ALL PROJECTS PROGRESS OVERVIEW REPORT & BOOK OF ABSTRACTS
(Inclusive of a blueprint for Varanasi: a Mega-exploratory project)

SANDHI
A Science-Heritage Initiative
Sponsored by the Ministry of Human Resources Development, Government of India

www.iitkgpsandhi.org

October 2014

भारतीय प्रौद्योगिकी संस्थान खड़गपुर
INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR
October 2014
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Acknowledgements

The opportunity and the certainty of being a part of Sandhi is a life-time blessing. Not many are blessed like us. It is a platform which has given us the ways and means to serve our very Motherland – India – the fountainhead of civilization.

The freedom and the camaraderie that we enjoy under the portals of this great Institute, which are built on the bedrock of the sacrifices of our great martyrs, are the first foundations of Sandhi. We feel further blessed to dedicate Sandhi to their hopes, aspirations and the purpose for which they had once stood for.

Our acknowledgements are due to many. Just to mention two from a countless list – One, recalling a time more than a decade back, it was a rare patronage of Prof. Amitabha Ghosh, our past Director, who had inspired many of us to go ahead with these kinds of holistic and syncretic efforts of inquiry and explorations, though they were just nascent or rather, in a seed form. During that period, i.e., in the year 1999-2000, we had floated an exhibition cum publication called 'Madhu Vidya', meaning a ramification and a revelation on the Heritage of Indian Deep Ecological correspondences and complementarities, which contained the first fruits. Many well-wishers and guardians had shared their blessings – the names of Swami Pravananda, General Secretary, Ramakrishna Math and Mission, Belur Math; Artist-Engineer Sri Arunendu Banerjee; and most significantly, Swami Ramananda of Sadananda Ramakrishna Mission, Dakshineswar are to name a few only. From there we have treaded to our recent times, forerun by the leadership of PPC (Prof. Partha P. Chakraborti), who is our present director. He has been the ‘heart and mind’ – the master-drive and a perpetual friend in our efforts to capture and shape Sandhi. We particularly owe a lot to Ms. Amita Sharma, the past Additional Secretary (Technical Education), Ministry of Human Resources Development, Government of India, for her unparalleled support and guidance. Without her, IIT Kharagpur could not have initiated Sandhi. Other IITs followed. In this connection, we sincerely acknowledge an overarching guidance forwarded by Mrs. Swati Jain, Honorable Minister-in-Charge, Ministry of Human Resource Development, Government of India, and also to her wonderful wishes and support from her very first day.

I particularly forward our sincere gratitude to Prof. Sunando Dasgupta, Dean, Sponsored Research and Consultancy Cell, IIT Kharagpur for his silent but uncompromising support and guidance. Particularly, I dedicate this book to him – a professional colleague, Prof. Palab Dasgupta, Associate Dean of the same Cell and also a key person in Sandhi, and Prof. Dibakar Pal of our Department of Humanities and Social Sciences. Much of what has been accomplished in Sandhi and much of what you see in this book are because of the two of them.

Finally, a note of deep gratitude has to be forwarded to all our Heads of the Concerned Departments, Centers and Schools; and most important of all, to our excellent team of Principal Investigators and their teamwork to shape ‘Sandhi’…. and last but not the least, to the fulfilling contributions of their league of scholars, research associates and research assistants, in the making of this book.

On the behalf of a ‘friendship with values’ called ‘Sandhi, I sincerely seek your continued blessings and support.

Joy Sen
Principal Investigator, SANDHI
October 2014

Acknowledgements

The modern physicist experiences the world through an extreme specialization of the rational mind; the mystic through an extreme specialization of the intuitive mind. To paraphrase an old Chinese saying, mystics understand the roots of the Tao but not its branches; scientists understand its branches but not its roots.

Science does not need mysticism and mysticism does not need science; but men and women need both.

Fritjof Capra

Epilogue: Tao of Physics

The seer-wisdom realizes that supreme solar world in the form of a Asswattha (pippal) tree, where the branching of the rays of the sun carrying the immortalizing waters (the madhu) reverts back to its roots at night and resurges again to flood the universe with the day light.

– This is the eternal truth and they all, who know the truth, are one with their ‘Father in the supreme heaven’

Seer Dirgha-tama

Rig Veda: Mandala one, 164:20
SANDHI is a major ‘Science-Heritage’ initiative. It means a ‘Scientific Approach to Networking and Designing of Heritage Interfaces’. SANDHI is a recovery and recognition of our heritage in the ‘lens of science’. SANDHI is also the augmentation of scientific methodology by incorporating and absorbing inputs and processes embedded in our Indian and global traditional knowledge systems. It is the ‘Sandhi’, the spirit of association and integration of the two - Science and Heritage that matters.

SANDHI is sponsored by the Ministry of Human Resource Development, Department of Higher Education, Government of India. It is an inter-institutional and people and ground centered approach. The project is anchored on the foundation of design systems and pedagogy, by involving students right from the first day and positioning them as key players. SANDHI explores in real-life projects through the 16 SANDHI projects. IIT Kharagpur is exploring the various SANDHI projects through an apex body, which consists of Prof. P. F. Clearyman, Director, IIT Kharagpur, Prof. Surendra Dasgupta (Dean) and Prof. Fulbas Dasgupta (Associate Dean), Sponsored Research and Consultancy Cell (SRC) at IIT Kharagpur and Prof. Joy Sen, of the Department of Architecture and Regional Planning. Preamble of the SANDHI initiative.

SANDHI has three bandwidths of projects. First, it has a deeper level, where deep science and heritage interface based projects have been designed. Secondly, there are large scale geo-exploratory and geo-technical level based projects which are based on geo-morphological studies and for the students. It is not an ‘either or’ but essentially an integration of science and heritage.

The present Compendium is presented in three parts. The First part forwards a synopsis of SANDHI’s three bandwidths: the heritage and current socio-cultural activity, the research significance and the overall purpose of the SANDHI projects. The Second part is a collection of the Inception cum Progress reports of every project. All PIs along with their team of research associates, scholars and research assistants have diligently worked out this part. The Third part is a summary of the SANDHI projects and for the students. It is not an ‘either or’ but essentially an integration of science and Heritage.

The SANDHI projects are divided into three parts:

1. To conduct a re-explorative geo-archaeological – architectural – iconographic study of Chandraketugrah, East of Kolkata: as a potential site of current and future exploratory projects; Section A on geo-exploratory projects and Section B on creative economic regeneration projects.
2. Assessing the current and future Creative Economic regeneration scope of Kolkata Metropolitan Area (Phase I: East of Kolkata) - a) Terracotta and b) adobe related / reed plastered handicraft and image-based approach.
3. A multi-dimensional exploratory study of the ‘Heritage City’ of VARANASI for re-resuscitating the livelihood of hawkers + allied informal sectors keeping in mind the Hawkers + allied informal sectors happier and healthy towards the supreme source of light and strength and turning to discover the complete meaning and a larger form of her Dharma (religion).
4. An in-depth pilot project in the heart of Kolkata (Ganesh Ghat) to re-design and re-rectify the livelihood of hawkers a allied informal sector keeping in mind creative economy. The concern is to boost the background technology of different home-based, cottage-industrial products to which the Hawkers represent a retail market. (In association with Kolkata Museum of Modern Arts, Kolkata)
5. An in-depth pilot project in the heart of Kolkata (Ganesh Ghat) to re-design and re-rectify the livelihood of hawkers allied informal sector keeping in mind creative economy. The concern is to boost the background technology of different home-based, cottage-industrial products to which the Hawkers represent a retail market. (In association with Kolkata Museum of Modern Arts, Kolkata)
7. Re-configuring Dāna (Generosity) as a new Institutional Financial Mechanism for Improving ‘End-of-Life Care’ (EoLC) for the Elderly by Integrating Indic Perspectives.
8. A pilot project on ‘Heritage/Urban tourism considering the creative economy of Kolkata area – a) Terracotta and b) adobe related I need unplastered handicraft and image making. The concern is to re-explore the application and range of Terracotta technology as a building material in contemporary Industry. (In association with Kolkata Museum of Modern Arts, Kolkata)
9. A pilot project on ‘Educational Heritage tourism considering the creative economy of College Street Area (In association with Kolkata Museum of Modern Arts, Kolkata)

SANDHI aims at putting forth a new order, a greater order in thought and action – by and for the students. It is not an ‘either or’ but essentially an integration of science and tradition – assimilating the analytical and deep intuitive sectors of human thinking and for the students. It is not an ‘either or’ but essentially an integration of science and heritage.

Final Part that we have Four Creative Economy Regeneration projects namely:
1. Assessing the current and future Creative Economic regeneration scope of Kolkata Metropolitan Area (Phase I: East of Kolkata) - a) Terracotta and b) adobe related / reed plastered handicraft and image-based approach.
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To Develop a Scientific Rationale of Indo-European Language Systems

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Prof. Anirban Dasgupta

Language is a process of free creation; its laws and principles are fixed, but the manner in which the principles of generation are used is free and infinitely varied. Even the interpretation and use of words involve a process of free creation.

- Noam Chomsky
To develop a scientific rationale of Indo-European Language Systems

SANDHI
A Science-Heritage Initiative

Introduction

To summarize the whole truth behind the foundation of Indo-European Language systems having Sanskrit either at the core or the apex of that very system, one may refer to the following words quoted from ‘Hymns to Mystic Fire’ P I.:

In ancient times Veda was revered as a sacred book of wisdom, a great mass of inspired poetry, the work of Rishis, seers and sages, who received in their illumined minds rather than mentally constructed a great universal eternal and impersonal Truth which they embodied in Mantras, revealed verses of power, not of an ordinary but of a divine inspiration and source. The name given to these sages was Vasishtha, which afterwards came to mean any poet, but at the time had the sense of a seer or Truth – the Veda itself describes them as ‘Kavaya satyasrutah’ or ‘seers who are hearers of Truth’ and the Veda itself was called ‘sastra’, a word which came to mean ‘revelated scripture’…’

- Sri Aurobindo

A research abstraction

The abstraction is evident in the Figure 1 below showing a morphological upward evolution, which can be reciprocally structured to counter a downward evolution of language systems from deeper (core) to surface (peripheral) levels. The two-way ladder, in the form of a vertical tree-like structure is suggested on the basis of a three stepped inquiry (refer Figure 2). Sufficient work has been done till date to address:

1. Earmarking an evidence of an upper strata leading to a hierarchy of surface (temporal and personified) and deep (universal) structures
2. Assessing further inter-linkages of ‘Shape Grammar’ depicting response-stimulus exchanges based on iconography (templates)
3. Establishing morphological evolution of Language systems based on hierarchy of response-stimulus exchanges through components: vowels, consonants, syllables, etc (bases of varnamala in Project Code: OPP)

Figure 2: Methodology III: (SANMITH)

- Upper (1) strata word: Deep ecology (1)
- Upper (3) strata word: Deep ecology (3)
- Upper (5) strata word: Deep ecology (5)
- Upper (7) strata word: Deep ecology (7)

Involution of Language systems

Core formations

Inner periphery

Outer periphery

Upper strata (1) word: Deep ecology (1)
Template 1 LA
Template 1 U
Template 1 VM
Template 1 TM
Template 1 VM
Template 1 T

Lower strata (1) word: Ecology (1)

Assessment of evolutionary** and Evolutionary *** propensities (*IP*) based on hierarchy of Needs (HON) and its inversion

Assessment and output of extended near evolutionary sequence (ENS) between Word of one trunk with iconography of other – refer. For example, blue arrow – this is the basis of semantics and proposed II semantics – delivery of ajj Comparandum and bhj Glossary of a new spectrum of ELS

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True knowledge is not attained by thinking. It is what you are; it is what you become.

- Sri Aurobindo

A Deep Validation Study of Indian Language Systems Based on Patterns of Varnamala

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Prof. Anirban Dasgupta
Introduction

To optimize the whole truth behind the founded set of phonological syntax (sabda) and the deeper phonetic semiotics and semantics (artha) systems of Sanskrit and its other derivatives in Indian Philology and etymology it is perhaps necessary to revisit the following quotation:

"There are two worlds, the microcosm, and the macrocosm; the internal and the external. We get truth from both of these by means of experience. The truth gathered from internal experience is psychology, metaphysics, and religion; (and) from external experience, the physical sciences. Now a perfect truth should be in harmony with experiences (tanmatra) in both these worlds. The microcosm must bear testimony to the macrocosm, and the macrocosm to the microcosm; physical truth must have its counterpart in the internal world, and the internal world must have its verification outside. Yet, as a rule, we find that many of these truths are in conflict. At one period of the world's history, the internal becomes supreme, and they begin to fight the externals. At the present time the externals, the physicists, have become supreme, and they have put down many claims of psychologists and metaphysicians."

-Swami Vivekananda

A suggested research approach: Varanamala and its thermodynamic hierarchy

It is suggested that an inner or deeper hierarchy of a 'thermodynamic' evolution of structural or compositional part of language systems is operational. It is the Varnamala made hereby evident:

There is in the Rig-Veda, the oldest human writing in existence, a beautiful passage describing creation: "When there was neither aught nor naught, when darkness was rolling over darkness, what existed?" and the answer is given, "It then existed without vibration." Then it existed as vibration: "Then vibration had stopped. Then when the life was moving, there existed Re-fire (called prana and then itsiva and then it is converted into dense matter, and it grows back in exactly the reverse way. The seed will be liquefied and all the paramantrum force used up, and the last will get back its motion."

The works of Sir John Woodruff (Arthur Avalon*) and Swami Vivekananda on the one hand, and its complementarity with that of French mathematician Jean Baptiste Joseph Fourier on the other hand holds the key. The phonological quality of sound waves is comparable to its thermodynamic property in a way that any function whatsoever can be thought of as consisting of a mixture of sine waves, and this is why we refer to the set of sine wave components necessary to make up some signal as the signal’s Fourier spectrum. When Fourier came up with this idea he actually tried to calculate the rate at which heat flows in the medium concerned. Accordingly, the phonological property can be classified from two angles – anthropometry (microcosm based) and thermodynamics (macrocosm based). Major literature review and initial analyses has been done till date to carry forward the intent of the approach suggested in Figure 1.

Figure 1: An approach to understand the evolution of Varnamala based on thermodynamic property of macrocosmic involution (1) based on a complementary and cumulative hierarchy of evolutionary experience in the neo-physiological anthropometrical (2) framework (microcosm)

Based on the idea of Cosmology as per Bhagabata Samkhya Darshana of Sage Kapila and TriBRIT*

The Sankhyas define it as the equilibrium of three forces, one of which is called Sattva, another Rajas, and the third Tamas. Tamas, the lowest force, is that of attraction; a little higher is Rajas, that of repulsion; and the highest is the balance of these two, Sattva; so that when these two forces, attraction and repulsion, are held in perfect control by the Sattva there is no creation, no movement in the world. As soon as this equilibrium is lost, the balance is disturbed, and one of these forces gets stronger than the other, motion sets in, and creation begins. This state of things goes on cyclically, periodically. In one cycle of cosmos it is a Kalpa.

A deep validation study of Indian Language systems based on patterns of Varnamala

The Sanskrit define it as the equilibrium of three forces, one of which is called Sattva, another Rajas, and the third Tamas. Tamas, the lowest force, is that of attraction; a little higher is Rajas, that of repulsion; and the higher is the balance of these two, Sattva, so that when these two forces, attraction and repulsion, are held in perfect control by the Sattva there is no creation, no movement in the world. As soon as this equilibrium is lost, the balance is disturbed, and one of these forces gets stronger than the other, motion sets in, and creation begins. This state of things goes on cyclically, periodically. In one cycle of cosmos it is a Kalpa.
Decoding and Exploring Ancient Classification of Indian Music Through:
(a) Machine Learning And (b) Audience Response

ITA

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The magic happens only when the artist serves with love and the listener receives with the same spirit.
- Pandit Ravi Shankar
Decoding and exploring ancient classification of Indian music through: (a) Machine learning and (b) Audience response

SANDHI | A Science-Heritage Initiative

Introduction

In Indian tradition ragas (lit. hue, colour, beauty, melody) are fundamental melodic constructs with their own distinctive grammar, rules of composition and evocation which have come down to us through thousands of years of tradition (parampara). Some distinctive aspects of ragas are their association with specific times of days, seasons, moods, emotions, colour and even relation to spirituality which can be traced to the notion of Jati in the Natya Sastra. In this project we propose to explore if there are distinctive and fundamental ‘codes’ or ‘structures’ with their own distinct syntax and associated semantics which make these classifications, associations and evocations successful through (a) MIR and machine learning techniques, and (b) through audience response to music and its evocations.

Research Objectives and Methodology

The main objectives of this project are presented below. The methodologies, where machine learning and audience response use one another’s results and validate results, are presented in the two diagrams:

- To explore and apply techniques from music information retrieval (MIR) and machine learning for automatic classification of Indian Music; to study hidden features in traditional renditions of various ragas, and to find whether some of these features can be used to explain the classifications of the ragas.
- To explore through “audience response” the various dimensions of Hindustani classical music which evoke a variety of cognitive and emotive responses to music; to understand the deeper underlying principles which govern the generation of “meaning” and “effect” in Indian ragas by the way they are experienced and interpreted by their listeners.

Work Done so Far

- Music feature extraction methods are being evaluated and melody extraction methods are being developed for automatic rotation creative of ragas.
- Development of classifiers for automatic detection of ragas through development of feature identifying algorithms.
- In order to be able to model and discover structures that explain the various classifications of the ragas formal model for the ragas is being developed. Such models will not only help in explaining the ancient classification of ragas but also enable us to develop several prototypes such as raga identifiers, recommendation systems and more appealing music style services.
- Under audience response preliminary research on the influence of timbre of different Indian musical instruments, of the range of emotions and dominant features of various ragas based on mood and time are being explored.
- Framework and pedagogy for web-based interactive concept repertoire, educational tutorial and illustrative software and games are being developed for dissemination of Indian classical music.

Figures 1 and 2: Methodology to be adapted from computational & signal processing approaches to understanding the underlying grammar of Indian classical music and Interactive software to visualize the scales of ragas based on the circle of fifths. To be used as an online interactive tool.

Figures 2 and 3A and B: Methodology to be adapted from audience-response approaches to understanding the underlying grammar of Indian classical music (see top left) and Derived notes of Ahir Bhairav music clip and Bhibas music clip (see top right)
To establish a scientific correlation between 2-D Ecologic footprints and 3-D built formations in Indian architecture

To establish linkage between iconography representation of Pre-Buddhist/ Vedic and Buddhist periods

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"The ancient artist felt a deep feeling of being himself an integrated part of the cosmos and of participating in all life categories and elements, a feeling acquired by innumerable generations in uncounted centuries of meditative experience."

- Alice Boner

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Co-investigators / advisors (LBV)
Prof. Priyadarshi Patnaik
Prof. Pallab Dasgupta

Co-investigators / advisors (BCW)
Prof. Priyadarshi Patnaik
Prof. Saikat Kumar Paul
Prof. Mainak Ghosh

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Introduction

Indian architectural traditions are synonymous with Indian cosmic traditions having footprints in user’s charts and cosmological models as an imprint. The relations are complementarities between Indian building physics and the metaphysics of shape grammars. These relations lead to a footprint derived from the macrocosmic model imprinted on the user or the microcosmic representation (both the deity and the devotee as one).

