

Scholars'  
Day

February 28

2009

Catalyzing &  
Accelerating  
Research  
Forward

# **Book of Abstracts**

**Venue**

**School of Physical Sciences,  
Jawaharlal Nehru University, New Delhi 10067,  
India**

**Designed & Compiled by**

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Scholars' Day 2009

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# Preface

Scholars Day 2009, a one-day gathering of active researchers was organized on 28<sup>th</sup> February at the School Of Physical Sciences, Jawaharlal Nehru University, New Delhi, India. The event was organized with the objective of exchanging research development and ideas among all disciplines cutting across boundaries of Natural Sciences, Social Sciences, Humanities and Languages.

The gathering was aimed not only at encouraging interdisciplinary studies but also to bridge the gap between various forms of 'inquiries', 'methodologies', 'perspectives' and 'knowledge production'. The need for organizing such a gathering was also prompted by the fact that there has been hitherto no such interaction among all those engaged in research areas.

Scholars Day 2009 brought together researchers who are energetic and active across the world to build up a strong research community. The success of this conference was due to the enthusiastic participation and collective support from various people. This book of abstracts which is being brought out is intended to be a record of this event, and to serve as a reference for further accelerating and catalyzing research which the event hopes to have nucleated.

And last but not the least, this gathering will serve as an initiation and a catalyst for further making it an annual event in our academic calendar.

# Acknowledgements

It is a pleasure to acknowledge all those whose co-operation, efforts and guidance helped us in successfully organizing the Scholars' Day 2009.

First of all, we thank and show our gratitude to Jayanti Thokchom, Thoinu Naorem, Shristi Pukhrem, Abdul Gaffar, K. Naresh Sharma and Monish Tourangbam of JNU who took active participation in organizing this event. We also thank Tuisem Shimrah for editing the Natural Sciences section. Our sincere thanks to Dean of SPS, JNU for allowing the use of institutional infrastructure as well as their warm interest in this event.

Words are not enough to express our deep respect for our seniors R.K. Brojen Singh, Dhiren Sadokpam, S. Santinath Singh, and Sharatchandra Yanglem for enthusiastically guiding us through the entire process of organizing this academic event.

Finally, we gratefully acknowledge all contributors of the abstracts, speakers and participants who helped make this event successful.

28<sup>th</sup> February 2009

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## **Part I**

### **Natural Sciences**

# 1. Investigating Brain Dynamics using Generalized Flow Tensor Imaging

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## **Introduction & Motivation**

An important aspect of Neuroscience and Brain Research is the mostly unknown functional dynamics of the brain. There is now a common consensus that even though there are structural localizations of the brain, which account for many of the brain functions as elucidated by NMR and MRI studies, it is the dynamical behaviour of the functional connectivity of several anatomically different parts of the brain, which results in its unique complexity. So a strategy to measure, map and visualize the functional brain changes such as conductivity, has immense use for both basic as well as clinical neuroscience. One such strategy is the novel concept of generalized flow tensors.

Scalar tomography (Computed Tomography or CT) though highly successful in biomedical imaging is limited in that it gives only the structural information. For the functional information like the fluid flow or elastic dynamic stress-strain which are vital in understanding the neurodynamics and connectivity across brain circuitry, one needs to go to the vector tomography, especially if one considers brain surface or cortical areas. However, owing to the highly anisotropic nature of deeper brain tissues (e.g. white matter and deeper parenchyma), the properties of the biological tissues as diffusion, perfusion and conductivity, are best elucidated by the use of 'tensors'. Thus there is a vital need for the formulation of new algorithms for the novel concept of tensor tomography that would truly characterize the biophysical and biochemical dynamics in anisotropic brain tissue, which the conventional scalar or vector tomography would not be able to characterize.

## **Methodology**

Tensor Tomography can be performed by developing projection theorems and backprojection formulae for tensor fields. For this, we are using two approaches: namely, Radon Transform approach and Convolution approach.

## **Results**

We have developed algorithms for projection theorems and backprojection formulae. These have been validated using computer simulations. The accuracy of reconstruction algorithms are tested using statistical comparisons like correlation coefficient. Regarding fluid flow, we reconstructed the tensor field voxel-wise of brain using Helmholtz solenoidal-irrotational decomposition of tensor field.

## **Summary**

Our work can lead to tensor reconstruction work in not only flow imaging, conductivity imaging but in various other biomedical imaging as dielectric, permittivity, elastic stress-strain tensor. Tensor Tomography would be of great help in monitoring/optimizing drug flow to brain tumours, charting deep brain electrical sources of epilepsy and delineating electrical conduction and oriented information flow across brain tissues and networks with clinical applications for neuromedicine, neurosurgery and neuroradiology.

## 2. Ultrasound-modulated diffuse optical tomographic imaging

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**Abstract:** Most pathological changes are associated with changes in tissue optical and mechanical properties (stiffness). Near-Infrared (NIR) diffuse optical tomography has been evolving continuously over the past 15 years and it is a promising tool for non-invasive imaging of optical parameters of tissues inside the body. The light transport through soft tissues is highly diffusive in nature and can be modelled using diffusion equation under certain constraints. The diffuse light that traverses through the object is sensed by using PMT to reconstruct the internal inhomogeneity. Unfortunately, the diffusive nature of light through soft tissues has a disadvantage. The resolution of reconstructed images is poor. Ultrasound (US), on the other hand, is less scattered by soft tissues and it has been in use for imaging in medical ultrasound systems exploring its echoing property where the time of flight or doppler effect is used to locate the inhomogeneity. Combining the highly contrast sensitive property of diffuse light with good localization property of ultrasound, it is possible to reconstruct images of inhomogeneities embedded inside the body non-invasively, which becomes useful in cancer diagnosis. On other hand, elastic properties of soft tissue increases by many fold (vary more than one to two orders of magnitude) with malignancy (no other tissue parameters such as absorption co-efficient, scattering co-efficient are changed by pathology to as great an extent as its elasticity). Taking into account the variation in elastic properties, optical contrast and the ultrasound resolution, ultrasound-modulated optical elastography is an excellent technique for imaging and characterising a biological tissue and hence for medical diagnosis. Change in elasticity often results from pathological changes in many organs such as liver, thyroid, prostate and breast. The stiffness measurement of these tissues leads to early detection of cancer in breast and prostate where the treatment is effective.

Tissue-like objects scatter visible light strongly which implies that before it finally escapes from the object the photon interacts with the tissue particles a number of times.

One can introduce localization of measurements to a particular small region of interest by introducing deterministic movement confined to a location by using ultrasound radiation force. Two advantages emerge: Firstly, a tomographic image of the object properties can be constructed by scanning the object with the ultrasound beam. Secondly, the light interacted with the insonified region are tagged by the ultrasound beam and manifest a modulation in the measured intensity autocorrelation. Coherence of light allows the formation of speckles and the fluctuation of the intensity in the speckle spot is a measure of temporal fluctuation of the scattered field, brought about by the optical path length fluctuations. Three possible mechanisms have been identified for the ultrasound modulation of light in scattering media. They are (1) variation of elastic properties affecting the amplitude of vibrations of tissue particles, (2) change in refractive index and (3) changes in absorption and scattering coefficients.

An experimental set-up has been made to detect the optical signals that traverse the tissue using a CCD camera as a detector array. The pixel map formed on the CCD is used to reconstruct the embedded inhomogeneity. The use of CCD camera has an advantage of improving the signal-noise-ratio (SNR) by averaging the signals from all of the CCD pixels. Conventional filtered backprojection algorithm is used for image reconstruction. The pixel map is a measure of the projection data. The pixel intensity and the phase are measured using lock-in detection method, where a sequence of two or four images are taken with phase shifted US modulation by  $0^\circ$ ,  $90^\circ$ ,  $180^\circ$ ,  $270^\circ$  relative to the laser source signal. From these collected images, the modulation depth of ac signal relative to the dc background signal and the cross correlation co-efficient of the signal which are the signatures of the pathological changes can be extracted. It is possible to reconstruct a 2-D or 3-D image of a tissue object using this method. In this experimental setup, we reconstructed an embedded single inhomogeneity of size 9 mm. For pre-clinical study of validity of the system, an inanimate object (phantom) is used as sample tissues. The phantom used is made of poly (vinyl alcohol)(PVA). Its mechanical, optical, and acoustic properties are tailored by physical cross-linking affected through subjecting a suitable mixing of PVA stock and water to a number of freeze-thaw cycles and by varying the degree of hydrolysis in the PVA stock.

