) Sri Sri Tirtha Nath Goswami, Kshirod Kumar Goswami,B.A., Golaghat, Assam*
22. *Sharma, Dr. N., The Philosophy of Śaṅkaradeva an Appraisal, edited by Prof Nilima Sharma p.335, Srimanta Śaṅkaradeva Sachetan Mancha, Assam, First edition: 2008*
23. *Śaṅkaradeva, Kīrtana-Ghoṣā, v.1824 J.N.Dutta Boruah, Dutta boruah and Company, College Hostel Road, Panbazar, Gauhati, 1994*
24. *Śaṅkaradeva, Kīrtana-Ghoṣā, v.1823 J.N.Dutta Boruah, Dutta boruah and Company, College Hostel Road, Panbazar, Gauhati, 1994*
25. *Gupta, N.L. An Introduction to Eastern ways of Thinking, p. 150, Concept publishing Company, A/15-16, Commercial Block, Mohan Garden, New Delhi-110059 (India)*
26. *Kakati, Dr. B., Mother Goddess Kamakhya, p. 87 Lawyers Book Stall, Third edition: December 2004*

A Focus on the Study-skills of the Under-graduate level students.

Mrs. Arpana Nath
Assistant Professor, Department of Education

Abstract :

Performance of the students in the academic life depends upon their skills of managing the study matters. Its no secret that college requires a whole lot of studying. Learning how to study effectively can sometimes be tricky, but with the right tips and tricks, one can combat one's studying woes. The first semester students of undergraduate level are selected as the sample of the study as the first year is the most critical period of the student life. The first year is a transition period from school to college where students get a totally different environment of freedom, choice and selection. So to make adjustment and at the sametime to excell in their academic life they require to master certain study skills. These include time management, note taking, text book reading, test preparation and more. So at this crucial period of their student life, how they mange their study is a matter of interest to the investigator. The paper follows questionnaire methodology of data collection and stratified random sampling method is used for sample collection. Elaboration of the gathered data show the present status of study skills of the students. A comparative study of Arts and Science stream students as well as boy and girl students also show interesting trends of study skills.

Key words :

Academic life, undergraduate level students, success, study skills.

Introduction:

Education is nothing but the pursuit of developing, horning and mastering the skills that help us become the best that we can, with all that we have. It is the reaching for and realizing of our full potential as human beings. We all want to live full, productive lives, but sometimes, we just don't know where to begin. One thing, however is certain that if we want to accomplish anything in life and realize our full potential, we must have some skills. In order to excel at a job, a sport or any discipline including academic life, a person must acquire and master certain skills. Possessing

skills enables one to deal with the inevitable difficulties and adversities more effectively. It lessens chances of overusing prescription drugs, engaging in addictive behaviours, and experiencing overall despair and hopelessness. When we have the proper tools and strategies at our disposal, we have more controls over our life and are therefore happier and more productive.As Robert Louis Stevenson said : "To be what we are, and to become what we are capable of becoming, is the only end of life."

Origin of the problem :

Attending college for the first time is an exciting, yet daunting,prospect. College students have a lot more freedom than high school students, which means they can make their own decisions. This a double edged sword, as many new college students are not used to taking responsibility for their daily schedules and their academic achievements. Developing good study skills is one of the best ways to achieve success in college and create a bright outlook for the future. Developing good writing skills and learning how to take tests will help college students get the best grades possible, improving their chances of winning scholarships or getting hired for good jobs immediately after graudation. Success in college also depends on good time management. When a college student manages his or her time well, there is enough time for studying and socializing. Poor time magagement makes it difficulty to balance the academic demands of college. In college, time quickly becomes a rare commodity, course work is lengthy, competition is intense and the level of expectation is quite a bit higher than it was in high school. So though some people erroneously believe that studying a lot is essential to become a successful college student, but the key to becoming a successful college student is learning to studying smart. Time management, note taking, reading comprehension, essay writing, test taking, active listening, stress management, researching and memorization etc. are few areas which are part of study skills.

The present study will try to deal with few of these areas of study skills of college level students. How the students are been able to manage their study skills, what their present status in this particular and specific area of their accademic life, is a matter of great interest and concern to the investigator.

Objectives of the study :

The following are the objectives of the study.

a) To study the study skills of undergraduate level students.
b) To make a comparative study of study skills of the undergraduate level students of arts and science stream.
c) To make a comparative study of study skills of girl and boy students of undergraduate level.

Methodology :

Place of study - The study is conducted on undergraduate level students of S.B.M.S. College, under Gauhati University. The college is situated in semi urban area in the state of Assam, in the north-east part of India.

Period of study - The study is conducted during the academic year of 2013-14.

Sample selection :

Sample -The sample is consist of 40 number of 1st semester students who have major course, 20 each from Arts and Science stream of the above mentioned college. In the each group of 20 students 10 of them are male and 10 are female.

Selection procedure - Sample is selected by the procedure of stratified random sampling covering the departments namely Arts departments - English, Philosophy, Political Science, Economic, Education and Science departments - Mathematics, Zoology, Chemistry. The total number of the students having major course of all these departments are -102

Inclusion criteria:

1. Consent of the particular student is one of the basic criteria for selection of the student in the sample.
2. Only the student with Major subject is selected for the sample.

Exclusion criteria-

1. Nobody is included in the sample without consent.
2. Student without Major course is not included in the sample.

Data Collection

1. Data on the socio-demographic variables is collected using a performa constructed by the author.
2. Data on study skills is collected by using the Study Skill Inventory.

This inventory is a college level study skills inventory of the Student Academic Resource centre of the University of central Florida.The student Academic Resource centre Provides high-quality academic support programms for enabling university of central Florida students to achieve their academic goal. The purpose of this college level study skills inventory is to provide students immediate feedback on their current approach to college level study skills. There are six critical study skills, college students need to consistently be developing : text book reading, note taking, memory, test preparation, concentration and time management. At the conclusion of the inventory, each of these skills are assessed based on the manner in which the questions are

answered. Accoding to this inventory the bench mark in the different demain of study skills are as below -

Sections	**Banch mark**
Text book reading	30
Note taking	20
Memory	30
Test preparation	40
Concentration	35
Time management	20

If the individual scores are less than the above bench mark, the particular student stand to improve in those areas.

Result / Discussion

The result obtained by the study on 'study skills' of the students is presented in table and graph below

TABLE -1

TABULAR PRESENTATION OF THE RESULT ON 'STUDY SKILLS' OF THE STUDENTS OF SCIENCE STREAM.

	BOYS							**GIRLS**					
Study skills →	**Text book reading**	**Note taking**	**Memory**	**Test Preparation**	**Con-centration**	**Time management**	**Study skills**	**Text book reading**	**Note taking**	**Memory**	**Test Preparation**	**Con-centration**	**Time management**
Bench Mark →	30	20	30	40	35	20	**Bench Mark**	30	20	30	40	35	20
Students ↓	INDIVIDUAL SCORES						**Students ↓**	INDIVIDUAL SCORES					
A	29	18	33	33	35	13	A	23	21	38	55	47	23
B	29	18	35	34	35	10	B	23	21	38	52	47	21
C	29	18	35	50	40	10	C	24	19	29	53	24	20
D	29	18	32	36	39	26	D	26	16	27	47	24	18
E	35	24	41	45	43	20	E	24	19	29	50	27	18
F	31	19	36	51	41	20	F	29	15	24	53	29	17
G	30	25	36	55	34	27	G	23	18	31	46	42	12
H	35	34	41	45	43	20	H	27	18	37	46	42	15
I	35	24	41	45	43	20	I	24	16	27	53	24	20
J	35	24	41	45	43	20	J	27	15	29	50	24	20
AV. Score	317/10 =31.7	222/10 =22.2	371/10	439/10 =43.9	396/10 =39.6	186/10 =18.6	AV Score	250/10 =25.0	178/10 =17.8	309/10 =30.9	505/10 =50.5	330/10 =33.0	184/10 =18.4

DISCUSSION ON TABLE -1

College level study skill inventory used for the purpose of data collection assist in providing student immediate feedback on their current approach to college level study skills. The table-I shows the bench mark, induvidual scores as well as average scores of the science stream students in the six different domains of the study skills.

DISCUSSION ON THE DATA OF BOY STUDENTS

The data show that the indivudual scores of 4 students are below, while that of 1 student is equal to and another five students are above the bench mark in respect of study skill 'text book reading'. The average score for the particular domain is 31.7 which is more than bench mark 30. In case of 'note taking' individual scores of 5 students are below and 5 students are above the bench mark and the average score which is 22.2 is more than bench mark 20. The individual scores for the study skill 'memory' of all the 10 students are more than the bench mark and the average score which is 37.1 is naturaly more than the bench mark 30. The seores for the study skill 'test preparation' show that out of 10 students, 3 has scored below and 7 has scored above bench mark and the average score which is 43.9 is more than the bench mark. The scores for 'concentration' show that only 1 has scored below and 2 has scored equal to and 7 has scored above the bench mark and the average score which is 39.6 is more than bench mark 35. In 'time management' 3 has scored below, 5 has scored equal to and 2 has scored above bench mark and the average score which is 18.6 is less than bench mark 20.

DICCUSSION ON THE DATA OF GIRL STUDENTS -

In the study skill 'text book reading' individual scores of all the 10 students are below bench mark and naturally the average score which is 25 is less than the bench mark 30. In 'note taking' individual scores of 8 students are below and 2 students are more than the bench mark and the average score which is 17.8 is less than the bench mark 20. In 'memory' individual scores of 6 students are below and 4 students are above the bench mark and the average acore which is 30.9 is more than the bench mark 30.In 'test preparation' the individual scores of all the 10 students are more than the bench mark and the average score which is 50.5 is more than the bench mark 40. In 'concentration' the individual scores of six students are less and 4 students more than the bench mark and the average score which is 33 is less than the bench mark 35. In 'time management' the individual scores of 5 students are less and 3 students are equal to and 2 students are more then bench mark and average score which 18.4 is less then bench mark 20.

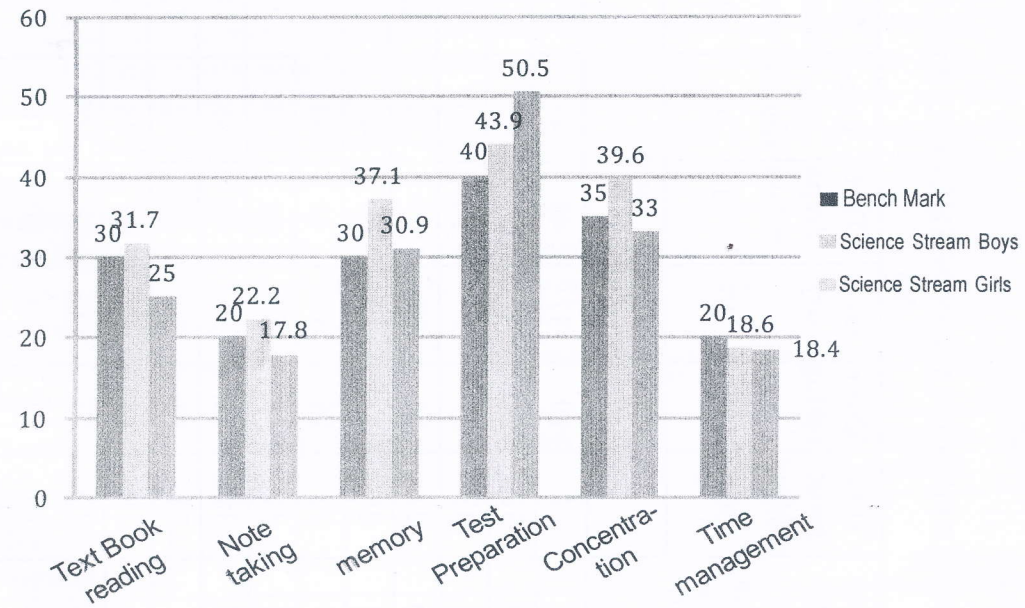
The average scores for the different domain of study skills in comparison to bench marks are presented below -

Sections	Average Scores of boy students	Bench mark	Average Scores of girl students
Test Book reading	31.7	> 30	> 25
Note taking	22.2	> 20	> 17.8
Memory	37.1	> 30	< 30.9
Test preparation	43.9	> 40	< 50.5
Concentration	39.6	> 35	> 33.0
Time management	18.6	< 20	> 18.4

Graph-I is the representation of the above data

Graph-I

Graphical representation of the bench marks and average individual scores of the science stream students.



STUDY SKILLS

TABLE -II

TABULAR PRESENTATION OF THE RESULT ON STUDY SKILLS OF THE STUDENTS OF ARTS STREAM

BOYS

Study skills → Bench Mark → Students ↓	Text book reading 30	Note taking 20	Mem-ory 30	Test Prepa ration 40	Con-cen-tration 35	Time manag ement 20
	INDIVIDUAL SCORES ↓					
A	31	19	37	49	45	16
B	32	21	40	51	45	17
C	33	21	37	50	45	17
D	27	14	39	49	39	23
E	26	13	39	49	43	23
F	30	16	39	49	43	23
G	34	18	40	48	34	21
H	30	18	35	42	35	18
I	32	18	32	38	42	13
J	29	16	37	49	38	22
AV. Scores	303/10 =30.3	179/10 =17.9	375/10 =37.7	474/10 =47.4	409/10 =40.9	193/10 =19.3

GIRLS

Study skills → Bench Mark → Students ↓	Text book reading 30	Note taking 20	Mem-ory 30	Test Prepa ration 40	Con-cen-tration 35	Time manag ement 20
	INDIVIDUAL SCORES ↓					
A	31	22	29	43	37	18
B	34	16	41	50	35	06
C	34	16	42	54	31	06
D	37	20	38	52	43	09
E	36	20	33	48	43	07
F	34	16	38	50	31	06
G	37	18	32	45	44	10
H	36	19	38	51	44	06
I	34	16	37	47	44	06
J	35	16	36	54	35	09
AV. Scores	348/10 =34.8	179/10 =17.9	364/10 =36.4	494/10 =49.4	387/10 =38.7	83/10 =8.3

DISCUSSION ON TABLE -II

Discussion on the data of boy students -

In 'Text Book reading' individual scores of 3 students are less, 2 students are equal to, 5 students are more than the bench mark and the average score is 30.3 which is more than the bench mark 30. In 'note taking' individual scores of 8 students are less and 2 students are more than the bench mark and the average score is 17.9 which is less than the bench mark 20. In 'memory' individual scores of all the 10 students are more than the bench mark and average score which is 37.5 is more than the bench mark 30. In 'test preparation' individual score of 1 student is less and 9 students are more than the bench mark and average score is 47.4 which is more than the bench mark 40. In 'concentration' individual score of 1 student is less and 1 student is qual to and 8 students are more than the benchmark and average score is 40.9 which is more than the bench mark 35. In 'time management' individual scores of 5 students are less and 5 student are more than the bench mark and average score which is 19.3 is less than the bench mark 20.

DISCUSSION ON THE DATA OF GIRL STUDENTS -

In 'text book reading' the individual scores of all the 10 students are more than the bench mark and naturally the average score which is 34.8 is more than the bench mark. In 'note taking' individual scores of 7 students are less, 1 student is more and 2 students are equal to bench mark. The average score which is 17.9 is less than the bench mark 20. In 'memory' individual score of 1 student is less and 9 students are more then the bench mark and the average score which is 36.4 is more than the bench mark. In 'test preparaton' individual scores of all the 10 students are more than the bench mark and naturally the average score which is 49.4 is more than the bench mark 40. In 'concentration' individual scores of 2 students are less, 6 students are more, and 2 students are equal to bench mark. The average score which is 38.7 is more than the bench mark 35. In 'time management' individual scores of all the 10 students are less than the bench mark and naturally the average score which is 8.3 is less than the bench mark.

The average scores for the different domain of study skills in comparison to bench marks are presented below -

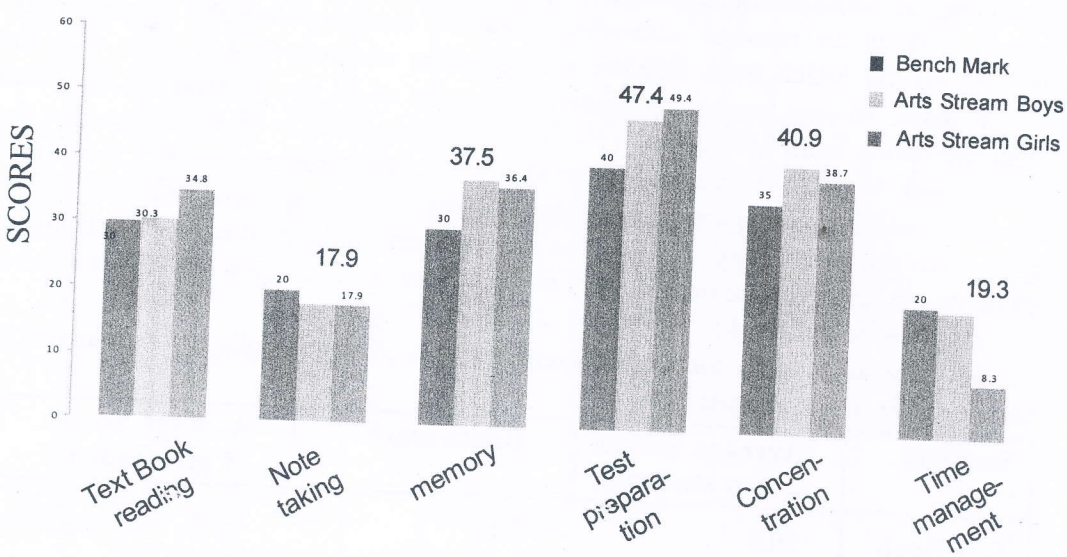
Sections	Average Scores of boy students	Bench mark	Average Scores of girl students
Test Book reading	30.3	> 30	< 34.8
Note taking	17.9	< 20	> 17.9

Sections	Average Scores of boy students		Bench mark		Average Scoresof girl students
Memory	37.5	>	30	<	36.4
Test preparation	47.4	>	40	<	49.4
Concentration	40.9	>	35	<	38.7
Time management	19.3	<	20	>	8.3

Graph-II is the representation of the above data

GRAPH-II

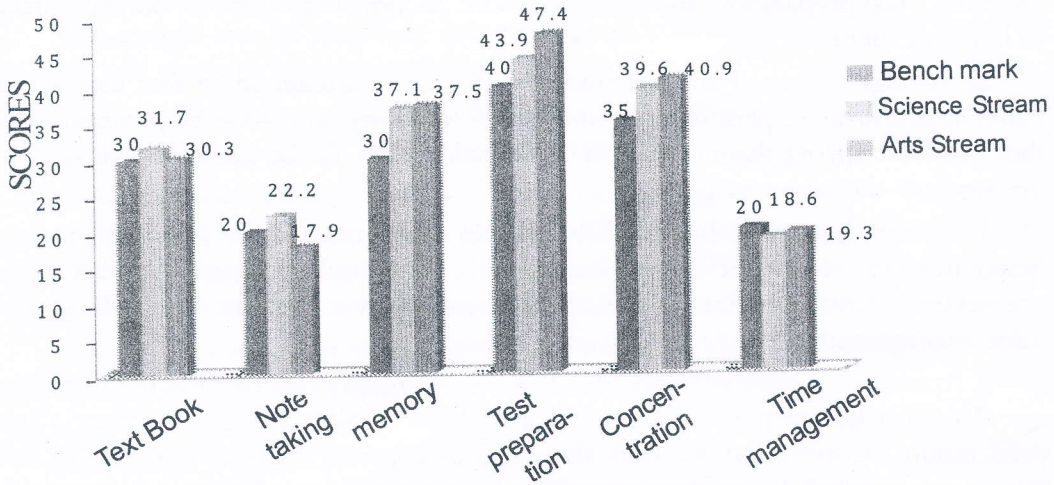
Graphical representation of the bench mark and average individual scores of the Arts stream studetns



Graph-III represents the data of boy students of both the Science and Arts Stream

GRAPH-III

Graphical representation of the bench mark and average individual scores of Boy Students of both the Science and Arts Stream.