At the second stage, the project LBV attempts to establish linkages between iconographic re-interpretation of architecture and engineering patterns of Vedic and Buddhist periods based on various start points of Indian history (see Figure 2). Basic literature review and start up analyses have been initiated till date for:

1. Identification of underlying common patterns: built-forms; shape grammar; principles of design; styles and continuity embedded in the two layers
2. Earmarking a methodology to establish the continuity
3. Re-interpretation of Indian history of science linking the two period of remote antiquity

...the way of practising this samādhi is not singular and its actual method of cultivation depends upon the functioning of the mind and mental concomitants (citta-caitta pravftti) of each living being (mahat).

-Mahayana Sutra of the Foremost Shurangama at the Crown of the Great Buddha

...the word "Chaitya Purusha" for the "Psychic being"...it is the direct portion of the Divine in the human and it is also the being that is behind the Chitta.

-Sri Aurobindo: Conversations

...what is the solution of the Vedantist? His solution is that, just as the Sankhyas say, it requires some sentient Being (Chaitya) as the motive power behind, which makes the mind think and Nature work..

-Swami Vivekananda: The Free soul

...then the Chaitya (the Principle of sentiency) who is the Kshetrajna (the Knower of the Field as Jiva) enters and the Cosmic Being wakes up.

-Kapilopadesha in (Bhagabat Puarana) English by Swami Tapasyananda of Advaita Ashrama

Research Objectives and Methodology

Initially there are three major steps to trace the ontological connections of ‘being’ and ‘becoming’ to satisfy Project BCW:

1. To scan a set of architectural prototypes like a) Vedic Mandala and Temple ratha and shrine, b) Buddhist Mandala and Stupa, and pattern off Archetypal house-related anthropometrics and the making of Sivasan and so on.
2. To document the cardinal footprints, ecological footprints, built-environmental footprints, and solar orientation footprints of the 3D object under study with cognition of 2D inputs (physical, visual, optical, semantic attributes) representing the design hierarchy in Vedic and Buddhist periods [Application of orders/ optical algorithms of Cybernetics – I, II, III and IV] as per a four step process below described. Cybernetics is a working philosophical matrix of design philosophy, design logic and algorithm, and design dynamics.
3. To develop working models of relationship between the two to arrive at response-to-stimuli ontogeny (Environment-behavior complementarities under some applied Indian and global behavior relation studies like generosity, meditation, and altruism).

![Figure 1: 4 step cybernetics based inquiries for establishing 2D – 3D linkages of iconography](image)

To establish a scientific correlation between 2-D Ecologic footprints and 3-D built formations in Indian architecture

To establish linkage between iconography representation of Pre-Buddhist/ Vedic and Buddhist periods

![Figure 2: Establishing linkage between iconographic traditions of Vedic and Buddhist periods: Template Approach](image)
If words are pictures spoken, where sounds weld themselves into form; then painting is story in form (rup-katha) told by color and line.

- Abanindranath Thakur

The effects of meditation, pranayam and meditative sounds on the cognitive and emotional performance of human brain

CEH

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Dr. Rajlakshmi Guha
Preamble of the project

Meditation (including breath, postures, meditative sounds, chants and meditative music) is purported to have beneficial effects on the human body and mind. Many scientific studies suggest that it helps remove stress and regulate body metabolism thereby improving the immune system, energy level, and general well-being. Meditation is also reported to improve mental abilities, stabilize emotions and contribute positively to a healthy and happier life. Scientific construction of the physiological and mental changes that take place due to meditation is required. However, there is a lack of holistic research, and many studies lack a number of parameters such as brain waves, facial and ocular changes, voice signals, physiological changes as well as psychological and cognitive alterations are relatively few. Similarly, studies that look at a wide range of Indian meditation techniques, both ancient and modern are also scarce. Therefore there is the necessity for such a holistic, large scale scientific multidisciplinary research.

Research objectives

To identify the nature of psycho-physiological changes that take place during and after (a) very short periods of meditation, (b) short periods of meditation and (c) meditation over a long period of time. These would be explored for different kinds of meditation techniques and traditions of India.

Methodology: Study Design:

1. In order to assess these changes a multi-pronged approach shall be used to explore changes in the psychological variables such as attention, alertness, working memory and information processing, decision-making, problem-solving, mood and affect, perceived stress, frustration-tolerance, emotion-regulation and control, and attitude towards and perception of discomfort. Changes in level of mental bias will be investigated by analyzing salivary samples. Behavioral changes and perception of things will also be documented.

2. To explore if there is any physiological change during and after the meditation process, assessment of body signals will be made to explore changes in ERP, pulse rate, skin conductance, eye movements and fixation, voice parameters, facial expressions and regulation. Thermal and hyperspectral images of facial expressions will also be examined.

3. Attempts would be made to explore if there are correlations between the changes recorded in psychological variables and physiological measures. Alterations in level of mental bias will be investigated by analyzing salivary samples. Behavioral changes and perception of things will also be documented.

4. The research aims to make well researched recommendations, and to develop techniques which will prove effective and beneficial for humans, and which, in the future, can be incorporated into intelligent monitoring systems.

Work done so far

Literature review surveys. Extensive literature review on the effects of meditation, pranayama and meditative sounds on the human brain has been done. The correlation of meditation with physiological and psychological parameters has been done. Study design for future experiments has been formulated based on literature review.

A review paper on studying the effects of various meditation techniques based on EEG signals has been drafted:

- Mukherjee, R; Chaudhuri, A; Routray, A, Patnaik, P, “Advances in Electroencephalography studies of different meditation traditions during the last decade”.

Initial experimentation: A pilot study comprising 23 experienced Kriya Yoga meditators has recently been completed in Arua, Kendrapada, Odisha. All the physiological measures and psychological assessments have been performed. Earlier a similar experiment was conducted in Pur, Odisha which consisted of Kriya Yoga meditators (n=23) and Non-meditators (n=10) as well. A conference paper has been published based on these initial experiments.

- Chaudhuri, A; Nayak, S.; Routray, A, “Use of data driven optimal filter to obtain significant trend present in frequency domain parameters for scalp EEG captured during meditation,” Students' Technology Symposium (TechSym), 2014 IEEE, pp. 7-12, Feb. 28 2014-March.

Any paper in the making:

1. Shaw, L; Mishra S; Routray, A, “Generalised Orthogonal Partial Directed Coherence as Measure of Neural Information Flow During Meditation”.

2. Shaw, L; Routray, A, “Efficacy Of Adaptive Directed Transfer Function for Neural Connectivity Estimation of EEG Signal During Meditation”.

The effects of meditation, pranayama and meditative sounds on the cognitive and emotional performance of human brain

<table>
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<th>Condition</th>
<th>State</th>
<th>Alpha Power (µV)</th>
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</table>
The wise man does not lay up his own treasures. The more he gives to others, the more he has for his own.
- Lao Tzu

Reconfiguring DANA (generosity) as a new financial mechanism for social enterprises

DGE

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Prof. Jitendra Mahakud
Prof. C. S. Mishra
Prof. A. K. Pradhan
Preamble of the project

The word Dāna signifies the act of giving with a desire to promote the welfare of others. It is manifested in both tangible and intangible forms. In India, various customs across religions and social groups have nurtured the tradition of Dāna over the ages. It is a key religious practice in many religious traditions including Hinduism, Buddhism and Jainism. In India, Dāna has always been an integral part of our daily life through its forms and shapes have changed with time. In modern India, religious and other philanthropic organizations have affected millions of people to make generous donations. These organizations, in turn, are expected to conduct extensive work in social sector.

Research Objectives and Methodology

The primary aim of this study is to explore the rich history of giving in India with the hope of adopting some best practices for promoting effective giving. It also aims to explore the tradition of Dāna in its historical-traditional context and relate it to Dāna as it exists in India today in the form of charity or philanthropy and to propose suitable models for effective utilization of funds generated through the act of giving. In effect, this study attempts to address the following pertinent issues:

(a) Nature, forms and extent of generosity in India
(b) Factors influencing giving behavior
(c) Channels of donations
(d) Identifying priority sectors for donations and alternative models of philanthropy in India, and
(e) Exploring the linkage between generosity and microfinance in Indian context.

The study also aims to examine how Indic perspective of Dāna is different from/similar to the Western notion. Eventually, the study will attempt to develop a working model of Dāna generation and utilization in academic institutions in order to explore the possibility of converting the latter into academic-industrial complexes. It is expected that understanding these issues would result in developing self-sustaining models of philanthropy in our cultural context, and in modifying Dāna behavior within Indian cultural milieu.

The study is based on both primary and secondary data. Primary data will be collected through primary surveys and interviews. In addition, experiments will be carried out whenever necessary to explore perception and communication, and their relations to giving behavior. A broad outline of the research is presented in Figure 1.
Work done so far

Literature on various aspects of Alms from the perspectives of both historical traditions and modern practices is under review. Especially, studies on economics of philanthropy, experiments on giving behavior, and understanding donors’ motivations have been explored. Some preliminary surveys were carried out in Varanasi (Ramakrishna Mission, Krishnamurti Foundation and Kaali Lohit-Mukti Bhawan) and Puri (Bharat Sevashram). An interview with Mr. Vinayak Lotani of Parivaar (a social organization) was also undertaken. All these have given insights into how different kinds of organizations sustain themselves. An experiment on trust and a survey on the giving behavior of IIT students’ community are being carried out now. The project has also generated two short reports on ‘Religious Giving’ and ‘Secular Giving’ under the summer internship program.

Electric motion makes the molecules of a body move in the same direction. Another point from physiology we must remember, that the centre which regulates the respiratory system, the breathing system, has a sort of controlling action over the system of nerve currents.

- Swami Vivekananda
Preamble to the Project

India is going through a demographic and epidemiological transition. As a result, most aged in India are experiencing a highly protracted ‘medicalised death’ in acute care hospitals. There are also many who are dying in object neglect. Although a few Palliative centers and Hospices have been set up in some states, yet the entire movement seems to be in an initial stage and not suited to Indian socio-structural and cultural needs. As opposed to the western ‘specialization of death’, India has for long, mastered a unique art of dying nurtured by a death affirming philosophy and an indigenous healing system which helped the dying to exit peacefully. These Indic concerns need to be revisited within a Public health strategy to End-of-Life care (EoLC).

Research Aim and Methodology

The project aims to:

1. Document the traditional and existing dying practices in India in different care settings—hospitals, homes, Palliative centers, Old age homes and a few Gerontopolises like Kashi.
2. It intends to develop a Public health approach to EoLC which is suited to local needs and is culturally sensitive.
3. It proposes an Action research involving an Experimental model of EoLC which integrates different components of Indic perspectives—philosophy, spirituality, aesthetics, indigenous medicine, culturally congruent communication strategies, and architectural inputs. The aim is to epitomize measures in end-of-life, build a continuum of care structure, create an interface with biomedicine and indigenous healing traditions and empower community care for the elderly.

The methodology involves documentations of various kinds—primary and secondary, to understand the Quality of Dying. Primary data is collected through surveys involving questionnaire and interview methods. In addition, the proposed experiments would develop specific observation strategies under controlled conditions.

Work Done So Far

The challenges of dying in old age have been reviewed in all the four settings mentioned earlier. The project has been meeting a global discourse on End-of-Life care. The findings are being compiled in a manuscript for a book which would be complete in the next six months. Based on the literature review, Task mapping for the existing project has been completed (see Fig. 1). Some of the components have been taken up for primary surveys, for example, a short survey has been conducted on dying destitute in Kolkata and field visits have been made to indigenous dying spaces in Kashi. To facilitate understanding of ancient dying practices, a collaborative research plan has been worked out with Sri Ramakrishna Mission. Simultaneously, visits have been made to Pallium India (Kerala) and Koshish (Jharkhand) for collaboration with experts on Palliative medicine.

The project is now poised for an Action research centered on the installation of an age-friendly portable cottage in IIT campus. This would act as an Alternate Care Pathway between Home and BC Roy Hospital and facilitate experiments and interviews from various disciplinary perspectives. However, the proposal is subject to clearance from the Institute.

The methodology involves documentations of various kinds—primary and secondary, to understand the Quality of Dying. Primary data is collected through surveys involving questionnaire and interview methods. In addition, the proposed experiments would develop specific observation strategies under controlled conditions.

Figure 1: Project Objectives and Task-Map for a Public Health Approach to EoLC for the Elderly
Quantum theory thus reveals a basic oneness of the universe. It shows that we cannot decompose the world into independently existing smallest units. These relations always include the observer in an essential way. The human observer constitutes the final link in the chain of observational processes, and the properties of any atomic object can be understood only in terms of the object’s interaction with the observer.

- Fritjof Capra
Preamble to the Project

Odisha, a heavily populated as well as culturally and naturally rich coastal state, is vulnerable to multiple disasters such as tropical cyclones, storm surges, earthquake and tsunami. The threat of the coastal vulnerability to such hazards has increased manifold with the growing population. Odisha’s coastal belt which has one of the richest heritage sites of the world such as Puri and Konark temple is facing a typical problem of coastline erosion. As a result of which the sea embankment, heritage sites and clusters of human settlements near the sea have been the worst affected. This important coastline is witnessing severe natural hazards including heavy erosion, seawater intrusion and inundation. There are even reports of structural tilting. However there are no comprehensive studies undertaken so far to understand specific processes and factors driving these natural hazards. Given the complexity of the natural system, a comprehensive study has to be undertaken to (a) document history, myth and other cultural practices and sources to identify if in the past there were geo-tectonic changes or river-shifts, (b) find exact causes and (c) possible solutions, and (d) to assess risk to heritage and life through interdisciplinary team of experts.

Work done so far

- An attempt has been made to find the lost mythological river like Chandrabhaga in and around Konark Sun temple from integrated analysis and interpretation of satellite imagery data and Google Earth using sophisticated software like Arc GIS version 10.2. Initial analysis suggests high probability of a channel near Konark temple.
- An exploration of myths, history, rituals, images, interaction with villagers suggests the presence of a necessary channel. This is enlivened through virtually all the different sources reviewed, documented and analyzed. Moreover, field trips and interactions with villagers suggest there was a narrow palaeo-channel that was used to transport stone for the construction of the temple.
- A preliminary review of literature on economics of heritage has been carried out to elicit socioeconomic implications of heritage sites with special emphasis on coastal heritage. Consequently, a tentative work plan has been developed with particular focus on making an assessment of risks of heritage site erosion on tourism, creative economy, vegetation, etc.

Research objectives and methodology

Objectives

- Historical and mythical investigations to assess the existence (if any) of ancient river system, mountains, etc. such as Chandrabhaga and Saraada Bali, Nila Shaila and other such historical/mythical landmarks.
- Scientific investigation of identified sites and locations by Measurement, Modeling using Remote Learning and Data Analytics to assess Past and neo-tectonic (erosion, tilting etc) activities, Paleo-channels of the extinct river systems, Geohydrology and Geomorphology.
- Risk assessment with respect to socioeconomic loadshed.

Research Methodology

- Historical and mythological investigations
  - Review of cultural texts and artifacts to identify if in the past there were geo-tectonic changes or river-shifts.
  - Collection of names and titles of cricket teams.
  - Brainstorming of key names.
  - Translation of key names.
  - Final documentation.

- Scientific investigations
  - Large scale and high evolution surface changes/surface geopolitical measurements and data collection using remote sensing and geospatial approaches along the study belt.
  - Deep surface measurement and data collection using remote sensors.
  - Shallow surface and deep surface data driven modeling of the vectors and biogeology.
  - Validation of the myths with respect to socio-economic existence using Machine Learning and Data Analytics.

Figure 1

Figure 2

Historical Evidence, myth and geophysical modeling to assess the tectonic movement and risks associated with Odisha coastal ‘Heritage’ belt
Three Complementary sets of Geo-Quest and Geo-archaeological Urban Exploratory Projects

Project methodology based on Geo-tourism and creation of Ecological Innovation Hubs

Geo-quest project approach for each project
Proposed methodological framework* for initiating and establishing potential Geo-tourism circuits of the 3 Geo-archaeological projects

SANDHI attempts to address Geotourism, a relatively new concept, towards avoiding an undifferentiated global mass tourism brought forward by the National Geographic Center for Sustainable Destinations, is a step not only for sustaining but also enhancing the destination by means of restorative and constructive forms of tourism. The idea of Geo-Tourism can be best applied in all the three cases applying a commonality of three objectives:

1. Objective 1: To develop a micro-level network (both inter & intra-regional) based on clustering of GT sites, in circuits of heritage tourism, cultural tourism and ecotourism sites in Varanasi, Chandakeshwar and Pushpargir.
2. Objective 2: Developing strategies for augmenting the sustainable Geotourism infrastructure through implementation of available norms, charts, governance policies etc.
3. Objective 3: To develop a micro level demonstrative pilot plan for the highest propensity geotourism circuit in the 3 geo-archaeology projects.

Three Complementary sets of Geo-Quest and Geo-archaeological Urban Exploratory Projects

*Developed by Ms. Debapriya Chakrabarty (MCP, 2nd year 2014-15) and Joy Sen

**Developed by Ms. Mouli Mazumdar (MCP, 2nd year 2014-15) and Joy Sen
Scientists tell us that when time began, fourteen billion years ago, something came from nothing. When you awaken to the ground of Being, you realize that when something came from nothing, the nothing didn’t disappear. That unmanifest, unborn dimension is the ever-present ground out of which everything is arising in every moment. It is what the Buddha called “the deathless,” and what others call “eternity consciousness.”

- Andrew Cohen

(a) Geo-Quest of Varanasi

(b) Urban planning and engineering exploration of Varanasi
Varanasi
The oldest living city in the world

Overview
Varanasi is not only one of the oldest cities in the world but also it is considered to be the spiritual and cultural capital of India. It has a long history which is full of mystery. Celebrated American Humorist-explorer Mark Twain (1898) commented after experiencing Varanasi, “Varanasi is older than history, older than tradition, older even than legend, and looks twice as old as all of them put together.”

Known by its various names like Benares, Kashi, Arshakuta, Yamana, Anarnava, Rudravasa, etc., it is situated on west bank of the river Ganges, bounded by two tributaries Varuna and Assi. In Hindu epic, the description of Kashi was first found in Rigveda, where it is mentioned as the king of Kashi. There are various historical and archaeological evidences which establish that Varanasi is the oldest city which attracts people from India and around the world. Visitors have unique experiences in this city and anyone who visits Varanasi once desires to come again and again. For Hindus, it is a spiritual and cultural city if India. It has a long history which is full of mystery. Celebrated American Humorist-explorer Mark Twain (1898) commented after experiencing Varanasi, “Varanasi is older than history, older than tradition, older even than legend, and looks twice as old as all of them put together.”

The IIT Kharagpur SANDHI Team in collaboration with IIT BHU Varanasi Team are trying to collect data from various reliable sources to understand the rich cultural heritage of Varanasi. In this context, it is essential that one should take into consideration the faith, attachment and the feelings of the local people, like Pandars, Marlians and the Doms. These are the people who can help a lot to make the city world class without compromising its rich cultural values. Undoubtedly, there are a lot of challenges like how to maintain cleanliness of the river Ganga and the Ghats of Varanasi. Without active participation and awareness of the local people, it is just impossible to make the city world class with its rich historical and cultural values.