### 3. Cosmological Scaling Solutions with Tachyon: Modified Gravity Model

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**Abstract:** Wide belief “universe has two periods of accelerated expansion in history of cosmic evolution” which has been supported by variety of observational data like Supernova Type 1a, Cosmic Microwave Background Radiations (CMBR), galaxy clustering by large scale red shift surveys, etc has made studies of accelerated expansion of the universe as one of the most challenging subjects of investigation in cosmology. For early universe, it plays an important role of solving the major problems in standard cosmology like horizon and flatness problem. It also provides an effective mechanism for producing a nearly scale-invariant for the quantum fluctuations of the inflation which can work as a seed for the structure formations in universe. To discover the nature of driving force behind the late time acceleration of the universe, also termed as “dark energy”, is one of the most important tasks in cosmology today.

Modifying the Einstein’s gravity at large distance scales is one of the interesting proposals to explain the late time acceleration of the universe. We have studied the scaling solutions in modified gravity models where the universe is sourced by a background matter fluid together with a tachyon type scalar field and calculated the scaling potential and the scale factor for specific examples of the modifications. So one can use



#### 4. Evaluation of thermal stability of Indinavir Sulphate using Diffuse Reflectance Infrared Spectroscopy

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**Abstract:** Indinavir sulphate is a potent and specific protease inhibitor of human immunodeficiency virus (HIV). It is used for the treatment of acquired immune deficiency syndrome (AIDS). At elevated temperature the drug which otherwise remains crystalline undergoes a phase transition to an amorphous phase to form degradation products. In the present study, thermal stability of indinavir sulphate is evaluated using diffuse reflectance infrared Fourier transform (DRIFT) spectroscopy. Infrared spectra of the drug before and after the exposure to thermal radiation at different temperatures were acquired in the diffuse reflectance mode using a Fourier transform infrared (FTIR) spectrophotometer. The differential scanning calorimetry (DSC) and the X-ray diffraction (XRD) studies were used as complimentary techniques to adequately implement and assist the interpretation of the infrared spectroscopy results. The DRIFT spectra reveal that the drug remains stable up to 100 °C, degrades slightly at 125 °C and undergoes complete degradation at about 150 °C to produce degradation products. The degradation products can easily be characterized using the infrared spectra.

## 5. Bidirectional transport of a cargo vesicle: Statistics of single -particle trajectories.

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**Abstract:** Though there has been a significant progress in the understanding of the mechano-chemical cycle and processive dynamics of a single motor such as kinesin and myosin (and to a lesser extent dynein); the cooperative dynamics has received much lesser attention. Theoretical studies of cooperative motion (e.g. axonal transport of mitochondria, transport of pigment granule in melanosomes) have been carried out only recently. In this paper we study the bidirectional motion of a single vesicle (e.g. mitochondria) along a polar filament (e.g. microtubules), carried by both +ended (e.g., kinesin) and –ended (e.g., dynein) processive motors using a Master equation approach in the dilute motor coverage regime. The motors transition from an active(bound) to an inactive(unbound) state, leading to a dynamical switching between +end directed and –end directed vesicle transport. We analyze several microscopic models relating the vesicle velocity to the relative number of bound motors of the two species, and study its consequences for a variety of statistical measures describing single vesicle trajectories. We also observed that in spite of the presence of stochastically varying two opposing species of molecular motors a long directed work can be achieved by the vesicle at longer times. Moreover, for the simulation of bidirectional transport of mitochondria along axons we observed a spatial polarization in the distribution of mitochondria (which is observed in the experimental study of fast axonal transport of Herpesvirus). The spatial polarization is found to depend on the duty ration of each motor species and the motor bearing capacity of the vesicle. We also studied the crossover behavior of the mean square displacement (MSD) with time. The crossover of MSD of all the models considered are found to exhibit the same qualitative behavior. Thus, the analysis based on single-particle tracking experiments alone is not enough to differentiate between the various microscopic mechanisms for vesicle velocity.

## 6. Phase locking of an array of Spin Transfer Torque Oscillators coupled through dipolar fields

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**Abstract:** The Giant magnetoresistance (GMR) effect has played an important role in the development of read heads within hard disk technology and has led to a tremendous increase in the capacity and robustness of data storage devices. Beside the GMR effect, the associated spin transfer torque can cause the free layer of spin valve and magnetic tunnel junction spin transfer oscillators (STO) to precess. The frequency of precession lies in the gigahertz range and is converted to a microwave voltage due to the GMR. The output power of a single STO oscillator is too small (1nW approx.) for industrial applications. However, the synchronization and coupling of an array of STOs can achieve the power required for industrial applications. Phase locking may be achieved through a self-generated or externally injected microwave current but is dependent upon the agility of the STO. Phase locking of arrays of STO through dipolar fields has opened a new window for investigation. Time resolve scanning Kerr microscopy (TRSKM) is the one of the powerful experimental techniques that can observe the spatial as well as time dependent spin wave dynamics of a magnetic sample. This technique will be used to study the coupling of STOs through dipolar fields. By optimizing the coupling within an array of STO we hope to develop agile microwave sources for use in future telecommunications technology.

## 7. Aging behavior of agar-gelatin Co-hydrogel

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**Abstract:** Dynamic Light Scattering studies were carried out to explain quantitatively the dynamical changes occurring inside agar-gelatin co-hydrogel over a time period of  $\approx 30$ -days. The degree of non-ergodicity was extracted as a heterodyne contribution from the measured dynamic structure factor data. From the analysis of the data, we observed two relaxation modes namely fast and slow modes with relaxation times  $\tau_f$  and  $\tau_s$  whose dependence with aging time,  $t_a$  fall on a scaling behavior given by power laws,  $\tau_f \sim (t_a)^{-1/5}$  and  $\tau_s \sim (t_a)^{3/5}$  and it revealed the “speeding up” of fast and “slowing down” of slow mode relaxation processes respectively. We studied this dynamical behavior theoretically using Kawasaki and Tanaka model of dynamics of density fluctuations in gels and are found agreed qualitatively with experimental results. The study gave rise a new interesting insight of time evolution behavior in agar-gelatin co-hydrogel.

## **8. Genetic association analysis of tryptophan hydroxylase isoform 1 gene (TPH1) polymorphism A218C (rs1800532) with autism spectrum disorder in the Indian population**

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**Abstract:** Abnormalities in serotoninergic system have long been implicated in autism. Platelet hyperserotoninemia represents one of the well replicated endophenotypes of autism. Thus TPH1, the rate limiting enzyme in the biosynthesis of serotonin remains as a potential candidate gene for autism. Furthermore, genome wide scans showed that TPH1 lies within the critical region for autism at chromosome 11p and its nominal association with autism has been investigated through haplotype analysis in Caucasian American population. TPH1 A218C (rs1800532) polymorphism in intron 7 has been found to be associated with other psychiatric disorders such as schizophrenia and Alzheimer's disease. However, there is no investigation report on association of this polymorphism available with autism in Indian population. Therefore, for the first time, we have carried out genetic association analysis of this marker with autism spectrum disorder in Indian population. Diagnosis of the patients was done following DSM-IV criteria and CARS was used as assessment tool. Genomic DNA isolated from the leucocytes of autistic patients (n=111), their parents (n=206) and healthy controls (n=110) were used for genotyping analysis using PCR and RFLP analysis. Genotypic distributions of all the groups conform to Hardy-Weinberg Equilibrium. We have not noticed any bias both in the genotypic and allelic distributions between the cases and controls from West Bengal. Moreover, family based analysis also does not show any preferential transmission either of the alleles from the parents to the affected offspring. Therefore, we conclude that TPH1 A218C (rs1800532) polymorphism may not be associated with autism spectrum disorder in Indian population.