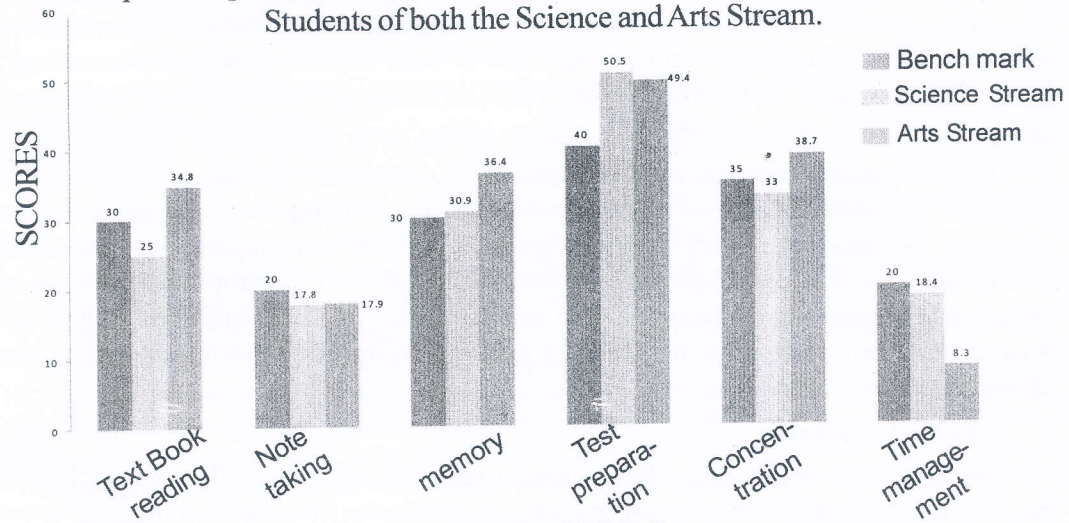


STUDY SKILLS

Graph-IV represents the data of girls students of both the Science and Arts Stream

GRAPH-IV

Graphical representation of the bench mark and average individual scores of Girl Students of both the Science and Arts Stream.



STUDY SKILLS

Findings :

From the above discussion we can draw the following finding -

1. Average scores of boy students of the science stream show that they are in a better position in respect of their study skills - 'text book reading', 'note taking'. 'memory'. 'test preparation' and 'concentration'. In 'time management' only they need to improve them.

2. Average scores of the girl students of science stream show that they are in better position in respect of their study skill 'memory' and 'test preparation'. But they need to improve them in the rest of the study skills. In the particular skill of 'test preparation' they are very good.

3. Average scores of boy students of the Arts stream show that they are in a better position in respect of the study skills - 'text book reading', 'memory', 'test preparation', 'concentration', and they need to improve them in 'note taking' and 'time management'.

4. Average scores of girl students of the Arts stream show that like the boys they are also in a better position in respect of 'text book reading', 'memory', 'test preparation', 'Concentration'. They also need to improve them in 'note taking' and 'time management'. In the particular skill of 'time management' they are very weak.

5. If we do a comparative analysis of these results on the basis of stream we find that the skills of boy students of both the streams are more or less of the same kind. The boy students of the science stream need to improve them in 'time management' only and the boy students of Arts stream need to improve them in 'note taking' and 'time management'. In case of girl students, science stream students need to improve them in four domains of study skills like - 'text book reading', 'note taking', 'concentration', and 'time management'. The Arts stream girl students need to improve them in two domains of study skills - 'note taking' and 'time management'

6. Comparative analysis of these data on the basis of sex show that the study skills of the boy students of the science stream are batter than the girl students except in the particular study skill, 'test preparation'. In 'test preparation' girls are in a very better position. In Arts stream, study skills of both the boys and girls are of more or less same kind, except in 'time management'. In time management girls are weaker than boys, but boys are also in a position to improve them in the particular domain.

CONCLUSION :

Study skill inventory helps the students to identify the area of their strengths and weaknesses in regard to their study matter. The particular investigation helps to know the present status of students' study skills and thereby it helps to identify the area where guidance is needed by the students. Proper arrangement of guidance will

definately help the students in their academic life and will minimize the scope of failue or dropout. So it has the very much educative value for the students to be conscious and careful regarding their study skills as it will help them in their academic life to persue a golden path.

LIMITIONS :

The sample size of the study being small, on condition of its being larger the study could claim to be more authentic.

Fact remains that if the study conducted could have included more than one college, the findings would have been more extensive.

Acknowledgement :

I owe a deep sense of gratitude to the 'Student Academic Resource Centre' (SARC) of university of Central Florida as with the aid of "The study skills Inventory" of SARC the present study has been materialised and hence comes into a reality.

I express my sincerest thanks to the student respondents for kindly responding and furnishing necessary and accurate feedback needed for the study.

Reference :

* *STUDY SKILL INVENTORY [online] file :///F:/Documents/Downloads/study skills inventory >> Student Academic Tesource Centre>> UCF.htm. [Accessed on 15th April, 2014]*
* *College Atlas .org., Top 10 study skills for college students : [online] file :///F:/Documents/Downloads/Top 10 Study skills for college students. htm. [Accessed on 25th April, 2014]*
* *About SARC >> [online] file :///F:/Documents/Downloads/About SARC>> Student Academic Resource centre>> UCF htm. [Accessed on 25th April, 2014}*
* *Shrine Nittany Lion, Academic success [online] file :///F:/Documents/Downloads/Academic success-penn slate Division of undergraduate studies htm. [Accessed on 27th April, 2014]*
* *College Grants. org., study skills and other helpful. [online] file :///F:/Documents/Downloads/Study Skills and other Helpful Resources for college students. htm. [Accussed on 27th April, 2014]*
* *University of Central Florida, [online] file :///F:/Documents/Downloads/University of Central Florida - A University in Florida, college in Florida, htm [Accessed on 1st may, 2014]*
* *College Atlas org., Study skills guides for college students - [online] file :///F:/Documents/Downloads/Study skills guides for college students.htm. [Accussed on 1st may, 2014]*
* *College study skills for college students, [online] file :///F:/Documents/Downloads/College study skills & tips for college students-college tips. com.htm [Accessed on 2nd may, 2014]*
* *Academic Tips. org 1999-2013, college study tips-study skills guide, [online] file :///F:/Documents/Downloads/College study tips-study skills, guides and strategies. htm. [Accessed on 5th may, 2014]*
* *Study Skills Inventory Results [online] file :///F:/Documents/Downloads/Study skills Inventory Results >> student Academic Resource Centre >> UCF. htm. [Accessed on 15th may, 2014]*

Inter-Temporal Analysis of Population Growth, Urbanization and Changing Land Use Pattern in Assam

Shruti Dhara Kashyap
Assistant Professor, Dept. of Economics

Abstract:

Economic development and urbanization go side by side in almost all countries in 21st century. High rate of population growth and ill planned urbanization result in many challenges in third world countries. Changing land use pattern and its consequences are major challenges faced by the countries. The paper deals with inter-temporal analysis of population growth, urbanization and changing land use pattern in Assam. The secondary data used in this paper are collected from Economic Survey, 2012-13, India State of Forest report, FSI, 2011 and from the website www.mospi.gov.in. Population is increasing at a rapid rate in Assam but percentage decadal variation is coming down from 35 per cent in 1971to 16.9 per cent in 2001-2011 periods. The percentage of urban population to total population is in an increasing trend in Assam. Female percentage is increasing but male percentage shows deterioration in total urban population share. The comparisions of different land uses categories show that the area under forests decrease but area under the category land not available for cultivation which includes built up areas increase significantly, the net changes in terms of decreased area is much more higher for moderately dense forest in comparison to very dense forest. Assam is losing 66 square kilometer of its forest cover in 2007 assessment and ten districts are showing negative net changes in terms of forest cover in 2007 assessment.

Keywords: population growth, urbanization, land use pattern, forest cover, moderately dense forest, very dense forest.

1. Introduction:

The economic development process of the 21st century is characterized by high rate of urbanization in almost all countries of the world. Economic development

and urbanization go side by side. The twenty century statistics showed that most of the developed countries of the world were the urbanized economies; the developing and the underdeveloped countries being primarily rural with very low rate of urbanization. But as the process of economic development progresses, the developing and the underdeveloped countries are becoming increasingly urbanized. These countries are experiencving increase in the number of people living in urban areas and expansion of the geographical boundaries of cities and towns. Many individuals prefer to live in an urban area because of the availability of different means of earning livelihood and necessary facilities including utilities and services, shopping, recreational and cultural facilities, educational facilities, means of transport and communication. That is the reason why more than half of the world's 6.6 billion people live in urban areas, crowded into only 3 percent of the total land surface area of the earth. There are various problems associated with the high rate of and particularly ill-planned urbanization in different countries of the world.

Although urbanization is the driving force for modernization, economic growth and development, there is increasing concern about the effects of expanding cities, principally on human health, livelihoods and the environment. The implications on rapid urbanization and demographic trends for employment, food security, water supply, shelter and sanitation, especially the disposal of wastes(solid and liquid) that the cities produce and staggering (UNCED, 1992).

Not only the issues as cited by the Rio Summit (UNCED,1992) are troubling the countries as side effects of modernization and urbanization, another formidable challenge before the countries is changing land use pattern affecting productivity, employment and other socio-economic aspects of the societies.

The paper attempts to study the trend of urbanization and changing land use pattern in Assam along with the changing forest cover and different problems arising out of it. This is an inter-temporal analysis of the status of urbanization and changing land use pattern in the state.

2. Origin of the Problem:

Urbanization is the outcome of social, economic and political developments that lead to urban concentration and growth of large cities, transformation from rural to metropolitan pattern of governance and changes in land use pattern. India is experiencing a high rate of urbanization; the large cities becoming over-crowded with people and growth of small cities and towns. India's economic development process is followed up by urbanization. From 1951 to 1991, India's urban population grows by more than three times from 58 million to 216 million. In 1981, India had 12 metropolitan cities with a total population of about 42 million (6.2 percent of the

country's population) whereas in 1991, the number of metropolies had nearly doubled to 23 with a total population of 71 million (8.4 percent of India's total population). This high rate of urbanization has caused a change in land use pattern of the country. The lands which were previously covered by vegetation are brought under residential and commercial uses. Forest cover has been gradually declining. The hilly lands and other open access resources are subjected to clearing of vegetation at a rapid rate due to high demand for land arising from increased number of people in urban centers. The land used for agricultural purposes are brought under non-agricultural use. Infrastructural development also has effect upon changing land use pattern as lands are cleared for building roads- highways and bridges. These changing land use pattern is increasingly deriving attention as it has impact on productivity of agricultural goods, employment and moreover, on environment also.

Assam is experiencing high population growth in the recent years. Guwahati, the capital of Assam, being the commercial hub of north east India is the most urbanized city among all the cities of north east India. Not only natural growth but also migration is contributing to this population growth of Guwahati to a large extent. Not only Guwahati, that is Kamrup district but other districts, its headquarters are increasingly urbanized with extension of geographical boundaries of towns. The result is the changing land use pattern in the state, with decreased forest cover and increased land used for commercial and residential purposes.

3. Objectives:

The main objectives of the paper are:

- To study the trend of population growth in post- independence censuses in Assam.
- To analyze the tempo of urbanization in Assam and comparison with all India average.
- To study the changing land use pattern in Assam.
- To analyze the impact of changing land use pattern on different categories of forest cover in the study area.
- To overview the district wise changes in forest cover in Assam.

4. Methodology:

The paper involves inter- temporal analysis of population growth, urbanization and changing land use pattern in Assam. The paper is based on analytical method based on secondary data. The secondary data used in this paper are collected from Economic Survey of Assam, 2012-2013, India State of Forest Report, 2011, Department of Forest, Government of India and the website www.mospi.gov.in.

As the title of the paper suggests, the state of Assam, situated at north –eastern part of India, between 24°07/ N-28°00/ N latitude and 89°42/ E- 96°02/ E longitude, a land of 78,438 square kilometer is selected as the study area. Assam is the gate-way to north east India and Guwahati is the commercial capital of this part of Indiah. The impact of commercialization and modernization accompanied with urbaniza-tion and changes in land use pattern is more rapid in Assam than other north eastern states.

5. Trend of Urbanization in Assam:

Assam is experiencing a high rate of population growth causing its impact upon different socio-economic and political dimensions. Assam which was a land of eighty lakhs population in 1951 turns into a land of more than three crores population in 2011. Different census reports for population of the state in the post independence -era reveal increased rate of population in the state.

Table1: Number of Population in different census years in Assam

Census Year	Population (in Lakhs)
1951	80
1961	108
1971	146
1981*	180
1991	224
2001	266
2011	311

*In 1981, census was not conducted in Assam; therefore, interpolated data for this year is used.

Source: www.mospi.gov.in

The percentage decadal variation of population in the state shows that from 1951 to 1961, in a decade, decadal variation is the highest (35%) which remained the same for the next decade (1961-71) also. But the latter decades (1971-81),(1981-91), (1991-2001) and (2001-2011) reveal a decreasing trend in the percentages.

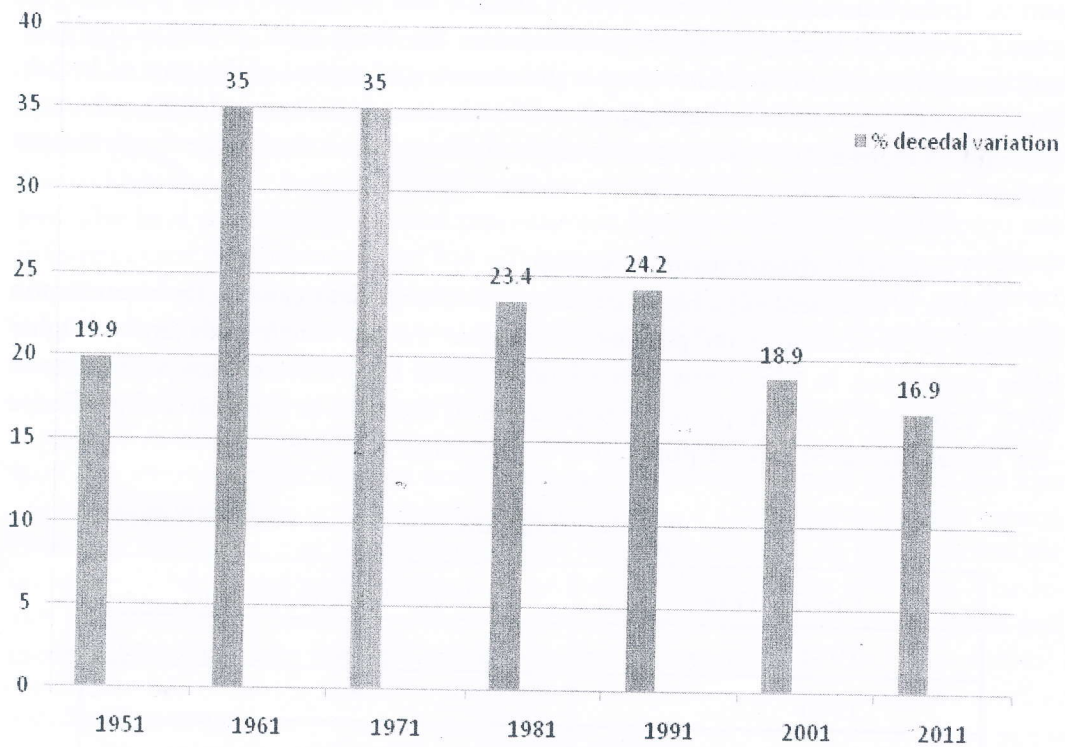
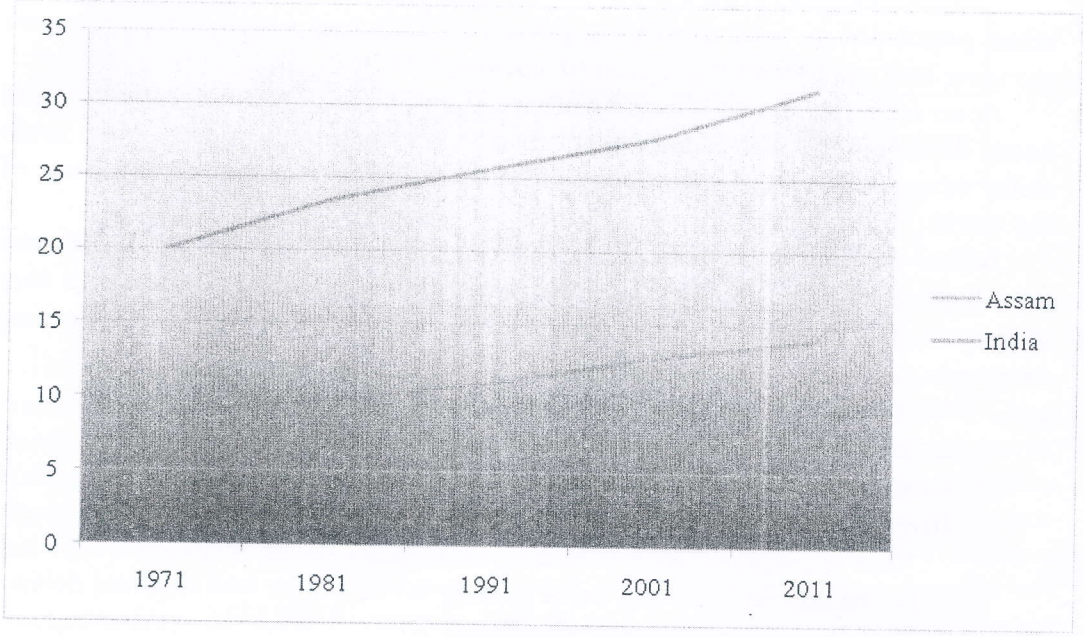


Fig.1: Percentage decadal variation of population in Assam

Source: Economic survey-Assam, 2012-13

Not only rural population, but also urban population has increased in Assam which has very important implications on Assamese economy. As India is growing very fast with rapid urbanization, Assam is also influenced by the wave of modernization and urbanization like other states of India. It is very important to be pointed out that the pace of urbanization is somehow slower than other states of India. The slow but rising trend of urbanization in terms of percentage of urban population to total population in Assam is revealed in the following figure.



Source: Economic survey-Assam, 2012-13

The figure 2 reveals that the rate of urbanization in terms of percentage of urban population to total population which was 8.87 per cent in 1971 has increased to 14.08 per cent in Assam. The percentage of urban population to total population is 31.2 per cent in 2011 in India. Therefore, the all India figure is higher than whichever in Assam. The male population which was 53.41 per cent of total urban population according to 2001 census decreases to 51.61 per cent in 2011 census whereas the female population which was 46.58 per cent of total urban population shows an increasing trend (48.39 per cent in 2011). The increased female population indicates more entrance of females to urban centres in search of employment, for availing educational opportunities and through marriage. The increasing female participation in urban centres shows the sign of women empowerment for some instance. According to 2011 census, the highest number of urban population is in Kamrup (Metro) with 1,044,832 number of urban population whereas the lowest number of urban population is in Baksa district (12,173).

6. Changing Land Use Pattern in Assam:

Population growth in a country has significant impact upon the land use pattern; as population grows, the amount of land used for non-agricultural purposes increases at the expense of loss in area used for agricultural purposes. Increasing share of

urban population in total population growth of a country makes the effect upon changing land use pattern more prompt and rapid.

Apart from the known effects of urbanization on global warming, acid rain and ozone depletion, it is also claimed that urbanization has serious impact on the availability of arable land and subsequently leading to deforestation in several parts of the world.(Mohanty, S.)