Introduction to Geo-Quest portion of Varanasi project

The city of Varanasi (Banaras or Kashi), located on the north bank of the River Ganges in the Uttar Pradesh state of India, is regarded as one of the holiest cities of ancient religions of Southeast Asia (Hinduism, Buddhism, Jainism). Along with cities like Alexandria, Luxor, Faiyum, Varanasi is regarded as one of the oldest cities of the world that has been continuously inhabited till the present time. The present city probably dates back to 1200 BC, which was re-built after the destruction of Muhammad Gauri. The current population of 1.1 million covers an central area of 3.13 km² (wider urban agglomeration = 112.76 km²).

The present project is geared towards looking at the geological conditions (geomorphology, morphology, sedimentation during syn and post-Himalayan Orogeny) that led to the inception, evolution and survival of the city through ages. The city is located at the eastern bank of the Ganga River, which becomes unusually narrow around the city, from a 3-km wide NW-SE trending flood plain into a narrow (1–2 km) broadly NE-SW trending channel. The Ganges channel has contracting meanders: a higher southeastern bank that remains above the level of the river floods and forms part of the Marginal Plain (Upland Surface). A lower western bank, essentially a floodplain that is submerged during the monsoon floods. The Gangetic Alluvial System (GAS) that hosts Varanasi, has formed as a response to tectonic induced sedimentation during up and post-Himalayan Orogeny. The GAS is the present flood plain from the river rising and ending Himalayas in the north, and is located on the south by the monsoonal surface exposure of Indian crust. This earthward turn of the Ganges is due to the rise of the Himalayas, which has resulted to lot of theological and mythological interpretations and aspirations. The town of Varanasi is mentioned as the northernmost surficial exposure of Indian craton. This northward turn of the Ganges river has resulted to lot of theological and mythological interpretations and aspirations. The town of Varanasi is mentioned as the northernmost surficial exposure of Indian craton. This northward turn of the Ganges river has resulted to lot of theological and mythological interpretations and aspirations.
### Objective

- Application of non-invasive and invasive geoscientific methods (e.g., geological, geophysical, tectonic, hydrogeological, remote sensing) to delineate the extent of growth phases of Varanasi civilization through ages
- Understanding how the evolution of the river GAS vis-à-vis the north Indian river systems might have influenced the development and sustenance of Varanasi
- Determining the quantity and quality of the river and groundwater and their interactions in and around the Varanasi area to understand the usable water resources and rejuvenation of the river Ganga
- Understanding the weathering patterns and restoration of the ancient and historical monuments and ghats of Varanasi

### Deliverables

We plan to execute the study by coupled non-invasive and invasive geological and geophysical techniques, along with detailed remote sensing to delineate the various geological and hydrological features that control the geomorphic and societal evolution of Varanasi, and its impact on the future sustainability of the city. The work would focus on integrating the local-scale natural features to the development of Gangetic civilization along with growth of the Varanasi city, in the backdrop of the regional geological features across various spatio-temporal scales. The project would also lead to exploration of other riverine civilization sites of northern India and try to relate the site dependence and probably transformation/migration between these civilizations. The results of this proposed work is combination with other parallel works in the SANDHI project, could re-interpret and re-define the known history of the ancient India, which would provide plinth for the future India.

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**Methods**

- Hydrology
- Geology
- Geophysics
- Remote Sensing
- Aeromagnetics
- Ground magnetic

**Hydrology**

- Delineation of extent of growth phases of Varanasi civilization through ages
- Understanding how the evolution of the river GAS vis-à-vis the north Indian river systems might have influenced the development and sustenance of Varanasi
- Determining the quantity and quality of the river and groundwater and their interactions in and around the Varanasi area to understand the usable water resources and rejuvenation of the river Ganga
- Understanding the weathering patterns and restoration of the ancient and historical monuments and ghats of Varanasi

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**Glimpses from Varanasi study sites**

- Western Bank of River Ganga: Rescue, 2011
- Archaeological findings of ancient times in Varanasi
- Pollution of River Ganges at Varanasi
- View of the Ghats and sacred geography of Varanasi

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**GTC**

- Principal investigator (GTC): Prof. Arindam Basu
- Co-investigators / advisors (GTC): Prof. Probal Sengupta, Prof. Abhijit Mukherjee, Prof. Joy Sen

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**C) Geo-Quest of Chandraketugrah, West Bengal**

- Principal investigator (GTC): Prof. Arindam Basu
- Co-investigators / advisors (GTC): Prof. Probal Sengupta, Prof. Abhijit Mukherjee, Prof. Joy Sen

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**D) Archaeological Planning and Engineering exploration of Chandraketugrah, West Bengal**

- Principal investigator (GTC): Prof. Arindam Basu
- Co-investigators / advisors (GTC): Prof. Probal Sengupta, Prof. Abhijit Mukherjee, Prof. Joy Sen

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"The secret of health for both mind and body is not to mourn for the past, worry about the future, or anticipate troubles, but to live in the present moment wisely and earnestly."

- Paramahansa Yogananda
Introduction to Geo-Quest portion of Chandraketugarh project

Chandraketugarh, situated at Latitude 22°41’48.28”N and Longitude 88°41’19.38”E in the North 24 Parganas, West Bengal, exhibits remnants of an important port city that apparently flourished from about 4th century B.C. to Pre-Gupta age. The excavated site ‘Khana Mihir Dhipi’ at Chandraketugarh is believed to be early medieval. The place was connected with the Bay of Bengal mainly through two rivers, Bidyadhari and Padma (or Padda). It is believed that the city had trade contacts with foreign lands like southeast Asia and the Mediterranean and indirectly with even Graceo-Roman world in the early days. The inferences about the civilization history of Chandraketugarh are at large based on the antiquities found at this place. Although the antiquities like coins, semi-precious stones, terracottas, stone sculptures, ivories etc. found here also occur at all the contemporary settlements of the Indian subcontinent, the quality, diversity and the number of the terracotta and ivory objects discovered in this region point towards a sophisticated ancient urban centre of India. However, issues starting from the origin of the city’s name, confirmation about its location on the river bank, the actual area of the site, date of this urbanization in relation to the early historic urban growth in Bengal or of a wider network, etc. are still not fully authenticated by field evidences. This proposed research aims to resolve some of these issues and/or to check/validate the existing inferences by adopting geo-scientific approaches. The research is also to shed light on degradation status of the ancient structures and subsequently on their plausible preservation and/or restoration.

Being situated on the Ganga-Brahmaputra Delta, the site of Chandraketugarh and its surroundings are packed with numerous signatures of palaeo-channels, marshes, palaeo- levee and palaeo-point bars etc., which indicate heavy sediment load and low discharge capacities of the rivers. Earlier research infers that Chandraketugarh and other historic sites of the region are buried sites where early alluvial horizons are buried under thick alluvial deposits because of the influence of active flood plains. With a due need, geomorphological and hydrogeological studies, application of non-invasive and plausible invasive geophysical techniques, engineering geological investigations, study of the sedimentary characters and sedimentary structures, geochemical studies and sediment dating form the foundation of the proposed research in order to address the first mentioned objective.

Non-destructive index tests would be employed in order to assess the status of degradation of the ancient structures which eventually would enable us comment on plausible preservation and/or restoration aspects with reference to these structures. It should be noted that depending on feasibility, a few other relevant cites in Bengal and beyond proposed to be covered in the investigation for obvious reasons.

Objectives

- To reframe the evolutionary trend of urban settlement of Chandraketugarh primarily in relation to the early historic urban growth in Bengal and beyond using geo-scientific knowledge.
- To evaluate deterioration status and plausible preservation and/or restoration aspects of the ancient structures.

Deliverables

Being situated on the Ganga-Brahmaputra Delta, the site of Chandraketugarh and its surroundings are packed with numerous signatures of palaeo-channels, marshes, palaeo-levee and palaeo-point bars, which indicate heavy sediment load and low discharge capacities of the rivers. Earlier research infers that Chandraketugarh and other historic sites of the region are buried sites where early alluvial horizons are buried under thick alluvial deposits because of the influence of active flood plains. With a due need, geomorphological and hydrogeological studies, application of non-invasive and plausible invasive geophysical techniques, engineering geological investigations, study of the sedimentary characters and sedimentary structures, geochemical studies and sediment dating form the foundation of the proposed research in order to address the first outlined objective.

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- To reframe the evolutionary trend of urban settlement of Chandraketugarh primarily in relation to the early historic urban growth in Bengal and beyond using geo-scientific knowledge.
- To evaluate deterioration status and plausible preservation and/or restoration aspects of the ancient structures.
You give but little when you give of your possessions. It is when you give of yourself that you truly give.
- Khalil Gibran

(e) Geo-Quest of Lalitagiri-Pushpagiri, Odisha

(f) Archaeological Planning and Engineering exploration of Lalitagiri-Pushpagiri, Odisha
Introduction to Geo-Quest portion of Pushpagiri Project

The Buddhist complex of Pushpagiri, consisting of Udayagiri (the hill of rising sun), Ratnagiri (the hill of gems) and Lalitagiri (the red hill), in the Jajpur district of Odisha, is one of the major archaeological sites of eastern India. The Chinese traveler Hsuan Tsang visited Wu-cha (or Orissa) in the first half of the seventh century AD. At that time, the roads passing through Orissa from North India to South India lay along the seaside. Hsuan Tsang described the site as the Pusi-po-kili monastery in a mountain, in the south-western part of the country, the main stupa of which exhibited supernatural light. Hsuan Tsang referred to it as the Udayagiri hill. The sea at that time probably reached the foot of these gneissic hills, rising suddenly from the alluvial plain. This conjecture is supported by the fact that water-worn pebbles have been found near the foothill of the mountain. These pebbles are of beach origin, and have not rolled down from the hill.

The Buddhist Monasteries, Stupas and Chaitya grihas, encircled by many votive stupas at Udayagiri, Ratnagiri and Lalitagiri are one of its kind. According to some researchers, the Buddhist sites at Ratnagiri, Udayagiri and Lalitgiri have two wings — archaeology and art history — hardly found elsewhere. The beautiful hills and rice-growing plain lands are home to remarkable Buddhist remains of the Vajrayana sect, set in a wonderful landscape surrounded by green fields. The excavations at the three sites have revealed Buddhist stupas, monasteries, sculptures and Buddha images. Along with Udayagiri and Ratnagiri, Lalitgiri constitutes the Diamond Triangle. The three hills preserve the ruins of the Buddhist complex that once flourished in the state of Orissa.

Objectives

- Application of non-invasive and invasive geoscientific methods (e.g., geological, geophysical, remote sensing) to identify the civilization in and around Pushpagiri complex through ages
- Understanding the linkage between Udayagiri, Ratnagiri, and Lalitagiri settlements
- Decipher the connection of sea with this complex
- Understanding the weathering patterns and restoration of the ancient and historical stupas in Pushpagiri complex.

Deliverables

We plan to execute the study by coupled non-invasive and invasive geological and geophysical techniques, along with detailed remote sensing to delineate the various geological, topographical features that control the geomorphological evolution of Pushpagiri. The work would focus on integrating the local scale natural features to the development of civilization in and around the Pushpagiri complex, in the backdrop of the regional geological features across various spatio-temporal scales. The project would also lead to establish the connection of Pushpagiri with other Buddhist sites in the country and try to analyze the interdependency and probably transformation/migration between these sites. The results of this proposed work, in combination with other parallel works in the SANDHI project, could be interpreted to re-define the known history of the ancient India, which would also relate the modern India with ancient India.
PART - I
Section C

Progress and Review Report
Four Creative economy projects
A Methodological approach to the Four creative Economy Projects

To explore the area of design knowledge in the grassroots in general and craft in particular for:

- Understanding measuring systems of low literate designers amongst the creative communities involved in the 4 cases – The question is how do low to illiterate craftsmen handle measurements related to proportions, scales and balance in the absence of explicit understanding of mathematics and geometry and access to precision tools? What is their inherent design process that has been handed down with appropriate moderation through ages and generations?

- Understanding and promoting Pedagogy of the Karkhanas: Mainstream curriculum often lacks a studio based practice, like the Design Schools or Industrial manufacturing processes. Tacit learning is limited to assignments that mirror principles into practice. But practice has a pedagogy of its own, which craft Karkhanas excel in. In the absence of formal education, learning here is limited to the tacit exchange of knowledge during production itself. Thinking and production run parallel in the Karkhanas. Can we get a handle on the methods and tools of this tacit pedagogy?

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Prof. Bhargab Maitra
Prof. Haimanti Banerji
Prof. Pulak Mishra

The wise man does not lay up his own treasures.
The more he gives to others, the more he has for his own.
-Lao Tzu
Kolkata Metropolitan Area (KMA), the third largest metropolitan region of the country, is uniquely located on both the sides of river Hooghly and consists of urban zones as well as water bodies and large stretches of vegetation. Thus, it uniquely encompasses three distinct dimensions of tourism, i.e., riparian based creative economy, eco and heritage tourism. However, it is important to identify if these unique attributes have been properly assimilated and developed by the current tourism practices in KMA. Similarly, in the context of the steady rise of population and pollution, it is important to identify the appropriateness of current tourism practices in this region and assess their impact on KMA.

A working methodology of KMA contributes of two parts A & B

**Part A:**
- Review the existing state of tourism and circuits in the KMA area.
- Chart out three nodal and circuit maps E, H, C that address ecological, heritage and river-based tourism of the region.
  - earmark Ecological Resources features (E) (organized and informal green belts; not embanked and shifting areas of river banks; key named or symbolic precincts that are natural; extended back water bodies; etc)
  - identify heritage Precincts and premises – signs and signatures (H) (identify a legend of ancient spots; pre-Islamic times; Islamic and colonial times)
  - earmark prominent areas of Creative economic community patterns (C) which depends on River-based tourism (west bank and east bank).
- Create an overlay map of 1) features; 2) Signs and Signatures; 3) patterns which finally leads to key nodes / hubs / zones having potential of integrated development in the metropolitan region
- Based on the overlay map, prioritize the different tourism zones as per the study
- Final layout with structural / network accessibility maps – of existing bridges, railway stations, roads, ghats for steamers and ferries and other important attributes (government and trans municipal corporations)
- Based on the overlay map, prioritize the different tourism zones as per the study
- Final layout with structural / network accessibility maps – of existing bridges, railway stations, roads, ghats for steamers and ferries and other important attributes (government and trans municipal corporations)

**Part B:**
- Prioritize for piloting
- Create a final overlay map of 1) features; 2) Signs and Signatures; 3) patterns which finally leads to key nodes / hubs / zones having potential of integrated development in the metropolitan region
- Based on the overlay map, prioritize the different tourism zones as per the study
- Final layout with structural / network accessibility maps – of existing bridges, railway stations, roads, ghats for steamers and ferries and other important attributes (government and trans municipal corporations)
History doesn't repeat itself, but it does rhyme.
- Mark Twain

Assessing creative economic and urban design regeneration of Gariahat Area

PAK

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Prof. Koumudi Patil

Co-investigators / advisors
Prof. Bhargab Maitra
Prof. Haimanti Banerji
Prof. Pulak Mishra
Aim

The project aims at creative economic clustering of existing commercial agglomeration through networking & spatial up-gradation of Gariahat Hawkers belt by virtue of a) pattern hierarchy and b) clustering hierarchy.

Objectives

1) To map the existing pattern hierarchy of creative economic clustering amongst street vendors taking into account the existing pattern of agglomeration economics & networking and
2) Induct policies in revived creative economy and urban design patterns in the overall context of Gariahat
3) To upgrade spatial urban design solutions networking.

*Developed by Ms. Suparna Dasgupta(MCP, 2nd year 2014-15) and Joy Sen

Figure 1: Pattern hierarchy
The geologist takes up the history of the earth at the point
where the archaeologist leaves it, and carries it further back
into remote antiquity.

- Bal Gangadhar Tilak

Assessing creative economic and urban design regeneration
of Kumartuli area

CKI

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Prof. Naranayan C. Nayak
Prof. Mainak Ghosh
Prof. Pulak Mishra
Introduction

Art and Craft as an integral component of the history of civilization, adds meaning and uniqueness to cultural communities evolving through time. Art and craft interface in the metropolitan, social and economic aspects to enriches the structural and aesthetic quality of urban standard of living. It humanizes the built environment and participating activities of public space through the aspect of interactive design approach and free accessibility. Therefore an artist responds to times, they portray their inner vision to the outside world through art, and create a narrative of our collective experience.

Research Concern

To reconstruct the present unorganized situation of the potters quarter of ‘Kumartuli’ in north Kolkata, a systematic planning (Figure-2) should be introduced by visual art elements. Application of the research topic is to reconstruct the Kolkata ‘Kumartuli’ landscape integrated by the contemporary art forms, and revalue public art which includes sculptural materials, murals, mosaics, digital mediums, etc. Through this process we can establish a link between traditional practices of art forms and modern urban landscape tools to create an infrastructure of art practice environment. While there has been considerable research, focus should be conducted at the indigenous visual arts in urban art spaces, cityscape designing.

Objectives of the study

- To reconstruct the present unorganized situation of the potters quarter of ‘Kumartuli’ in north Kolkata i.e. first of quality of life with the beautification of entire physical environment without in any way disturbing or breaking its essence.
- To upgrade quality & quantity of main artifacts of community of ‘Durga’ idols, through the visual art elements, popular culture and introducing new technology (for working field and marketing) without breaking the continuity of the tradition.
- To reconstruct the present unorganized situation of the artisans quarters of ‘Kumartuli’ in north Kolkata, a systematized planning (Figure-2) should be introduced by visual art elements. Application of the research topic is to reconstruct the Kolkata ‘Kumartuli’ landscape integrated by the contemporary art forms, and revalue public art which includes sculptural materials, murals, mosaics, digital mediums, etc. Through this process we can establish a link between traditional practices of art forms and modern urban landscape tools to create an infrastructure of art practice environment. While there has been considerable research, focus should be conducted at the indigenous visual arts in urban art spaces, cityscape designing.

Figure 1: Creative economy zone (CEZ)

Figure 2: A working methodology* for upgrading Kumartuli area

*Developed by Shri Tushar Kanti Saha (MS, SANDHI), Joy Sen and Priyadarshi Patnaik
The modern economist is used to measuring the "standard of living" by the amount of annual consumption, assuming all the time that a man who consumes more is "better off" than a man who consumes less. A Buddhist economist would consider this approach excessively irrational: since consumption is merely a means to human well-being, the aim should be to obtain the maximum of well-being with the minimum of consumption.

- E F Schumacher
Introduction

The present research proposal attempts to conceptualize ‘Boipara’ (the book colony) as a living art installation having in its own autonomous or self-evolved array of visual elements. It is a living art installation that would be based on its visual landscape assimilated in its educational-cultural and economic connection of book loving communities. The book loving communities have different tastes, modes of communication, and perceptions that directly or indirectly determine or at least, affect (correlation) the zonal classification or categorization of book shops, according to parameters such as, old/new book, size, age, category, subject, guild of publishing house and most importantly language to mention a few. Additionally, the visual elements may stretch up to dimensions of physical design, like parking zone, swimming pool, availability of space to appropriate book oriented materials, and perhaps, the presence of small food corners.

The organization of visual elements of ‘Boipara’ may comprise of an embodiment of that may either be a plethora or an organized ramification as a variety of materials/methods of constructions / built styles and the system of relation between whole in an area of site specific art or built environment. The question is to what extent it is an order, and if so, what the testing grounds?