## 9. Shifting agriculture: an imminent challenge for everyone

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**Abstract:** The immense biodiversity wealth of the Northeastern Region has made it a priority area for investment by the leading conservation agencies of the world. For example, WWF has identified the entire eastern Himalaya as a priority Global 2000 Ecoregion; and Conservation International has subsumed its eastern Himalaya “hotspot” into a wider Indo-Burma hotspot, which now includes all the eight states of northeast India along with the neighboring territories of Bhutan, southern China, and Myanmar. Northeast India supports one of the highest bird diversities in the Orient, with about 850 bird species. The eastern Himalaya and the Assam plains have been identified as an endemic bird area by the Royal Society for the Protection of Birds. The global distribution of 24 restricted-range species is limited to the region. The region’s lowland and montane moist to wet tropical evergreen forests are considered to be the northernmost limit of true tropical rainforests in the world.

Deforestation or destruction of habitat is a primary cause of extinction of many species of plants, animals and several micro-organisms in the tropics. The impacts of deforestation in tropical biodiversity hotspots are of particular concern because these regions contain high concentrations of globally endemic species. The forest farmers in the tropics have managed the traditional shifting agriculture (‘slash-and-burn agriculture’, locally known in India as ‘Jhum’), which is essentially an agro-forestry system organized both in space and time for centuries. The small-scale perturbations caused during jhum done in the past, ensured enhanced biological diversity in the forest, with enriched crop and associated biodiversity, with the added bonus of being able to capitalize upon the nutrients released during the slash and burn phase for ecosystem.

With increasing pressure on forest resources from outside, and population pressure from within, and the consequent declining soil fertility through land degradation in agricultural areas, the people of all walks of life cannot sit idle and stare at this imminent threat for present and future generations. The north eastern hill region of India is no exception to this well-known and widespread situation prevailing in all parts of the world – the tropical Asia, Africa and South America. It is suggested that, in late 1980s, about 500 million people were dependent upon shifting agriculture in 90 countries, covering an area of 400 million ha approximately of tropical forest land area. A subsequent forest resource assessment by FAO in 1995 found that more than 7% of the 1980 forest area underwent change during the period 1980-1990, more than half of this change being due to shifting agriculture, resulting in moderate to severe degradation. In such complex natural features and local practices, the need of thrust area for research should be to understand ecosystem dynamics and function at individual, population and community levels. Studies on maintenance of soil fertility through an understanding of soil biological processes at ecosystem and landscape levels and sustainable livelihood/development of traditional societies could be considered as research priority.

There are divergent views/school of thoughts of shifting agriculture and debate is still on. The first view is narrower, abrupt and insensitive (often termed as ‘outsiders view’) condemns this practice stating that ‘it dries up the springs of the hills, causes soil erosion, destroys valuable forests and adversely affects rainfall and deprives people of benefits of forest produce’, while the second view is more humane, accommodative, sensitive and positive in approach, often called ‘insiders’ view’ and considers this practice as main and sustainable food producing agricultural system.

## 10. Arsenic Problem in North-East: A Future Threat

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**Abstract:** Groundwater arsenic contamination and sufferings of people have been reported in 20 countries in different parts of the world. The magnitude is considered highest in five Asian countries and the severity is in order of Bangladesh>India>Mangolia>China>Taiwan. The world's two biggest cases of groundwater arsenic contamination and those that affected the greatest number of people were in Bangladesh and West . In the North Eastern region of India, natural springs and dug wells are the only cost effective and viable means of fulfilling the needs of freshwater for present population. High concentration of arsenic (As) in groundwater in the northeastern states of India has become a major cause of concern in recent years. As in groundwater has been detected in some parts of Assam, Tripura, Manipur, Nagaland and Arunachal Pradesh. In India after West Bengal and the bordering districts of Bangladesh, arsenic in groundwater was detected in part of Assam, Arunachal Pradesh, Manipur, Nagaland and Tripura. Maximum arsenic content was observed in Jorhat (Titabor, Dhakgorah, Selenghat and Moriani Block), Dhemaji (Sissiborgoan and Dhemaji Block), Golaghat district (Podumani Block) and Lakhimpur (Boginodi, Lakhimpur Block) in Assam; West Tripura (Triania Block), Dhalai (Salema Block) and North Tripura (Dharmanagar Block) districts in Tripura, Thuobal (Kakching Block) in Manipur and Dibang valley (Midland) in Arunachal Pradesh The presence of arsenic (As) in groundwater in the north-eastern states of India and its effect on human health has become a serious concern in recent years. A long-term environmental planning is essential to blunt the danger from such pollution



## 11. Bioremediation of Endosulfan contaminated soil

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**Abstract:** Endosulfan is a chlorinated cyclodien pesticide used for controlling various pests all over the world. Due to its hazardous effect on ecosystem, it has been banned in many countries; however in India, it is still using as one of the most preferred insecticide. Reports of endosulfan toxicity have been reported from various corner of the world. Recently many works has been focus on the use of micro-organism to enhance the degradation of endosulfan.

For bioremediation of endosulfan, in this study an attempt was made to isolate and characterized an endosulfan degrading bacteria from endosulfan enriched soil, through repetitive enrichment and successive subculture. The bacterium isolated so is identified on the basis of 16srDNA sequence analysis and MIDI test as *Pseudomonas* sp C4. This bacterial strain can degrade 86% of  $\alpha$ -endosulfan and 79% of  $\beta$ -endosulfan. This result suggests that *Pseudomonas* sp C4 can be used for the bioremediation of Endosulfan contaminated soil.

## 12. Sustainability Science- towards good ecology for good economy

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**Abstract:** Sustainable Development is defined as “the development to meet the needs of the present generation without compromising the ability of future generations to meet their own needs” (Brundtland, 1987). But with the increasing needs, the solution for a long term perspective is complex in definition and is a ‘vague and oxymoronic’ concept. The urgent need is to give attention on the patterns of human actions with that of immediate and future consequences through an integrated approach. Thus, the subject- Sustainability Science which is multidisciplinary with interdisciplinary inputs; both natural and social sciences are appropriately blended to achieve sustainable development.

It is a fact that human beings received all their demands from the natural system and so the health of natural system is the indicator of sustenance of human society. In other words, good ecology is the need of the hour which is rooted to good economy and vice versa. Thus, there is the existence of the inter-linkages among all the systems and its products. And Sustainability Science is the outcome of these linkages which is a branch of science beyond science.

The present study is a review on the new subject. The core elements and methodologies of the subject are systematically described. It is interpreted as a dynamic and evolving field that always has a vision pointing the way towards good ecology in particular and global sustainability in general. It will be able to bridge the gulf across science, practice and politics.

### 13. Agenda-21 and biodiversity assessment at local level- a case study in the upland village of India

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**Abstract:** The Agenda 21 was an outcome of the United Nations Conference on Environment and Development held in Rio de Janeiro, Brazil, June 03-14, 1992 addresses the pressing problems of today and also aims at preparing the world for the challenges of the 21<sup>st</sup> century. Poverty, resources depletion, environmental degradation accelerated by global warming, sea level rise and climate change are among the most serious challenges. The Agenda 21 has also focused on (a) unsustainable patterns of production and consumption, and (b) developing national policies and strategies to encourage changes in unsustainable consumption patterns. Conservation of biological diversity is one of the important dimensions of Agenda-21.

Biodiversity begets ecosystem. The web of life which is called as the food web is the cardinal principle of ecosystem. The question of conservation arises due to the uncontrolled pressure of human on the natural resources that finally tend towards resource degradation. Degradation of resources in general and extinction of species at local level has direct impact on the ecosystems' cardinal principle.

The main objective of the study is to find the human pressure on the natural resources at micro level. The dependence of their livelihood security on the forest products and the institutional link up with that of landscape farming is explored. The region is dominated by the tribal community in the upland villages and the primitive form of agriculture exists as "shifting agriculture" or "Jhum". In the present study, a local tribe called "Zo community" is studied in a small pocket of Churachandpur district, Manipur.