Before explaining the relationship between population growth, especially the growth of urban population and land use pattern in the context of Assam, it is very important to study the land use data and to classify them into the following categories-

1. Forests.
2. Area not available for cultivation, which includes:

Area under non-agricultural uses;

Barren and unculturable land.

- Other uncultivated land excluding fallow land, which includes:

3. Permanent pastures and other grazing lands;
4. Miscellaneous tree crops and groves
5. Culturable wasteland.

- Fallow land, which includes:

6. Fallow lands, other than current fallows;
7. Current fallows.
8. Net area sown.

To study the change in land use pattern in Assam, land use data for two periods 2005-06 and 2008-09 are collected from India State of Forest Report, Government of India, 2011. The changing land use pattern is determined by several socio-economic, demographic factors etc. in Assam.

Table2: Land Use Pattern in Assaam

Classification	Area in' 000 hectares	
	2005-06	2008-09
Total geoggraphical area	7,844	7,844
Reporting area for land utilization	7,850	7,850
1. Forests	1,954	1,853
2. Not available for cultivation	2,512	2,696
3. Permanent pastures and & other grazing lands	160	160

4. Miscellaneous tree crops and groves	209	196
5. Culturable wasteland	77	77
6. Fallow lands, other than current fallows	60	59
7. Current fallows	127	126
8. Net area sown	2,753	2,753

Source: Land use Statistics, Government of India.

Table 3 reveals that the area under forests in Assam has been in a decreasing trend from 1,954,000 hectares in 2005-06 to 1,853,000 hectares in 2008-09. Other land utilizations showing the same trend are miscellaneous tree crops and groves, fallow lands, other than current fallows and current fallows. The land uses categories showing decreasing trend are very important for ecological stability and environmental safety concerns. However, land used under category not available for cultivation' which includes land used for non-agricultural use and barren and unculturable land increases from 2,512,000 hectares in 2005-06 to 2,696,000 hectares in 2008-09. The following figure shows the changing share of different land uses categories in total geographical area during the periods under consideration.

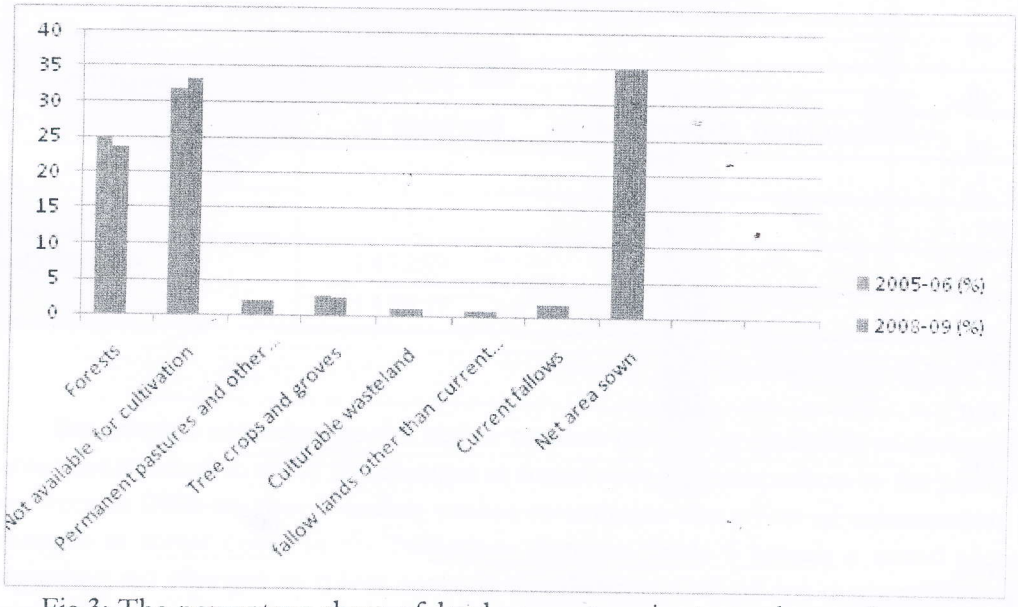


Fig.3: The percentage share of land uses categories to total reporting area

Source: India State of Forest Report, 2011

7. Changes in forest cover in Assam:

Assam is gifted by nature with rich natural heritage including rivers, forest resources, hills etc. There is no need to say about the importance of forest resources towards the economic development of a country or a region. The very necessity of existence of forests lies in maintaining stability of our ecosystem now a days. But changing dynamics of economic development accompanied by population growth, industrialization and urbanization have adverse effect upon the forest cover all over the world. Studying the situation in the context of Assam also gives the same kind of results.

Table 4: Forest cover in the state

Classifications	Area in square km.	
	2009	2011
Very dense forest	1,481	1,444
Moderately dense forest	11,558	11,404
Non forest	50,567	50,583

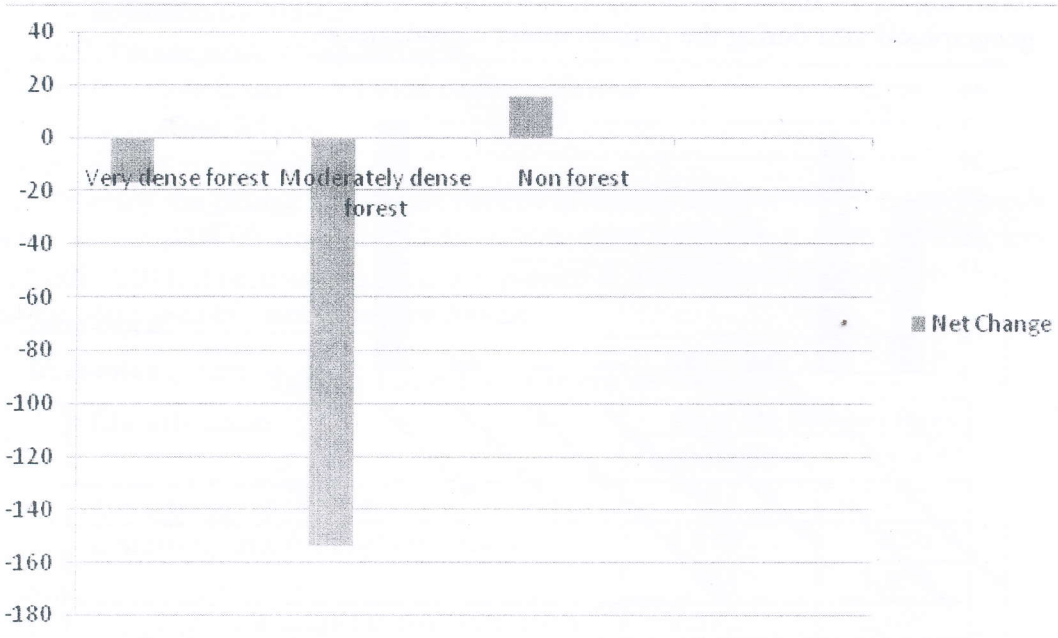


Fig.4: Net changes (2009-2011) in forest cover

Source: India State of Forest Report, 2011

Comparison of forest cover in Assam of 2009 with year 2011 reveals that the net changes which is negative are higher for moderately dense forest than very dense forest indicating that people are targeting to clear up moderately dense forest to establish different types of constructions, be it residential, commercial or infrastructural due to ease for clearing at low cost and fewer time. This type of forest is found to be decreased by a significant level of 154 square kilometer.

8. District wise changes in forest cover:

From the view point of the number of urban population in the districts in Assam, ten districts are taken to study the changing forest cover in the districts.

Table 5: District wise forest cover distribution

Districts	Number of urban population	Percentage of geographical area	Change
Kamrup (Metro+ Rural)	1186846	32.96	-2
Nagaon	368100	20.60	0
Cachar	316010	58.93	2
Tinsukia	262992	40.53	1
Dibrugarh	243764	22.42	2
Jorhat	219565	21.40	7
Dhubri	201917	14.90	-3
Sonitpur	171140	17.90	-10
Barpeta	147289	12.36	0
Goalpara	137827	18.42	-1

Source: India State of Forest Report, 2011

Ten districts according to the higher number of urban population in descending order are selected to study the changes in forest cover in comparison to the previous assessment 2005 so that it makes enable to estimate the effect of urbanization to changes in forest cover in the respective districts. Table 5 reveals a mixed picture regarding net changes in forest cover in the districts. Out of ten districts, four districts - Kamrup (both Metro and Rural), Dhubri, Sonitpur and Goalpara are found to be losing forest cover in terms of percentage of geographical area over the previous

assessment in 2005. Nagaon and Barpeta are neither improving nor deteriorating in terms of changes in forest cover, net changes being zero. Jorhat, Dibrugarh, Tinsukia and Cachar have shown improvement with addition to forest cover, net changes being positive. Due to this mixed effect, the correlation coefficient between the number of urban population and percentage of geographical area is very low (0.2964). But it is worth mentioning that the districts with negative net changes, especially Kamrup district is losing its forest cover in a rapid rate due to rapid urban growth. Assam is losing 66 square kilometer of its forest cover in 2007 assessment over 2005 assessment.

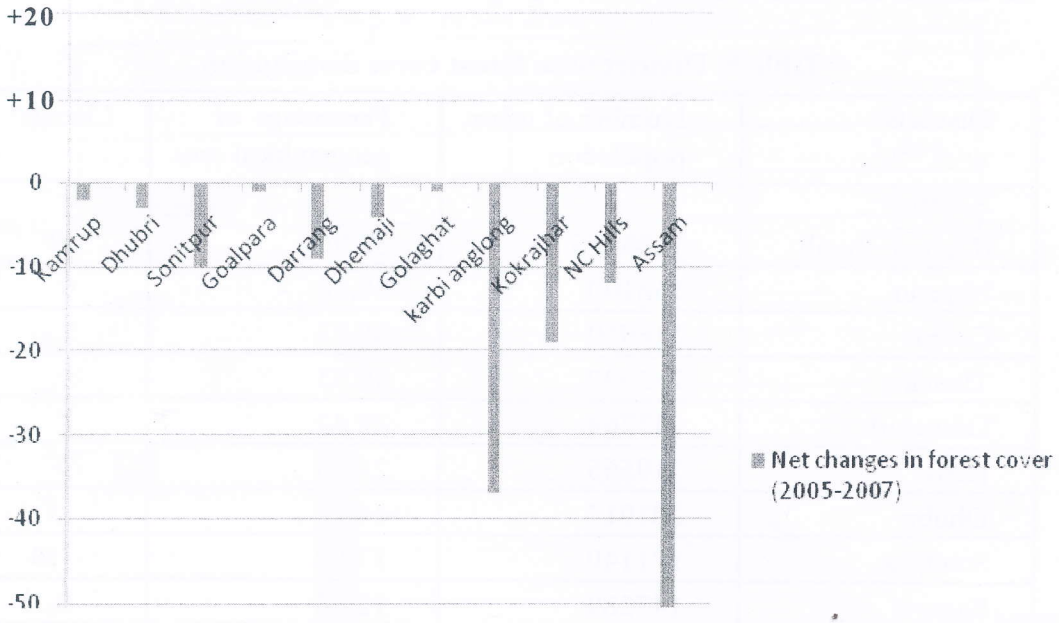


Fig. 5: Districts with negative net changes

Source: India State of Forest Report, 2011

Ten districts in Assam-Kamrup, Dhubri, Sonitpur, Goalpara, Darrang, Dhemaji, Golaghat, Karbi Anglong, Kofkrajhar, and North Cachar Hills are showing deterioration in terms of percentages of forest cover in 2007 assessment. Karbi Anglong district has lost the highest 37 square kilometer of its geographical area as compared to 2005 assessment.

9. Results and Conclusion:

The temporal analysis of population data and land use data in Assam reflects many interesting results. The changing land use pattern and specially the forest cover

obviously reflect the pressure of population on land. Changing land use pattern in Assam with increased non forest areas and decreased forest covered areas results in socio-economic and environment related problems. Due to decreased forest cover, the instances of human - animal conflict becomes frequent in Assam. In urban areas, land encroachment is the common problem. Absence of property rights on forest lands and government lands help the encroachers to target such type of lands. The encroachers are generally the marginalized section of people who do not afford to purchase land of their own at a higher land prices in cities. Another problem which is acute in third world cities is the creation of slums. Slums affect not only the land use pattern but also urban infrastructure to a large extent. Migrating people encroach upon the lands on the banks of rivers, on the sides of roadways and railways, hill slopes etc. This is the common story of third world cities and Guwahati, the capital of Assam is seriously affected by the problems accompanied with urban growth. Borah et al. (2002) states that according to 1991census, 57.8 per cent of the total migrants to the city were rural of which 27.3 per cent were illiterate. These illiterate rural migrants were to form the urban poor. With the growth of the city, the rate of migration of the poor has been increasing with time leading to the formation of slum areas. There are forty slum areas in Guwahati in 2002 according to the Office of the Municipal Administration. There are 19558 families with total population of 1,13,064 living in slums in Guwahati.

The inter-temporal analysis of population growth and changing land use pattern in Assam gives the following results:

Although population is increasing at a rapid rate in Assam but percentage decadal variation shows deterioration as in from1951to1961 and 1961 to 1971, the percent decadal variation of population was 35 per cent which is coming down to 16.9 per cent in 2001-2011 period.

- Although the ratio of the number of urban population to total population is lower in Assam than all India average, it is in an increasing trend in Assam. Female percentage is increasing but male percentage shows deterioration in total urban population share in Assam.
- The comparisons of different land uses categories between the periods 2005-06 and 2006-07 show that the area under forests decrease but area under the category land not available for cultivation which includes built up areas increase significantly.
- Studying the net changes in area under different forest types from 2009 to 2011 gives an interesting result that there are negative net changes in both the cases of very dense forest and moderately dense forest, the net changes in terms of decreased area is much more higher

for moderately dense forest in comparison to very dense forest. However, in that period, non forest areas are showing positive net changes.

- The district wise analysis of urban population, geographical area under forest and net changes in forest cover reflects a vivid result. Among the ten districts in terms of highest urban population in Assam, Kamrup, Dhubri, Sonitpur and Goalpara are losing forest cover, Nagaon and Barpeta are neither improving nor deteriorating in terms of forest cover and others are found to be improving. As a whole. Assam is losing 66 square kilometer of its forest cover in 2007 assessment and ten districts are showing negative net changes in terms of forest cover in 2007 assessment.

In modern era, the dynamics of development and environment creates trade-off between the two and globalized world faces many challenges arising out of it. But both of the two are important. No one can deny the necessity of economic development and environmental protection. The process of economic development accompanied with urbanization and industrialization alters land use pattern in the countries which have significant adverse impact upon environment. The need of the hour is to make proper urban planning and management to ensure urban sustainability.

References:

- *Website : www.mospi.gov.in*
- *Economic Survey, Assam, 2012-2013.*
- *India State of Forest Report, 2011, Forest Survey of India, Department of Forest, Government of India.*
- *Borah, J. & Gogoi, B. (2012), 'Growth of Slum Areas and Changing Land Use Pattern in Guwahati City, India', The Clarion,Vol.1, No.2, pp 189-195, ISSN:2277-1697.*
- *Borah, J. 'The Rural-Urban Migration Pattern in Guwahati's Environment'.*
- *Borah, K.C. (1997), 'Land Usei Pattern in North East India'. In: Baishya, P. et al. ed. 'Development Issues of North East India', First Ed., Lawyers Book Stall, Guwahati, pp*
- *Borthakur, M. & Nath, B.K. h(2012), 'A Study of Changing Urban Landscape and Heat Island Phenomenon in Guwahati Metropolitan Area' International Journal Scientific and Research Publications, Vol.2, Issue II, Nov., ISSN: 2250-3153.*
- *Daimary, P. (2008), 'Economic Development of Assam: Problems and Prospects', First Ed., EBH Publishers, India.*
- *Mohanty, S., 'Population Growth, Changes in Land Use and Environmental Degradation in India'.*
- *Sharma, P., Deka, D. & Saikia, R. (2011), 'An Analysis of Changing Land Use Pattern and Its Effect on Umtrew Basin, North East India', Hungarian Geographical Bulletin, 60(1), pp 67-68.*

Armed Forces (Special power) Act. 1958 and Violation of Human Rights in Manipur

Mr. Tapan Das
Assistant Professor, Department of Political Science

Abstract:

The Armed Forces (Special Power) Act 1958 is one of the most draconian laws that the Indian parliament has passed in its parliamentary history. The Act was passed by both houses of Parliament on 18th August'1958. The Armed Forces (Special Power) Act has been in force in several parts of India, including the state of Manipur in the northeast of the country. The vaguely formulated provision of the Act grant extraordinary powers to the Indian armed forces in the so-called "disturbed areas" Where it is applicable. The Act has been at the heart of concerns about human rights violations in the region, such as arbitrary killings, torture, Cruel, inhuman and degrading treatment and enforced disappearances.

This paper aims at highlighting how Armed Forces (Special Power) Act 1958 carried an unrest situation in Manipur and how it has been violating the human right of the state.

Introduction:

Manipur is currently a federal state of Indian Union merged with India controversially in Oct. 1949. Within some years of the merger with India, insurgency movements started in Manipur at low levels.

To fight such insurgency movements, India Government passed and imposed this inhuman law called Arms Forces Special Power Act (AFSPA) in 1958 in Manipur and other states in the North-East India that gives the Indian Army all the powers to encroach upon the basic human rights of the common people, that is to disturb people anytime, anywhere; arrest without warrant; torture and kill anyone suspicious with full legal impunity for whatever heinous crimes army can commit upon the civilians; in the name of fighting insurgency in Manipur, other North-East states and Jammu and Kashmir in India.

Objective:

In this paper an attempt is made to discuss how Armed Forces (Special Powers)

Act,1958 carried on unrest in Manipur and how the Human Rights of the people of the state were violated. It is in this context, this paper seeks to give a systematic analysis of AFSPA and its adverse effect in Human Rights. The objective of this paper is to discuss the impact of AFSPA on the people of Manipur.

Methodology:

The paper is based an Secondary data, which mainly descriptive, collected from books, research papers, articles, internet, newspapers etc.

What is Armed Forces Special Power Act. 1958:

The Armed forces (Special power) Act 1958 is one of the most draconian law that the India Parliament passed by both houses of parliament on August 1958 and received presidential assent on 11 September 1958. Subsequent amendments to the Act, which dealt with the territorial scope of its application, were enacted in 1960, 1970, 1972 and 1986. Even though there was some resistance within the parliament against the passing of the Act, the majority prevailed and the law was passed. Today the Act is applicable to the north-eastern territory of India, namely, Assam, Manipur, Tripura, Meghalaya, Arunachal Pradesh, Mizoram and Nagaland. In 1990, a similar Act was enacted to cover the state of Jammu and Kashmir.

The Act grants extraordinary powers to the military including the powers to detain persons, use lethal force, and enter and search premises without warrant. This Act gives the Armed forces wide powers to shoot, arrest and all in the name of 'aiding civil power'. The impact of the Act on the people of the Manipur is dangerous. The law has facilitated grave human rights violations, including extrajudicial executions, enforced disappearances, rape and torture, arbitrary killings, torture, cruel, inhuman, degrading treatment and other ill treatment. This Act has made the people of region to suffer a lot, People are deprived of basic human rights which are inherent in every individual's life. The legislation is sought to be justified by the Government of India on the plea that it is required to stop the North-east states from seceding from the Indian Union. AFSPA empowers the governor of the state or the centre to declare any part of the state as a 'disturbed area', if in its opinion there exits a dangerous situation in the disturbed area which makes it necessary to deploy armed forces in the region. The 1958 Act empowers armed personnel with guns pointed at the ready starling at street corners, regular cordon and search operations in this particular area.