The perception whether disorganized or organized, is a function of the taste, the priority and the intellect, and often, the heart of the perceiver. So can there be a testing process to quantify the perception through which the visual elements can be clustered by:

- Different modes of communication
- Different perceptions that directly or indirectly determines or at least, affects (correlation)
- The zonal classification or division of category of book shops, by old book/new book, size, age, category, guild of publishing house etc.

Then, cumulatively, can there be a prescription in the a) built level (urban design) b) behavioral guidance through facility induction, such as:

- The visual elements may stretch up to dimensions of physical design, like near availability of parking zone and the counter presence of vehicular free zones
- Availability of space to appreciate book oriented materials, negative space / positive space - green space / brown space - furnished space / deserted space
- Street furniture and additional amenities, perhaps like:
  - The presence of a small food corner
  - The supportive displays and e-hoarding (day and night shifts of the ‘Boipara’)
  - Street vistas / audio visual plug-in add ones

- Event management induction - reading culture, fair, political-procession universities-educational institution and heritage buildings

Cultural augmentation through right (user friendly; vendor-friendly; guild-friendly) communication (means of transport - design of ‘Boipara’ transport).

Methodology

The methodology is to sieve out the key parameters which will augment the assessment of Art and Its Application in the Design of Visual Culture Based Built-Environment; case study: “Boipara”, College Street, Kolkata.

The work may proceed in three steps (from a Book Market to a Visual installation of Walkeapedia):

1. Identification and organization of visual elements of ‘Boi Para’ which may comprise of an embodiment of that may either be a plethora or an organized ramification
2. Application of visual elements to test the perception of selected uses to find out whether the place is disorganized or organized, that is, a function of the taste, the priority and the intellect, and often, the heart of the perceiver
3. To organize cultural augmentation through right (user friendly; vendor-friendly; guild-friendly) communication (means of transport - design of ‘Boipara’ transport) using key elements of ‘Visual Culture Based Built-Environment’.

Research Concern*

- The organization of visual elements of ‘Boipara’ may comprise of an embodiment of that may either be a plethora or an organized ramification as a variety of materials/methods of constructions / built styles and the system of relation between whole in an area of site specific art or built environment. The question is to what extent it is an order, and if so, what the testing grounds?
- The perception whether disorganized or organized, is a function of the taste, the priority and the intellect, and often, the heart of the perceiver. So can there be a testing process to quantify the perception through which the visual elements can be clustered by:
  - Different modes of communication
  - Different perceptions that directly or indirectly determines or at least, affects (correlation)
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  - Street vistas / audio visual plug-in add ones

- Event management induction - reading culture, fair, political-procession universities-educational institution and heritage buildings

- Cultural augmentation through right (user friendly; vendor-friendly; guild-friendly) communication (means of transport - design of ‘Boipara’ transport).

* A Working guideline for upgrading Boipara, College street area developed by Ms. Sabitha Naskar (MS, SANDHI), Joy Sen and Priyadarshi Patnaik

Then 

The iconic singer Manna Dey at Coffee House

Now

Coffee House: the legendary café witnessing many cultural and political vicissitudes over the decades
Establishing complementary Indo-European language linkages based on historic and allied inquiries: a case study of three words

Preeti Pal, Apala Sarkar Ghosh and Joy Sen

The paper attempts to establish complementary Indo-European language linkages based on historic and allied inquiries. To best forward the complementary linkages, three words from the domain of science, literature and history of trade have been examined. They are: a) autotrophic which means the propensity to self-nourish; b) axiom, which means a directional thinking provision, this word is used in various contexts including the evolution of various semantic dimensions, which is necessary to establish the linkages. Additionally, it also makes evident the complementary relationship based on mixing various patterns of history and allied domains like iconography, mythology and anthropology from the ‘satem’ (eastern) and ‘centum’ (western) group of Indo-European language systems.

Keywords
Complementary linkages; mirroring of patterns; ‘satem’-‘centum’ inter-relationships

A Comparative Exploration of the Eastern and Western Branch of Indo-European Words Using Iconographic Application

Apala Sarkar Ghosh, Preeti Pal, Ankhi Banerjee and Joy Sen

A fundamental premise of conducting a comparative analysis of words and their iconographic verbatimization can be designed on the bases of the ancient etymological and philological implications of the Veda and its current interpretations by the Indian seers on the one hand and mental cognition and recognition in linguistics and environmental related thought in the west on the other hand. A mere literal based inquiry, based on the eastern and western perspectives, thereby may lead to a view-point that language is the surface manifestation of deeper domains of universal thought and psychic impressions that reflect underlying orthographic layers of articulated words, expressions and the world patterns of individuals and societies through time and space.

The study aspires to design and develop a methodology for comparing sets of corresponding pairs of words of Indic (Indian) and European (English) origins having phonological and phonetic affinity and analyse a range of continuum of reconstructions through a juxtaposition of iconographic expressions in different cultural habitats often separated by great spatial distances. This approach intends to formulate a scientific and unbiased method of analysis to trace the evolutionary sequence of Indo-European language and interpret the orthographic process of articulation words and expressions in languages of divergent societies and cultures across the globe. These iconographic expressions in the way of rituals, symbols, literary works and built forms are of crucial importance in understanding and interpreting the underlying causal factors that influence the outward appearances of transformational process of articulated words and expressions in languages of divergent societies and cultures.

Keywords
Cognition, phonological, phonetic, orthographic, iconicographic expressions, Indo-European language, orthographic, Vedas, human psychology, behavioural pattern, culture.

A pattern hierarchy exploration of the Garland of Letters: Varanamala — based on Samkhya Darshana

Tanmaya Mukhopadhyay, Ankhi Banerjee and Joy Sen

The paper contains a discussion on the sequence of “Varanamala” (letters) on the basis of Indian philosophy and science. The discussions are divided into six sections and an appendix. Section One contains the introduction part. Section two contains a brief definition of language. This is followed by a short description about auditory system is discussed in Section three. Historical background of auditory system and Fourier Spectra are discussed in Sections four and five. The concluding section is on cosmology and Samkhya philosophy based on the works of an ancient Sage Kapila, as contained in its original form in Bhagabata Purana and the Swetaswatara Upanishad and later expanded by Swami Vivekananda and Sri Aurobindo. The paper attempts to bring together these viewpoints — a pattern hierarchy based explanation of the evolution of universe which further provides a thermodynamic hierarchy of the creation of varanamala as portrayed by Samkhya Darshana and a complementory viewpoint which may be enriched with cache from the original works on Fourier series spectra inclined to heat flow and its measurement as a property of discrete wavelets, which are otherwise auditory.

Keywords
Samkhya Darshana, Fourier spectra, pattern hierarchy, garland of varanamala

A Science-Heritage Initiative

Book of Abstracts
Developing Web-based Interactive Educational tools on Basic Concepts and Teaching of Hindustani Classical Music: The First Step

Gouri Karambelkar, Palash Nimodia, Priyadarshi Patnaik and Joy Sen, Sourangshu Bhattacharya and Pallab Dasgupta

Currently, there is a dearth of good websites which address the key concepts of Hindustani classical music or give an initiation into exploring Indian ragas in a logical, comprehensive, interesting and interactive manner. However, in order to develop such a web-based platform, it is necessary to explore existing websites on Hindustani music to assess their features, explore websites which deal with Western classical music to identify if there are features that can be borrowed and to get for a detailed audience feedback from a wide range of prospective users – children to adults and from novices to more serious includes. This work proposes a methodology which (a) reviews existing websites systematically to identify and classify their various features, (b) tests for both web-based and in-class audience feedback in order to identify usability issues, (c) analyzes the intrinsic quality and nature of Indian classical music, its structure and context, (d) in order to develop a map of concepts and tutorials that are interlinked, hierarchally arranged, with animations, audios, interactions and games so that the fundamental concepts can be properly and lucidly communicated. It thus attempts to address both music pedagogy keeping in mind the culture and context of Indian classical music, and its easy communication to contemporary learners. It proposes to develop some pilot modules and go for a final round of feedback and assessment through audience feedback before developing the modules. The detailed method of developing this project, the ideology that drives it, and work done so far will be reported in the paper and the presentation. One small interactive online program that uses the concept of the circle of fifths in relation to the notes of various ragas along with audio will also be demonstrated during the presentation.

Keywords
Circle of fifths, educational tools, Hindustani classical music, pedagogy, ragas, web-based interactive tool

Hindustani Classical Music and Audience Response: A Review of Existing Literature, Proposed Roadmap and Initial Findings

Gouri Karambelkar, Biki Kanodia, Rabindra Sharma, Prathik Paris, Priyadarshi Patnaik, D. Nair, Sourangshu Bhattacharyya and Joy Sen

Indian classical music has a rich tradition of texts and musical repertories which give us insights into its deep-rooted relation to the total human being – emotions, personality, and relation to the circle of life. A stupa is a considerable religious institution of how music influences human behavior. The music, as we know how much of music is cultural and how much is organic. This paper reviews the recent as well as older work that deals with audience response to Hindustani classical music using social-scientific methods and scientific tools. Based on this, it proposes a detailed roadmap for exploring the issues discussed above. It also reports the initial findings of preliminary experiments and surveys conducted so far, and proposes the agenda for future exploration and experimentation.

Keywords
Audience Response, Hindustani Classical Music, Reviewer Literature, Roadmap, Survey
Pre Buddhist and Buddhist Iconography

Buddhism is one of the schools of thought formed in ancient times of India and became an integral part of Indian society. Buddhism was formed by the spiritual teachings of Shakyamuni Buddha and with the passage of time, all his spiritual teachings and way of life were realized into various modes of illustrations such as texts, relics, visual and artistic expressions. The mode of illustration by visual and artistic manner can be called as ‘Iconography’ for this study.

In this Iconographic study, efforts have been focused to understand iconographic work of Pre Buddhist and Buddhist period. The meaning of iconography has been listened from its reference in literature and etymology. The following study sees iconographic work under different topics which are ‘Legacy of Gautama Clan’, ‘Legacy of Hiranya Stupa’, ‘Legacy of Shakyamuni Clan’, ‘Legacy of Asita Devala’, ‘Legacy of Bodhisattva’, ‘Legacy of Siddhartha’, ‘Iconography of Vajra’, ‘Iconography of Enlightenment’, ‘Iconography of Yoga’, ‘Skambha’, etc. This research also gives comparative dimension to fact that depictions of different ways of spirituality from different religions in the world are similar highlighting that they give the same message or teachings.

**Keywords**

Vedas; Buddhism; Stupa; Chaitya; Vajra; Gautama, Bodhisattva

This paper focuses on a few aspects:

1. Religious beliefs associated with Indus seals: The situation of non-existence of any structural evidence of any religious buildings makes us unaware of the religious tradition followed by the Indus civilization people. But some of the seals depict some eminent religious forms such as the mother goddess and pro Shiva like form which have been depicted in many seals with animals surrounding the sculpture and involved in some rituals or praying. Some other evidences are the bovid creature and many which give a different interpretation of their existing religious trend.

2. Creative economy of Indus and its overseas trade: Indus had a flourishing trade of pottery, metallurgy, jewelry, and stoneware. Indus was flooded with trade products coming from various parts of the world which is evident from the its link with the mesopotamia civilization, Afghanistan, Iran and central Asia describing long sea routes which was traversed with the help of long wooden boats.

3. Materials and technology of Indus: The major materials used at that time include semi precious stone, metal, terracotta and faience. Most of the artifacts found from Indus civilization is made of clay and its derivative which could have been influenced by their location near river. Most of the clay materials were used in jewelry making and artifacts of that period. As well as the toys and many pottery work was done using clay and its byproducts.

4. Human and animal figures of Indus iconography: The human figures and animals which were normally impregnated in the Indus seals include the Shiva like form and animals such as bull, unicorn, bovid creature, Indian rhino and many. Apart from the seals there are numerous sculptures such as the dancing girl, the red male torso, the priest and the mother goddess forms and many other made exclusively out of clay or stones. This implies that the Indus people had a good skills of sculpture making, respective material use and aesthetic views and ideology.

5. Scripts and signs of Indus: Though there is no clear understanding of their language and signs but its close relation with some of the old Indian languages such as Tamil, Sanskrit proving it to be ancient to them or having some relation with these languages. Apart it has some clue related with the eastern scripts such as the Japanese scripts proving some of the trade links even with the eastern countries. The signs and symbols are likely to be descriptive of the natural animal forms and some standard symbols. Since the complete language is yet to be decoded because of lack of prior knowledge or some related evidences.

6. Geometry and pattern making in Indus seal designs: The seals represent simple geometric designs in repeated simple pattern. Some of the common shapes found in the seal are concentric circles, swastika, cross which implies some kind of movement and energy. Apart from the geometric ideas behind the seals, they also represent some kind of ideology behind it and hidden messages in it. Thus, the Indus seals are some great source of information about the civilization which lasted for a long period, the various aspects such as religious beliefs, trade, scripts and technology existed during that reign giving us a rough idea of their culture and ideologies followed by the successful survival and proving to be one of the great civilizations which existed during that period.
Chaitya: An Iconography of Physical Built Environ and Cosmic Archetype in Early Buddhism
Tanima Chakrabarty and Joy Sen Bera

The paper is aiming to decipher the hidden elements and their interconnection that reinvigorate the edifice of Sanatana Vedic cultural, architectural and mythological orientation. The iconography of ‘Chaitya’ as a physical and cosmological archetype has been tapped to which the earliest form of Buddhism is perhaps an original context. Toward forward the continuity, the iconography of ‘Chaitya’ has been earmarked to bridge the gap between Vedic period and Buddhism on the larger side of Indian history and provide means to: further penetrate deep ecological status of individual variation by analyzing the continuum of specific terms and meanings through the interim period. This research has expanded the iconographic analogy along with Indo-logical convergences between Chandravala, philosophy, language and its physical representation.

The paper has mainly concentrated on the term “Chaitya”, both in physical and cognitive levels. An exhaustive literature review accomplishes the initial understanding and textually interprets enegetic axis as the supportive material. Archetypal and symbolological assimilation of the built form of “Chaitya” can be best stimulated to probe into an understanding of the continuity of the two periods, which is still unclear.

Keywords
Chaitya, the principle of sentiency, Chaitya Hall, Continuity

MTatar-Mongoloid Migration and Asia: A forgotten case in applied cultural anthropology and iconography
Tiyasha Sengupta and Joy Sen

The phenomenon of migration has been a common and constant feature of human history. Ethnic intermingling, brought about by migration is integral to the development of a civilization, and subsequently, as a rule. The paper attempts to map the Tatar-Mongoloid migration between 23,000 B.C. and 10,000 BCE with respects to ancient Indic civilizations of Asia.

The origin of the Tatar-Mongoloids, according to Metuzof Z. Zeleski can be located in the Central Asian region on or around present day Mongolia and Siberia. Consequently, migration to various regions of Asia and beyond followed. The paper will be discussing various linguistic, historical, mythological and iconographic evidences collected from archives and other secondary sources to study the outcomes and impacts of Tatar-Mongoloid migrations on Asian cultures.

Keywords
Tatar-Mongoloid migration, ancient Asian civilizations, ancient Asia, migration and culture

Meditation, Spirituality and End of Life Communication and Care
Bhui Sanyam, Pradip Poddarik, Subhrajit Chopra Chatterjee and Aurobinda Routray

Meditation and spirituality are often associated. But what is the convergence point between the two? Does meditation induce spirituality and its attributes? Does spirituality lead to meditation? How these two relate to the context of end of life care and communication? End of life gives rise to two basic feelings: grief and acceptance both for the dying and the care-giver. Grief can be defined as a multidimensional response or reaction to loss, particularly to the loss of someone or something, who has passed away, which a bond or affection was formed. Although conventionally focused on the emotional response to loss, it has physical, cognitive, behavioral, social, spiritual, and psychological dimensions. While the terms are often used interchangeably, bereavement refers to the state of loss, and grief to the reaction to loss, along withاكا. Acceptance in human psychology is a reaction to reality, recognizing a process or condition (often a negative or uncomfortable situation) without attempting to change it. However, it is generally perceived that both meditation (a technique which induces a state of mind) and spirituality (as a guiding philosophy and attitude) lead to increased positive emotions and a reduction in negative emotions. On the other hand, it is generally observed that both for the dying as well as the care-giver or the bereaved negative emotions dominate and there is a need to balance with more positive emotions. Since both meditation and spirituality reduce negative emotions and increase positive emotions, it is felt that they must play a very significant role in the dying.

The paper will attempt to explore the relation between meditation and spirituality, and their use as coping and communication strategy in order to address the dying and the bereaved. This will so be a review of secondary literature. On the basis of initial findings, it will then try to create a road map for administration of meditation and spirituality for end of life looking into consideration an Indic perspective and communication strategies.

Keywords
Meditation, spirituality, end of life, positive emotions, coping strategies

Effects of Brief Session of Guided Meditation on Metabolic Profile
Robine Malhotra, Anirban Dasgupta, S L Happy, Bibek Kabi, Aritra Choudhury, Aurobinda Routray, Priyadarshi Patnaik, Rajlakshmi Guha

Although long-term meditation has been found to alter metabolic in meditators, the effects of a brief meditation intervention on metabolic variables are relatively unknown. This experiment examined whether a brief session of guided yoga meditation intervention would change the metabolic variables when compared to a pre-meditation condition. Twenty one experienced Kriya Yoga meditators (11 males, 10 females), with a meditation experience of 11.11±1.75 years [Mean ± SEM] participated in one session comprising of a 12 minutes guided Kriya Yoga meditation. Heart rate, blood pressure, and psychological variables (State Anxiety Inventory) were assessed before and after the intervention. Salivary samples were collected pre and post meditation intervention. Fourier transform infrared (FTIR) spectra of saliva were obtained in the wavenumber range of 600-4000 cm−1 and 4-1 cm−1. Spectral peaks corresponding to the carbohydrate, protein and lipid region were significantly altered in post meditation phase as compared to pre-meditation. The results suggest that brief meditation session may lead to altered metabolic profile but a larger sample size is required to validate these preliminary findings. Future directions include study on control groups where intervention strategies include relaxation, stress, cognitive and affective activities.

Keywords
Meditation, metabolic profile, Fourier transform infrared spectroscopy (FTIR), nuclear magnetic resonance spectroscopy (NMR)
Designing Experiments for Studying Effects of Meditation on the Cognitive and Emotional Performance of Human Brain: Getting the Right Combination of Experiments

Rashmi Mukherjee, Anirban Dasgupta, S L Happy, Bibek Kabi, Aritra Chaudhury, Aurobinda Routray, Priyadarshi Patnaik, Rajlakshmi Guha

Design of experiments (DOE) facilitates researchers to determine simultaneously the individual and interactive effects of many factors that could affect the output results in any design. DOE also provides better insight into the interaction and correlation between different causes and factors of a given problem. There should be effective planning of experiments so that the data obtained can be analyzed to yield valid and objective conclusions. In all the more relevant when we are analyzing a multi-factorial problem. The objective of the project is to identify the nature of psychological and physiological alterations that take place during meditation in different practitioners of meditation. In short periods of meditation and meditation over a long period of time, we can observe different brain activities in the patterns of brain waves which can be compared to the Neuroimaging results of various studies. These alterations include looking at these issues through a number of parameters such as brain signals, facial and ocular changes, voice signals, physiological changes as well as psychological and emotional alterations in Indian meditation traditions has been planned. This paper reviews existing designs used in meditation research and also looks into the pilot tests done by this team on meditators and non-meditators. A total of 1000 participants will be included. Physiological signals [EEG, HRV, BP, oxygen saturation, EOG, GSR, breath pattern, voice pattern, thermal imaging] are included in the study [Group II]. Group I has been further subdivided into 3 groups [1. novice practitioners (0-2 months); 2. Intermediate practitioners (>2 months to < 2 years); 3. Advanced practitioners (2-7 years or above)]. A series of cognitive tasks are performed before meditation and the results from the thermal videos show a reduction of stress and anxiety of a person after the meditation session. Analyzing the visual signals, it was observed that the meditators are good at controlling their emotions, both positive and negative. Some meditators did not react to any emotional stimuli at all, whereas a few responded to the positive stimuli and did not show any kind of discomfort to negative stimuli. This suggests reduced effect of negative emotions, reduced anxiety level, and low arousal of long term meditators. The study is further supported by the analysis of EEG signals of subjects.