Jhum crop field, jhum fallow, community forest and reserve forest are the major land use pattern in the study area. Floral Inventorization survey was conducted and it is supported by preformatted questionnaire based survey. The highly demanded local plant species for different purposes was identified with the help of local people and it is quantified. The major local demands on forest are for fuel, food and medicinal value. The demand of fuel has more impact on the ecosystem.

The present study also tries to find out the willingness to accept in the initiation of agenda-21 by the local people for improving their livelihood condition. The existing local governance is analysed in the context of community decision support system for sustainable land use practice. The village council play an important role in making the decision within the community. It is concluded that the absence of better alternative forced them to follow the present practices which is one of the factors that brings ecological degradation. “A hungry person listens neither to reason nor religion, nor is bent by any prayer”. Thus, it is suggested to enhance productivity in perpetuity without associated ecological and social harm.

#### 14. Carrot juice and Honey Enriched Odor less Fermented soybean.

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**Abstract:** In this study we optimized the production of odor less fermented texturized vegetable protein (soya flour after the soybean oil has been extracted). Carrot juice was added 1.5% of the total volume mixed well and autoclave. Primary state fermentation with *Bacillus subtilis* for 15 hours at 42 °C followed by secondary fermentation with *Leuconostoc mesenteroides* ssp for 4 days at 25 °C and 20 % honey after secondary fermentation followed by curried at 60°C for 1 hour. The result suggests that the fermented product possesses functional properties with tyrosine content, protease activity, fibrinolytic activity, and mucliage content  $3.85 \pm 0.5$ . The addition of carrot juice and honey result in good flavour and sweet taste which is rare an innovative in fermented soya products.

**15. A novel role of Famotidine in Downregulation of Matrix Metalloproteinase-9 during protection of Ethanol-Induced Acute Gastric Ulcer.**

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**Abstract:** Gastric ulcer is a multifaceted process including acid-secretion, reactive oxygen species generation, prostaglandin inhibition and extracellular matrix (ECM) degradation. Matrix metalloproteinases (MMPs) have the ability to cleave and remodel the ECM. We investigated the activity and expression of MMP-9 and -2 in ethanol-induced acute gastric ulceration in rats. We found that severity of gastric ulcer was strongly correlated with increasing doses of ethanol and increased secretion of proMMP-9. ProMMP-9 was upregulated ~25-fold at maximum ulcer index. Increased secretion of proMMP-9 was associated to increased expression of tumor necrosis factor- $\alpha$  and interleukin-6. We examined the effect of H<sub>2</sub>-receptor antagonists and antioxidants on proMMP-9 secretion and synthesis during prevention of ethanol-induced gastric ulcer. Our data reveal that famotidine dose-dependently blocked increased secretion and synthesis of proMMP-9 during gastroprotection and arrested infiltration of inflammatory cells as well as oxidative stress in rat gastric tissues. Similar to H<sub>2</sub>-receptor antagonists, N-acetyl cysteine and dimethylsulfoxide, well-known antioxidants inhibited proMMP-9 upregulation to the control level. In conclusion, ethanol-induced gastric ulceration is associated with increased expression of proMMP-9 that can be attenuated by H<sub>2</sub>-receptor antagonists and antioxidants. These findings furnish a novel MMP-9 mediated pathway and its inhibition via proinflammatory cytokines by famotidine in ethanol-induced gastric ulceration.

## 16. Towards Isolation of Seed Specific Promoter from Small Millets

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**Abstract:** Seed specific promoter is a prerequisite for the high level expression of protein of interest in endosperm of the cereals. Very few promoters are available for seed specific expression in cereals. The present study was taken with a view to isolate the new prolamin seed storage gene promoter from foxtail millet (*Setaria italica*) and new glutelin seed storage gene promoter from barnyard millet (*Echinochola frumentacea*) and kodo millet (*Paspalum scrobiculatum*). The prolamin and glutelin proteins of the minor millets were characterized using SDS-PAGE analysis. In order to isolate the seed storage protein promoter's attempts were first made to isolate the partial gene of the seed protein gene; the sequence information which will be subsequently used for isolation of promoter. Prolamin and glutelin gene specific and degenerate primers were designed using the storage protein gene sequences of the cereals deposited in the NCBI database. In foxtail millet, two prolamin specific primers gave amplification of single PCR product of expected size. The DNA sequencing of the PCR products revealed that the DNA sequence of one of the PCR product of 510 bp in size had high level of homology to the reported prolamin genes of cereals. Phylogeny study among the isolated foxtail millet fragment and other prolamine orthologs revealed that partial coding sequences of prolamin was similar to that of *Panicum sumatrense* zein like protein and *Pennisetum glaucum* (pennisetin) which codes for 21 KDa protein. The sequence information of the isolated prolamin gene in foxtail millet will be utilized for the cloning of the prolamin promoter of foxtail millet using Rapid Amplification of Genomic End (RAGE) PCR method. Amplification of glutelin specific clones from genomic DNA of the barnyard millet, kodo millet resulted in many bands. RT-PCR analysis using the seed specific cDNA of kodo millet and barnyard millet failed to amplify any PCR product with the glutelin specific primers. In order to isolate seed specific clones, an attempt was made to isolate the seed storage protein genes using the cDNA-RAPD method. The sequencing result of cloned RAPD product showed some of them to be seed specific clones but none of the clones showed homology to the seed storage protein genes.

## 17. Effect of Heat and Heavy metal Cadmium Co-stress on Rice Antioxidative Enzymes and Immobilization of Rice Peroxidase in Presence/Absence of Calcium

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**Abstract:** Plants often encounter individual or a combination of environmental and biological stresses. To explore the cross talk between the heavy metal stress and heat stress responses, we studied the effects of increasing concentrations of  $\text{Cd}(\text{NO}_3)_2$  in the growth medium as well as heat treatments in seedlings of rice cvs. We report the effects of different doses of Cd alone and heat co-stress on rice seedlings. The uptake of Cd in rice roots grown under 500  $\mu\text{M}$  Cd revealed 44  $\mu\text{g g}^{-1}$  dry wt of Cd accumulation at 15 day of the growth period. The examination of root sections by light and electron microscopy revealed a slight tissue disorganization in roots whereas heat stress induced fold like structures in cells that were quite significant with slight changes in cell-shape. Histochemical localization of Cd disclosed accumulation of large amounts of Cd in the parenchyma cells under 100  $\mu\text{M}$  Cd levels. The activity staining of guaiacol peroxidase in root tissues located it primarily in the cell wall. To assess the changes in antioxidant defense apparatus the level of hydrogen peroxide, lipid peroxidation and activities of guaiacol peroxidase, ascorbate peroxidase catalase, SOD and Superoxide anion were estimated under individual and in abiotic stress combinations. And it is thus postulated that rice plants have ability to adopt various strategies against the combined harmful effects of Cd alone as well as the combination of Cd and heat stress which makes it a useful plant for detoxification. Moreover, the direct immobilization of soluble peroxidase isolated and partially purified from shoots and roots of rice seedlings in calcium alginate beads and calcium agarose gel was carried out.



The maximum specific activity and immobilization yield of the calcium agarose immobilized peroxidase reached 2200 U mg<sup>-1</sup> protein (540 mU cm<sup>-3</sup> gel) and 82% respectively. Based on 50% conversion of hydrogen peroxide and four times reuse of immobilized gel, the specific degradation of guaiacol for the agarose immobilized peroxidase increased three folds compared to that of free peroxidase. Nearly 165% increase in enzyme protein linking to agarose matrix in presence of calcium was noted suggesting the presence of calcium ions helps in the immobilization process of peroxidase and mediates the direct binding of the enzyme to the agarose gel.