Violation of Human Rights by Armed Forces Special Power Act 1958:

Every Country dealing with insurgency or with terrorism has its own laws and legislations to tackle the menace. Likewise, India has laws to fight insurgency and terrorism and has given legal powers to armed forces operating in 'disturbed' areas

under AFSPA 1958. Indian Government has imposed Armed Force (Special Power) Act 1958 in Assam and Manipur and was extended to all the states of North-eastern region in 1972 with a purpose of eliminating insurgency activities from the region. But practically no out come is seen except hurrashing the innocent people of Manipur. Now whole Manipur is under martial rule. The exercise by the armed forces of the unchecked powers to arrest, search, seize and even shoot to kill conferred under section 4 of the Act has resulted in large-scale violation of the fundamental rights of the citizens under Articles 14,19,21,22 and 25 of the constitution. The power under the section 4 (a) of AFSPA Act has hurt the citizens of Manipur the most as they feel that the Act confers the armed forces with broadly defined powers to shoot to kill and that this is a law, which fasters a climate in which the agents of law enforcement are able to use excessive force with impunity. It is alleged that security forces have destroyed homes and other structures presuming them to be used by insurgents under provisions of section 4 (b) of AFSPA Act. Manipuris also feel that section 4 (c), arrests without warrant, is a serious encroachment on the right to liberty of a person. The power of search and seizure under section 4 (d) has been extensively used by the armed forces in cordon and search operations leading to widespread violation of fundamental rights of citizens and the forces have kept arrested persons (section 5) for several days in their custody.

The application of the AFSPA Act has over the years led to numerous violations of human rights. The following examples are the most illustrative ones, which were widely covered by the media and triggered investigations which, were not capable of leading to the establishment of the truth of what had happened. The widely reported events that took place on 5 March 1995 in Kohima, Nagaland, still stand out as one of the most glaring examples. The military while driving along the streets of the town, mistook the sound of a burst tyre from their own convoy for a bomb explosion and opened fire indiscriminately, Individuals who were considered to be terrorists accomplices were dragged from their houses and arbitrarily killed. As a result, seven civilians lost their lives. In addition, 22 passers by, including seven minors, were injured. A commission of inquiry set up by the Government of Nagaland found that there had been no reasonable ground for the use of any force in the circumstances.

Another well publicised case is the arrest and death of Ms. Thangian Manorama Devi. On 11 July 2004 the 32 years old was arrested under the Act at her house in Manipur by the Assam Rifles. Three hours later her badly mutilated and bullet-ridden body was found by the roadside nearby. No investigation followed, and the Indian Army Vice Chief of Staff explained that what happened to Monorama had been "unfortunate". Her death, as well as the authority's failure to investigate it, led to large scale protests throughout Manipur, prompting the Prime Minister of India to visit the state. The Government of Manipur established a commission of inquiry

headed by Justice C. Upendra, a former sessions judge, but the Assam Rifles challenged that decision before the courts, claiming that the state Government had no competence to investigate their actions. The ensuring prolonged litigation came to an end only in 2010 when the challenge was rejected. However, at no point during this period and thereafter have the authorities taken any measures to establish the circumstances of Manorama's abduction, possible torture and death and to identify those responsible. The inquiry report itself has not been made available to the public. Manorama's family approached the High Court to obtain a copy of the report. The court agreed. However, the Union Government at the time filled a special leave petition against the order and the case is still pending before the court. Another reported case of arbitrary killing by the military acting under the Act concerned Mr. Rengtuiwar, a 75-year-old retired school teacher, and his disabled wife, who were killed and injured, respectively, on 16 November 2004 when they were fired at by the Assam Rifles in Bungle Chiru village, Manipur.

The more recent examples of the activities of the military in Manipur include indiscriminate use of firearms during the night of 2-3April 2011, which led to the killing of Ms. Waikhom Mani in the village of Nongangkhong, and assault against the justice of the Guwahati High Court in Imphal on 20 April 2011. Private and confidential admissions of military officer's reportedly characterise civilian causalities as "errors in judgement" in the application of the Act. They attest to an apparent practice in which priority is given to the use of lethal force over the arrest of suspects and subsequent prosecution, were warranted. The frequent violations and culture of impunity led to protest by civil society activists in Manipur, who have been campaigning and litigating for the repeal of the Act since the 1980s. An exceptional mode of protest against the Act is that of Ms. Irom Chanu Sharmila, also known as the "Iron Lady of Manipur", a civil rights activist and writer. She has been on Hunger Strike since 2000 demanding the repeal of the Act, which she blames for violence in Manipur and other localities in the North-eastern part of India. Sharmila has been repeatedly arrested on charges of attempt to commit suicide under section 309 of the Indian Panel Code, and forcibly fed by her prison wardens. Her protest is probably the world's longest hunger strike.

The people of northeastern India have witnessed three major military operations as part of counter insurgency operations. They are (1) Operation Bazrang, (2) Operation Rhino and (3) Operation Blue Bird. These three operations had also violated large scale human rights in that region.

These above are the major areas and ways of human rights violation in North East India by AFSPA of 1958. All these cases of human rights violation had very nicely symbolized the status of human rights in North East in the shadow of AFSPA.

Conclusion:

The imposition of AFSPA act 1958 has led to widespread Human Rights Violations in Manipur, such as arbitrary killings, torture, cruel, inhuman and degrading treatment and enforced this appearances. Every individuals Human Rights are needed because it is inherent in every individual's life. People should be left with them to leave in dignity. But AFSPA gives the armed forces wide and blanket power to shoot to kill, arrest and search without a warrant in a disturbed area. The greatest outrage of the Act is depriving life on mere suspicion in order to maintain public order, It violated Article 21 of the Indian Constitution which provide " no person shall be deprived of his life and personal liberty except according to procedure establish by law". The exercise by the Armed Forces of the unchecked powers to arrest under section 5 of the Act has resulted in large scale violation of the fundamental rights of the citizens under Article 22 of the constitution.

Repeal of AFSPA will help to create favourable condition of dialogue with insurgency groups in Manipur. Dialogue must be a way forward and repeal of AFSPA will enable insurgency groups to come forward for dialogue with the Government. I am inspired by Mahatma Gandhi that any conflict can be resolved through discussions, love and peace. Both the insurgent groups as well as state authorities should come forward for democratic process. Repeal of AFSPA may be a step forward in bringing peace and harmony in Manipur. Though it may not be enough, still it may create conditions of peace which will prove to be beneficial in the long run.

REFERENCE:

1. *Assam Tribune, 27th April, 2014.*
2. *Baruah, Sanjib Durable Disorder: Understanding the Politics of North-East India, OUP, 2005.*
3. *Kamboj, Anil, "Manipur and Armed Forces(Special Power) Act 1958", Strategic Analysis October-December'2004*
4. *Laishram, Dhanbir, "North-East in Benthic Zone", Akansha Publication House , New Delhi,2007.*
5. *Singhal, S.C., "Human Rights", Lakshmi Narain Agarwal Educational Publishers, Agra, 2012-13*
6. *Maita,Kironshanker, " The Noxious Web: Insurgency in North-East India", Kanishka Publication, 2001.*
7. *Talukdar,Sushanta, "Manipur's protest" ,Frontline,27th August'2004.*
8. *Yasin Adil-Ul and Upadhyay Archana, "Human Rights", Akansha Publishing House, New Delhi, 2006*
9. *Talukdar, Sushanta, "A Promise to Manipur", Frontline, 3rd Dec'2004.*
10. *The Asian Centre for Human Rights, " An Analysis Armed Forces Special Power Act.1958" PUCL Bulletin, March'2005.*
11. *Yogi, A. K., "Development of the Northeast Region, Problem and Prospective", Spectrum Publication, Guwahati'1991.*

Study of the Diseases caused by the Airborne Fungal Spores

Dr. Nandini Kakati
HoD, Dept. of Botany

Abstract

Aerobiology has developed into an expanding science with inter disciplinary boarders extending to plant pathology, mycology, palynology, biodeterioration and allergy. The aerobiological investigations of the outdoor atmosphere involve the experiments conducted for the detection of the aero allergenic fungal spores and other biologically significant particles which have their impact on human health as a part of the general aerobiological experiments. The airborne fungal spores such as *Aspergillus*, *Cladosporium*, *Stachybotrys* etc. play an important role in allergic disorders to man. Again many plant discases are caused by some airborne fungi, such a *Alternaria, Fusarium, Helminthosporium, Cercospora, Pyricularia* etc.

Introduction

Aerobiology is a more recently developed multidisciplinary science dealing with aerial bioparticles present both in indoor and outdoor environments and their impacts on plants, animals and human system and also provide means for preventing or controlling airborne diseases. There bioparticles include pollen grains, fungal spores and some other microscopic particles. The study of aerobiology has its bearing on various areas of human health and welfare among which may be mentioned allergy and plant pathogenicity, involving fungal spores, which form the subject matter of the present investigation.

A disease is an abnormal condition that affects the body of an organism. It is often construed as a medical condition associated with specific symptoms and signs. It may be caused by factors originally from an external source, such as infectious diseases or it may be caused by internal dysfunctions , such as autoimmune diseases. There are four main types of diseases : pathogenic disease, deficiency disease, hereditary disease and physiological disease. Majority of the pathogenic disease of the organisms are caused by fungi, bacterial spores, virus etc. Within the group of

microorganisms fungi are dominant in the air followed by pollen, bacterial spores etc. Fungal spores are always present in the air although their number depends on time of day season, geographical location etc.

The investigation of aerobiology is important in the pathogenesis of respiratory allergic diseases in human beings. Allergic Bronchiopulmonary Aspergillosis (ABPA) is the most frequently recognised disease caused by the fungi *Aspergillus* sps. More than 15% of the human population suffer from allergic disorders such as rhinitis, conjunctivitis and atopic dermatitis etc. caused by airborne fungi.

Origin of Problems

History of aerobiology is also an enterprising aspects. In "Atharva Veda" and "Ayurveda" which dates back about 1000 B. C., it has been clearly suggested that inhalation of contaminated air causes respiratory diseases. One of the daily duties prescribed by "Aryan scripture" was the offering to fire knowledge as "Agnihotra". Agnihotra is performed daily in the morning and evening. The utility of "Agnihotra" as mentioned in ancient Indian literature was for the purification of air in the house and the surroundings. The ancient Indian literature clearly pointed out the modern concept of plant pathology and allergy. In the ancient literature like "Vedas" (1500-500 B. C.) from India, there are references of plant, animal and human diseases and various control measures.

In India, aerobiological investigations have been also carried out with reference to diseases of rice, wheat, jawar, bajra, sugarcane, cotton, banana, potato, citrus, sunflower, groundnut, mung, arhar and vegetables by various investigators.

Methodology

Aerobiological sampling methods are diverse based on different scientific principles and vary according to individual interest in component of the aeromicroflora. For air monitoring of the selected sites, the petriplate exposure method has been used. The identifications are based on the colour, size, shape of spores, symptoms of the diseases and other important diagnostic features. Literature consulted for fungal spore and disease identification are the books written by Nair et.al (1986) Tilak (1989) and Priti Kakati (2000).

Result

Fungal spores contribute a major portion of air-spora. The relevance of fungal spore content of the atmosphere is very important to the scientists engaged in various fields of research like (1) Plant Pathology - due to the presence of airborne plant pathogens (2) Medicine - Since some fungal spores act as allergens and (3) Industrial Microbiology - spores responsible for deterioration of stored food materials.

The result of investigations all over the world have established beyond doubt the significant role of fungal spores in the etiology of respiratory allergic disorders. More than 15% of human population suffer from allergic disorders such as rhinitis, conjunctivities and atopic dermatitis etc. The incidence of occupational asthma accounts for 5-15% of all asthma. Since the time of Blackly (1873) it was known that certain forms of human allergy such as hay fever (seasonal allergic colds), asthma and sometimes eczema was associated with certain airborne spores. He noted that the inhalation of fungus spores *(Puccinia glaucum)* causes allergic effects. Freinberg (1947) has proved that not only *Puccinia* spp. but also *Alternaria*, *Cladosporium* and *Mucor* spp. which act as allergic reagents.

A fumigatus, an opportunistic infection has now surfaced as a pathogen found to effect the respiratory system leading to a disease called Allergic Bronchiopulmonary Aspergillosis (ABPA) with symptoms very similar to tuberculosis. *Aspergillus* spp. are responsible for causing ABPA. Apart from being allergenic, spores of some mould species such as *Stachybotrys* contain toxic. Compounds called mycotoxins. Symptoms associated with mould spores may include allergy, headache and fatigue, running nose, sneezing, coughing pneumonia and asthma among other non-specific symptoms. Young children, the elderly and people undergoing medical treatment are particularly susceptible to mould spores.

Few fungal diseases need to be focused immediately due to the emerging treat to public health. The diseases which are to be dealt immediately include aspergillosis, condidiasis, histoplasmosis, cryptococcosis, mucor mycosis, alternariosis, penicillosis and blastomycosis. Clinical presentation in allergic and invasive fungal diseases are complicated and currently available diagnostic methods are time consuming and are inadequate.

Again there are many plant diseases caused by the airborne fungi. In India, 5000 various types of plant diseaes are recorded till now. Among these 1000 various types are responsible for causing plant pathogens to the important plants. The blight disease of potato, the blast of rice, the rust of wheat, the panama disease of banana, the wilt diseases of crop are the serious plant diseases which caused severe losts to the cultivators.

The allergenic principles of allergic disorders and the fungal spores of various plant pathogens however, different with species of various types as well as their environment and seasonal changes. The occurrence and prevalence of these spores are related to their production and meteorological parameters like rainfall, temperature, relative humidity, wind velocity etc. and the available of plant and plant debris which act as a host or substrate for the most commonly encountered fungi, eg - *Cercospora, Alternaria, Curvularia, Cladosporium, Fusarium* usually during the rainy season. The

atmospheric fungal population decreases due to 'Washing off' by rain, however it gradually increases again after the rains have stopped. In general, the concentration is minimum during hot summer months. However, it can be said that, there is no 'Spore free' month.

Some important human and plant diseases caused by the airborne fungi are listed below

(A) Human diseases :-

Sl. No	Name of the diseases	Name of the causing fungi
1.	Aspergillosis	*Aspergillus* spp.
2.	Candidiasis	*Candida* spp.
3.	Histoplasmosis	*Histoplasmoces* spp.
4.	Mucor mycosis	*Mucor* spp.
5.	Alternariosis	*Alternaria* spp.
6.	Penicillosis	*Penicillium* spp.
7.	Blastomycosis	*Blastomyces* spp.

(B) Plant diseases :-

Sl. No	Name of the diseases	Name of the causing fungi
1.	Blast of rice	*Pyricularia oryzae*
2.	Foot rot of rice	*Furarium moniliforme.*
3.	Brown spot of rice	*Helminthosporium oryzae*
4.	Wilt of arhar	*Fusarium* sp.
5.	Leaf spat of arhar	*Cercospora indica*
6.	Tikka disease of groundnut	*Cercospora personata*
7.	Wilt of linseed	*Furarium oxysporum*
8.	Black rust or stem rust of wheat	*Puccinia graminis*
9.	Brown rust or leaf rust of wheat	*Puccinia triticina*
10.	Yellow rust or stripe rust of wheat	*Puccinia glumaram*
11.	Loose smut of wheat	*Ustilago tritici*
12.	Smut of maize	*Ustilago zeae*
13.	Rust of maize	*Puccinia sorghi*
14.	Rust of jowar	*Puccinia purpurea*

15.	Rust of bajra	*Puccinia penniseti*
16.	Blast of ragi	*Pyricularia sp.*
17.	Wilt of catton	*Fusarium Vasinfectum*
18.	Early blight of potato	*Alternaria solani*
19.	Leaf spot of couliflower	*Alternaria brassicola.*
20.	Blight of couliflower	*Alternaria brassicae*
21.	Yellow disease of knol-khol	*Furarium oxysporum*
22.	Leaf spot of beet	*Cercospora beticola*
23.	Soft rot of sweet patoto	*Rhizopus stolonifer syn.*
24.	Wilt disease of tomato	*Fusarium bulbigenum*
25.	Lady's spot of finger	*Cercospora malayensis* *C abelmoschi*
26.	Leaf spot of brinjal	*Alternaria melongenae, A. Solani, Cercospora solani and C solani melongenae*
27.	Fruit rot of cucumber	Pythium aphanidermatum
28.	Leaf spot of cucumber	Cercospora spp.
29.	Panama disease or Banana wilt	Fusarium oxysporum
30.	Grey leaf spot or blight of coconut	Pestalotia palmarum
31.	Leaf rot of coconut	Helminthosporium halodes
32.	Wilt disease of sugarcane	Furarium moniliforme, Cephalosporum, sacchari

Discussion

The most frequently occured spore types which eventually contributed to the total airspora, are *Aspergillus, Cladosporium, Curvularia, Penicillium Fusarium, Alternaria, Helminthosporium, Mucor etc.* The genus *Aspergillus* and *Cladosporium* are important from allergic point of view. The genus *Furarium* is a severe pathogen causing wilt of number of vegetables leading to considerable damage to the crop. Again *Alternaria* is a severe pathogen causing Early Blight disease of solanaceous vegetables leading to considerable damage. Some of the pathogenic fungi, such as *Curvularia, Cercospora, Helminthosporium* are generally found responsible to bring about the leaf spot disease incidence. During the clear weather the fungal spores are carried to short or long

distances by the air currents. The low temperature of winter decreases the fungal population in air but again optimum temperature favours airmicrobes from January to April. Though most of the spore types exhibit seasonal variation in the concentration but spores of *Alternaria, Cladosporium, Curvularia* do not exhihit marked seasonal variations and are present more or less all the year round, this may be due to their wide host range.

Many of the sopres are found to be responsible for biopollution in the air and biodeterioration. Biodeterioration includes ratting, mechanical damage, staining and spoilage of material. Spores namely Aspergillus, Cladosporium, *Penicillium, Alternaria, Furarium* and *Rhizopus* are responsible for biodeterioration. The process of biodeterioration is hasten due to excessive humidity and poor ventilation. There is a correlation between microbes and environmental conditions, that lead to biodeterioration of biological material.

There are numerous soil, water and airborne fungi which have been implicated or proven to be etiologic agents of human, animal and plant disease. For the most part, very few clinical cases have been recorded and generally even less has been reported concerning their mechanisms of pathogenesis.

Reference:

1. *Freinberg S. M. (1947) : Allergy in practice, 2nd edition, The year book publish, Inc. Chicago, USA*
2. *Kakati Priti (2000) : Udvidar Rog, 2nd edition, Guwahati.*
3. *Nair, P. K. K. Joshi, A. P. and Gangal, S. V. (Edts.) (1986) : Airborne Pollen, spores and other plant materials of India - A survey, CSIR Centre for Biochemicals, Delhi and National Botanical Research Institute, Lucknow.*
4. *Tilak, S. T. (1989) : Airborne Pollen and Fungal Spores, Vaijayanthi Prakashan, Aurangabad*

Computer Network Congestion and use of Fuzzy Logic

Kusumbar Baishya
Asstt. Prof., Dept. of Mathematics
Amitabh Sarma
Asstt. Prof., Dept. of Comp. Science

Abstract

"Computer network congestion" plays an important role in packet switched communication and occurs when a node or link is bearing higher data than its quality of service. As a result network loss its packet, delay in service or disturbing in new connections. Therefore Congestion control could be understood of mechanisms and techniques to control the congestion and maintain capacity below of its load. Computer network congestion control problems are vital issues and a high priority, especially given the growing size and demand of networks, despite the many years of research efforts. Designing effective congestion control mechanism for computer networks is a hard work because of the difficulty of realistic, cost effective, tractable analytical models of congestion. But Computational Intelligence using Fuzzy Logic Control methodology is trying to offer effective solutions for certain classes of control problems. In this article we propose discuss a fuzzy based congestion control mechanism to address the congestion control problem.

Keywords:

Network congestion, Congestion Control, Congestion avoidance, FERM, FERM2, CI.