Effect of Meditation on Emotion Regulation

Anushree Basu, S L Happy, Aritra Chaudhury, Rashmi Mukherjee, Anirban Dasgupta, Bibek Kabi, Asish Rout, Priyadarshi Patnaik, Rajlakshmi Guha

Meditation, a practice that has been a part of human life for centuries, has been considered a means to improve mental well-being and emotional balance. The practice of meditation involves focusing the mind on a particular object, thought, or activity to achieve a mentally clear and emotionally calm and stable state. This research focuses on the effects of meditation on emotion regulation by studying the cognitive and emotional processes involved in the regulation of emotions. The study aims to understand how meditation can influence the way individuals regulate their emotions and how this can be used to improve mental health.

Using emotional visual stimuli, both positive and negative emotions are elicited in meditators before and after a short meditation session. The physiological changes of the subjects are obtained using EEG and the facial expressions, thermal images are recorded during meditation elicitation. From the self-assessment of emotion and the recorded signals, it was observed that the meditators are highly capable of regulating emotions. The temperature of various regions of a person changes under various emotional conditions due to changes in the blood flow rate. A series of cognitive tasks are performed before meditation and the results from the visual signals show a reduction of stress and anxiety of a person after the meditation session. Analyzing the visual signals, it was observed that the meditators are good at controlling their emotions, both positive and negative. Some meditators did not react to any emotional stimuli at all, whereas a few responded to the positive stimuli and did not show any kind of discomfort to negative stimuli. This suggests reduced effect of negative emotions, reduced anxiety level, and low arousal of long term meditators. The study is further supported by the analysis of EEG signals of subjects.

Keywords
- Meditation
- Physiological signals
- Psychometer tests
- Metabolic profile
- Neutrinostrainers

Methodology

1) Clasification Scheme to Identify Meditation states through Dominant Trends in Frequency Domain –

Information such as Shannon entropy and Rotational entropy of the different EEG signals such as Alpha, Beta etc. help in obtaining the dominant trends which can be used to classify the meditation states. This parameter sequence is found to have a hidden dominant trend associated with the modelled states, which are classified using Supervised Learning algorithms.

2) Vector Field approach to describe Source Localization based Observation of Dipole Changes corresponding to Meditation & Resting Brain State –

By the use of source localization algorithms such as Standardized Low-resolution Brain Electromagnetic Tomography (sLORETA), to analyze scalp EEG data, these dipole sources are classified. These data are then mapped to dipoles placed at equal intervals on the head model, and these vectors can be used as a basis of classification. The difference between these two vector fields, corresponding to the brain states of Meditation and Rest, this provides a unique insight about the specific classification problem.

3) Scalp Electroencephalogram (EEG): A modelling approach consisting of - observation of Frequency Domain changes, and the use of conduction artifacts and gives better result than g-PDC. Finally, aforementioned methods are utilized to determine the dynamic evolution of transmission of brain activity in terms of these sources as vectors, and the magnitude variations of these vectors can be used as a basis of description of a vector field. The difference between this two vector fields, corresponding to the brain states of Meditation and Rest have been outlined in this work. Future scope of this work includes, establishment of a modeling structure for these vector fields, and outlining the difference between the two models.

4) Coherence Connectivity Estimation as an Measure of Neural Information Flow through Brain –

Neural information flow and its quantification in brain signals during meditation, can be addressed by connectivity measures. Estimation of functional connectivity aims to obtain a neural connectivity measure in terms of a binary string called Multi-Linkage Auto-Regressive (ML-AR) model fitted to the multichannel brain signal obtained during meditation. The time varying Granger Causality based connectivity estimators like g-PDC (Partial Directed Coherence), gOPDC (generalized Partial Directed Coherence), OPDC (Orthogonal Partial Directed Coherence), gOPDC (generalized Orthogonal Partial Directed Coherence), are calculated using the estimated time varying fMRI connectivity. The approach for the calculation of connectivity matrices is based on a procedure developed by using Autoregressive (AR) model for data analysis. The method looks promising for the case of fMRI and gOPDC, has been used to scale invariant connectivity measures for quantifying neural information flow between EEG channels. In addition gOPDC is also immune to source conduction artifact and gives better result than g-PDC. Finally, aforementioned methods are utilized to determine the dynamic evolution of transmission of brain activity in terms of

A Noveland Study to Identify the Brain States during Indic Meditation through Analysis of Scalp Electroencephalogram (EEG): A Modelling approach consisting of - observation of Frequency Domain changes, construction of Vector Fields of Sources, and the use of connectivity measures to model the Neuromon Information Flow

Chaudhuri Arind, Mane Lukan, and Roshin Ashweth, Portracl Polyadic, and Siva Reddy

Information transfer in human neocortex occurs in the form of Synapses, which in general occurs through formation of current dots near the surface of neurons. This dots together form a network which transfers information between neurons. This information as observed from mentioned in the methods and materials, this work has been focusing on these two main tasks, classify the Meditation state, and classify the Resting state. The model for neural information flow by the use of Coherence Connectivity Estimation as an Measure of Neural Information Flow through Brain [EEG] database, estimation of Brain states in various mood and emotion states, is trained to classify the meditation state, and Resting states. This provides a unique insight about the specific classification problem.
A study on the Effect of Short-term Kriya Meditation on Alertness as observed using eye saccades

Anindita Dasgupta, Asudhagogra, Ankur Chaudhuri, Rabitali Mahbub, Anindita Dasgupta, S.K. Nayeb, Bibik Kohli, Anindita Raykhi, Priyadarshi Patnaik, Rabitali Goli

Alertness or alertiveness is important for people who have to be alert on their jobs, such as air traffic controllers, drivers or pilots. However, maintaining sustained attention is a challenging task. Meditation is believed to be an effective tool for increasing the alertness level of an individual. In the present work, we study the effect of short-term meditation, on the effect of alertness.

It is well established fact that saccadic eye movements are correlated with alertness. Eye saccades are fast movements of both the eye balls in the same direction. The peak saccadic velocity increases with alertness as reported by Ueno et al. In this work, we have conducted experiments on 33 subjects to study the changes in alertness level with respect to short-term meditation.

The subjects consisted of meditators (test group) and non-meditators (control group). The alertness level has been gauged using saccadic peak velocity obtained using high frame rate videos of eye images sequences. The method has been cross compared with other techniques and is a frequency domain based method. The result show that there is an increase in the peak saccadic velocities for the meditators in most of the cases, whereas the control group exhibited random results. This indicates increased alertness with short term meditation.

Keywords: Meditation, saccades, peak saccadic velocity

Nature and Extent of Religious Giving in India

Aditi Sen., Shubhanki Nait., Nasima Chandak Nayak., Subho ... N. and J. Mahakud

Religion in India is characterized by a diversity of religious beliefs and practices. In almost all such beliefs, giving or Dana is considered as an integral part of one's dharma (religious duty). It is a well-established fact that saccadic eye movements are correlated with alertness. Eye saccades are fast movements of both the eye balls in the same direction. The peak saccadic velocity increases with alertness as reported by Ueno et al. In this work, we have conducted experiments on 33 subjects to study the changes in alertness level with respect to short-term meditation. The subjects consisted of meditators (test group) and non-meditators (control group). The alertness level has been gauged using saccadic peak velocity obtained using high frame rate videos of eye images sequences. The method has been cross compared with other techniques and is a frequency domain based method. The result show that there is an increase in the peak saccadic velocities for the meditators in most of the cases, whereas the control group exhibited random results. This indicates increased alertness with short term meditation.

Keywords: Meditation, alertness, saccades, peak saccadic velocity

Designing Advantageous Communication Strategies by Assessing Components of Trust and Uncovering Giving Pattern/Behavior amongst Youth

Rashi Ranjan Bhaumik, Priyadarshi Patnaik, Suhita Chopra Chatterjee, Narayan Chandra Nayak and Jitendra Mahakud

The present paper tries to focus especially on giving or Dana in Hindu temples and religious organizations. Offering money or anything in kind in a temple is viewed as Dana. Giving in Hindu temples among practicing Hindus is immensely diverse and rich. An enormous amount of literature, tales, and folklore inform and sustain this tradition. Temples are said to have made very effective use of donor psychology and have built up a logical structure. In the study, the ‘trust components’ used were identified through literature reviews and interviews with student communities and the identified ‘trust components’ were employed to design messages (a combination of both verbal and visual messages). Eight different components/variables that contributed to overall trust building were identified; i.e., brand value, sympathy, active role of donor, success stories/past records, transparency, urgency and novelty-freshness; and eight different sets of messages corresponding to each component/variable were framed. Two random groups were chosen to conduct the experiment where students were presented the messages and asked to donate in a hypothetical situation and then justify their actions by the images shown by the hosts. In the study, the ‘trust components’ used were identified through literature reviews and interviews with student communities and the identified ‘trust components’ were employed to design messages (a combination of both verbal and visual messages). 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End-of-Life care, formally known as palliative care, is a caring approach to dying patients in which the quality of life of the patients is improved by reducing pain and suffering through some simple and effective methods. Though India is not much familiar with the word ‘palliative care’, across the globe, several palliative care models are followed and implemented. This research work attempts to identify those models of palliative care which are economically and socially viable in the context of India. The study is initiated on the basis of reviewing literature on palliative care. While in international context, most of the palliative care models are bound to be either government funded or community run. In case of India, there is hardly any provision for government funded palliative care programmes. However, a community-run palliative care set up for elderly people is found only in the state of Kerala. Family caregivers approach is most common in India. Other palliative care models followed across the globe are consensus model, public-private-partnership (PPP) model, NGO model and many more. The present research, while finding out the merits and demerits of such models, examines their structure, funding and administration aspects. The study will be useful to understand the model(s) best fitted in Indian context in terms of cost-effectiveness and/or welfare maximization.

**Keywords**

Consensus model, cost-effectiveness, family caregiver, Palliative care

The best part of the Kashyapa Samhita is that the solutions offered are cost-effective and easy to administer. They also do not need much infrastructure. Thus, this text provides an easy pathway to the healing of various ailments commonly found in the elderly. The Kashyapa Samhita offers treatments and cures for hyperacidity, indigestion, fevers, and other ailments common in terminally-ill patients. A section deals with the analysis of various psychological illnesses. This text also deals with various diets catering to different physiques. Also dealt with are the changes of physical conditions depending on the different seasons.

**Keywords**

Palliative care is both explicit and implicit in numerous texts of Ayurveda. These inputs can be broadly classified as:

1. Inputs regarding medicine in palliation
2. Inputs regarding nutrition in palliation
3. Inputs regarding psychological care in palliation
4. Inputs regarding nutrition and diet in palliation
5. Inputs regarding architecture or housing for palliation

In the palliative care of a person, particularly the elderly, certain ailments are commonly encountered. The conventional treatment of such ailments often leads to side-effects and other complications. Ayurvedic treatment of these ailments alleviates pain and often good result. The Kashyapa Samhita or Vridhajivaka Tantra offers many treatments for ailments common among the elderly. It also gives treatment methods for psychological disorders. This paper attempts to bring out these insights, particularly from the perspective of palliative care.

The Search for the Lost River(s) at Konarka Temple: An Integrated Exploration using Myth, History and Remote Sensing Data

Chirashree Srabani Rath, Rashmi Ranjan Behera and Priyadarshi Patnaik

This paper focuses on the identification, analysis, explanation and translation of various myths, legends, oral traditions, folklores and cultural practices that indicate the existence of river(s) around Konark, located near a small town in the state of Odisha which lies on the eastern coast by the Bay of Bengal. While tradition talks of a holy river known as Chandrabhaga near Konark, currently there are no rivers there. Did a river exist? Where was it located? What role did it play in community life? How did it possibly disappear? The methodology proposed for the work is (a) identification and review of ancient and contemporary texts; (b) analysis and review of folk tradition and Hindu beliefs; (c) identification and analysis of socio-cultural practices; (d) identification and documentation of archaeological evidences, paintings and photographs; and (e) correlation of the findings that emerge with scientific evidences. The challenge is to go through contrasting indicators, identify consistent components and to come up with a working hypothesis with the support of scientific evidences. This would both contribute to history (as opposed to myth) and foster further scientific explorations.

The paper attempts a comprehensive review of ancient and contemporary texts, oral traditions and folklores, epigraphic documents, old illustrations and photographs and interviews with the elderly people of local communities to arrive at the conclusion that there is very high probability that a river existed near Konark. This is embodied by the existing scientific data.
The Search for the Lost River/s at Konarka Temple, Odisha, India: An Integrated Exploration using Myth, History, Remote Sensing and GIS
Subhamoy Jana and William K. Mohanty

The east coast of India stretching from Tamil Nadu in the south to West Bengal in the north is a vast landmass of world heritage temples, monuments and historical places. Odisha is one such state in the east coast where every year many tourists come from different regions to visit the historical as well as mythological places like Puri and Konark. Konark, which is located 60 km from Bhubaneswar in the east coast, is famous for the 13th century Sun temple. Presently this temple is mostly in ruin state. Mythological literature like Samba Purana, Madala Panji, Baya Chakada, Sarala Mahabharat speak about the existence of holy rivers such as Chandrabhaga besides Konark temple. However, presently the river is reduced to a dry bed or narrow trickle.

Puri and Konark are two such integrated coastal heritage sites, which have the distinct features of being considered amongst the historically and culturally significant coastal heritage sites of the country. In course of history, these heritage sites have, however, witnessed serious challenges of gradual erosion or destruction of these important monuments. There have also been reported cases of coastal erosion leading to increased threats of losing such important sites and the associated socio-cultural and economic activities in such heritage sites. This study thus aims to find out the risks associated with such happenings and estimate the benefits of protecting and managing the coastal heritage belt of Odisha for future generations. Furthermore, it will also examine the socio-cultural and economic implications of the adverse effects of erosion on the coastal heritage sites of Puri and Konark. In effect, it will allow us to understand the adverse socioeconomic impacts of erosion, vegetation, etc. It may be important to state that preservation of heritage sites largely depends on people’s willingness to pay. The latter, in turn, may depend on the quality of life and other factors. This study thus aims to find out the determinants of the willingness to pay in the context of Puri and Konark heritage site conservation. However, as a preliminary effort, the present study will focus on the temporal implications of coastal erosion in Puri and Konark, and will examine the possible implications of a coastal heritage site from the perspectives of the effects of heritage loss on two important sub-activities of coastal heritage activities viz. heritage economy and coastal economy.

Keywords
Coastal Heritage, coastal economy, creative economy, environmental risk assessment, all willingness to pay

Methodological framework for establishing potential Geotourism circuits of Kendrapara-Jagar-Juttack belt, Odisha
Debapriya Chakraborty, Priyadarshi Patnaik and Joy Sen

Geotourism, a relatively new concept, towards avoiding undifferentiated global mass tourism brought forward by National Geographic Center for Sustainable Destinations, is a step not only for sustaining but also enhancing the destination by means of restorative and constructive forms of tourism.

The coastal belt of the state of Odisha has ample scope for eco-tourism, heritage tourism and cultural tourism. The state attracts tourists from the neighboring states as well as foreign tourists. Odisha being a part of the Gondwana supercontinent can boast of the oldest rocks in the Indian subcontinent having the richest sites of fossils mostly in the Mahanadi and its river basins. A rich forest cover including National Parks and Biosphere Reserves at Bhubaneswar, Elephant Reserve at Chandil and the bio-diversity of Chilika Lake are just glimpses of what the region has to offer to ecotourism. Besides it is mouth of huge system of rivers namely the Mahanadi, Brahmani, Baitarani and their numerous distributaries. The region has been a seat of many ancient folklore and tribal traditions to which the Hindu and Buddhist cultures and monastic settlements were added as the formal ones in the ancient times and such are still continuing to flourish. The community has been successful in passing on the legacy of its traditional dance form, art forms and the scripts. All these add up to contribute to heritage and cultural tourism realm. Kendrapara-Jagar-Juttack belt of Odisha can hence offer its visitors an enriching experience through participation of the host community and ultimately sustaining the elements that combine to form the ‘sense of place’.

This paper deals with the methodological framework of organizing information & networking of sites aimed at planning and management of sites from the geotourism potentials. In effect, it will make an assessment of the probable risks on tourism, creative economy, and marine environment activities in such heritage sites. This study thus aims to find out the risks associated with such happenings and estimate the benefits of protecting and managing the coastal heritage belt of Odisha for future generations. Furthermore, it will also examine the socio-cultural and economic implications of the adverse effects of erosion on the coastal heritage sites of Puri and Konark. In effect, it will allow us to understand the adverse socioeconomic impacts of erosion, vegetation, etc. It may be important to state that preservation of heritage sites largely depends on people’s willingness to pay. The latter, in turn, may depend on the quality of life and other factors. This study thus aims to find out the determinants of the willingness to pay in the context of Puri and Konark heritage site conservation. However, as a preliminary effort, the present study follows, available literatures, will examine the possible implications of a coastal heritage site from the perspectives of the effects of heritage loss on two important sub-activities of coastal heritage activities viz. heritage economy and coastal economy.

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Assessment of Risks and Benefits Associated with the Odisha Coastal ‘Heritage’ Belt
Sweta Sen, Narayan Chandra Nayak., Priyadarshi Patnaik

Many cities in developing countries are cradles of history and culture, abounded with heritage buildings and sites. In many cases, they are also the areas where economic, social and environmental problems are concentrated. Puri and Konark are two such integrated coastal heritage sites, which have the distinctive features of being considered amongst the historically and culturally significant coastal heritage sites of the country. In course of history, these heritage sites have, however, witnessed serious challenges of gradual erosion or destruction of these important monuments. There have also been reported cases of coastal erosion leading to increased threats of losing such important sites and the associated socio-cultural and economic activities in such heritage sites. This study thus aims to find out the risks associated with such happenings and estimate the benefits of protecting and managing the coastal heritage belt of Odisha for future generations. Furthermore, it will also examine the socio-cultural and economic implications of the adverse effects of erosion on the coastal heritage sites of Puri and Konark. In effect, it will allow us to understand the adverse socioeconomic impacts of erosion, vegetation, etc. It may be important to state that preservation of heritage sites largely depends on people’s willingness to pay. The latter, in turn, may depend on the quality of life and other factors. This study thus aims to find out the determinants of the willingness to pay in the context of Puri and Konark heritage site conservation. However, as a preliminary effort, the present study follows, available literatures, will examine the possible implications of a coastal heritage site from the perspectives of the effects of heritage loss on two important sub-activities of coastal heritage activities viz. heritage economy and coastal economy.