## 18. Context Dependent Reference States of Solvent Accessibility in Proteins and Their Effect on Sequence-based Prediction

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**Abstract:** Predicting solvent accessibility (ASA) provide information for the prediction of binding sites and reconstruction of the 3D-structure based on protein sequence. To predict solvent accessibility (ASA) of amino acid residues it is customary to first transform the absolute values of exposed surface area to their normalized relative values. This normalization is typically attained by assuming the highest exposure state based on extended state of that residue when it is surrounded by Ala or Gly on both sides i.e. Ala-X-Ala or Gly-X-Gly solvent exposed area. This normalization procedure misses the sequence and structure contexts of residues, caused by actual residue neighbors and their folding state compared with the extended state. Folding state of residues imposes additional constraints on the highest possible (or highest observed) values of ASA, which depend on the sequence neighbor contexts. Here, we analyze how the highest observed ASA of a residue depends on its immediate sequence neighbor environments and to what extent, these values approximate the extended state values in Ala-X-Ala environment. We examine how renormalizing absolute ASA values of residues using context-dependent Highest Observed ASA (HOA) instead of context-free extended state ASA (ESA) of residues can influence the performance of sequence-based prediction of solvent accessibility. We observe that renormalizing solvent accessibility with HOA values can significantly enhance prediction performance of a neural network trained for this purpose in all residues except Glycine.

## 19. Prime Number Theory

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We know that prime numbers are an important part of number system, they are the building blocks of numbers and play a crucial role in mathematics and day to day life. My current research interests are primarily in the areas of Prime Number Theory which studies the properties of prime numbers, solving equations with integer coefficients, showing the irreducibility of polynomials, Diophantine Approximation, Transcendental Number Theory, Combinatorial Number Theory. I am also interested in number Theoretic problems arising in Cryptography, the science of secure communications and Coding theory.

It is well known that there are infinitely many arithmetic progressions of length 1, 2, and 3. However Fermat showed that there are no arithmetic progression of squares of length 4. Euler generalised Fermat's result by showing that product of 4 consecutive terms of an arithmetic progression is never a square.

Refinement and generalizations of Euler's result is connected to the prime divisors of terms of an arithmetic progression. My thesis work, under the supervision of T. N. Shorey, is on the refinements, generalizations and applications of a result of Sylvester on greatest prime factor of a product of consecutive terms of an arithmetic progression. My thesis contains theory and results in this direction. For example, we proved that product of upto 100 consecutive terms of an arithmetic progression is never a square. In fact we proved another result which is very important and useful for lots of applications.

Theorem 1. There is a prime  $p > 2k$  dividing a product of  $k$  consecutive terms of an arithmetic progression  $n(n+d)(n+2d)\dots(n+(k-1)d)$  unless  $(n,d, k)$  is given by an explicit finite set. There are other open problems directly linked with my thesis work.

The first question I would like to answer is the general conjecture which states that the product of four or more consecutive terms of an arithmetic progression is never a perfect power.

There are also several other well known exponential Diophantine equations like the equations of Pillai, Nagell-Ljunggren and Goormaghtigh. Several techniques have been applied to the study of these equations. In particular, Algebraic methods, Diophantine Approximations and Transcendence theory has been very useful. I would like to make further contributions of these techniques to the study of the above Exponential Diophantine Equations.

A conjecture of Grimm states that if  $n+1, \dots, n+k$  are all composite numbers, then we can find distinct primes  $P_i$  such that  $P_i | (n + i)$  for  $1 \leq i \leq k$ . This conjecture implies  $\omega(\Delta(n + 1, k)) \geq k$  whenever  $n + 1, n + 2, \dots, n + k$  are all composite numbers. Erdős and Selfridge noted that this conjecture is quite difficult to prove since it implies that there is always a prime between two consecutive squares which is out of bounds even after assuming the Riemann hypothesis, one of the Millenium Prize problems. we verified the conjecture of Grimm for  $n \leq 1.9 \times 10^{10}$  and for all  $k$ . I plan to make further contributions in this area.

Another problem which I am interested to work with P. Moree is on Robin's criterion for the Riemann Hypothesis and on the divisors of  $x^n - 1$  and coefficients of cyclotomic polynomials and Artin Conjectures. Sylvester's theorem and its sharpening and extensions have been applied to prove results in Coding Theory, Cryptography, irreducibility of polynomials and Galois group problems. I wish to work on further applications in this direction.

## 20. Processing of Camera-Captured Documents Images

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Digital cameras have proved to be a powerful alternative to conventional scanners for document image analysis owing to its ease of use, portability, high-speed non-contact image acquisition. Its ability to capture non-paper document images like white boards, text on buildings, road signs or license plates has enabled freedom to the user to capture any document under any condition. This had led us to a new sub-field of research to the document processing community and research towards camera based document analysis is growing.

Unlike conventional flatbed scanners, where there is a controlled illumination, camera-captured images inherently suffer from uneven illumination, blur, perspective distortion and deformation that can severely affect the performance of any optical character recognition system. Traditional scanner-based document analysis systems fail against this new and promising acquisition mode. We study these issues inherently present in camera images and propose novel techniques to overcome them. We demonstrate the feasibility of these algorithms with our experiments on camera-captured complex document images.

### **Specialized Binarization Technique for Camera Images**

In most document processing systems, a binarization process precedes the analysis and recognition procedures. The use of two-level information greatly reduces the computational load and the complexity of the analysis algorithms. It is critical to achieve a robust binarization since any error introduced in this phase will pass down to the subsequent processing steps.

We propose a novel method for binarization of color documents whereby the foreground text is output as black and the background as white regardless of the polarity of foreground-background shades. The method employs an edge-based connected component approach and automatically determines a threshold for each component. It has several advantages over existing binarization methods. Firstly, it can handle documents with multi-colored texts with different background shades. Secondly, the method is applicable to documents having text of widely varying sizes, usually not handled by local binarization methods. Thirdly, the method automatically computes the threshold for binarization and the logic for inverting the output from the image data and does not require any input parameter. The proposed method has been applied to a broad domain of target document types and environment and is found to have a good adaptability. Some example outputs are shown in Figure 1.



Fig. 1. Some example outputs of binarization. As desired, the output binary images have black text on a white background irrespective of their colors in the input images.

## Document Image Mosaicing

Document image analysis often requires mosaicing when it is not possible to capture a large document at a reasonable resolution in a single exposure. Such a document is captured in parts and mosaicing stitches them into a single image. We propose a robust method for mosaicing of document images using features derived from connected components. Each connected component is described using the Angular Radial Transform (ART).

To ensure geometric consistency during feature matching, the ART coefficients of a connected component are augmented with those of its two nearest neighbors. The proposed method addresses two critical issues often encountered in correspondence matching: (i) The stability of features and (ii) Robustness against false matches due to the multiple instances of characters in a document image. The use of connected components guarantees a stable localization across images. The augmented features ensure a successful correspondence matching even in the presence of multiple similar regions within the page. Figure 2 shows the results of mosaicing pairs of document images with large variations in viewpoint, scale and rotation.



Fig. 2. Mosaic outputs of document images exhibiting perspective distortion, large variations in scale and rotation.

## **21. Overview of forest and its Management in Manipur**

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Forests are one of the most crucial life supporting systems available to all life forms on earth, including human beings. This study suggest the need for the effective management and sustainable development of forest in Manipur as the state continued to attain rapid economic development, it reflects more to public concerns about environmental stability. Over the years, the dependence has not diminished in extent, but has changed in form. The disappearance of the forests has been a major cause of soil erosion and flooding. As the forests are becoming scarce, the urgency of the situation and the magnitude of this dependence and the role of forests are becoming clearer. As the present society has been experiencing economic and income growth, institutional changes, and development of transportation due to vast industrialization and urbanization the demands for nature and leisure has increased as well. The reduction in Jhum cycle to an average of 4-5 years due to increase in population has resulted in a number of distortions affecting the recovery of soil fertility, nutrient conservation by the ecosystem, variation in the crop yield and losses the top soil. The destruction of forest and biodiversity in Manipur is the result of excessive deforestation for firewood and timber and encroachment of forest land multifarious and developmental works like establishment of housing colony, road and dam construction. It is in this context that traditional ecological knowledge and resource management systems, practiced by the indigenous communities since ancient time, need to be properly understood and revived in order to conserve relict vegetation. The Forest Department of Manipur has puts special emphasis on developing valuable forest resources, enhancing forest health and vitality for the people and has helped in maintaining the ecological balance in the state and preserving the forest areas of Manipur. The State is very rich in bio-diversity; large areas are still virgin forests. There is a need to slow down the destruction of forest, valuable natural resource in the state.