Introduction:

Since many years of research efforts, the problem of network congestion control is still a critical issue and a high priority that is the growing size, demand, and bandwidth speed of the networks. By growing packet switched Network congestion is becoming a critical threat. Congestion is caused by saturation of network resources means when the demand is greater than the available resource that means the packets send load is higher than its network

handling capacity. In network congestion incremental increase in carrying data or packets leads to minimum network throughput or reduction in network throughput. Network congestion result in loss of packets delay in service or bottleneck in new connection. Network congestion may become unmanageable unless effective, robust, and efficient methods of congestion control are developed. Currently there is an ongoing discussion between the active members of the networking community as to give the right definition of congestion. Existing solution to control congestion are now becoming ineffective due to the growing size of the network and can't scale up. But computational intelligence could play an important role in this issue. The Fuzzy Logic is one of the tools of what is commonly known as Computational Intelligence (CI). Therefore, Computational Intelligence is an area of fundamental and applied research involving numerical information processing.

We all know that when the sum of demand on any resource is greater than the available resource, the resource is known to be congested for that demand. So in mathematical term we can say-

We all know that when the sum of demand on any resource is greater than the available resource, the resource is known to be congested for that demand. So in mathematical term we can say–

- **Demand > Available resource**

Thus we can say that depending on resource availability congestion problem classify as single or distributed resource problem. For example in dumb resource such as LAN medium where all the effort need to solve the congestion problem by the single users. It seems that all access method of LAN like token access, carrier sense multiple access with collision detection (CSMA/CD) are single problem solution. But the intelligent resource can manage itself. In case of distributed resource it is so complex to handle. For example when a users demand is unlimited than the available capacity of a link (resource) is said to be distributed resource problem.

From the above discussion we can classify congestion schemes as resource creation schemes and demand reduction schemes. In resource creation schemes reconfigure dynamically to increase the capacity of the resource. For example added dial up links scheme in high usage, increases power on satellite link scheme, splitting of path for extra traffic sending scheme etc. All these schemes are not aware of congestion problem where only network is deal with the congestion

The demand reduction schemes indicate that they try to reduce amount of demand of the available resources. The basic demand reduction schemes are service denial schemes, service degradation schemes and scheduling schemes. The service denial schemes stop new connection or sessions to begin in congestion period. For

example when someone is busy with a telephone line than nobody is allowed to connect to that person and signalling a busy beep sound. The service degradation schemes indicate to all the users signalling to minimise their load. The scheduling schemes point to the users to schedule their demand to keep below the capacity. In resource creation schemes or demand reduction schemes the network computes the total load on the network and farther go for some avoidable action. A feedback signal that is based on the load is sent from the resource which is congested to one or more control point. Some proposed feedback mechanism are discuss bellow-

• Feedback in routing messages: The intermediate resource despatch its overload to neighbouring nodes and respectively all receiving nodes share the load level.

• Feedback message: Feedback message may also called chock point message or source quench message or permits message where explicit messages are sent from the congested resource to the control point.

• Probe packets: It is send from the sources via network to adjust their load depending

on the delay.

• Rejecting further traffic: In this mechanism a back pressure is create where the incoming packets are lost or un-acknowledge and thus queues are create at the other nodes. In the demand reduction mechanism the control node performs as source node on the network.

Some alternatives to the location of the control discuss as-

• Transport layer: End system is the best suited to adjust the traffic load in transport layer. But when the network and end system running under different administrative then the control is balanced only first and last intermediate node.

• Network access: When the network is not congested then only the access control in the source node allow to in new traffic in the network layer.

• Data link layer: The data link level flow control techniques can be applied at data link level to the control.

• Network layer: Using fair queuing technique or buffer class technique or leaky bucket algorithm technique we can take steps to control the congestion when the router and gateways fall in congested. But such of technique are only beneficial for public networks.

Fuzzy logic is mainly known as Computational Intelligence (CI). Computational Intelligence is an area where fundamental and applied research involves numerical information processing. In recent time Computational Intelligence research is most active and simultaneously its uses are seen in some end user products. The Computational Intelligence mainly concerned with Fuzzy Logic, artificial neural network and

evolutionary. While these techniques are not a panacea, it seems that demand of these techniques is not only from the academic research community but also from telecommunication companies. Fuzzy Logic Control (FLC) is viewed as an alternative way of designing feedback controllers when rigorous control theoretic approaches cannot be used because of difficulties in obtaining a formal analytical model.

The control algorithm is a non-linear law and packed as a set of commonsense rules. Fuzzy Logic have been implemented smoothly to the controlling systems where difficultly has faced to obtain analytical models, even though it is available is too complex and highly nonlinear.

In recent times, numbers of research papers have been popularised and successful using fuzzy logic investigating solutions to congestion control issues in ATM networks where facing the complexity of ATM networks, varieties of traffic sources operating on them, and for depth analysis obtaining difficulty of formal models, it is still favoured by many of researchers that are deal with ATM network. Fuzzy Logic is recently applied to TCP/IP networks, and also TCP/IP Differentiated Services Networks providing in either case, handful congestion control in diverse networking technologies. The Transmission Control Protocol (TCP) is one of the key Internet protocols and is responsible for managing end-to-end connections across the Internet. Since that time and still today, TCP remains one of the most important congestion control mechanisms in use in the Internet.

The congestion control algorithms as FERM and FERM2 explicit rate congestion control schemes are very similar except in FERM desired queue length is implicit and in FERM2 queue length is set by higher level control module. FERM scheme is complaint with the ATM Forum Traffic Management Specification. FERM strictly maintain the current queue length and growth rate when in the calculation of Explicit Rate. The FERM scheme performs the Explicit Rate and Flow Rate Correction based on the current queue length and queue growth at the ATM switch. FERM is a non-linear controller where for certain queue length it performs different flow rate limits based on queue length different rate. FERM2 is very common to FERM. FERM2 is an improved scheme over the earlier or original scheme (FERM). The difference is that in the original scheme the desired queue length is implicit, but in FERM2 scheme desired queue length is set by higher level control module and gives flexible use of resources across the virtual connection. FERM2 scheme is also complaint with the ATM Forum Traffic Management Specification. The parameters used in the FERM2 are PCR, ICR, AIR, MCR and Nfn. The Resource Management cells are periodically evaluated by traffic sources and forward to the destination end systems.

Origin f of the Problem

Its seems that the origin of "congestion" problem in the Internet observed to the work of Leonard Kleinrock. He was the first person to focus on the problems of congestion in large multi-node networks with queuing. Later he works with Larry Roberts at ARPA where they implement analytic basis and theoretical feasibility of communication and thus it has been an important area in congestion control, congestion research and congestion management for the network researchers. In congestion when sending packets are more than the handling capacity of intermediate routers, then the intermediate routers fail to carry packets and waits for having retransmit the information. In earlier sending and receiving rate of applications was primarily maintained by TCP congestion control and when a packet loss is detected an inference is made that the loss occurred because of congestion. The basic cause of the congestion is too much demand from the collection of users that share the network resources. The pattern of demand and the capacity, architecture, and management of network resources all contribute to determining a congestion state.

Methodology Applied

This article is mainly based on secondary data. The secondary data is collected from various sources, such as-books, journals, internet source and some research topic.

Simulative Evaluation / Discussion

Extensive simulations using OPNET, on a representative ATM network and have compared the performance of FERM against enhanced proportional rate control algorithm (EPRCA), where we have seen that FERM offers excellent transient behaviour with good rise time, good settling time, and insignificant, if any, oscillations. FERM2 yields yet better throughput results than FERM in an overloaded network for both LAN and WAN networks. Its transient behaviour is much better than EPRCA, in the sense that FERM attains steady-state much faster, and that it offers 'smooth'. FERM2 performs still better throughput results than FERM in an overloaded network for both LAN and WAN network.

Conclusions

In this paper we have presented a fuzzy logic control methodology that is applied in two diverse technologies: ATM and TCP/IP networks for congestion control. The design of the fuzzy knowledge base is kept simple, using a linguistic interpretation of the system behavior. We have presented an illustrative example of using

CI intelligence to control congestion using Fuzzy Logic and have addressed limitations of existing alternative mechanisms. This is clearly shown from the extensive simulative evaluation. Both Fuzzy Logic based controllers are shown to exhibit many desirable properties, like robustness, fast system response and fairness, with capabilities of adapting to highly variability and uncertainty in network. From the results presented, using simple designs, we are optimistic that th e Fuzzy Control methodology can offer significant improvements on controlling congestion in computer networks. Various enhancements of the proposed fuzzy based congestion control designs, such as adaptively, as well as the formal evaluation of the properties of the controllers are currently being investigated

References:

[1]A. Pitsillides, 'Control Structures and Techniques for Broadband-ISDN Communication Systems', PhD Dissertation, Swinburne University of Technology, 1993.

[2] L. Roberts, 'Enhanced Proportional Rate Control Algorithm', Tech. Report, AF-TM 94-0735R1, August 1994.

[3] R. Jain, S. Kalyanaraman, R. Goyal, S. Fahmy, R. Viswanathan, 'ERICA switch algorithm; a complete description', ATM FORUM, AF/96-1172, August 1996.

[4] A. Pitsillides, J. Lambert, 'Adaptive Connection Admission and Flow Control: Quality of Service with High Utilization', IEEE INFOCOM Õ94, Canada, June 1994, pp. 1083-1091.

[5] A. Pitsillides, J. Lambert, 'Adaptive Congestion control in ATM based Networks: Quality of Service with High Utilization', J. of Comp. Commun. 20, 1997, pp. 1239-1258.

[6] 'ATM Forum, Traffic Management specification version 4.0', Tech. Report AF-TM-0056.000, April 1996.

[7] B. Braden et al, 'Recommendations on Queue Management and Congestion Avoidance in the Internet', IETF RFC2309, April 1998.

[8] S. Floyd, V. Jacobson, 'Random Early Detection gateways for congestion avoidance', IEEE/ACM Trans. on Networking, Aug. 1993.

[9] K.K. Ramakrishnan, and S. Floyd, A proposal to add explicit congestion notification (ECN) to IP, draft-kksjf-ecn-03.txt, October1998. (RFC2481, January 1999).

[10] Hadi Salim, Internet draft-salim-jhsbnns-ecn-00.txt, A proposal for Backward ECN for the Internet Protocol (IPv4/IPv6), June 1998.

[11] ATM Forum, Traffic management specification version 4.0, Tech. Rep. AF-TM-0056.000, April 1996.

[12] W. Stevens, "TCP Slow Start, Congestion Avoidance, Fast Retransmit, and Fast Recovery Algorithms", RFC 2001, January 1997.

[13] V. Jacobson, Congestion Avoidance and Control, ACM SIGCOMM88, 1988.

[14] G. M. Woodruff, et al "A congestion control framework for high speed integrated packetized transport", GLOBECOM'88.

[15] D. Mitra, J. B. Seery, "Dynamic adaptive windows for high speed networks with multiple paths and propagation delays", INFOCOM'91.

[16] K. K. Ramakrishnan and R. Jain, A Binary Feedback Scheme for Congestion Avoidance in Computer Networks, ACM Transactionson Computer Systems, Vol. 8, No. 2, pp. 158-181, 1990. (Also K.K. Ramakrishnan and R. Jain, "A binary feedback scheme forcongestion avoidance in computer networks with a connectionless network layer", ACM SIGCOMM, 1988).

[17] N. Yin, M. G. Hluchyj, "A dynamic rate control mechanism for source coded traffic in a fast packet network", IEEE JSAC, Sept.1991.

[18] Osama Aboul-Magd and Henry Gilbert, 'Incorporating congestion feedback in B-ISDN traffic management strategy' ISS'92International Switching Symposium, Osaka, Japan, October 1992 [19] Peter Newman, 'Backward explicit congestion notification for ATM local area networks', GLOBECOM'93, Houston, USA,December, 1993.

[20] S. Floyd, R. Gummadi, S. Shenker, 'Adaptive RED: An Algorithm for Increasing the Robustness of REDÕs Active Queue Management', Technical report, ICSI, August 2001. [21] C. V. Hollot, V. Misra, D. Towsley, W.-B. Gong, 'Analysis and Design of Controllers for AQM, Routers Supporting TCP Flows" IEEE Trans. on Automatic Control, vol. 47, no. 6, pp. 945-959, June 2002.

[22] S. Athuraliya, V. H. Li, S. H. Low, Q. Yin, 'REM: Active Queue Management', IEEE Network Magazine, 15(3), pp. 48-53, May 2001.

[23] K. Ramakrishnan, and S. Floyd, 'The Addition of Explicit Congestion Notification (ECN) to IP', IETF RFC 3168, September 2001.

[24] W.Pedrycz, 'Computational Intelligence: An Introduction', CRC Press, 1998.

[25] A. Sekercioglu, A. Pitsillides, A. Vasilakos, 'Computational intelligence in management of ATM networks', Soft Computing Journal, 5(4), pp. 257-263, 2001. [26] B. Azvine, and A. Vasilakos, 'Application of soft computing techniques to the telecommunication domain', ERUDIT Roadmap, (G. Tselentis, Ed.), pp. 89-110, 2000, http://www.erudit.de/erudit/papers/Roadmap.pdf.

[27] E. Morales, M. Polycarpou, N. Hemasilpin, J. Bissler, 'Hierarchical Adaptive and Supervisory Control of Continuous Venovenous Hemofiltration', IEEE Transactions on Control Systems Technology, Vol. 9, No. 3, pp. 445-457, May 2001.

[28] A. Pitsillides, A. Sekercioglu, 'Congestion Control', Computational Intelligence in Telecommunications Networks, (Ed. W. Pedrycz, A. V. Vasilakos), CRC Press, ISBN: 0-8493-1075- X, September 2000, pp- 109-158. [29] Sekercioglou A, Pitsillides A, Egan GK, 'Study of an adaptive fuzzy controller based on the adaptation of relative rule weights', in Proceedings of ANZIISÕ94, Brisbane, Queensland, Australia,1994, pp 204-208.

Factors Affecting the Seasonal Prevalence of Mosquito Population

Bandana Deka
Assistant Professor (HOD), Dept. of Zoology

ABSTRACT

Mosquitoes are the most prominent blood sucking arthropods that cause the greatest sufferings to human and their possessions. Besides sucking blood, they inflict painful and irritating bites; and act as vector transmitting some of the deadliest diseases like malaria, filariasis, dengue fever, yellow fever, encephalitis, etc. In Assam, mosquito fauna is rich and breeding sites are innumerable owing to heavy rainfall and high humidity, rendering the environment conducive for mosquito survival and proliferation. Certain physico-chemical parameters of various mosquito breeding grounds and the identification of the key factors that provide optimum condition for population density of mosquitoes in the urban areas like Guwahati, encourage the mosquito population. It has been observed that in Guwahati city mosquito population shows an abrupt rise during the period from February-April in contrast to the other non urban places of Assam. The population density of 3 important genera, *Anopheles*, *Culex* and *Aedes* of mosquitoes has been studied during Feb-Apr, 2009 by collecting larvae from different breeding grounds of Chandmari, Ambari and Uzanbazar of Guwahati. The total population of the mosquito is attaining its highest in the month of March. The genus *Culex* contributed the highest percentage of total population ranged from 96.80 to 99.09% and appeared as only dominative group followed by *Anopheles* (1.41 - 3.20%) at every place of collection while the population density of *Aedes* is nil. The population density of *Culex* indicates that all the 3 breeding places were found to be self sufficient nutritionally for the rich population of mosquito. It is due to the algal population which is good for mosquito larvae encouraged by the presence of high concentration of phosphate originated from the detergents of the domestic sewage.

Keywords: Arthropods, Vectors, Breeding ground, *Anopheles*, *Culex*, *Aedes*

INTRODUCTION

Mosquitoes are the most prominent blood sucking arthropods that undoubtedly cause the greatest sufferings to human and their possessions. Besides sucking blood,

quito menace while sleeping.

the family in Guwahati is bound to use mosquito net to remain away from the mosquito menace while sleeping.

ORIGIN OF PROBLEMS

It is usually observed that in Guwahati mosquito menace becomes a great social problem during the period from February to April. The menace is experienced by members of all ages of the society. Students can't concentrate their minds in studies; man can't sit comfortably in libraries, in public places and in the academic centres having evening classes, etc. due to mosquito bites. This problem is greatly involved in the economy of the society because to escape from the mosquito repellants in the form of tablets, coils, aerosols, etc. which ultimately cause great harm to human health including baby. Moreover, it transmits germs of several diseases such as malaria, encephalitis, dengue fever, filariasis, etc. Moreover, each and every member of

The present investigation deals with certain physico-chemical parameters of various mosquito breeding grounds of Chandmari, Ambari and Uzanbazar; and the identification of the key factors that provide optimum condition for population density of mosquitoes in the urban areas of Greater Guwahati that encourage the mosquito population.

In Assam, mosquito fauna is rich and breeding sites are innumerable owing to heavy rainfall and high humidity, rendering the environment conducive for mosquito survival and proliferation.

As mosquitoes are known to breed in a wide variety of habitats, it is essential to determine species specific breeding habitats for species sanitation.

hosts (WHO, 1982).

mitted from pig to pig and bird to pig by Culex vector and human is only incidental complex natural cycle of JE virus, which includes pigs and birds. The virus is transHost feeding pattern of vector mosquitoes is crucial for the maintenance of the importance in the epidemiology of mosquitoes borne pathogens (Romoser et al., 1989).

It has been recognized that the feeding behavior of mosquitoes is of paramount

et al., 1994 and Rodrigues, 1988).

and 16, 11 and 6 isolations of JE virus have been made from them respectively (Pant

vishnui and C. *pseudovishnui*, has been studied as important vectors of JE in India also,

South-East Asia (Reuben, 1968). Three species namely Culex tritaeniorhynchus, C.

are natural vectors of Japanese encephalitis (JE) in different countries of East and

fatigans and A. *vittatus* (Dutta and Bhattacharya, 1993). Species of genus Culex

have been recorded, comprising a few malaria vector species, namely *A. minimum*, *A.*

genera of mosquitoes are *Anopheles*, *Culex* and *Aedes*. More than 20 *Anopheles* species

like malaria, filariasis, dengue fever, yellow fever, encephalitis, etc. The important

they inflict painful and irritating bites; and transmit some of the deadliest diseases

It has been observed that in Guwahati city mosquito population shows an abrupt rise during the period from February-April in contrast to the other non urban places of Assam. Its main reason is the presence of numerous nutrients rich breeding grounds located in different places within the Guwahati city. The non urban places adjacent to Guwahati city are not experienced with such an erratic rise in mosquito population instead of having stagnant breeding grounds with similar climatic condition. In the present investigation a critical study has been carried to bring into focus the encouraging factors in the breeding grounds to support mosquito population.

METHODOLOGY

Three areas viz. Chandmari, Ambari and Uzanbazar of Guwahati metro has been selected for the study. While selecting the area, primary importance has given in the location of breeding ground where large amount of organic nutrients are deposited by the sewage carrying drains from the thickly populated areas containing adequate amount of water, providing best ecological parameters for mosquito breeding.

Collection of water sample containing mosquito larvae: The comparative population density of 3 families of mosquitoes has been studied by collecting larvae from breeding grounds. Water samples containing the larvae were collected in the plastic bowls of 300 ml without agitating the area. Utmost care was taken not to disturb the mosquito larvae. Ten samples were drawn from each breeding site per month. After collection, the larvae were killed by mild formaldehyde solution and they were identified using microscope up to family level with the help of standard literature. Simultaneously the number of larvae of different families was taken into account for the study of their population. To obtain an errorless data all the larval stages are counted and the data so obtained is considered to be a total number of larvae present.

Various physico-chemical parameters were studied by using standard methods in the laboratory of Assam Pollution Control Board, Bamunimaidan, Guwahati.