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An approach to assess the Creative Economic Potentials based on River Tourism

A Case: Kolkata Metropolitan Area

Anuradha Patnaik, Ankhi Banerjee, Ankita Mandal and Joy Sen

Tourism lately has been coming up as a major vibrant industry in India. One of a major part of the GDP is coming from the tourism industry. The richness of cultural heritage resources in India has remained as one of the major attractions for the people from inside and outside the country. Kolkata, the capital of West Bengal, remains as one of the major attractions for the people from inside the country as well as outside to take up travel or tourism as one of the major activities, to its various states. West Bengal as a part of this culturally rich country has an immense potential for the development of ecological, heritage and river based creative economic tourism. Even though emerched by the marquis of river Hooghly and its other tributaries, West Bengal is a Kolkata is predominantly backed by a long legacy of pre-Islamic, colonial, cultural and post-colonial assets of cultural economic potentialities. To better the evident, the case study of principal city i.e. the Kolkata Metropolitan Area has been assessed.

Accordingly the study attempts to revive and revitalize the three integrated nodal areas of existing tourism circuits based on ecological resources, the heritage precincts and premises and the creative economic community patterns of KMA through a twofold study sequence:

1. The paper forwards a literature review of resources from the existing researches and tour operations listed zones of tourism circuits from the web.

2. This is followed by a secondary data that indicate KMA has immense potential for the development of various forms of tourism which also improves the socio-economic conditions of the people without harming the ecology and environment of the place. In summary, the paper unfolds an approach to earmark the various integrated nodal points through which all the above mentioned areas can be best integrated and developed into tourism.

Keywords
River Tourism, ecological resources, heritage precincts, creative community - features, signs and signatures, and patterns

Keywords
An Approach to assess the Geospatial Setting of Chandraketugarh based on a historical review of current works and research

Chandraketugarh or an urban centre, perhaps located as a key part of the ancient state of Gangaridai has been excavated where the trans-Bengal region (interface of West Bengal and Bangladesh) lies today. This description has been found from various sources of traveling accounts of the writers and travelers in their different piece of works. The position of Chandraketugarh has been acknowledged on the basis of Maritime-Land-route evidence and textual-historic evidences obtained from within India and also from the eastern and western sides of Asia. The archeological excavations at this site have also been carried out until the 21st century, excavated much prior to the Mauryan era, from where various relics of the subsequent Harappan culture have been unearthed. Chandraketugarh has been acknowledged on the basis of Maritime-Land route evidences and textural-historic evidences obtained from within India and also from the eastern and western sides of Asia. The archeological excavations at this site have been carried out until the 21st century, excavated much prior to the Mauryan era, from where various relics of the subsequent Harappan culture have been unearthed.

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Keywords
An approach to assess the opportunity of a walkable space to promote creative economy: Case of Boipara, College Street, Kolkata

The Environmental Protection Agency (EPA) notes that, ‘To remain competitive, communities will need places that respond to changing attitudes and behaviors driving people and businesses toward the center of metropolitan areas.’ By understanding the space syntax of a given area the connectivity and integration of surrounding spaces and elements can be analyzed. The analysis may further result in developing strategies for better infrastructural support for the creative economic activities flourishing in the area. Studies show that the cognitive complexity of an area or network exhibits a user preference to a greater extent. However, Pedestrian movements in and around, as well as consumer preferences depends upon other indicators such as legibility, enclosure, accessibility, visibility of choices. In order to assess the momentary changes through space syntax, a selected stretch of College Street, Kolkata has been selected. The area comprises of key educational sectors & business centres along with various creative support infrastructure. Due to its prime location of various educational centers for disseminating the knowledge, it has generated scope for various creative economies since its development from the colonial period. The study of its dynamic demand and characteristics of high-end users and buyers is needed for preserving, strengthening, and survival of an old creative space with rich historical background. The major concern arises from the diminishing traditional culture of the creative economy generated by the status quo of the distributors, publishers, book sellers, high-end readers due to deviation from the correlation between its social effects and spatial layouts. In this paper, an approach to apply space syntax to predict this correlation will be undertaken in order to understand the impacts and needs of the creative space for the local economy of the selected area.

Keywords
Space syntax, pedestrian movement, creative economy, high-end users, dynamic demand, Boipara-College Street, infrastructure, creative space, correlation.

A methodology to assess a correlation of Creative Heritage based economy and tourism, based on river-metropolis interface - Case of Kolkata Metropolitan Area (KMA)

The creative economy is a holistic concept, which delineates activities based on the original ideas and executes the intellectual properties held in common or in private. In all societies, creativity is bound with stocks of intangible cultural goods and creative industries. This has led the world economy, the creative industries are getting more dynamic and beneficial sector and highly mutual in terms of scenario generation, job creation, export earnings and overall well being of the society.

The present context integrates and highlights the creative economy and tourism within the world economic scenario and Indian context. The tourism and creative economy have been a major sector since the Harappan, Mauryan and Kushana periods, Gupta age, till the Pala-Sena age have been unearthed. This research paper attempts to revive and resuscitate the three integrated nodal areas of existing tourism circuits based on ecological resources, the heritage precincts and premises and the creative economic community patterns of KMA through the chronological shifting of the river courses of this area. Research and outputs are taken on the basis of the existing general spatial setting with respect to the chronological shifiting of the river courses, based on the outputs obtained, a detailed study approach has been further outlined.

Keywords
Creative Heritage, Creative Economy, Tourism

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Planning For Creative Economic Clustering. Case study: Gariahat Street Vendors, Kolkata
Sudipta Deagupta and Joy Sen
Creative economy combines of traditional knowledge, technology & development of skills in empowering the contemporary world for products & services that respond to the consumer needs. Networking local enterprises to form clusters can open new market opportunities & ensure prosperity long term sustainability of the enterprise. Furthermore, networking enterprises based on a right aggregation of typologies of goods, carrying capacity of trades and space available to showcase the products in dense urban area actually ensures long term sustainability of the enterprise (as an individual) and embedding into whole cluster.

This right agglomeration represents a “pattern”, which may range from small design detail (micro) to large urban spaces (meso). The concept is applied to cluster existing economic agglomerations of hawkers at Gariahat. Sir Christopher Alexander’s technique of pattern hierarchy as a tool for cluster identification & linking them two tiers of small (micro) and large (meso) designs & find a study to the city (macro). The paper towards the ground hereby showing “how” without much direct physical intervention an approach can be planned to re-cluster them based on creative strategies. The paper presents the process of identification of clusters & regrouping them based on pattern hierarchy and cluster hierarchy.

Keywords
Creative economy; pattern hierarchy; cluster hierarchy
A systems approach to re-organize artisans of ‘Kumartuli’ by visual elements
Tushar Kanti Saha, Priyadarshi Patnaik and Joy Sen
Culture and creativity play a significant role to bridge creative communities and the worldwide marketplace. Their impact is evident not only on the economy but also an environment, through people’s efficiency and organic intelligence. The SANDHI in IIT Kharagpur has taken an initiative to rebuild Creative Economy (CE) based on integrates of research and practice. The initiatives of SANDHI have addressed the twofold activities, namely exploring the socio-cultural nature and systematizing approach of creative opportunity zone (COZ) by developing both theory and process of application.

In the above context research concern, the present paper concentrates on the traditional cultural zone of Kumartuli in North Kolkata. The paper aim reconstruct the present unorganised initiatives of SANDHI have addressed the twofold activities, namely exploring the socio-cultural nature and systematizing approach of creative opportunity zone (COZ) by developing both theory and process of application.

The methodological procedure of research consists of two broad areas:
1. To study the various stages of traditional Kumartuli gharana and their modern art practicing system and technology. Those approaches will lead to modernize the kumartuli landscape and upgrading qualitative & quantitative artefacts through the visual art elements.
2. The artefacts value of fine craft excellence, practices, beliefs, life ways, visual individuality or social institutions of a living community.

Articulated value of fine craft excellence, practices, beliefs, life ways, visual individuality or social institutions of a living community.

Keywords
Kumartuli, an environment for tourist attraction, their economical upliftment and their global participation through a long lasting tradition of local activities.

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Planning For Creative Economic Clustering. Case study: Gariahat Street Vendors, Kolkata
Sudipta Deagupta and Joy Sen
Creative economy combines of traditional knowledge, technology & development of skills in empowering the contemporary world for products & services that respond to the consumer needs. Networking local enterprises to form clusters can open new market opportunities & ensure prosperity long term sustainability of the enterprise. Furthermore, networking enterprises based on a right aggregation of typologies of goods, carrying capacity of trades and space available to showcase the products in dense urban area actually ensures long term sustainability of the enterprise (as an individual) and embedding into whole cluster.

This right agglomeration represents a “pattern”, which may range from small design detail (micro) to large urban spaces (meso). The concept is applied to cluster existing economic agglomerations of hawkers at Gariahat. Sir Christopher Alexander’s technique of pattern hierarchy as a tool for cluster identification & linking them two tiers of small (micro) and large (meso) designs & find a study to the city (macro). The paper towards the ground hereby showing “how” without much direct physical intervention an approach can be planned to re-cluster them based on creative strategies. The paper presents the process of identification of clusters & regrouping them based on pattern hierarchy and cluster hierarchy.

Keywords
Creative economy; pattern hierarchy; cluster hierarchy
A systems approach to re-organize artisans of ‘Kumartuli’ by visual elements
Tushar Kanti Saha, Priyadarshi Patnaik and Joy Sen
Culture and creativity play a significant role to bridge creative communities and the worldwide marketplace. Their impact is evident not only on the economy but also an environment, through people’s efficiency and organic intelligence. The SANDHI in IIT Kharagpur has taken an initiative to rebuild Creative Economy (CE) based on integrates of research and practice. The initiatives of SANDHI have addressed the twofold activities, namely exploring the socio-cultural nature and systematizing approach of creative opportunity zone (COZ) by developing both theory and process of application.

In the above context research concern, the present paper concentrates on the traditional cultural zone of Kumartuli in North Kolkata. The paper aim reconstruct the present unorganised initiatives of SANDHI have addressed the twofold activities, namely exploring the socio-cultural nature and systematizing approach of creative opportunity zone (COZ) by developing both theory and process of application.

The methodological procedure of research consists of two broad areas:
1. To study the various stages of traditional Kumartuli gharana and their modern art practicing system and technology. Those approaches will lead to modernize the kumartuli landscape and upgrading qualitative & quantitative artefacts through the visual art elements.
2. The artefacts value of fine craft excellence, practices, beliefs, life ways, visual individuality or social institutions of a living community.

Articulated value of fine craft excellence, practices, beliefs, life ways, visual individuality or social institutions of a living community.

Keywords
Kumartuli, an environment for tourist attraction, their economical upliftment and their global participation through a long lasting tradition of local activities.
PART - III
Varanasi: A Mega Exploratory Project
Abstract of presentation on Project Varanasi

Prof. D. Singh and Prof. R. K. Misra, IIT BHU

The Project Varanasi seeks to undertake the study of the extra-ordinary city of Varanasi and its surroundings in all its aspects -- the living aspects as well as the dead, contemporary as well as the past, architecture as well as craft practices as well as its influence on the external conditions, its glory as well as its woes and stains.

- It will address its communities as well as the individuals, as crafts as well as the industry and in relation with its traditions as well as with modernity.
- It would connect with the local surroundings ranging from the city of Varanasi to the larger eastern region of India. It can draw its topics from the city and the region, and their relation with the country and the rest of the world, with the past and the contemporary.

The research projects would collectively create a larger picture of times and society. Five example group projects which have started are (I) Ganga, (ii) Varanasi City, (iii) Craft Communities, (iv) Historical-Paleo-Sanskrit, and (v) Education.

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Issues on Infrastructure Development of Varanasi City

Prof. Manek Kansal, Transportation Engineering Group, Civil Engineering, IIT (BHU), Varanasi

It is reported that about 200 illegal residential colonies have cropped up and the VDA is incapacitated in regularizing them. Such residential colonies have name right of way (RoW) of the NH/Postman Road/Sahastradhara Road. They are built without any reference to the road alignment plan. Such developers rather than the government agencies. The number of illegal and unplanned residential colonies is many folds higher than those residential colonies developed by the VDA.

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Settlement Pattern of Communities and their Role in Creative Economy of Varanasi: Past and Present

Sandeep Mishra, Indian Institute of Technology (BHU, Varanasi)

The paper attempts to study the settlement pattern of various communities of Varanasi city and their role in creative economy by the comparative analysis of past and present scenarios. The heritage city Varanasi is also known as the "Cultural Capital" of India. As it has adopted different cultures and communities so perfectly that it gives the glimpse of "Mini India" by blending various religions, cultures, traditions, rituals etc. Fearlessly over centuries.

Varanasi has a unique pattern of settlement. Every community has its specific habitat and remains conscious to maintain it. At Varanasi one can feel the changing patterns and movements in the course of history. The city presents an exceptional social and cultural blend, traditional and linguistic pluralism. At Varanasi one gets to explore the city of intellectuals, one traditions, one cast and costumes, personalities and communal harmony.

Varanasi has also been a leading centre of trade and commerce from centuries by maintaining its position as the wholesale market of eastern India. It has attained the international status for its handicraft works. In order to retain this distinction all these communities have contributed a lot and are still contributing. Each community has its own sector of trade which has played an important role in the creative economy of the city. In the course of time few shifts and changes have also been noticed.

This paper attempts to identify the root cause of these shifts and their impact along with the suggestions for possible remedial measures to finalize the necessary action plan.

Keywords
Settlement pattern, Varanasi, communities, culture, tradition, creative economy, trade and commerce.

Present Condition of Slums in Varanasi city

Drishit Awasthi, Indian Institute of Technology(BHU) Varanasi University

In developing countries, the problem of both housing and living space calls for urgent solution. This is because of increase in the world population and large influx into the urban areas. Rapid and uncontrolled urbanisation has caused a series of complex problems, ranging from shortage of housing, sanitation, environmental pollution, the quality of life affecting the mental and social attitudes and values and the mobility associated with urban life. Like other cities, Varanasi also suffers from housing deficit due to rapid population growth and migration from surrounding areas. Rapid growth of population and urbanisation has resulted in a concerted growth of slums in Varanasi city. It has also witnessed faster growth of slums more specifically in outer parts of the city. It has further deteriorated the quality of housing in Varanasi. Deficit of houses and ever flowing migrants in the city from surrounding area as well as neighbouring states have also worsened the crisis. Varanasi Development Authority (VDA) has been intensively surveyed. We have covered slums distributed in different parts of the city according to their nature and type.

According to Varanasi Development Authority (VDA), there are 227 slums spread all over the city on government and private lands. Total population of slums in Varanasi is about 4,53,222 and it has been intensively surveyed. We have covered slums distributed in different parts of the city according to their nature and type.

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The paper attempts to make a comparative study between the traditional cottage industries and craftsmanship in two historically important, culturally rich cities which were also economic heritage cities of the world has been of utmost importance.

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Comparative Study of Varanasi and Kyoto: Traditional Industries, Crafts, Artisans, and Modernization

M. S. Bhakth, Yashwantrao Chavan College of Engineering & Ritu Katkar, L.I. Institute of Technology (IIT) (BHU), Varanasi

This paper attempts to make a comparative study between the traditional cottage industries and craftsmanship in two historically important, culturally rich cities which were also economic heritage cities of the world. This paper seeks to understand the reasons for these trends and what Varanasi can learn from Kyoto.

Kyoto, being the traditional industry and craftsmanship center of Japan, has been the nucleus of various industries such as traditional industries, crafts, and folk arts. These industries are the backbone of the economy of Kyoto and are responsible for the city’s distinct identity. Varanasi, on the other hand, is known for its traditional industries, crafts, and folk arts. It is the center of various traditional industries such as weavers, potters, and metal workers. The traditional industries in Varanasi are closely connected with the culture and heritage of the city. Varanasi is also known as the “Cultural Capital” of India, which highlights the importance of its traditional industries. The aim of this paper is to give suggestions and discuss the objectives, necessity, and the importance of designing a web portal for the Project Varanasi. Varanasi being one of the oldest heritage cities of the world has been of utmost importance.

The paper attempts to study the settlement pattern of various communities of Varanasi city and their role in creative economy by the comparative analysis of past and present scenarios. The heritage city Varanasi is also known as the “Cultural Capital” of India. As it has adopted different cultures and communities so perfectly that it gives the glimpse of “Mini India” by blending various religions, cultures, traditions, rituals etc. Fearlessly over centuries.

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A methodology to assess Creative Economy based Heritage Tourism at Land-River Interface: Case – Varanasi

Dipangjan Sahu, V. N. Giri, Pradyudh Panda and Joy Sen

Creative Economy is one of the rapidly growing sectors today. Such a form of economy is deeply rooted in the context where it originates and flourishes, and the communities in which it engages. The present paper attempts to explore and map the impact of land-river interface upon the development of creative and cultural industries which further grow as assets to tourism of their location.

A methodology to assess Creative Economy based Heritage Tourism at Land-River Interface: Case – Varanasi

Amy Rani and Joy Sen

The concept of “aerotropolis” or “airport city” has evolved as now the airport is not only a hub for movement but has also become a driver of business location and regional growth, and integrates the global economy. Economic scenario of a region has always been a key factor for the growth in an service demand, and air transportation itself can be a strategic cause and facilitator of a region’s economic growth. This fact becomes even more significant in the development of Regional Aeropolis for Heritage Cities as still the evident and true economic potential of these cities has not been truly realized. In addition, the aerotropolis also advances the region’s accessibility and overall social development and assures the modern needs of the traditional city.

This paper presents a review of literature defining the concepts of Regional Aerotropolis and Airport Logistics in relation to Heritage Cities and recognizes the major catalytic impacts spawned by its development. The impacts include generation and enhancement of regional economic competitiveness by promoting export activities and tourism activities; improving market connectivity, boosting business operations and productivity; and influencing business location and investment decisions. The paper attempts to bring together the identified components in a synergistic manner and further analyse their impacts on one another.

Keywords
Regional Aerotropolis, Heritage City, Airport Logistics, Economy Generation

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Books of Abstracts

Varanasi, one of the oldest living cities of the world, has a long history which is full of mystery. Known by its various names like Benares, Kashi, Avimuktka, Telmapur, Varnavati, Assi, etc., it is situated on north bank of the River Ganges, bounded by its tributaries Varuna and Assi. In Hindu epic, the description of Kashi is found in Bhagavad Gita, where Krishna is mentioned as king of Kashi. The time period of Kashi is considered about 1200BC – 800BC. According to Jain epics (Achara Ratnakara and Jñānavijaya), Buddha is born in Varanasi. The significant mention of Kashi as the birthplace of Buddha is also found in Kautilya’s ‘Arthasastra’ and Koshayana’s ‘Advaitik’.

In this regard, Varanasi places itself as an excellent case-study, as it provides a unique land-river interface along the River Ganges which is believed to be a sacred geography. The city itself is considered about a cultural civilization in this area with 15 Mahajanpads theory which is also in Vedic and Jain epics which proves the theory and time period of origin of Kashi. Other sources like Kautilya’s ‘Arthasastra’ and Megasthenes’ ‘Indica’ also give the evidences about Kashi. In archaeological evidences, the wares found in the exploration of sites in Varanasi, is defined as ‘painted grey wares’. The period of such wares is considered to be during 1200BC – 600BC, which is also called the ‘iron age’.