## **22. Astronomical site characterization at IAO Hanle, Ladakh**

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A quantitative survey of aerosol loading is one of the prime criteria for the selection of good astronomical sites. The aerosol loading is generally minimal in high altitude regions, where there is cleaner and thinner atmosphere. In this context, the Indian Institute of Astrophysics, Bangalore has already commissioned the world's highest 2M, Himalayan Chandra Telescope (HCT), at the Indian Astronomical Observatory (IAO), Hanle, Ladakh. The Optical-Infrared Telescope is remotely controlling from Bangalore, using a dedicated satellite-based communication link. The Institute is further looking for a suitable site for setting up a 2M class solar telescope in and around Hanle under the proposed National Large Solar Telescope (NLST) project. As a part of the site characterization program for NLST, a Skyradiometer (PM01L, of M/s Prede, Japan) has installed at IAO Hanle, in October 2007. It consists of an automatic sun tracking system, a spectral scanning radiometer, rain detector and a sun sensor. The unique features of the instrument includes, an in-built calibration facilities, an automatic solardisk scanner for calibration of solid view angle and single detector designed. Using the inversion techniques from the the measured direct and diffuse solar irradiation data at five visible-NIR filters, columnar aerosol optical parameters i.e. single scattering albedo (SSA), volume size distribution, and phase parameter are retrieved. The derived parameters are comparable with other high altitude observatories such as Mauna Loa (3400 m amsl) and Dome C (East Antarctica, 3233 m, amsl).

### 23. Multistability and Synchronization in Modulated Nonlinear Systems

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Around mid-1970s, the love affair between meteorologist and computer simulations blossoms but in a weather model build by breaking the atmospheric phenomenon into a set of deterministic equation, the computer misbehaves: Repetitions were never quite exact. There was a pattern: An orderly disorder. This leads to discovery of chaos; aperiodic dynamics in deterministic systems in which there is a sensitivity of initial conditions. Deterministic numerical forecasting figured accurate courses for spacecraft and missiles.

Why not winds and clouds? Phenomenon of nature cannot be explained by models based on linear ansatz. All systems contain elements of nonlinearity. And, a little nonlinearity in a systems do exhibit behavior of complexity and chaos is an essential part of it. A world of nonlinearity makes things interesting and exciting. Disorder of atmosphere, cloud formations, fluctuations of population dynamics, oscillations of heart and the brain. Irregular side of nature always fascinates us and it seems to defy basic laws of nature. In the wake of chaos, a new frontier of science opens up. Where chaos begins, classical science begins to stop. Chaos breaks down the boundaries that defines separate scientific disciplines.

Nonlinear science has brought together many disciplines together; Mathematicians, physicists, biologist, chemist, physiologist, ecologist, economist, all have to collaborate to explore deep secrets of chaos and tame its complexity. We study two phenomena in forced or modulated nonlinear dynamical systems: Multistability and Generalized synchronization. Nonlinear systems often exhibit multistability; coexistence of two or more states and they are observed in examples ranging from nonlinear optics, nonlinear electronic circuits, ecological to biological systems. We investigate the occurrence of multistability, their origins in nonlinear systems as one goes from periodic to quasiperiodic forcing.

Another important phenomenon in forced or modulated systems is synchronization. Synchronization is the adjustments of rhythms due to weak interactions. When subjected to a common environment, many systems often synchronize. An understanding of how synchronization comes about in a general settings--and indeed the nature of synchrony between dissimilar systems--is still incomplete. We have recently shown that there are different scenarios through generalized synchrony can arise that parallels to the routes to chaos or to the creation of strange nonchaotic attractors. Our studies could find potential applications in medical sciences, secure communications and a means to understand the dynamics of biocomplexity.

## **Part II**

### **Social Sciences**

## 1. Obama's America: Changes and Continuities

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**Abstract:** A change of monumental proportions has recently been realized in the United States of America. A land primarily settled and founded by the Anglo-Saxon stock, its history almost ran parallel with an alternative history of slavery. Even some of the so-called founding fathers had questionable credibility when it came to the issue of slavery. Though the Civil War supposedly abolished slavery and unified the two warring factions, practically the exploitation of blacks refused to die down. The years of segregation and discrimination were constitutionally brought to an end only after the Civil Rights Movement of the 1960s. So, when Barack Hussein Obama took oath as the 44<sup>th</sup> president of the United States, America made a major leap in its democratic credentials and its capacity to accept change in its society. While we should all be thankful to have witnessed such a triumph of human spirit, there is also need to academically question the degree of change that Obama the President will bring and the continuities that will largely direct American foreign policy.

## 2. Social Capital in decentralized governance and intra-state conflict: A case study of *Leikai Club* in Manipur state

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**Abstract:** Manipur, in India's North East, conjures up an image of a natural landscape dotted with socio-political crisis. On the one hand, the state is known for a near total breakdown in institutions of governance, unemployment, corruption, unending insurgencies, ethnic clashes and AIDS, and on the other, the state is also famous for the great contribution it makes in the field of arts and culture, literature and sports.

Seen from a liberal economic paradigm, the state lacks any semblance of balanced development in terms of a match between outlays and outcomes. The state government's effort to allocate the financial resources coming from the centre to various parts in the region has only produced an unbalanced economy with a loosely defined tertiary sector benefiting only the few. In such a situation, people often fall back to community based formal and informal network substitute system that has almost all the features of a modern organization in its structure. One such community based organization within the Meitei community in Manipur valley is the *Leikai Club*. *Leikai Club* is the generic term that denotes any small or big organization in every locality that constitutes a *leikai*. It is a community platform for the collective welfare of the people. *Leikai Club* in its current form has been in existence for over 60 years now. How traditional institutions change over a period of time to adapt to the ways of formal democratic institutional functioning yet retaining elements of continuity with the past are some concerns this paper seeks to address.

Taking cognizance of the form and functions of *Leikai Club*, this paper seeks to analyze the phenomenon using the concept of 'Social Capital' that has been defined in multiple ways by many scholars in people-centric governance. Robert Putman, Francis Fukuyama, Bowls, Gintis et al. define social capital as community networks that either substitute or complement existing institutional networks of state or market. The paper shall try to study the form of social capital that exists in Manipur embedded in the *Leikai Clubs* with special emphasis on *Meitei society* and explore its contribution for democratic decentralized informal governance.

### 3. Poverty, Schooling and Violence: Experiences from the Field

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**Abstract:** Experiences from the world over reveals that there is strong interlocking relationship among poverty, schooling and violence. During heightened political emergency and violence, school going children of poor households are worst affected. In the recent past, the experience was witnessed in many parts of Africa and Asia including the Indian state.

The aim of the present paper is to highlight the enriching field experience of interlocking relationship between **poverty, schooling and violence** in the state of Manipur with special focus on the findings of a case study of a government school in West district of Imphal. Of late, national and international education strategies are targeting access and completion of basic education to all children by 2015 while the country has unsuccessfully crossed the targeted goal to achieve Universal Elementary Education by 2007. Recently, the Government of India, with the passing of the 93rd Amendment of the Constitution, has made elementary education fundamental right.

However, despite these developments, massive educational deprivation among children of poor households remains the biggest challenge in regions where **poverty, conflict and violence**, to mention a few are rampant. In situation of persistent poverty, violence and failure of public school system, school children of poor households are hit the hardest. Educational deprivation of poor children denies them even the very limited options that there for their social mobility through schooling. This also defeats the hopes and dreams of parents and eventually the student themselves who regard schooling as a key to higher income and status, which is particularly crucial, for, social mobility may mean difference between lifelong entrapments in poverty and decent living.