Morphological differences of 3 families of mosquitoes Culicine, Anopheline and Aedes:

	Character	Culicine	Anopheline	Aedes
1	Position of siphon	Penultimate segment of the abdomen	Does not possess respiratory siphon	Penultimate segment of the abdomen
2	No. of spiracles	2 pairs	1 pair	2 pairs
3	Body orientation	Larva hangs down at an angle with only the tip of the siphon in the surface film	Larva held up	Lara hangs

Larval population is expressed in terms of density, frequency and abundance.
Density = Total no. of individual encountered/Total no. of observation
Frequency = No. of species occurrence/Total no. of observation
Abundance (%) = No. of individual sp. in a sample/Total no. of all spp. in that sample x 100

Analysis of physico-chemical parameters of water:

(i) Rainfall: Stagnant water reservoir is the primary requirement for mosquito breeding. The population density of mosquitoes is very high during the period from February to April. It infers that high rainfall is not conducive for mosquito breeding in the drains of Greater Guwahati because during summer months the drains are flooded with running water that provides unfavourable condition for mosquito breeding.

(ii) Temperature: It is most important factor influencing the population density of any insect in an area. The temperature of Guwahati ranges from 280C to 320C ± 20C from February to April. During winter season population density seems to be low due to lower temperature; however, population of culicine species doesn't reduce as because of their non-hibernating nature. The study reveals that the atmospheric temperature between 280C to 320C ± 20C is the optimum temperature for culinine mosquito.

(iii) pH: pH level of all breeding grounds found to be slightly alkaline ranging from 7.5 - 7.6. It suggests that the urban drains during pre-monsoon period are not affected by inorganic pollutions. However, higher range of pH is the optimum for breeding of culicine species.

(iv) Chemical parameters: The water quality reveals that certain important parameters like biological oxygen demand (BOD), chemical oxygen demand (COD), chloride, phosphate etc. have exceeded the permissible limits in the breeding grounds of mosquitoes in stagnant aquatic body in polluted drain water. Ammonia, nitrogen, nitrogen, nitrites, nitrates and phosphates are the best requirements of algal growth but level of BOD and COD clearly indicate that the water of selected breeding ground is highly polluted to provide condition for aerobic macro and micro flora and fauna except the algal population.

The study has been carried out during February to April, 2009. This period seems to be the best period for mosquito population in Guwahati.

In the present studies, the population distribution of the 3 mosquito families in their natural breeding grounds within the boundary of Greater Guwahati has been studied in relation to the encouraging factors in the breeding habitats.

RESULT AND DISCUSSION

In the present investigation, the seasonal abundance of mosquito population of 3 breeding places in Guwahati area has been critically studied in relation to the sewage borne organic component in the breeding grounds during pre-monsoon period from February to April. There was a little variation in population in 3 breeding sites. The result shows that the total population of the mosquito is attaining its highest in the month of March. The genus *Culex* contributed the highest percentage of total population and appeared as only dominative group followed by *Anopheles* at every place of collection while the population density of Aedes is nil.

In Chandmari (Spot-I) the population percentage of *Culex* is highest in all the months of the study. On the other hand, Anopheles shows its highest (3.2%) abundance in April and lowest in March (1.41%). During the study period it was found that when population abundance of *Culex* is highest then the *Anopheles* shows lowest. In Ambari (Spot-II) also population abundance of *Culex* is highest (98.29%) in the month of March. The *Anopheles* population contributed an insignificant percentage and reached its peak in the month of March. In Uzanbazar (Spot-III) the Culex group contributed 99.09% of total population in the month of February followed by 98.56% and 97.61% in March and April. The *Anopheles* population contributed an insignificant percentage in Spot-III too (Table 1).

The *Anopheles* species is the most dominant one in Assam, tend to breed in stagnant fresh water bodies and larvae are sensitive to polluted water (Bhattacharya, 1992). The larvae feed upon organic particles present in the water viz. protozoa, bacteria, algae, fungal spores, pollen, etc. In this study, their population density was found to be almost nil in all 3 breeding places. Moreover, *Anophiles* species grow well in sunlight ponds or aquatic body, especially with aquatic vegetation.

Culex species can be categorized into i) domestic and peri-domestic, ii) semi domestic members of blood sucking dipterans (Carpenter and Lacasec, 1995). Large number of *Culex* species form culicine complex and the members are prone to breed in small collection of water around human dwelling furthermore the adult commonly enters houses and feed on man. Culicine species are prone to breed in polluted water and hence, in drains, swamps containing organic sewage (Harstall, 1995).

The present study reveals that culicine population density encouraged by eutrophic conditions of the breeding grounds caused by abnormally high amount of nutrient from sewage, fertilizer, animal waste and detergents. From the pH record it is interpreted that the drains of the Guwahati city contain mainly organic pollutants. The results of BOD, COD and DO don't encourage micro/macro flora or fauna to func-

tion as trophic level to supply nutrients to the mosquito larvae. On the other hand, the population density of culicine indicates that all the 3 breeding places were found to be self sufficient nutritionally for the rich population of mosquito. It is due to the algal population which is good for mosquito larvae encouraged by the presence of high concentration of phosphate originated from the detergents of the domestic sewage.

CONCLUSION

The seasonal abundance of mosquito population in Guwahati shows little variation in population in 3 breeding sites. The total population of the mosquito is attaining its peak in the month of March. The genus *Culex* contributed the highest percentage of total population and appeared as only dominative group followed by *Anopheles* at every place of collection while the population density of *Aedes* is nil. The population density of *Culex* indicates that all the 3 breeding places were found to be self sufficient nutritionally for the rich population of mosquito. It is due to the algal population which is good for mosquito larvae encouraged by the presence of high concentration of phosphate originated from the detergents of the domestic sewage.

Table 1. Species wise Density, Frequency & Abundance (%) of Mosquito in Guwahati

Month	Study area	Mosquito species	Density	Frequency	Abundance (%)
February	Spot-I	Culicine	12.7	1.0	98.44
		Anopheline	0.5	0.1	1.55
	Spot-II	Culicine	9.6	1.0	98.96
		Anopheline	0.1	0.1	1.03
	Spot-III	Culicine	11.0	1.0	99.09
		Anopheline	0.1	0.1	0.90
March	Spot-I	Culicine	13.8	1.0	98.57
		Anopheline	0.5	0.5	1.42
	Spot-II	Culicine	11.5	1.0	98.29
		Anopheline	0.5	0.5	1.70
	Spot-III	Culicine	13.7	1.0	98.56
		Anopheline	0.5	0.5	1.43

April	Spot-I	Culicine	12.1	1.0	96.80
		Anopheline	0.4	0.4	3.20
	Spot-II	Culicine	10.5	1.0	97.22
		Anopheline	0.3	0.3	2.77
	Spot-III	Culicine	12.3	1.0	97.61
		Anopheline	0.3	0.3	2.38

Spot-I=Chandmari; Spot-II=Ambari; Spot-III=Uzanbazar

ACKNOWLEDGEMENT

Assam Pollution Control Board, Bamunimaidan, Guwahati and Dr. RC Rajkhowa, Department of Zoology, Cotton College, Guwahati are duly acknowledged.

REFERENCE:

Bhattacharya DR, 1992. Anopheline fauna of parts of Tirap District, Arunachal Pradesh reference to malaria trasmission.

Carpenter SJ and Lacasec WJ. 1995. North American Masquito University of California Press.

Dutta PVD and Bhattacharya DR. 1993. Anopheline fauna and malaria incidence in Changlang District, Arunachal Pradesh, India. J. Malaria. 30: 135-143.

Horstall WR. 1955. Mosquitoes, bionomics and relation to disease. RONALD, New York. 723 p.

Pant UI, Seman MA and Shetty RS. 1994. First isolation of Japanese encephalitis virus from mosquito in UP. UP. J. Res. 99: 149-151.

Rodtrigues FM. 1988. Epidemiology of arboviral diseases of man in India. Known facts and unsolved questions. NIV Bull. 6: 3

Reuben R. 1968. A redeseription of culex vishnui Theo, with notes on C. pseudovishnui Colless from Southern India. Bull. Entomol. Res.

Romoser WSE and Scoff TW. 1989. Histological parameter useful in the identification of multiple blood meals in mosquitoes. Med. Hyg. 41: 737-742.

WHO, 1982. Manual of Environmental Management for mosquito control. WHO Publication, 1982. WHO, Geneva.

Evaluation of IPv6 secure Neighbor and Router Discovery Protocol, using Locally Authentication Process

Simanta Sarma
HoD & Asstt Professor, Dept. of Computer Science
Dipranjan Baishnab
Asstt. Professor, Dept. of Computer Science

Abstract:

Internet Protocol version six (IPv6), the next generation Internet Protocol (IP), exists sparsely in today's world. Internet Engineering Task Force (IETF), in IPv6, allowed nodes to Auto configure using neighbor discovery protocol. Neighbor Discovery (ND) and Address auto-configuration mechanisms may be protected with IPSec Authentication Header (AH). However, as it gains popularity now a day, it will grow into a vital role of the Internet and communications technology in general. In Protecting all traffic will include Address Resolution Protocol. To protect this, IPSec will need agreed Key. For Key setup, UDP packet is sent, which requires IPSec for secure communication. So IPSec requires Agreed Key and for Key setup IPSec is needed, this creates a loop. To solve this problem Locally Authentication Process is presented in this paper and we provide taxonomy for the IPv6 Neighbor and Router Discovery threats, describe two new cryptographic methods, Cryptographically Generated Addresses (CGA) and Address Based Keys (ABK), and discuss how these new methods can be used to secure the Neighbor and Router discovery mechanisms.

Keywords : Stateless Address Auto-configuration, Neighbor Discovery, Cryptographically Generated Address (CGA),IPsec, MLS, IP next generation, Multilevel security, Router Discovery, Secure Neighbor Discovery (SEND), Digital Certificate, Security Attacks in IPv6.

1. INTRODUCTION:

Fifteen years ago, when the basic design for IPv6 [1][2] was being decided, it was hardly possible to foresee the kinds of wireless environments that are now being

considered for use with IPv6. In the Internet Protocol version six (IPv6), also known as the next generation Internet Protocol, lies the future of communications for networked computers and possibly the future of all telecommunications. IPv6 is a complete redesign focusing on eliminating the weaknesses of its predecessor, IPv4. The used IP version 4(IPv4) was developed long time back. By the end of 2012, the number of mobile-connected devices will exceed the number of people on earth, and by 2016 there will be 1.4 mobile devices per capita [1]. IPv4 address space is of 32 bits. The theoretical limit of IPv4 addresses is 4.3 billion addresses. The aggravate problem of exhaustions of addresses, was mitigated by the introduction of Classless Inter-Domain Routing (CIDR), and reduced even more by the adoption of Network Address Translators (NAT). Other problems facing IPv4 are the lack of deployed security, and the rapid growth of the size of the routing tables. Before implementing CIDR the backbone routing table was growing at very high rate as compare to memory technology. The Internet Engineering Task Force (IETF) designed a next generation protocol Internet Protocol version 6 (IPv6) to solve these problems and eventually replacing the existing Internet Protocol, IPv4. This IPv6 was designed after having the rich experience of almost 30 years, of IPv4. IPv6 functions that manage the local link were designed with physically protected, trustworthy links in mind. However, now people are planning to use IPv6 on public radio networks, such as Wireless LANs at airports, hotels, and cafes. Even though the actual link may still be somewhat protected with layer 2 authentication, access control, and encryption some of the nodes on the link may be untrustworthy.

In this research paper, we focus on IPv6 Neighbor Discovery (ND) and Router Discovery (RD) functions. Their current definition relies on the assumption that there are no untrustworthy nodes at the local link. In practice, even a single untrustworthy node can launch various kinds of attacks, including Denial-of-Service (DoS), and masquerade. The current set of RFCs [6][7][8][9] do acknowledge the situation to a degree, but do not provide much detail about how to use the suggested protection mechanism, IPsec. Unluckily, there are a number of problems when using IPsec for securing Neighbor Discovery [10]. In IPv4, the configuration of IP addresses is done manually by the network administrator or with the help of DHCP server. Apart from manual configuration and state full auto-configuration, using DHCP, IPv6 has stateless auto-configuration. Stateless auto-configuration does not require manual configuration of hosts, and additional servers and state-full auto-configuration, hosts obtain interface addresses and configuration information and parameters from a server.

2. BACKGROUND

In this research paper, we will first briefly touch upon the most widespread way of auto configuration in IPv4-Dynamic Host Configuration Protocol (DHCP) [5].

The problems stemming from the design of DHCP will let us understand the design goals behind auto configuration protocols of IPv6. After introducing both the addressing schemes of IPv6 and the ND protocol, we give an overview of the Secure Neighbor Discovery (SeND) protocol.

2.1. Neighbor Discovery Protocol

Neighbor Discovery (ND) is one of the most important functions of ICMPv6. As an ARP replacement, it is responsible for finding other hosts on the segment. Regular ND specifications do not include any security provisions. Nodes can make any claims about who they are, as long as they belong to the right multicast group. Most multicast group memberships are assigned automatically, and without any human intervention needed. In IPv6, a host automatically gains some privileges when it has an address. Therefore, the security design for IPv6 is based more on the networking topography than a logical set of privileges and limitations: everyone outside the security perimeter is considered a potential attacker, but insider threats are not considered. ND messages are implemented as a set of ICMPv6 Types and Options, like redirection or a ping service. ICMPv6's Option field [11] provides a generic interface allowing extending ICMP's functionality. For example, Source Link Layer Address (SLLA) is an option type 1 and Target Link Layer Address (TLLA) is an option type 2. To learn the link-layer address of another node that is assumed to be directly attached to the local link, the node that needs the address sends a Neighbor Solicitation (NS) message to a multicast address specified by the target address. If the target node is indeed present, it should be listening to the multicast address. Upon receiving the solicitation, it replies with a Neighbor Advertisement (NA) message. The default operation is illustrated in Figure 1. Additionally, the specification defines that the messages may be protected with IPsec AH. From the security point of view, there are additional problems besides authentication. First, the NA includes a number of flags. One of the flags indicates that the replying node is actually a router, Another one is an "override" flag, specifying that the information in the packet should replace any information that the receiver(s) of the packet may already have. However, unless the authentication keys are strongly bound to IP addresses.

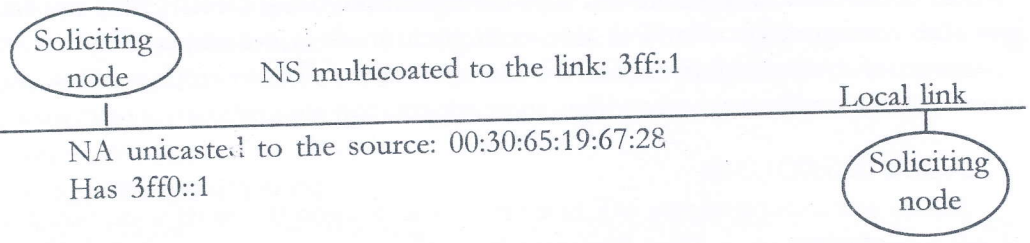


Figure 1: Neighbour protocols procedure

2.2. Address Auto-Configuration

Stateless Auto-configuration is the one of the most useful feature that lies in IPv6. The configuration can be done automatically without using any specific protocol such as DHCP. This very feature enables an IPv6 host to configure link-local (an address having link-only scope that can be used to reach neighboring nodes attached to the same link), site-local (an address having scope that is limited to the local site) and global addresses (an address with unlimited scope) for each of its interface. This feature is obtained by the protocol called Neighbor Discovery Protocol (NDP). This protocol includes router (a node that forwards IP packets not explicitly addressed to itself) discovery, stateless address auto-configuration, address resolution, neighbor reach ability, duplicate address detection and redirection.

2.3. Secure Neighbor Discovery

The Secure Neighbor Discovery (SeND) protocol [2], [3] proposes to address the insider threats discussed above. The main idea behind SeND is to use asymmetric cryptography to enforce authentication and integrity without changing the zero configuration paradigm of the regular ND protocol. IPsec is supposed to be the solution to IP protocol-based security needs, but it faces many practical problems, such as the initial key distribution [12]. Internet Key Exchange (IKE) is an implemented infrastructure to support IPsec's needs for transport of keys, but it requires IPv6 connectivity to work. There is a twofold problem in bringing a similar approach to protecting lower networking layers as a part of IPv6 security. The first problem is that of momentum. Unlike enhancements of the Web, IPv6 networking has no appeal to a regular user, as it does not provide any instantly observable improvements. The second problem is a major paradigm shift. Asymmetric cryptography has been historically used to protect data, by working at the highest layers of the OSI model. SeND uses asymmetric cryptography at the lower layers, which is a very novel idea. SeND, since it is an augmentation of the ND protocol, also encodes its messages in ICMPv6by creating a few new Option Types shared among the already existing ND messages.

Following ICMP messages are used by Neighbor Discovery Protocol.

*Router Advertisement: This message is used by Routers to inform other nodes existing on all links, to which they are connected, of its presence and other link related information. The process occurs periodically or in response to a Router Solicitation message.

*Neighbor Solicitation: These messages have 3 main purposes. The first is to discover the link layer address of a neighbor as part of the address resolution process. This process replaces the use of ARP requests and replies in IPv4. The second purpose

is to determine the reach ability of a neighbor. The last is to detect the presence of duplicate IPv6 addresses during the address auto configuration process which is detailed later in this report.

*Neighbor Advertisement: These messages are either in response to Neighbor Solicitations, or sent by a neighbor to announce a change in its link layer address. Upon receipt of a Neighbor Advertisement, a node will update its neighbor cache which contains mappings between IPv6 and link layer addresses of neighbors.

3. THREATS IN ADDRESS AUTO-CONFIGURATION

The stateless address auto-configuration allows a host to connect to the network without registering /authenticating itself. It simply configures the address and start communicating with other nodes on the network. Since node does not have to authenticate itself, any malicious node can get access to network. It can cause various kinds of threats which are explained as follows:

3.1. Redirect Attack:

Another big threat is in Router Solicitation / Advertisement message. In Neighbor Discovery, attacker can make fake advertisement of itself as default router, causing immediately timeout of all other default routers as well as all on- link prefixes. Node received advertisement and start forwarding its packets to this particular router causes man in middle and DoS attack.

3.1.1. Malicious Last Hop Router

A malicious router can send spoofed RA messages, pretending to be the target of RS messages. This would establish such a router as the default router. If the actual router was compromised, it would become a perfectly functional proxy, allowing hosts to carry on with regular transmissions. At the same time, the attacker could tunnel data out of the router to another computer, where sniffing for credentials could occur.

3.1.2 Neighbor Solicitation/Advertisement spoofing

A malicious node can send a NS message with a wrong Source Link Layer Address option, or a NA message with a wrong Target Link Layer Address option. Either one of these messages would populate attacker the target's Neighbor Cache with wrong IPMAC mappings. The target would send information to the wrong nodes, setting itself up for man-in-the-middle attacks and password and other sensitive information sniffing, effectively creating a redirection or DoS attack.

3.2.1. Parameter Spoofing

RA messages contain extra parameters that can be helpful to the autoconfiguring

hosts. In case such parameters are falsified, nodes might be forced to follow rules that might get them to talk to wrong hosts, or lose connectivity. The Current Hop Limit is one of the fields propagated in RA messages. If this parameter is set to an artificially low number, the packets will be dropped before they reach their intended destinations. Another peculiar aspect of the ND protocol is that one of its parameters can be used to indicate to hosts to use DHCPv6.

3.2.2. Duplicate Address Detection DoS

In networks where entering hosts obtain their addresses with stateless address autoconfiguration [8], an attacking node could launch a DoS attack by responding to every duplicate address detection attempt. If the attacker claims the addresses, then the host will never be able to obtain an address. This threat was identified in RFC 2462 [8] and an early attempt to solve the problem was made by Nikander [12].