According to Arthasastra, Varanasi, the capital of ancient Kashi, was considered a repository of traditional knowledge in art, crafts, literature, science and philosophy amounting to development of varied creative and cultural products over centuries (such as weaving, toy making and alcohols), which further induced heritage tourism over time. Finally, the potential of culture as a tool for integrated development has been explored, taking the case of Varanasi.

Keywords
Creative Economy, Cultural Industries, land-river interface, Heritage Tourism, Varanasi

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Varanasi: Historical and Archaeological Evidences of its Origin

Saurabh Sharma, Vijai Nath Giri, Pradyudh Panda and Joy Sen

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Keywords
Kashi, Rigveda, Sarnath, Buddhist Tripitaks, Arthasastra

Growth of Varanasi city from history to recent times – contribution of River Ganges: PalaeoCurrent Analysis

Purnima Das, Abhijit Mukherjee and Joy Sen

The river Ganges begins at the confluence of the Bhagirathi and Alaknanda rivers at Devprayag. It flows along the northern part of India following a trend of north-west south-east. At Varanasi, the river flows from south to north and the city is along the western bank of the river. The river along Varanasi city is broadened by islands which are attached with iron chain. The eastern bank of the meandering river is entirely consisting of point bar deposit resulting in a thick pile of sediments. Along the cross section of the river the sediment composition show drastic changes. Initially, in the era of 1200-900 BC, the city was very small. Northern part was broadened by the river and southern part by the Ayirav. Flow of the river grew radically more than 3000 years. To get an idea of the chronological development of the city the subsurface features have to be taken into account with aid of either grid method or radial bore-hole method. Since the city has grown gradually the second method would be more idealistic. First the remote sensing data would provide us the total plan view of the place. Then the bore-hole data will provide the cross sections of the whole area. Now dating the sediments, correlating them with the recent sediments and the cross section will provide a clear idea about the migration of river Ganges and growth of the city accordingly. These bore-hole cores also provide us with different historical anthropogenic items, dating and correlating which will give a good overview of the old Varanasi that stayed buried underground since the Vedic age.

Keywords
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Sunny Bansal and Joy Sen

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A methodology to assess Creative Economy based Heritage Tourism at Land-River Interface: Case – Varanasi
A methodological framework to establish eco-innovation development potential of greater Rajghat zone, Varanasi

Mouli Majumdar and Joy Sen

Over the last few decades innovation of knowledge based economy aiming at symbiosis of high order human development and environmental-ecological preservation is being considered as a major aspect of sustainable development. For ages, India has turned to nature for its source of regeneration, intellectual growth & creative expression. It’s belief that the best ideas have come where humans are in communion with nature, reflected through expressions of the ecological-human-expressive labs like that of Rabindranath Tagore in form of 'Shantiniketan', Mahatma Gandhi in form of 'Sabarmati ashram' and of Aurobindo in form of 'Auroville' are to name just a few.

So it is better to strengthen the existing intellectual clusters of Varanasi rather than dispersing it following the current trends of urban sprawling in her peripheries. This paper would explore through a possible methodological framework, the potential of greater Rajghat zone which holds the strength and the opportunity of being developed as a high order ecological-innovation zone.

The paper starts with an assessment of eco-development propensity of the greater Rajghat zone through three overlays or integrations:

1) Mapping a land use/population density validation
2) The earmarking of an inventory of the rich ecological resources/infrastructure facilities augmentation on the basis of
3) A final earmarking of knowledge/innovation clusters in the form of (i) academic (ii) spiritual (iii) livelihood/creative economy generating centers or holistic centers which will promote all three together.

Rounding it off with spatial clustering of land use, long term initiatives, short term initiatives and a demonstrative pilot planning in a selected area of greater Rajghat zone, the long term goal of ecological innovation potential constitutes the integration of natural, human and technological resources with deep ecological planning can be best targeted.

Keywords
Ecological innovation; Integral planning; Rajghat-Sarnath belt

Designing an eco-innovation Hub in greater Rajghat zone, Varanasi

Alibaha Makhum and Joy Sen

Being an on-going process, innovation needs to be encouraged as a culture. Hence, the goal of the thesis is to establish a model physical framework for a new-age community centre promoting holistic development of individuals through encouragement of innovation. Such a framework has been considered as a tripartite structure dealing with Ecological, Academic and Social and Entrepreneurial Innovation.

Ecological Innovation concentrates on the basic physiological development of an individual – by uniting the self and nature using spaces like Contemplation Hub, Horticulture Innovation spaces, Fitness Centre etc.

Academic Innovation connects the self with the world – by focusing on developing varied skill sets and acquiring traditional knowledge. It propagates interaction with peers and collaborations hence satisfying the human need for appreciation and esteem. Spaces like Multipurpose skill development zones - for music, art, dance forms, linguistics and crafts (workshops). Private silent spaces for working alone or in small groups, Library and Documentation cum Dissemination Centre will be present here.

Social and Entrepreneurial Innovation satisfies the third and highest dimension of human needs. It provides an incubation centre for people to come together for social projects in order to give back and contribute to the society. Public Display Galleries, Social Entrepreneurship Training Cell – with lecture halls and brainstorming rooms to support group projects and Counseling Centre populate this level of innovation.
Indian towns over time have been characterized by the clustering of buildings, each juxtaposed with the other, with balconies overlooking streets, and courtyards providing public space within the house, and with a scatter of terraces permitting yet another set of activities. Houses had both public and private space; yet in many ways this space was different from that in the changing towns of the present day.

-Similar yet distinctly unique, the religious city of Varanasi on the Ganges is a spontaneous and organic organization of meandering streets and informal layering of form. The entire city, developed as a connection to the holy river does not boast of dramatically great forts and palaces or exquisitely carved temples but it has the people who embody one of the oldest religions of the world, i.e. Hinduism. The city is undoubtedly unique in its architectural, artistic and religious expressions of traditional Indian culture. Aptly put by Mark Twain: ‘Benares is older than history, older than tradition, older than even a legend, and looks twice as old of them all put together.’

The traditional part of the city lies between the Ghats on the river Ganges and the modern Varanasi city, an ensemble of narrow streets and lanes which are primarily pedestrian, at times crowded and also claustrophobic. Mostly residential, interspersed with commercial activities surviving on the Ghats activities, the layout is punctuated with numerous temples acting as nodes binding the whole system together in soul and spirit.

The narrow lanes widen at junctions and other places to form squares that house the more commercial and community activities. This hierarchical networking propels the movement - passing of the more important nodes- the squares whose scale and proportion are exemplary for comfort and relaxation having fringes and platforms supporting the activities. The two to three storied courtyard dwelling units is clustered in an informal pattern face the naturally hierarchically streets and create a close sense of community where the opposing neighbors are also able to touch each other at extremely narrow sections. One can observe the gradual layering of space from the inside to the outside also visible from the transition from the ‘aangan’ (courtyard) to a room to external platform and then to a street or the informal squares.

Approachable both from the ghats and the streets the squares of the residential neighborhood are not restrictive but the meandering and changing scale from the public to the extreme private discourses thoughtful and timespace. Primarily pedestrian the streets have limited vehicular access hence giving priority to the people on foot. The sense of territoriality and belonging is remarkable at certain places due to the same.

The built and open relationship of the traditional city neighborhoods is suggestive of the dominance of the closed with respect to the open behaving as controlled relief spaces that largely contribute to the social well-being and interaction of the neighborhoods community. The spatial hierarchy and character of the neighborhood spaces is natural and progressive leading to movements and pause. The wider and larger squares, named on the basis of the primary activities taking place there, direct to narrower lanes and pathways where sometimes is almost impossible to maintain the sense of direction in the maze of man-made gazelles, at times gracefully at turns, broad with humility, softening with the wrapped head or strangely liberating at other places. The proportion and scale of these spaces modifies from 2:1 to 1:4 producing visual variety and changing degrees of enclosure. The articulated built edges provide ample alcoves and platforms favorable for interaction.

Though set in a composite climate where heat is a predominant problem as a result of winding narrow lanes the informal low scale clustered settlements never experience direct heating though in the humid months the funneled air from the river edge is a respite on balmy evenings. In winters sunny areas are located at strategic locations and house the maximum activity and interactions. Daylight is limited and welcome in summers but cloudy days lead to more uncomfortable conditions both outdoors and indoors. BENARES: MUTUALLY SHARED COMFORTABLE NEIGHBORHOOD SPACES

Over the years the original form of the neighborhoods have altered and become denser. Movement patterns have also changed and the automobile has infringed the inherent privacy. The substance of the buildings is crumbling, foundations have sunk, walls are dramatically bowed, and everywhere is an air of age and decay yet the essence of the space remains. The neighborhoods spaces thrive on the basic principles of hierarchy transition and comfort.
The tangible and intangible in the architecture of Benaras

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Benaras exists in our minds as intangible clearer than it physically manifests itself as a tangible city. It has been accepted by devout Hindus as a formless idea of the ‘centre of the cosmic’ since times immemorial. At the same time, it is a thriving city sustaining local trades and expressions of its existence and the outsiders. Benaras exists in its formal manifestation as a traditional city of ghats that connect in Ganga and soma simultaneously as a formless idea of the center of the cosmos. In Benaras, the four states of matter: Earth, Water, Air, Fire that can be interpreted as solid, liquid, gaseous and energy manifest in the inexpressible expression of the pre-manifest. The four physical states are metaphors or symbols for four “worlds” in which humanity either potentially or actually exists. Namely, the solid earth as the physical world, secondly, the liquid or water experience as symbol of the emotive psychic world; thirdly, air or the gaseous state as the symbol of the unseen world of mind or the intellect and fourthly, the radiant or world of Fire.

The four states of materiality—Earth, Water, Air, Fire— exists as the inspirational domain of the spirit. The architecture in Benaras alludes to the infinite through its timeless quality, ritualistic motifs or the culmination of the sequence in movement to the axis mundi. The manifestation of the cosmos that represents the universe in time are physically manifested in the concentric parikramas or pilgrimage routes, which comprises of a series of sacred spaces/shrines and also act as boundaries that define the aerogenic sacred territorial boundaries in Benaras. This system of spatial manifestations depicts the gross and the subtle, the solid and the subtle, the plenum and the apsara, the notion and reality simultaneously in Benaras.

Architects can be experienced / perceived simultaneously with many dimensions of our consciousness. For the sake of analysis, one can address them individually as:

§ Dogmatic mode - Perception through faith
§ Skeptical mode - Logical perception
§ Paranoid mode - Perception through heart

These, when seen in context explain the relationship of this architectural construct with the cosmos. There is a duality of existence in Benaras. The part to whole relationship is not a hierarchical structure but a symbiotic one giving each component and each ingredient it’s freedom to exist. The collective resolution, however, always manifests in harmony of all the subcomponents. This immediate parallel strip of architecture along the Gangaji comprises the ghats, which is a series of steps that leads to and from the river. The morphology of these steps is such that it directs the movement and attention to river unlike any promenade. Each ghat has its own function / want ritual that defines it.

The event that defines the manikarnika ghats is “death”. The living bring the dead for the last rites and assigning their ashes in the Ganges. This is the only activity that has happened and will happen at this ghat. The activity has a permanence and continues in time and consequently the ghat or ghats become the cycle of rituals that are associated with the final journey of the body and soul. The event of the ‘journey’ occurs in this ‘in between’ between the ‘land’ and ‘water’, which is constructed / punctuated with smaller events that cannot be unconsidered. It is the link and integral objectivity of the spatial continuum and lead to the ghats.

The Dashashwamedha Ghats is the main podium to the Ganga to witness and to be part of the morning ritual of the bath and the aarti perpetual, which is the distance to the Sun with perpetual. In the evening, the ghats is lit up with pyramid like oil lamps and prayers are chanted as veneration to the river. The energy of the ghats is manifested in the ghats and ghats and ghats are about death, birth (entering) and death. Spatially all the ghats are part of the cycle of rituals that are associated with the final journey of the body and soul. The ghats is lit up with pyramid like oil lamps and prayers are chanted as veneration to the river. The energy of the ghats is manifested in the ghats and ghats are about death, birth (entering) and death. Spatially all the ghats are part of the cycle of rituals that are associated with the final journey of the body and soul. The ghats is lit up with pyramid like oil lamps and prayers are chanted as veneration to the river. The energy of the ghats is manifested in the ghats and ghats are about death, birth (entering) and death. Spatially all the ghats are part of the cycle of rituals that are associated with the final journey of the body and soul. The ghats is lit up with pyramid like oil lamps and prayers are chanted as veneration to the river.
PART - IV


"Om! let the whole universe worship the Lord of Rudras, the three-eyed one, the TRIMBAKA, the Lord, who is perpetually linking everything (space) in the continuum of time, and also the very one, who is fragrant in spiritual essence and who nourishes and fosters all beings.

May he sever our bondage of samsara i.e., our attachment to the wheel of worldly life, so that like a fruit or cucumber is set free and hence severed from the bondage of its creeper or branches; the Supreme liberate us from the fear of death, by making us realize that we are beyond our little personality and never ever separated from our immortal expression i.e., our interconnected cosmic and transcendental nature.

Hymns to Maruti-Rudranath
Rig Veda: 7.59.12"
One of the oldest references of Kasi – ‘The city of eternal divine light’ emanates from the legacy of King-Sage Divodasa, whose pioneering lineage finds an exemplary mention in the Rig Veda where the City becomes a microcosm of all universal godheads (Viswadevas). From that time of remote antiquity, the line of kings which ruled Kashi and the Mauryan dynasty, an empire that ruled the Indian sub-continent from 320 BCE to 185 BCE claimed descent from Kusha, who descends from the Ramayana. The Rig Vedic Kaushitaki Brahmana Upanishad refers to a dialogue between a Gargya generation Brahmin named Balaka, and an older King named Ajatsatru, the then emperor of Kashi. The story is also mentioned in one of the most antiquate of all Upanishads, the Sukla Yajur-vedic Vrihad Aranyak Upanishad 2.1 and the place ‘Kashi’ is re-mentioned in the same Upanishad 3.8.2. Additionally, the Atharva Vedic Pranagni-hotra Upanishad bears a direct reference to Kashi in the name of ‘Varanasi’. Thousands of years, another emperor by the same name Ajatsatru, rules part of greater Kasi, who was also contemporary to Gautama the Buddha and Mahavira the Tirthankar.

The Adi Parva of the Mahabharata narrates about Amba’s swayamvara, who was the eldest daughter of the king of Kashi (Varanasi), who organized a swayamvara (a ceremony of choosing a husband from among assembled suitors by the bride) for his three daughters which was organized by Bhishma, the son of the Kuru King Shantanu of Hastinapur and his wife Ganga, the living goddess - the spirit of river Ganges (called Ganga in India). Of the later Puranas, there are special mentions in the various chapters of the Agni Purana (119); the Padma Purana 14.315; the Kurma Purana 1.3.35; Malaya Purana 191; Linga Purana 31; and, particularly, in the entire fourth chapter of the Skanda purana, which is called ‘Kasi Mahatyam’ (the Glory of Varanasi). The Buddhist Anguttara Nikaya (100 BCE), at several places gives a list of sixteen great nations or regional confederations of which one is Kashi. The Digha Nikaya or ‘Collection of Long Discourses’ is a Buddhist scripture, the first of the five nihayas, or collections, in the Sutta Pitaka, which is one of the three baskets that compose the Pali Tipitaka of Theravada Buddhism, also mentions Kashi as a prominent confederation. The Jaina Bhagavati Sutra (300 AD) also mentions Kasa as one of the sixteen Mahajanapadas. A very important event is the coming in of Siddhartha the Gautama to Varanasi looking to revive its sacred cosmic geography, turn the ‘wheel of dhamma’, and re-establish its green paradise for the Sages (Rishipatana), called ‘Saranath’ (Mrigadave or Deer’s park), and named after the Unicorn Sage of Ramayana, Saranganath or Rishya-Sringa. From that archaic period to centuries till date, Varanasi, India’s celebrated Spiritual Capital has continuously unfolded within a single bud (Karnika) an uninterrupted and sustainable urban lineage constituting many layers, embedding many traditions, and assimilating many schools of spiritual and intellectual legacies. As celebrated American Humorist-explorer Mark Twain commented after experiencing Varanasi:

“Varanasi is older than history, older than tradition, older even than legend, and长达 twice as old as all of them put together.”

Now, a Pan-IIT-SPA joint initiative is heading forth to take up Varanasi: as a mega-exploratory project. The goal is to explore in full depth a four phased design recovery (cybernetics), encompassing the entire flow of Varanasi’s unique land-river interface at all levels of eco-innovation.

Varanasi Its unfathomable genesis

“Four are the oldest names of Kasi – ‘The city of eternal divine light’ emanates from the legacy of King-Sage Divodasa, whose pioneering lineage finds an exemplary mention in the Rig Veda where the City becomes a microcosm of all universal godheads (Viswadevas). From that time of remote antiquity, the line of kings which ruled Kashi and the Mauryan dynasty, an empire that ruled the Indian sub-continent from 320 BCE to 185 BCE claimed descent from Kusha, who descends from the Ramayana. The Rig Vedic Kaushitaki Brahmana Upanishad refers to a dialogue between a Gargya generation Brahmin named Balaka, and an older King named Ajatsatru, the then emperor of Kashi. The story is also mentioned in one of the most antiquate of all Upanishads, the Sukla Yajur-vedic Vrihad Aranyak Upanishad 2.1 and the place ‘Kashi’ is re-mentioned in the same Upanishad 3.8.2. Additionally, the Atharva Vedic Pranagni-hotra Upanishad bears a direct reference to Kashi in the name of ‘Varanasi’. Thousands of years, another emperor by the same name Ajatsatru, rules part of greater Kasi, who was also contemporary to Gautama the Buddha and Mahavira the Tirthankar.

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Varanasi, the holiest of the Hindu pilgrimage sites in the microcosm of Hinduism. This is very evident as soon as you enter the city. The tradition, the culture, the myths, the legends seem to creep into you unknowingly. Even for someone who has not given a thought about religion in her life before, Kashi made me question ideas. There’s something in the air, something intoxicating. Talk about the colors, the random affairs along the streets, the music, the dance, the architecture. Here is a very different side of the cities I’ve worked in. The divinity of Kashi and the quest to attain eternal oneness of the body and soul, has attracted worshippers and pilgrims to this holy land from time immemorial. Not only have they been attracted, they have been made to feel at home, that people come back again and again. Even though this was not our exact reason to approach the place, Kashi was very successful in engraving its roots deep down in our hearts and minds.

On reaching Kashi around 5 in the evening, we drove straight away to the BHU campus. BHU or Benaras Hindu University is the oldest and the largest residential campus in India. It was initially established to promote the study of the Hindu shastras and Sanskrit literature, with learning and research in arts and science. In recent times, the university’s agenda!; some artists silently sketching the haveli situated beside the ghat. We even spotted some graffiti on the walls of the old building, one particular one said ‘fearless’, a word that defined the place. Just beside Assi, we discovered this book shop called Harmony book store. A beautiful cozy store, run by two German men seemed like a quiet lovely lush green abode of the university.