The basic educational deprivation of children who are at risk of social exclusion due to poverty factor thus affects a child's life chances in multidimensional ways; while on the other hand, constraints in schooling of poor children due to poverty can be drastically reduced by fulfilling critical issues of equal access, equity and quality of education through state action. Equally important role of the state is the control of various violent movements in the form of bloody killings, economic blockades, bands, general strikes and various forms of trafficking of civil life causing ***both silent and loud emergencies*** in the state.

During such heightened political instability and hegemonic crisis which is so frequent in the state of Manipur, there is educational emergency during which children of poor households are worst affected (since there is no alternative schooling arrangement is made as it is in the case of rich children), while their parents, most of who are survivors or earning intermittent income are virtually uprooted of their livelihood means.

Against this backdrop, the present paper tries to highlight the following findings with quotations and narrations from field experience:

- Poverty of public school persistently fails children in poverty; highlights of profile of children, 80% of who live in livable conditions.
- Socio-economic profile of poor households, their response and school community to failure of government school.
- Interface between poverty, school education and violence such as arms and conflict emergencies, ethnic violence, periodical insurgency movements and various forms of trafficking of civil life.
- Response from civil society sectors



#### 4. Hamas and Israel

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**Abstract:** Hamas means “zeal” in Arabic and is an acronym for Harakat-al-mugawami-al-islamiya. It is a branch of the Islamic movement, and sparked and marked the beginning of a truce and a clear political wake up of the Islamic forces in the disturbed areas of West Bank and Gaza Strip- the main areas of the Israeli occupation on the one hand, and on the other between national secular forces led by PLO (Palestine Liberation Organisation). It was formed in Gaza in 1987 by the Moslem Brotherhood with the goal of establishing an Islamic State in “Palestine”. According to Professor Khaled Hroub, “*Hamas is seen as the voice of the Palestinian Dignity and the symbol of Palestinian Rights*”. They have their own Islamic Charter and is very extreme- stating that Palestine in its entirety is sacred to Islam on perpetuity and that no Moslem has the right to relinquish even the slightest part of it. Hamas is of the view that peace initiatives are nothing but a waste of time and acts of absurdity. So they vehemently opposed the peace process, criticized it, baffled against it and believed that it would fall.

The differences between the factions called *Fatah* will also be highlighted. The victory of Hamas in 2006 Palestinian Election strengthened the organization. This election in Palestine had been the most remarkable event since Islamic Resistance Movement, Hamas, gained absolute majority defeating the arch rival Fatah of Mamoud Abbas and took absolute control of Gaza Strip. Hamas victory shocked Israel, United States and Europe. This very victory changed the entire relations between various major actors in international politics.

The paper will also explain the estrangement that has brewed up between the Palestinians, and the repercussion, especially on the peace initiatives of the Palestinian-Israeli conflict. The recently concluded Gaza Crisis will also be discussed.

## 5. Political Economy and Structural Changes in Colonial Manipur (1891-1947)

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**Abstract:** The subject matter to enquire is colonial Economy and the study of Political economy and structural changes in colonial Manipur (1891-1947) that are shaping structural changes in the state of Manipur. By the end of the 19<sup>th</sup> century, Manipur was in the state of agrarian economy that was naturally shaped by its unique physiographic, climatic condition and isolation from other states in the North Eastern part of India which producing at its self sufficient level without any structural differentiation from others. The imposition of colonial rule after the Anglo-Manipur War of 1891 subsequently introduced new land system of owning individually as a private property. The process of monetization and marketisation of the economy was developed through the commercialization of agriculture and taxation in the land was brought about many major structural changes and distortions in the state's economy.

Trade and commerce was expanded by the influx of Bengalis and Marawaris at Imphal. The export sector revolved around the rice economy and forest economy. Institutional changes in management of forest and agricultural land, the administrative and judicial structures, the nurturing of a commercial class of outsiders, modernization of communication and transport structures all served the expansion of budgetary extraction. New and cheaper consumption goods from abroad made the native de-industrialization and lack of new employment opportunities. Here, the question to answer, why was such structural changes not occurred in the pre-colonial Manipur, being as a princely state and a self- sufficient economy?

The main objectives of the study are to identity the agrarian structure during the colonial period, to examine the linkages between administrative and political changes and colonial economy, the nature of institutional changes in the colonial period having their impacts in the colonial economy, the structure of the colonial Budget and its economic impacts and the colonial economic structure and the nature of political economy.

## 6. Politics of Gender Representation with special reference to Meitei Women

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**Abstract:** The inherent complexities and weakness in the society has hampered the higher political participation of women in the state especially Meitei women. The socio-economic and cultural participation level of Meitei women was comparatively high. But this could not lead them to take participation in decision-making process. The final decision of the political sphere of the state rested on male counterpart based on the evolution of social hierarchy based on gender. It was also important to bring forth that the consciousness of gender bias in all sectors of society had been put under watch in every country and concluded with the decision of empowerment and eradication of evil socio-cultural outlook. The absence of reasonable participation of women in all the social activities has been recognized all over the world and there has been a considerable excuse in gender inequality when look at the angle of socio-cultural and economic viewpoint. However, in Manipur, despite playing a dominant role in the above spheres of the society, the level of political participation by Meitei women is very limited. This paper tries to explain how the need of the study was felt importantly.

## 7. Higher Education-A Case Study of Manipur University

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Manipur university was established on June 5, 1980 under the Manipur University Act, 1980 (Act 8 of 1980 passed by the Manipur Legislative Assembly) as a teaching cum-affiliating university at Imphal with territorial jurisdiction over the whole of the State of Manipur. The University is located at Canchipur about 8 km from the Imphal city on the western side of the Indo-Burma Road (NH No.39). The University campus is spread over an area of about 287 acres of land. 73 colleges of Manipur are affiliated to Manipur University. The primary objective of the University is to disseminate and advance knowledge by providing instructional and research facilities in such branches of learning as it may deem fit; to make provisions for integrated courses in humanities, natural and physical sciences, social sciences, forestry and other allied disciplines in the educational programmes of the University. There are several problems in the field of higher education and the mode of administration has a direct bearing on these problems. The problems and prospects of education cannot be discussed in isolation. And in Manipur the problem of higher education is the fallout of a large problem of social and cultural upheaval, political unrest and economic stagnation of the day. It has gripped the education system. Some of them are high-level corruption in public places, bandhs and strikes, a very flexible academic calendar and ban on recruitment by the State Government during the 8<sup>th</sup> Five Year Plan. The price obviously, is on the students. Absence of a counseling cell for students is another hindrance in the education of Manipur. Assessment and accreditation of institutions of higher education have become relevant in our State, to help maintain and improve its quality. Quality in education is the right of every student, parent, employer and in fact every citizen of the country. The problem of insurgency in Manipur has affected the students and their studies. It has also affected the administration of Manipur University. Functioning of University is conditioned by environmental factors. Educational Administration is to enable the right students to receive the right education at the right time from the right teachers so that they can be a resourceful person at a cost within the means of the staff. The present paper tries to probe the problems of higher education and measures need to be taken up to improve quality of higher education and to improve the teaching learning in the State.

## 8. Poetic Discourse in the Songs of Tapta

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**Abstract:** This paper attempts to examine certain aspects of the Manipuri songs of Tapta, pseudo name of Loukrakpam Jayanta, as a text of social dissent. Tapta has gone through a number of musical styling changes: topical and political songs; symbolic and expressionist songs in the range of genre from folk to Hindustani classical to rock 'n' roll, folk rock. Covertly his mixed genre itself is a form of protest reflecting the plurality and complexity of Manipur society as a whole that screams the anguish it is in.

Tapta refreshes the field of cultural studies and modernism because his performance is the axis of so many media which critical orthodoxy used to segregate. The success of his art depends, indeed, wholly upon such a confluence. Discourse analysis has served to remind us that reading is not confined to the letter or field of letters. The text is still one of the elements in the chain of interconnected media that represents Tapta's act.