3.3. Spoofing:

Spoofing is a way to achieve denial of service (DoS) attack, in an IPv6 network, in the Duplicate Address Detection (DAD) procedure. Attacker on the local link waits until a node sends a Neighbor Solicitation packet. The attacker falsely responds with a Neighbor Advertisement packet, informing the new node that it is already using that address. Upon receiving the Neighbor Advertisement, the new node generates another address and repeats the DAD procedure; the attacker again falsely responds with a Neighbor Advertisement packet. Finally, the new node stops initializing its interface.

3.3.1. Neighbor Discovery Spoofing

When the attacker spoofs certain Neighbor Advertisements, he can execute a MITM attack. By answering falsified Neighbor Advertisements to the issued Neighbor Solicitations from the victims, he redirects all IPv6 traffic over his "routing instance" in the same subnet

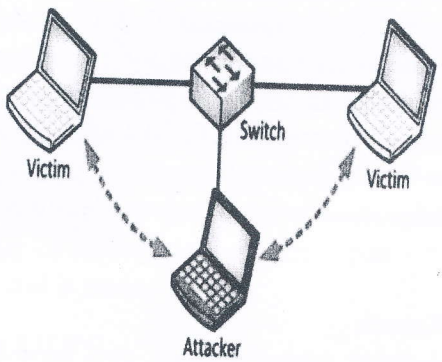


Figure 2: spoofing

3.3.2. Duplicate Address Detection

A DoS attack is executed if the attacker answers to all Duplicate Address Detection messages (DADs) from a new IPv6 node (with a not yet assigned IPv6 address). The node always believes that this address is already in use and will never get an available IPv6 address and is therefore unable to access the network. This situation remains until the attacker stops the attack.

3.3.3. Rogue DHCPv6 Server

An attacker can also place his own DHCPv6 server inside a network and distribute falsified values, e.g. a spoofed DNSv6 server address. If the clients accept this DNS server, they will get falsified DNS responses from now on if the attacker also owns the spoofed DNS server. With this attack, internal IPv6 users can be redirected to other (web) servers than they intended to access. The picture below shows the basic attack in the local network.

4. SOLUTIONS/ EVALUATION TO PREVENT THESE THREATS:

4.1. Sendas a solution

SeND claims to solve the mütual authentication problem. An IPv6 address is a function of a public key, and the public key is verifiably bound to the private key. This three-way binding is supposed to prevent a malicious user from spoofing the IPv6 address. Impersonation attacks would fail because of not being able to generate the IP address at all (lack of public key), or not being able to establish the binding between private and public keys (lack of private key). Replay attacks are supposed to be prevented by using nonces and timestamps. Old packets should simply fail, being outside of the allowed time difference, or due to response with an old nonce.

4.1.1. Cryptographically Generated Address (CGA)

A CGA can be used either as a name for a Cryptographically Generated Address, or the ICMPv6 Option. Both are at the foundations of SeND, but in this section we are concerned with the first meaning. CGA looks like a regular IPv6 address with two 64-bit portions. The first 64 bits are the network prefix portion, announcing the subnet number. The second portion is the Interface Identifier, which is derived using a SeND specific process.

4.1.2. Reply Attack

In order to prevent replay attacks, two new Neighbor Discovery options, Timestamp and Nonce, are introduced. Given that Neighbor and Router Discovery

messages are in some cases sent to multicast addresses, the Timestamp option offers replay protection without any previously established state or sequence numbers. When the messages are used in solicitation-advertisement pairs, they are protected with the Nonce option.

4.1.3. RSA Digital Signature Option

Once the public key is obtained from CGA Option, the receiver can use it to decrypt messages encrypted with the corresponding private key. ICMPv6 Option 12 allows us to use RSA digital signatures to establish authenticity of such packet exchanges. Here's a list of fields contained in a RSA Signature option:

* Key Hash-leftmost 128 bits of SHA-1 of the public key, used for constructing the signature

* Digital Signature-variable length field containing PKCS#1 v1.5 [17] signatures, using the sender's private key over these entities:

* 128 bit CGA Message Tag value for SeND.

* 128 bit Source Address from the IPv6 header

* 128 bit Destination Address from the IPv6 header

* 8 bit Type, 8 bit Code and 16 bit Checksum fields from the ICMPv6 header

* ND protocol message header, starting after the ICMPv6 checksum, and up to but not including ND protocol options

* ND protocol options preceding the RSA signature option

4.2. IPsec:

The neighbor discovery messages may be protected with IPsec AH [7]. Potentially, AH could be used by the hosts to verify that Neighbor Advertisements and Router Advertisements do contain proper and accurate information. Given a suitable set of AH Security Associations (SAs), the host can verify that the ND messages it receives are really valid and authorized. The proposed mechanism is quite cumbersome due the large number of SAs needed. Internet Protocol Security is meant for protecting the communication over the IP network. It supports network-level peer authentication, data origin authentication, data integrity, and data confidentiality (encryption) and replay protection. It basically uses the cryptographic security services for protection or authentication and encrypts each IP packet of a communication session. These can be either between a pair of nodes, or between a pair of security gateways or between a security gateway and a node.

5. PROPOSED SOLUTION

This solution envisages that only those nodes will be able to join the networks

which have been authenticated by issuing valid token, issued by local trusted node. The basic purpose of token is to allow node to verify link local address and its owner ship on Public key.

The basic terminologies used are:

ADDRESS BASED KEYS

Addressed Based Keys (ABK) [19] use a cryptographictechnique known as identity based cryptosystems. Identitybased cryptosystems allow any publicly known identifier, suchas an E-mail address or the IP address of a node, to function asthe public key part of a public/private key pair. That is,basically any bit string may act as a public key. The trick liesin the way the corresponding private keys and a number ofparameters are generated.

Public Key [Pu(X)(Y)]

Pu stands for Public key. X denotes entity that has generated this key and Y identifies the entity for which it is generated. Like Pu(AS)(N) defines Public key generated by AS for node N.

Private Key [Pr(X)(Y)]

Pr stands for Private key. X denotes entity that has generated this key and Y identifies the entity for which it is generated. Like Pu(AS)(N) defines Private key generated by AS for node N.

Identity Based Key Algorithms

There are many algorithms available for identity based cryptosystems. Shamir [20] introduced the idea of identitybased cryptography in 1984. Practical, provably secure identity based signature schemes [21][22], and Key Agreement Protocols [23] soon followed. Practical, provably secure identity based encryption schemes [24][25] have only very recently been found. In identity based signature protocols, the host signs a message using its private key supplied by its IPKG. The signature is then verified using the host's publicly known identity. In identity based key agreement protocols, two parties share a secret. Each party constructs the secret by using its own private key and the other party's public identity. In identity based encryption, the encryptor uses the recipient's public identity to encrypt a message, and the recipient uses its private key to decrypt the cipher text.

Certified addresses:

Identity based algorithms are fairly similar to conventional public key cryptosystems from the practical point of view. Consequently, instead of using the addresses directly as public keys, one could just use a conventional public key

cryptosystem and create certificates. Like ABK, address certification relies on a trusted agent. In this method, each node generates its own signature key pair. The node then co-operates with the trusted agent to generate 1-3 random host identifiers. For example, the host identifier can be produced by hashing together a random number Rhostgenerated by the host itself and another random number Rttpprovided by the trusted agent.

Host ID= HASH (Rhost/Rttp) Eq. 7

Finally, the trusted agent signs a certificate that binds the host identifier to the host's public key. This can be an X.509certificate where the host identifier is used as the entity name.

Digital Certificate DC(X)
Digital Certificate issued by X .
* Calculating Digital Signature (DS)
Digital signatures for ABKs are calculated using the following algorithm:

sig =SIGN (hash (contents), IPrK, Params) Eq. 4

where:
sig The digital signature.
SIGN The identity based digital signature algorithm used to calculate the signature.
hash A one-way hash algorithm, e.g. SHA1-HMAC.
IPrK The Identity based Private Key.
Params The public cryptographic parameters.
contents The message contents to be signed.
The recipient verifies the signature in the following way:

IPuK = IBC-HASH (ID) Eq. 5

valid = VERIFY (hash (contents), sig, IPuK) Eq. 6

where:
IBC-HASH A hash function specific to the identity based algorithm that generates the public key from the public identifier.
ID The publicly known identifier used to generate the key.
IPuK The Identity based Public Key.
Sig The digital signature.
VERIFY The identity based public key algorithm used to verify the signature.
Params The public cryptographic parameters.
valid 1 if the signature is verified, 0 if not.
* Message Digest MD(X)
Message converted into fixed size encrypted message. X represents the parameters which were converted into digest number.

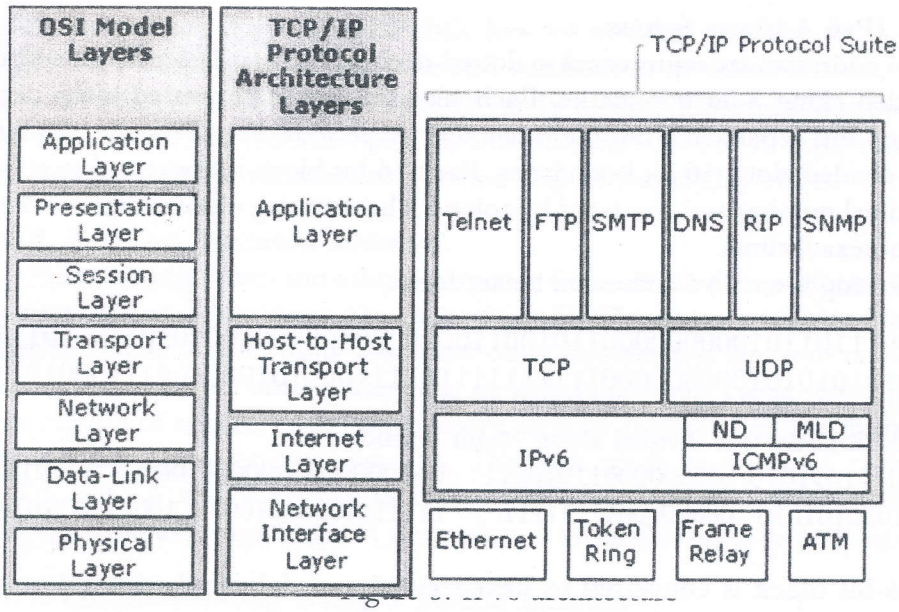
* Manufacturing Company [MC]
Here Company refers to those companies which are involved in the manufacturing of NIC (Network Interface Card) of the node wishing to participate in the communication in a network.
*Tentative Address [TA]
An IP Address Generated by node before it converted into permanent Address.
* Cryptographically Generated Address [CGA]
Cryptographically Generated Address use to authenticate sender.
*Token [TN(X)]
The Token is a Digital signature generated by AS using public key Pr(AS)(AS) of public key of AS Pu(AS)(AS) and TA and is issued to node X.

6. WORKING PROCESS:

Internet Protocol version 6 (IPv6) is a networking protocol that allows Windows users to communicate with other users over the Internet. It interacts with Windows naming services such as Domain Name System (DNS) and uses security technologies such as Internet Protocol security (IPSec), because they help facilitate the successful and secure transfer of IP packets between computers. Ideally, IPv6 is used in a pure environment, that is, an environment where IPv6 is the exclusive Internet protocol used between computers. Currently, however, pure IPv6 transmissions are attainable only with routers that support IPv6 and computers that are running Windows and that support IPv6. As IPv6 supplants IPv4, pure IPv6 across the Internet will become more prevalent and will eventually replace IPv4. Until that occurs, the transition technologies described in this reference can be used to bridge the technological gap between IPv4 and IPv6.

6.1. IPv6 Architecture

The IPv6 protocol component that is installed in Windows operating systems is a series of interconnected protocols that include Internet Control Message Protocol version 6 (ICMPv6), Multicast Listener Discovery (MLD), and Neighbor Discovery. These core protocols replace the Internet layer protocols in the Defense Advanced Research Projects Agency (DARPA) model. All protocols above the Internet layer rely on the basic services that IPv6 provides. Protocols at the Host-to-Host Transport and Application layers are largely unchanged, except when addresses are part of the payload or part of the data structures that the protocol maintains. For example, both Transmission Control Protocol (TCP) and User Datagram Protocol (UDP) must be updated to perform new checksum calculations that include IPv6 addresses. The following figure shows the architecture of the IPv6 core protocols in relation to the Open Systems Interconnection (OSI) model, the TCP/IP protocol architecture, and the other protocols in the TCP/IP suite.



6.2. IPv6 Core Protocols

Protocol	Function
(i) IPv6	IPv6 is a routable protocol that is responsible for the addressing, routing, and fragmenting of packets by the sending host. IPv6 replaces Internet Protocol version 4 (IPv4).
(ii) ICMPv6	ICMPv6 is responsible for providing diagnostic functions and reporting errors due to the unsuccessful delivery of IPv6 packets.
(iii) ICMPv6	replaces ICMPv4.
(iv) Neighbor	Neighbor Discovery is responsible for the interaction of neighboring Discovery nodes and includes message exchanges for address resolution, duplicate address detection, router discovery, and router redirects. Neighbor Discovery replaces Address Resolution Protocol (ARP), ICMPv4 Router Discovery, and the ICMPv4 Redirect message.
(v) Multicast	Multicast Listener Discovery is a series of three ICMPv6 messages Listener that replace version 2 of the Internet Group Management Protocol Discovery (IGMP) for IPv4 to manage subnet multicast membership.

6.3. IPv6 Address Syntax

IPv4 addresses are represented in dotted-decimal format. These 32-bit addresses are divided along 8-bit boundaries. Each set of 8 bits is converted to its decimal equivalent and separated from the other sets by periods. For IPv6, the 128-bit address is divided along 16-bit boundaries. Each 16-bit block is converted to a 4-digit hexadecimal number and separated by colons. The resulting representation is known as colon-hexadecimal.

The following is an IPv6 address in binary form:

0010000111011010000000001101001100000000000000000010111100111011
0000001010101010000000001111111111111111000101000100111000101101O

The 128-bit address is divided along 16-bit boundaries:

0010000111011010 0000000011010011 0000000000000000 0010111100111011
0000001010101010 0000000011111111 1111111000101000 1001110001011010

Each 16-bit block is converted to hexadecimal and delimited with colons. The result is:

21DA:00D3:0000:2F3B:02AA:00FF:FE28:9C5A

IPv6 representation can be further simplified by removing the leading zeros within each 16-bit block. However, each block must have at least a single digit. With leading zero suppression, the address representation becomes:

21DA:D3:0:2F3B:2AA:FF:FE28:9C5A

6.4. Verification of Certificate:

The message containing: DC(CA),DS(MC)(Pr(CA)(MC)) , Pu(N)(N), NIC number and DS (N)(Pr(N)(N)) are sent to AS. AS, then verifies Digital certificate DC(CA) by verifying public key Pu(CA)(MC) present in digital certificate with its database or from CA. However, it is not possible to verify from database, when AS does not have an entry into its database, of this particular company. Then AS sends request to the CA for verification of public key Pu(CA)(MC), present in Digital Certificate DC(CA).

6.5. Verification of NIC

This process is used to Verify NIC. After verification of Pu(CA)(MC), AS extract NIC Number from Digital Signature DS(MC)(Pr(CA)(MC)),using Pu(CA)(MC), and compares it with NIC Number present in message. The matching of NIC number, confirms that NIC number is not fake.

6.7. Registered Private and Public key for node

After the authentication of node and verification of token request, AS then generates Private/Public key pair Pr(AS)(N) and Pu(AS)(N) for node. The Pu(AS)(N), along with TA are stored into AS. This information is stored to reply any request made by any node for verification of owner ship of Pu(AS)(N) of TA.

6.8. DAD on Tentative address:

After receiving Token and other parameters from AS, AS then performs the DAD operation on tentative address. Nodes receiving DAD message performs the authentication of sender process using Token and other parameter. If any node replies DAD, it sends its token and other parameters to enquiring node. Node, then, performs authentication of sender, as explained above. If node receives message from authentic node, node again generates new TA. The node sends modification request with new TA, old TA and Token issues against old TA to AS. AS will verify node and modify its database accordingly. A new token is created to send to node again.

6.9. Communicating Using a Teredo Address

A Teredo relay is an IPv6/IPv4 router that can forward packets between Teredo clients on the IPv4 Internet (using a Teredo tunneling interface) and IPv6-only hosts. In some cases, the Teredorelay interacts with a Teredo server to help it facilitate initial communication between Teredo clients and IPv6-only hosts. The Teredo relay listens on UDP port 3544 for Teredo traffic.Initial configuration for Teredo clients is accomplished by sending a series of Router Solicitation messages to Teredo servers. The clients use the responses to derive a Teredo address and determine whether they are behind cone, restricted, or symmetric NATs. If a Teredo client is behind a symmetric NAT, then it cannot function. We can see what type of NAT a Teredo client has discovered from the display of thenetsh.interface ipv6 show teredocommand.

IPv6 router discovery processes:

- IPv6 routers periodically send Router Advertisement messages on the local link advertising their existence as routers. They also provide configuration parameters such as default hop limit, MTU, and prefixes.
- Active IPv6 hosts on the local link receive the Router Advertisement messages and use the contents to maintain their default router lists, prefix lists, and other configuration parameters.

7. CONCLUSION

In this paper we have described a number of threats pertinent to current IPv6 Neighbor and Router Discovery, discussed two new cryptographic techniques, Cryp-

tographically Generated Addresses (CGA) and Address Based Keys (ABK), and briefly described how these can be used to secure the Neighbor and Router Discovery functions. The Neighbour Discovery protocol was introduced to facilitate the node to configure itself. But if ND protocol is not protected it can open flood gate for threats. To protect from threats SEND was introduced which uses CGA address[4]. The basic idea in CGA is to generate most of the 64 low order bits in an IPv6 address as a cryptographic hash over a public key and other parameters. The underlying cryptosystem can be any public key cryptosystem, such as RSA, DSA, or Elliptic Curve based DSA. The missing part in Cryptographically Generated Address is that CGAs themselves are not certified, an attacker can create a new CGA from any subnet prefix and its own or anyone else's public key[5]. ABK uses either the low order bits of the address or all the bits of a routing prefix as a public key, relying on an identity based cryptosystem. Together these two methods can be used to secure Neighbor Discovery in a way that does not require any explicit security infrastructure. Further, the scheme presented, in this paper, ensures that owner of NIC number and its corresponding IP Address has sent the message. This provides message authentication to receiver. The Public-key mechanism is used to exchange secret key. This secret key is used to encrypt the message, to provide confidentiality. The message digest of encrypted message is used to provide integrity of message. Furthermore, it is essential to encode the security parameter as well as the address type into address bits. This may create further operational and other complications. If the security parameter were communicated in a protocol message and not encoded into the IP address, an attacker could misrepresent the values and attack a weaker mechanism than the one selected by the address owner. Further, the verification of TA and corresponding certified Pu(AS)(N), restrict the node to go to AS for verification of sender every time and in this paper are really effective only if the lower protocol layers are sufficiently protected or if the lower-layer attacks are considered unlikely or prohibitively expensive.

REFERENCES

[1] Al-Radhi, A, A. 2011. IPv6 Promised Role in Mitigating Cyber Attacks: Really it's Time!.Swiss Cyber Storm-International IT Security Conference, Switzerland.

[2] Fundamental Benefits of IPv6, http://www.ipv6now.com.au/primers/benefits.php

[3] Minoli, D. Kouns, J. 2009. Security in an IPv6 Environment.CRC Press, USA.

[4] T. Aura; Request for Comments: 3972; March 2005; Cryptographically Generated Addresses (CGA)

[5] S. Thomson, T. Narten and T. Jinmei; Request for Comments: 4862; September 2007; "IPv6 Stateless Address Autoconfiguration "

[6] Stefano M.Faccin and Franck Le ; "A Secure and Efficient solution to the IPv6 address ownership problem"; 0-7803-7605-6/02 ,2002 IEE Page : 162 -166.