The various trips to Varanasi by the IIT Kharagpur Team were just not surveys. They were living experiences of an Indian epitome – by our very youth. The days and evenings of sojourn on the ghats; the visits to an Interaction with Experts, Advisers, Head of Associations in Varanasi

Day 2

Day 2 started off at 5 am with us rowing to Rajghat. Rajghat is just beside the Varuna river which like Assi has become a very thin stream of water making its way into the huge mass of the holy waters of the Ganga. Crossing the bamboo bridge, we walked through the villages protected by the Krishna Murti bamboo fortress. The little settlements looked like a typical village with small temples, cows, bamboo bridge, we walked through the villages protected by the Krishna Murti bamboo fortress. The little settlements looked like a typical village with small temples, cows, little kids playing around, people from the city with lassies enjoying the peace before sunrise. We all got up early – all adding to the Warrants of built and unbuilt design experience.

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Interaction between IIT Kharagpur team and Experts at Varanasi

Parasaraganga ghat is primarily a bathing ghat. Many people come here over to take a holy dip. Just beside the ghat, the usual everyday life of the men here prevails. A man doing his laundry, a little kid getting his head shaved bald, a widow trying to make it up with the soft aspirations of human mind and all that has been perpetual because of many hidden reasons – and one could see that 'Green living' was Varanasi of the aeon. We were beginning to think of tours and circuits within these alleys – tap a heritage corridor and expose the craft and creative economy that are intertwined. More important than these is to revive that attitude en-masse, and high thinking'. We could spot premises and precincts where great minds had lived – from Sages to reason – and one could be an ever flowing attitude of the Indian average mind towards 'plain living and high thinking'. We were suddenly reminded of the Feluda flick, Joy Baba Felunath, where Feluda was attacked by the accomplices of the villain Maganlal Meghraj in one such sneaky lane. So basically throughout the morning we witnessed all types of people starting from the ferrymen calling out to the tourists to priests doing sacred post-funeral rituals, where the kindred of the bereaved perform "shraddh" and offer "tarpan", to body builders and wrestlers undergoing their daily exercise routines, to massage men looking out for customers, to "sadhus" just passing their idle time smoking "ganja" and so on and so forth.

On Panchaganga Ghat, we could see a balance – a balance of the quietness of a place and the smooth flowing 'ganja' in its narrow alleys and then move back high density opening to the Mother – the Ganga. After experiencing the urban archaeological structure of the ghat, in a day and night, we sometimes got skeptical to the approach that it is a beautiful place, it is a heritage place. It is a new experience where everything has changed and nothing has changed. Here hard reality co-exists with soft aspirations of human mind and all that has been perpetual because of many hidden reasons – and one could see that "Green living" in Panch Ganga is sustained. This is a Varanasi – an experiencing the ancient archaeological mounds of Rajghat, which is dead and gone, we experienced its divineness. Just beside the ghat there was this tunnel kind of place where poor old women were resting in the shades and begging for alms. I read in the books that it was a common practice in the old days to abandon Hindu widows in Varanasi as destitute, sometime with a little token pension, in old age homes to spend the rest of their living days in the refuge of God. But in many cases young widows would also not refrain from taking off to Benares, even of their own free will, to take the family property and status that came along with them.

Panchaganga also served a lovely view of the Dashashwamedh ghat going up to a Sadhu for a little prayer and then taking out her massive DSLR and taking white plastic boxes behind their backs as substitutes for floaters, the random traveller painstakingly to her abode, a swimming class going on in full swing with little kids wearing his laundry, a little kid getting his head shaved bald, a widow trying to make it up with the soft aspirations of human mind and all that has been perpetual because of many hidden reasons – and one could be an ever flowing attitude of the Indian average mind towards 'plain living and high thinking'. We were suddenly reminded of the Feluda flick, Joy Baba Felunath, where Feluda was attacked by the accomplices of the villain Maganlal Meghraj in one such sneaky lane. So basically throughout the morning we witnessed all types of people starting from the ferrymen calling out to the tourists to priests doing sacred post-funereal rituals, where the kindred of the bereaved perform "shraddh" and offer "tarpan", to body builders and wrestlers undergoing their daily exercise routines, to massage men looking out for customers, to "sadhus" just passing their idle time smoking "ganja" and so on and so forth.

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Our evening plan was to visit the famous Dashashwamedh ghat. We reached the ghat a little late and the ‘sandhyaaarti’ had already begun. It is the ghat nearest to the Kashi Vishwanath temple and remains crowded with devotees all day long and in the evening a group of priests perform the ‘sandhyaaarti’. All the front row seats (the steps of the ghat nearer to the river Ganga) were taken and we had to sit a few meters away in the middle. Five priests were performing some rituals and chanting some mantras. After some time the priests began jugglery with large lamps along with some dancing steps. Soon, a trance began to spread and at last people could concentrate on the ‘aarti’ rather than the tea vendors and the roaming cows. The large zoom lens helped, I couldn’t take very many good snaps from that distance but the magnificent view remained in my memory. The ‘aarti’ was followed by setting afloat small lamps along the river that created a magical scene.

Epilogue

The vacation was over and it was time to make the journey back to Kolkata. Though we missed out on some of the places due to dearth of time, nevertheless we were content since we came to get a hold of the pulsating character of the city and we were lucky to experience the vibrancy of the city which is still very much alive and lively even after all these thousands of years. We think and perhaps, we know, deep in our heart of hearts that we shall come back to her again and again. Increasingly, we shall experience her ‘innermost resplendent light’!

We are shaping a new green plan for Varanasi. We are planning to keep the core city intact and not change much. From the north, i.e., Greater Rajghat, we are planning to bring forward a green belt that may run through the city as her outer periphery. In response to that, we are planning to extend the agglomeration of intellectual centers in the south - (IIT BHU, Banaras Hindu University, Jnana Pravaha and many more) as an out-bound band, which may eventually flow northwards at the outer periphery - as an array of denser network of institutions seeing the flurry of activity and merging with the countryside. These thoughts are broadly outlined in the blueprint that one will find after this note. In the making of this BLUEPRINT, the contributions and support of the IIT BHU and BHU Team have been paramount. The simplicity and greatness of its Director and VC, Prof. Rajeev Sangal; that of Prof. R K Mishra and Prof. D. Singh and the whole team comprising of Swasti madam, Amrita Dwivedi, Phulkit, Nishant and many others have been indispensable to foster our humble ways and means to shape Varanasi's future. In fact, Varanasi is shaping us, our lives and thoughts, deeply and unknowingly.

Varanasi: A travelogue
A blue-print for Varanasi based on an Eco-Design approach

An Eco-Design approach

A systems methodology in Ecological Design, or in short ‘Eco-Design’ can be best forwarded if the discrete design steps and the features of an evolving design process are first worked out and then is followed by a pattern hierarchy where the various phases or levels of the design process cover iterations, flexibilities and innovations in the hierarchy are integrated based on a systems approach. Given this initial understanding, the present blue print is forwarded in three steps:

1. The evolution of relationship between user-environment in a systems approach called Cybernetics

2. The application of the approach through a case study of Varanasi: an ancient but continuous and sustainable urban habitat based on a pattern hierarchy of such relationships and interactions

3. Significance of the research and scope of further exploration in ‘Eco-Design’

Key Words:
Cybernetics of design; co-evolution; systems approach; pattern hierarchy; actions plans - groups A and B

1. The evolution of relationship in a systems approach

A Systems’ Approach (SA) is a way of understanding how things or events or both, which are located across a large space influence one another through a sequence of long stretches of interrelated events. In this sense, SA constitutes a holistic understanding of a system of which individual things and events are parts or subsystems. In SA, long stretches of events constitute timelines and timelines are often integrated with large space settings. SA therefore represents an integration of both time, i.e., spatial and temporal dimensions as ‘pattern of inter-systems’.

In the present blueprint, the Design Methodology is based on an approach called Cybernetics, which is defined as the study of control within a system, typically using combinations of feedback loops or ‘cylical’ relationships. As an evolving order –

Cybernetics is mainly addressed in four stages, the First, Second, the Third and at times, exceptionally, the Fourth. They are as follows:

1. First order Cybernetics relates to closed systems, and a common example may be that of the ‘Fahrenheit’ of an air-conditioner and a living space or that of the relationship between a ‘flywheel’ as a free-energy supplying another design system. ‘Hierarchy’ and ‘reciprocal’ are the normal design features at the initial level.

2. The second order is an expansion of the First order where the observer perspective is involved imparting some reflection of human consciousness in the evolution of the so called ‘materially designed world’. Thus ‘participation’ through ‘grouping’ or ‘Ecology of design process’ is emphasized leading to ‘interconnectedness’ or multi-co-lateral relationships. A full maturity of the third order is the Fourth order, which leads to a Whole implying a total, all-pervasive, Co-evolutional Integral, which is the subject matter of oriental thought and philosophy of meditation like Zen, for instance.

3. In third order Systems Approach in Cybernetics the two, the role of human consciousness and various systems in the material world bears phenomena of co-evolution. It is when a whole system acknowledges its surroundings in its growth and evolution leading to ‘reciprocal interconnections’ and non-linear dynamics.

A full maturity of the third order is the Fourth order, which leads to a Whole implying a total, all-pervasive, Co-evolutional Integral, which is the subject matter of oriental thought and philosophy of meditation like Zen, for instance.

1.1 Delineating a four stepped approach

Over the last few decades, there has been a growth and development of ‘Eco-Design’ approaches through innovation of knowledge based economy aiming anythngs of high order human development and environmental-ecological preservation, and the symbiosis

\begin{itemize}
  \item \textbf{Reductionist Observational Cybernetics IV:} The so called ‘materially designed world’. Thus ‘participation’ through ‘grouping’ or ‘Ecology of design process’ is emphasized leading to ‘interconnectedness’ or multi-co-lateral relationships.
  \item \textbf{Cartesian Cognitive Cybernetics IV:} A systemic approach to process and actions plans - groups A and B.
  \item \textbf{Physical Mental Cybernetics IV:} Such a state or rapture is the state of complete embedded consciousness and various systems in the material world bears phenomena of co-evolution. It is when a whole system acknowledges its surroundings in its growth and evolution leading to ‘reciprocal interconnections’ and non-linear dynamics.
  \item \textbf{Meditative Cybernetics IV:} A full maturity of the third order is the Fourth order, which leads to a Whole implying a total, all-pervasive, Co-evolutional Integral.
\end{itemize}
2. A subsequent probe into the next layer of mental or ‘ritual’ spaces that may be captured within a cybernetics approach to Eco-Design, namely: peripheries. The present study has taken such an approach to recognize the four steps of that theme. It’s belief that the best ideas have come where humans are in communion with nature, reflected through expressions of the ecological-humane exploratory labs like Varanasi. The answers to these questions the questions make the participatory dimension evolve.

2. The application of the ‘Eco-Design’ approach in a case study of Varanasi

Varanasi is one of the most ancient and continuously inhabited, and henceforth, sustainable habitat in the world. It is an Eco-Design that has evolved withstanding the continuous passage of over 4000 years of urban layout andlegislation based on higher-order ideas the environment, generally, ecologically, and spiritually.

A very important event is the coming in to City at around 550 BCE, of Siddhartha the Buddha. This event is believed to be a sacred geography. The city itself is a repository of traditional and experimental knowledge in art, crafts, literature, science and philosophy amounting to development of various creative cultures in ‘Cultural economy’ that is, including, top-making and artisans, which further have induced heritage tourism over here. Finally, the potential of the city as a tool for inclusive development has been explored, taking the case of Varanasi.

Varanasi is older than history, older than tradition, older even than legend, and looks twice as new. Given this backdrop, a four stage Eco-Design pattern hierarchy is suggested.

3. Eco-Design of the first order

Here the BLUEPRINT proposes a platform for designing land-water-urban environment integration and demonstrate environmental up-gradation through creation of city’s new ecosystem – sustainable technologies for green construction.

4. Eco-Design of the second order

Next, it proposes a further stage for augmenting a network of large Knowledge centers in the inner ring of the city from Banaras Hindu University (BHU) Campus and other Innovation Hubs pursuing a goal of deep ecological ethics to seek and lived ecological integration; the goal of this construct is to establish a model physical framework for a new eco-centric order promoting holistic development of individuals through encouragement of innovation. Such a framework has been considered as a tripartite structure dealing with deep ecological ethics, environmental up-gradation and social-economic integration. Building an on-going process, innovation needs to be encouraged as a culture. Hence, the BLUEPRINT attempts the co-evolution of ‘Eco-Design’ involving both the evolution of built physical design with the counter-existing human consciousness through participation, cognition, human security systems standards. The final goal is to unveil and integrate the built and the unbuilt – i.e., the ‘sacred geography’ of Varanasi with a ‘sacred ecology’, reflected through expressions of the ecological-humane exploratory labs like Varanasi.

4. Eco-Design of the fourth order

Finally, there is a culmination of the three orders that merge to recreate a deep ecosystem, which is a new order of reality, an ecosystem concept which is being professionalized. This construct is derived from the ancient Indian and the World’s tradition. This concept is rooted in the concept of the ‘turning the wheel of Dhamma’, based on some deeper cognition of the place, the folk and the culture. Such forms of economy is deeply rooted in the context where it originates and which is one of the rapidly growing sectors of the City expresses its sacred foundations. The beauty and depth of the Eco-Design approach is that every part of the ancient urban habitat is a derivative of the deeper. Even the layers of creative and Cultural Economy, which further have induced heritage tourism over here. Finally, the potential of the city as a tool for inclusive development has been explored, taking the case of Varanasi.
A Sandhi approach to levels of piloting and final ‘Design’ integration: Future of Varanasi

In summary: Sandhi of Future of Varanasi City Themes

Project 1 on Ganga

Project 2 on Origin, flow and destination: Heritage tourism

Project 3 on Music & Iconography | Rig Veda:::Ramayana:::Sufism | Epigraphy & archaeology (Indian Muses)

Project 4 on Heritage tourism

Project 5 on SARNATH & VINDHYAS

Origin of Buddhism & others…

Reconstruction of continuity & flow

Study of Flows ‘Water’ and capacity building of built-based ‘Bures’ in the center of Varanasi, and its spirituality and culture

Capacity building of Urban Livelihood Urban Renewal Mission project

Urban Heritage Mission on temples and people

Urban Heritage Mission on temples and people and their behavior at marketplace based on creative communities, their work places, their graphic designs, as well as social relations within and outside the community

Urban Epigraphy documentation, dissemination and cultural studies

Sacred texts and their parampara from the city of Varanasi having national as well as universal complementarities

World Heritage and Ecotourism Mission project around the twin centers of Varanasi-Sarnath

Based on Art, Cultural studies, Iconography, philosophy, history and sciences - based on related Buddhist communities of Tibet, Bhutan, SE Asian countries and Japan, Korea and China

Capacity Building and Recognition Programs and Institutional Augmentation Workshops

Based on Aryan: Buddhist, Hindu-Muhammadan, Epigraphy: notation tradition is related with Guilds, Patronage & Popular themes of Varanasi

Creation and Capacity Building of Varanasi Integrated Informatics and Analytica Labs

To promote the City Scope as a living Continuity of Indian Nuatric Traditions and Heritage

Varanasi-Specific Exploratory Initiatives

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Creation and Capacity Building of Varanasi Integrated Informatics and Analytica Labs

To promote the City Scope as a living Continuity of Indian Nuatric Traditions and Heritage
1. Diagnosing at the physical level, the land-water-air pollution mitigation and demonstrating environmental management through creation of a city-core – sustainable – 
ecological city-greenhouse – sustainable technologies for green construction. At this level, community-based 
interactions strategies based on an assembly of community-based organizations, governmental organization and private-public partnership-based associations are 
required to lead action at the grassroots self-governance in operation and 
maintenance strategy of the urban environment. It is the physical level, portraying 
the first order approach to Eco-Design.

2. Augmenting a network of large knowledge centers in the inner ring of the city from 
BHU and other Innovation Hubs; ecological ethics to deep ecological purusha. At this level, the rituals of the city dwellers – the movements and associations with the 
river and the various intellectual activities bordering on natural and organized 
religious events that reflect over a span of centuries generations have to be 
mapped and tapped. The second order cybernetics to Eco-Design, in here, 
especially, discovers the surface belief systems and rites that have been repetitive 
mapped and tapped. The second order cybernetics to Eco-Design, in here, 
ultimately, will bring out this essence.

3. Evolving a network of self-monitored sustainable green habitat system based on a 
12 suns, or the ‘Adityas’ (Sun) and they carry forward both the meanings from the 
ecological symbiosis and human activities. In effect, the BLUEPRINT has forwarded a 
three subsequent discussions to best arrive at the application of the evolution and relationship in a systems approach and the 
application of the approach has been carried out through a case study of Varanasi, an 
ancient but continuous sustainable urban habitat based on interactions between land-
water-river built interfaces and the deeper or intrinsic layers of non-built ecological- 
symbiosis and human activities. In effect, the BLUEPRINT has forwarded a 
methology, a four step cybernetic evaluation of the case study of Varanasi: involving 
between the cumulative growth and interaction between the two – the external 
environment or the macrocosm and internal human activities or the microcosm. As an 
Eco-Design, Varanasi may be seen as a living epitome of the highest representation of 
that interaction between user and environment.


8. Action plans ahead

- Action Group A: from the physical-environmental management of inner banks of AssiGhat
- Action Group B: for Creative Economic Communities and Eco-tourism circuit in AssiGhat
- Action Group C: for Creative Community regeneration in the banks of river: Boatmen, others in the river based communities (rituals; beliefs; crafts)

In summary, the BLUEPRINT has forwarded the three subsequent discussions to best 
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References


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Our Key Contributors

The movement called 'Sandhi' has become impossible without these names. They are the 'inner core' of 'Sandhi'. Ultimately, the youth of India have to take up the great responsibility of 'Sandhi' – the process of bridging modernity and tradition, from their heart, through their greater presence of mind, and finally, on their shoulders. A starting point of a list of names is a small but a definite signature of the progression:

1. Aditi Sen
2. Anirban Dasgupta
3. Ankhi Banerjee
4. Antara Chakrabarti
5. Ankita Mandal
6. Anushree Basu
7. Apala Sarkar Ghosh
8. Akshata Mohanty
9. Aritra Choudhury
10. Arpan Paul
11. Bibek Kabi
12. Biki Kundu
13. Chandrima Chatterjee
14. Debapriya Chakraborty
15. Deepanjan Saha
16. Gouri Karambelkar
17. Jaydeep Sengupta
18. Laxmi Shaw
19. Mouli Majumdar
20. Oindrilla Bose
21. Palash Nimodia
22. Pradeep Rengaswamy
23. Pratik Patra
24. Preeti Pal
25. Prerona Das
26. Prerona Mondal
27. Rashmi Mukherjee
28. Rashi Ranjan Behera
29. Roopa K. L.
30. Runa Sen Chatterjee
31. Sadhana Naskar
32. Saumya Bera
33. Saurabh Sharma
34. Sharanya Mukherjee
35. Srabani Nath
36. Subhamoy Jana
37. Sunny Bansal
38. Sweta Sen
39. Tanaya Mukherjee Sarkar
40. Tanima Chakrabarty
41. Tiyasaha Sengupta
42. Tulika Bhattacharya
43. Tushar KantiSaha