Tapta's art humbles the status of the text at the same time as it richly rewards anyone who decides to reflect on the texts that have emerged from his recordings and performing activities. I am not prepared to argue that the interrelation of music, word and gesture makes it invalid to judge rock music and lyrics qualitatively, or what a literary critic might find bad poetry can be turned into a great art with the assistance of flair, musicianship and electricity. But what is clear is that Tapta has managed to reach not the highest but the higher standards in all departments of his enterprise, while at the same time defying or inverting normal expectations.

The interpretation and aesthetic of scream I will present is directly related to my personal experiences, social, psychological and physiological terms. In other words; I do not claim or even try to find the one and only truth of this successful musical interaction, but I will try to present one of many possible ways to understand how this musical interaction can initiate important changes in Tapta's life as well as those who listen to him. For this paper, I choose his lyrics rather than his musical genre.

Cries or screams are a type of expression that perhaps is the most pure semiotic expressions we could think of as they normally occur in situations where strong emotions of pain, anger, grief or anxiety as well as strong feelings of joy and relief are involved.

## 9. Text, Image and Vision: Reading National Media and The Construction of India's Northeast

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**Abstract:** Trapped in political, military, security and administrative praxis, policy implications and assumed academic, cultural and aesthetic necessities, most non-fiction works on India's Northeast since independence fall between great rare insights feebly expressed and superbly written journalistic accounts posing as ideas extraordinarily exceptional. Acknowledging this peculiar situation, the paper makes an attempt to put in perspective the issues on National Media, Text, Image and Vision dealing with the Northeast. It looks at the existing material available on the theories and models on one hand and media practice on the other.

The paper covers the conceptual forging and stabilization of 'nations' with the advent of colonialism and makes an attempt at finding out the process of 'nation-making' in South Asia which was and is a source of group affiliation while acknowledging the fact that the same process had also spawned 'fissiparous' tendencies and conflicts amongst the peoples in the sub-continent. It also analyses the Indian National Media and the Northeast and go beyond the oft-debated issue of media representation of the region and its people.

While examining media trends, it argues that the 'relative autonomy' of the ever expanding media does not necessarily translate into 'broadening' the understanding of the Northeast. The paper analyses media texts and images dealing with different ethnic groups and identity assertions in India's Northeast and discusses how these texts and images have constructed 'realities' that run parallel to the state's attempt to forge an ideal Indian nation. It examines the qualitative 'similarity and difference' between two sets of 'imaginations' and draws special attention to how political pragmatism inherited from the days of colonial rule has impacted the everyday 'imagination' of the collective Indian 'Self' or the 'Other'.

## 10. Socialization, Health Practices and AIDS Awareness

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**Abstract:** The beliefs and practices concerning health and disease of a society are transmitted from one generation to another through socialisation process. There are dos and don'ts a child learns within the family, peer groups, community and school/college. While the family, peer groups, community and mass media engage in informal socialisation of the child, the school/college socialises formally or officially aspects of health and disease. It is these varying roles of different agents of socialisation that the study explored. It aimed to examine the linkages between socialisation, health practices and HIV/AIDS awareness among the undergraduate students within the socio-cultural context of Manipur. Both primary and secondary sources are used in the study. Though the focus has been mainly on perceptions of students, the data is also collected from various other respondents such as parents and teachers. The study uses a semi-structured interview schedule to collect data

Findings of the study showed that it is from the family and schools/colleges, a child/student receives information about health, hygiene and disease. But there are certain variations in the way the family transacts knowledge about health and disease to their children in terms of those who are coming from different places of residence and belonging to different ethnic communities. At the college, students hardly receive any information/ awareness about health and disease, particularly about HIV/AIDS. However, the informal peer groupings within the formal settings of school/college play an important role in raising real or false awareness of HIV/AIDS among students.



## 11. Empowerment of Meitei Women in Manipur

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**Abstract:** Empowerment is defined as a process by which women gain greater control over resources (income, knowledge, information technology, skill training), challenge the ideology of patriarchy and hence participate in leadership, decision making process. This paper will examine how empowered (i.e. ability to make decisions) are the paternal grandmothers, maternal grandmothers, mothers and daughters due to education and employment amongst the Meitei Women in all spheres of life like social, economic, political and moral etc.

Decision making is the process by which individuals and groups identify, combine and integrate information in order to choose one of several courses of action. Decision making power of a woman within the family has been looked upon as one of the important factors which can influence the life of the women herself as well as others. When women are more empowered then they can broaden their mind resulting to better decision making capability.

The Manipur society has a unique and impressive scenario when it comes to the socio-political empowerment of women. There are strong women's fronts in every community and tribes in Manipur. The reasons for lack of economic independence among them are due to many social and cultural constraints to women's work and employment. Therefore, in order to become economically independent, Manipuri women have to be empowered in all spheres of life like social, economic, political, cultural and moral etc. in the same way as proceeding in other countries also. Giving power to them will lead to the development of the capacity for self-reliance out-crossing the relationship of subordination on account of gender, social and economic status and the role in the family and society.

## **12.South Africa's Foreign Policy towards India in the post apartheid period**

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**Abstract:** Every state formulates its foreign policy so as to serve its national interests. From 1948 to 1994, South African foreign policy sought to justify and protect its authoritarian apartheid political system. This pariah status was ended in 1994. South Africa's relations with India have begun since the time of Mahatma Gandhi who described South Africa as his second home. The paper examines South Africa's foreign policy towards India in the post apartheid period, (1994 onwards). It includes to trace a historical background of relationship between South Africa and India, Emerging areas of co-operation, India-Brazil-South Africa (IBSA) Initiatives and Indian Diaspora in South Africa.

India's relation with the Republic of South Africa has grown from strength to strength over the years. This is due to historical links, mutual support of their struggle against colonialism and racism, the presence of Indian diaspora in South Africa. Among the areas of co-operation between the two countries are- defence, economic, energy, education, transport and science and technology. IBSA is a trilateral, developmental initiative between India, Brazil and South Africa established in June, 2003 to promote South-South cooperation and exchange. The three main issues which brought India, Brazil and South Africa into a dialogue forum are – WTO, the UN reforms and democracies. In the post apartheid era, there has been a tremendous scope for Indian settlers to rise up with the structural changes in South African society, polity and economy.

### 13. 'Hallyu' the Korean Wave

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**Abstract:** 'Hallyu' is the term coined by the Chinese media in 1998 to the rapidly growing Korean culture in China. To be precise, it is the phenomenon of swift popularity of Korean culture in other nations like China, Japan, Mexico, the Middle East and the Asian countries like Vietnam, Thailand, Malaysia, Taiwan, Singapore and India including the United States. The 'Hallyu' trend developed in Korea around the 1970s and the new generation consumers of this culture came to be known as the "Korean Tribes" in other countries. With its growing popularity in other countries, the 'Korean tribes' began to aggressively adopt and emulate the Korean customs like food and consumption patterns, fashion including dressing style, hairstyle and even their body language. So this paper attempts to explore Hallyu's brief history and its popularity in other countries and the reasons of its amazing success even in Manipur, where there is the ongoing "Korean Mania".

The Korean wave is at its peak in Manipur with a mass following of youngsters and they have even pick up some Korean words which they used as a code language while text messaging. So, how far this trend would go on is another question that lingers on the mind of many observers. In contrast, how far Korea would be able to promote its culture and the gains the Korean people made out of this phenomenon is questionable. Also, this paper would highlight Hallyu's different stage and the implications arising out of it. Thus, to put it all together in nutshell would be the query of 'Korean mania' in other countries despite having different cultures and traditions.

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### **Hamming's Ten Simple Rules for Doing Your Best Research:**

Rule 1: Drop Modesty

Rule 2: Prepare Your Mind

Rule 3: Age Is Important

Rule 4: Brains Are Not Enough, You Also Need Courage

Rule 5: Make the Best of Your Working Conditions

Rule 6: Work Hard And Efficiently

Rule 7: Believe and Doubt Your Hypothesis At the Same Time

Rule 8: Work On the Important Problems In Your Field

Rule 9: Be Committed To Your Problem

Rule 10: Leave Your Door Open