[7]AmirhosseinMoravejosharieh, Hero Modares and RosliSalleh; "Overview of Mobile IPv6 Security " ;2012 Third International Conference on Intelligent Systems Modelling and Simulation; 978-0-7695-4668-1/12,2012 IEEE.

[8] R. Hinden and S. Deering, IETF RFC 4291: Internet Protocol Version 6 (IPv6) Addressing Architecture, February 2006.

[9] C. M. Kozierok "IPv6 Interface Identifiers and Physical Address Mapping" [online] September 2005 [cited April 2007] available from,

WWW:http://www.tcpipguide.com/free/t_IPv6InterfaceIdentifiersandPhysical AddressMapping-2.htm.

[10] S. Thomson and T. Narten, IETF RFC 2462: IPv6 Stateless Address Autoconfiguration, December 1998.

[11] A. Conta and S. Deering, IETF RFC 2463: Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification, December 1998.

[12] P. Nikander, "A Scalable Architecture for IPv6 Address Ownership", unpublished manuscript, available at

http://www.tml.hut.fi/~pnr/publications/draft-nikander-ipngpbk-addresses-00.txt, March 2001.

[13] D. Thaler and J. Hagino, "IPv6 Stateless DNS Discovery", draft-ietf-ipv6-dns-discovery-04.txt, work in progress.

[14] Steven Bellovin, "Security Problems in the TCP/IP Protocol Suite", Computer Communication Review, Vol. 19, No. 2, pp. 32-48, April 1989.

Study of Physical Properties of Muga and Eri with the Help of Xrd (Undegummed)

Chandrama Kalita
Dept. of Physics

Abstract

X ray diffraction is a basic method for detecting the presence and determining the amount of crystallinity and orientation in a material having crystalline entity. It has become an extremely important factor in defining special relationship in polymer systems.In the field of textile materials Xray analysis finds and ever -increasing use for examining their structural behaviours.This method is used for obtaining informations about the fibre structure at the molecular and super molecular levels and helps to evaluat the degree of crystallinity or orientation of crystallities and the size of the fibres.

Silk culture is a traditional cottage industry rooted in the life and culture of Assam. Eri (Endi) and Muga silk are considered to be indigenous origin and found only in Assam and the foothills of Meghalaya. Endi culture has always remained as a subsidiary occupation of Indo-Mongoloid and Tibeto-Burman ethnic groups of the Brahmaputra valley (i.e The Assam plains) and the adjacent hill areas. Endi silk worm (Philosomis ricini) derivers its name from the castor oil plants (Ricinus communis) called 'erra' in Assamese. Muga silk worm is unique specific of semi domesticated scricigenous insect endemic to the North Eastern region of India particularly Assam. The climate condition of this region is well suited for the silk worms and their host plants. So people of this region have traditional practice as cottage industries of rearing the silk worms and spinning of fibres from their cocoons, since time immemorial. Thus the Muga and Eri fibres have a great impact on the socio-economic aspect of this region.

The aim of paper is to find out some physical property of undegummed Muga and Eri silk with the help XRD.

The average crystalline dimension (L) of MUGA and ERI are found to be 13.1(Å) and 14.6 (Å) respectively.The value of L for Muga is more then Eri and it is calculated with the help of formula.

And degree of crystallity (K) of different simples (Muga and Eri) under study is calculated by measuring the the areas of measurement, and crystalline amorphous section under the corresponding X_Ray diffractogram with the help of the equation

$K=100\ S_C/s$

Where Sc area under the crystalline field that is area of diffractogram maximum.

S=total area under the diffractogram

And it is found the value Muga is 55.8% and Eri is 41%

The degree of Muga is more than Eri.

Key Notes:

X-rd, undegummed.

INTRODUCTION

Muga, the golden silk is a wonderful gift of nature, known for its glossy fine texture and durability. Due to its low porosity, the Muga yarn cannot be bleached or dyed and its natural golden color is retained. This silk can be hand-washed with its luster increasing after every wash. The silk is obtained from semi domesticated silk worm viz. *Antheraea assamensis*. The Muga mekhela-chador is a traditional dress of Assamese women for Bihu dances and weddings. It is in demand in Japan to make kimonos, and also high demand in countries like U.S., Greece, Germany, South Africa and France. The golden-yellow Muga silk of Assam has been granted Geographical Indication (GI) registration by the GI Registry in Chennai. It has been identified as a silk of given quality, reputation and characteristic, attributable to the geographical area of Assam since time immemorial.

Eri silk, also known as *Endi* or *Errandi*, is a spun from open-ended cocoons, unlike other varieties of silk. Eri silk is the product of the domesticated multivoltine silkworm, *Samia ricini* that feeds mainly on castor leaves. This silk behaves like cotton and warmth like wool. Due to its coarseness, eri silk yarn can be blended with other yarns and made suitable for manufacturing of all varieties of fabrics, lighter to heavy fabrics, inner ware, dress material, ornamental fabric, thicker fabric like chadder, wall hangings, furnishings and hosiery fabric etc.

North Eastern Region of India with tropical to temperate climate holds indomitable positions in the global sericultural map having all the four varieties of silk viz. Mulberry, Oak Tasar, Eri and Muga. Sericulture in this region provides gainful occupation to nearly about 1.80 lakh families. However, the strength of the region lies mainly with muga and eri culture. Eri culture is mainly practiced in Assam,

Meghalaya, Arunachal Pradesh, Nagaland and Manipur of North East India. Of course, now-a-days this culture is spreading to certain non-traditional states of India viz., Andhra Pradesh, Gujarat, Madhya Pradesh, Chhattisgarh, Tamil Nadu, Karnataka, Maharashtra, Uttaranchal, Uttar Pradesh, Jharkhand, Bihar, West Bengal, Orissa and Sikkim. The largest share (above 90%) of eri silk production of India is contributed from N.E. India and it shares 77% of the total non-mulberry raw silk produced in the country.

In producing golden yellow muga silk, Assam, the easternmost state of the Indian Union, has the unique distinction, though wild counterpart of muga silkworm is found in the foothills of Meghalaya, Nagaland and Arunachal Pradesh. A good number of allied species of Antheraea are also found in NE India in their natural habitat.

Silk culture is traditional cottage industry rooted in the life and culture of Assam. Sericulture in Assam comprises mulberry (pat) and non -mulberry silkworm culture.

The latter includes endi, muga, and oak-tassar. Endi and muga silks are considered to be of indigenous origin and found only in Assam and the foot-hills of Meghalaya. Oak-tassar culture is recent introduction in some temperate of zones of Northeastern region especially in Manipur. The commercial prospect of which are yet to be ascertained. Endi culture has always remained as a subsidiary occupation of Indo-Mongoloid and Tibeto-Burman thenic groups of the Brahmaputra valley (i.e. the Assam plains) and the adjacent hill areas. It is carried out traditionally by the rural and tribal womenfolk in their leisure hours. Endi silkworm (Philosamis ricint) derives its name from the castor oil plant (Ricinus communis) called era in Assamese, on which it is usually fed .Endi cocoon is open at one end for which the silk does not form into a containuous filament. Hence, the cosoon is spun not reeled. The coarse, durable endi cloth is regared as the silk of the poor . The status of endi clothes in the folk life of Assam can easily be gauged from an old Assamese proverb, dair pani, erir kani, which implies that while curd cools, endi cloth warms up a person.

Muga worm (*Antheraea assama*) is basically a wild variety. It is commonly fed on som (*Persea bombycina*) tree in Upper Assam and sualu (*Litsea monopetela*) in Lower Assam. Mejankari (*Littsea cubeba*), pan chapa (*Magnolia sphenocarpa*) dighlati (*Listsea salicifolia*) are secondary host plants. Muga silk general is rich golden yellow or light brown in colour depending on the host plant on which the worms are fed and the season. Most of the cocoons are purchased ultimately by the traders of Sualkuchi (in Kamrup district of Lower Assam) where commercial reeling and weaving are done almost as a monopoly. Though the bulk of the rearing is done in Upper Assam, the womenfolk there reel a very small quantity of cocoon to utilize in their looms for household use. The most important Muga cocoon rearing villages lie in Lakhimpur,

Dibrugarh, Sibsagar and Jorhat districts. The items of dress made out of muga is Assamese women's apparel (riha, mekhela, chadar) saree and wrapper. Mulberry silk industry in Assam is also pretty ancient. The climate condition of Assam is favourable for mulberry culture. Mulberry silk locally pat, is produced by a silkworm known as Bombyx mori, which feeds solely on mulberry (*Morus indica*) leaves. Hence, the name of the silk the mulberry yarn reeled by the rural folk are primarily meant for domestic consumption. The commercial weavers purchase every year about 25,000 kg of twisted mulberry silk from Karnataka. Mulberry silk is light and cool; has sheen and is strong; delicate and resilent. It is used in Assam primarily for manufacturing items of dress such as mekhela, chadar, riha, saree, wrapper, dhoti and men's upper garment.

MATERIALS AND METHOD

Materials-The cocoons of Muga and Eri the basics material for the present investigation is collected from Sualkuchi and Ramdia.

Extraction and degumming of fibre-For degumming some cocoons were boiled in sodium carbonate solution for about one hour and fibres from the cocoons were extracted after removing the floss. These fibres, mostly from the middle portion of the cocoons. The fibres so prepared were used as degummed samples.

Preparation of silk gland sample-Silk glands of the silk worms were carefully extracted after dissection. The glands were then dried at room temperature without giving any tention or pressure of them. When completely dried the material of the glands was finnaly ground in a mortar and then passes through a hundred mesh sieve.The powdered glands material (particles size ~2 micrometer) was preserved in a desicator for used in x ray diffraction studies.

Counter Diffraction Technique-In counter diffractometer technique , the pattern of dispersed x -rays diffracted from planes of different spacings of the specimen are scanned by a radition detector which is moved either continuousely or in steps across the pattern. Several detecting devices are available and each in turn can be used with a wide vatiety of auxiliary electronic circuits. The most commonly used detector is the Geiger-Muller counter ,the use of which was first described by Geiger and Muller[69].

The scanning mechanism and the specimen holders are not greatly affected by the type of detector used and the same basic instrument is suitable for a variety of applications.

The diffractometer directly measures the intensity of x-rays diffracted at any particular angle 2θ.The dependence of the diffracted rays on the angle 2θ is continu-

ously recorded in the graphical form with the help of a strip- chart recorder.

By measuring the spacings between the corresponding symmetric maxima on the diffraction pattern (diffractogram), 2θ values can be determined and hence the interplanar spacings(d) can be evaluated.

X-ray diffractometer analysis helps to determined the degree of crystallinity of the specimen under study from the measurement of areas under the diffractograms. The degree of crystallinity percent (k) is given by the relation-

$K = 100Sc/S$.....(1).

Where, Sc=area of the crystalline field, ie, areas of the diffractogram maximums.

S = total area under the diffractogram.

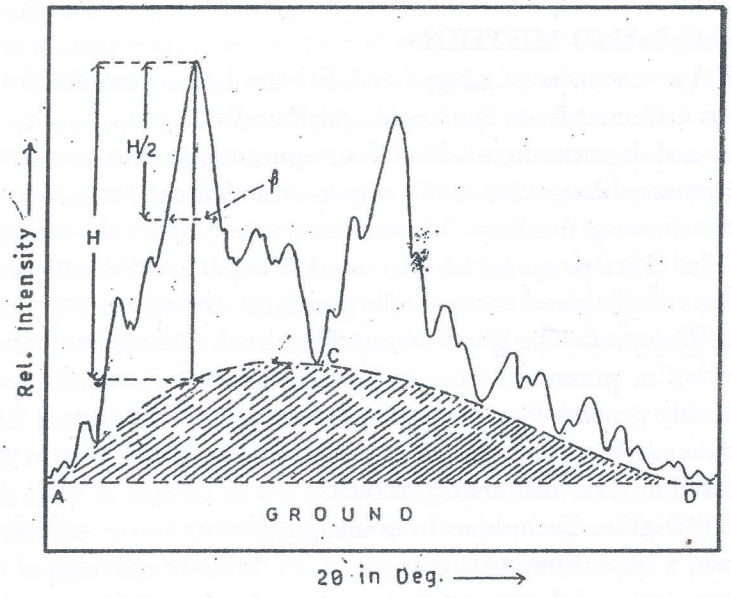


FIG.1

Diagramatic representation of the measurement of the broadening of intensity line from X-ray diffractogram.

The diffractogram gives relative intensities in terms of its height from the base line .Thus a measure of the crystalline intensity can be obtained from the heights of the diffractogram peaks.

The diffractograms also facilitate to account for the crystalline dimensions of the specimen. The average crystallite dimension Lis given by-

$L=K\lambda/\beta\cos\theta$.....(2)

Where K=factor of crystalline shape .For unknown crystalline spape,this factor is usually assumed as 0.9

Λ = wave length

β = Line broadening

θ = Bragg angle

The broadening of the line, β (mm) is determined at the level of half the height of the intensity curve maximum in the crystalline section. Each line of the diffractogram corresponds to the size of the crystallite in a certain crystallographic direction.By messuring several dimensions of the crystallites in space,it is possible to draw the general shape of the crystallites.

Adiagramatic represation of the measurement of β is displayed in fig (1). Where the three sections -the crystalline, amorphous and dispersion(ground) are outlined on the diffractogram. The area under section while the areas of the diffractogram maximums result to the crystalline section.

RESULT AND DISCUSSION

The aim of my paper is to study the degree of crystalllinity ,interplaner spacing ,and relative intensity with the help of x ray diffraction. For interplaner spacings using BRAGG'S equcation

$2d\sin\theta = n\lambda$ .....(3)

Which is Bragg's equcation were d = distance between two parallel crystal plans.(interplanar distance)

θ = angle between incident ray and lattice plane (BRAGG'S Angle)

n = order of reflection (=1, 2, 3.....)

λ = wave length of the incident ray beam

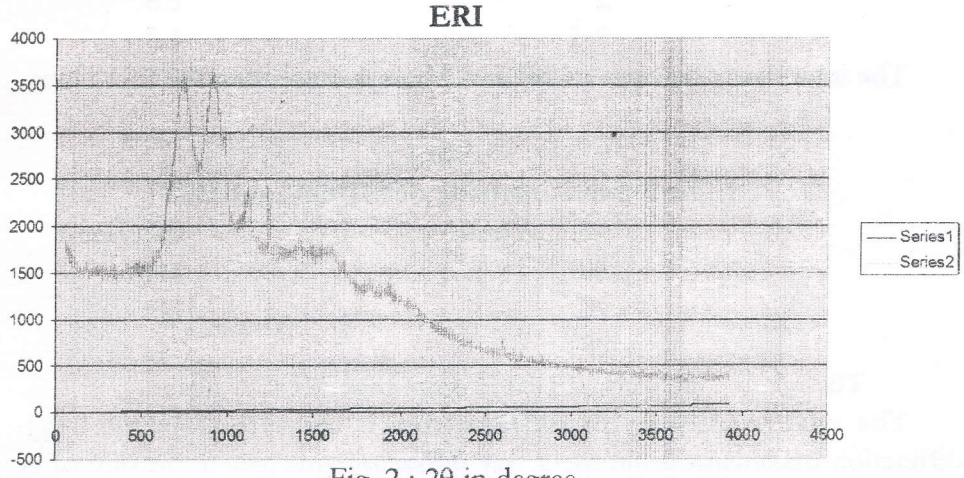
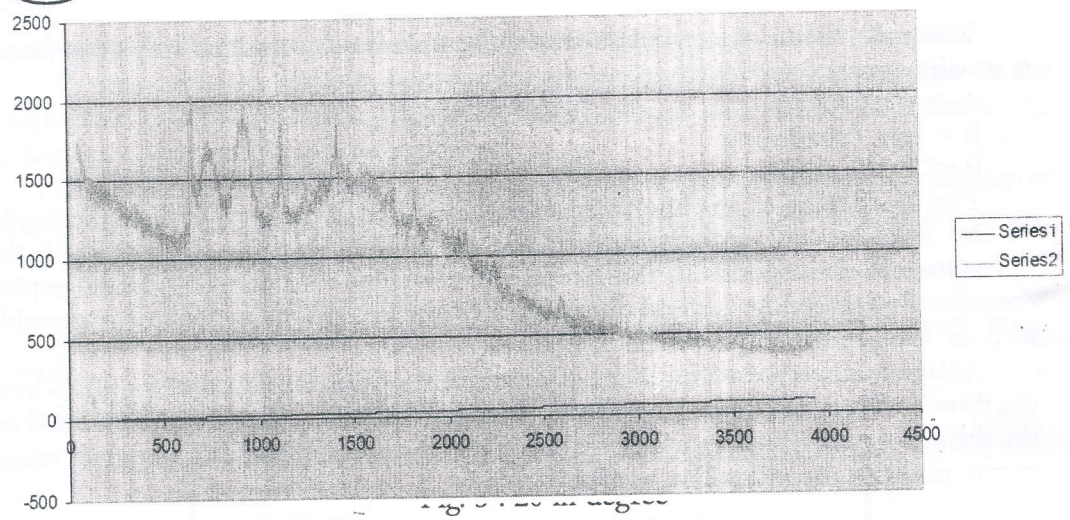


Fig. 2 : 2θ in degree

XRD OF ERI FIBRES



XRD OF MUGA FIBRES

The x ray diffractogram for ERI and MUGA fibres under undegummed condition are displayed in fig 2 and 3

The interplanar spacing for fibres obtained from the diffractogram are

TABLE--1

Interplanar spacing (Å)for Muga and Eri

MUGA	ERI
1.3	3.1
2	1.8
5.3	4.3

The interplanar spacings of MUGA fibres is more than the ERI fibres.

TABLE-2

The relative intensity of MUGA and ERI :

MUGA (mm)	ERI (mm)
80	110
90	111
88	74

The relative intensity of ERI is more than MUGA fibres .

The relative intensity of diffractogram is measure from the height of the diffraction maxima(peaks)in the x -ray diffractograms give a measure of crysallinity of the fibre sample.

The value of average L of Muga is = 13.1 amstrong and for Eri is = 14.6 A° using equation (2)

The broadening of the line β(mm) is determined at the level of half the height of the intensity curve maximum in the crystalline section.

Degree of crystallinity (k) of the fibre samples.

MUGA Undegummed = 55.8%

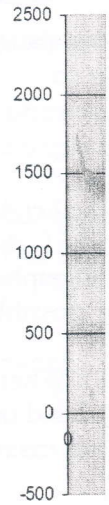
And for ERI = 41%

Using equation (1)

The Muga fibre has been found to posses higher degree of crystallinity than ERI.

REFERENCE

1. *Robson RM (1998) In-Lecoin. M, pearce EM(eds) Handbook of fibre chemistry, Marchel Dekkes Inc, NEW WORK.*
2. *Baruah B, B, Studies on the cooking of muga cocoon with special reference to mixed cocoons and its effect on fibre properties Ph.D thesis (Assam Agriculture university ,Jorhat, Assam)1995 .*
3. *Choudhury SN, MUGA silk industry, (Directorate of sericulture and weaving, Govt of Assam, Guwahati)*
4. *Gogoi N, Studies on bleaching and dying behaviour of ERI, philosemia recini, silk and evalutation of its physic chemical properties Ph.D thesis, (Assam Agriculture university, Jorhat, Assam), 2004.*
5. *Gagan Chandra Baruah, Studies on the thermophysical properties of some organic complexes (fibres) by x-ray diffraction and other physical method, 1991.*



The
tion are
The

Th

Th
diffract
of the

CONFLUENCE

S.B.M.S.College Research Journal

ISSN 2454-1168

Price : Rs. 200/-

Published by
Principal, S. B. M. S. College
Sualkuchi, Kamrup, Assam