

NATIONAL INSTITUTE OF ADVANCED STUDIES

ANNUAL REPORT
2008-09

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From the Director

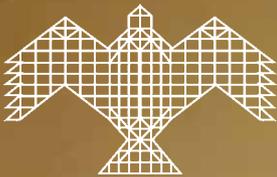
There are times in the evolution of an institution when it is necessary to step back and introspect on what has been achieved so far so that the gains can be consolidated and new goals clearly defined. The last year has been one such period for the National Institute of Advanced Studies.

The last two decades have been spent in pursuit of the vision laid out in 1985 of meeting the “need for a new type of institution which would encourage the development of responsible, thoughtful, farseeing men and women, capable of innovation as well as action.” This broad and challenging vision is undoubtedly open to diverse interpretations, but the institute has been following a path that was best described in a letter written in 1988 by Mr JRD Tata to the then Minister for Human Resource Development, Mr PV Narasimha Rao. As Mr Tata put it, “The institute will have two principal objectives. It will provide programmes for managers and officers . . . Secondly, the institute will set up small groups to conduct in-depth studies and research on specific problems of importance to the country.”

The very nature of these goals meant that the institute had to be sensitive to the socio-economic changes taking place across India. And the magnitude of these changes was not minor. This was an era when the emergence of a post-liberalization economy was matched by more assertive social tendencies leading to the necessity of coalition governments. These changes had their impact on both the specific objectives NIAS had set for itself.

The first to be affected were the programmes for managers and officers. These programmes were initially envisaged as courses that would last for many weeks. It would allow senior managers and officers to take time off from the routine and be exposed to the latest developments in a variety of diverse fields. The increasing pressures of competition in industry and the concurrent pressures on government policy meant few managers and officers had the time to spare for such long drawn out exercises. NIAS was almost immediately under pressure to cut down the duration of its courses.

The institute responded by seeking innovations that made better use of the limited time it had at its disposal. It has over the years developed a format, especially for its Senior Executives Course, which allows the participants to interact, and learn from,



leaders in a variety of fields, from government to sports. The programme also allows for the exchange of experiences between the senior executives themselves. The Senior Executives Course last year saw 45 participants interacting with invited speakers, NIAS faculty and with each other. The discussion on terrorism, for instance, was enriched by the participation of senior officers from different backgrounds including an Army Brigadier who had dealt with terrorists on the ground and a Joint Secretary of the Ministry of External Affairs.

At the same time NIAS has also sought to develop more specialized courses on topics such as Nanotechnology, Energy and Globalization. In addition there is a sustained effort to help younger minds come to terms with the nuances of methods of analysis. The institute has run successful summer schools on philosophy for students from all over the country pursuing Masters and PhD degrees.

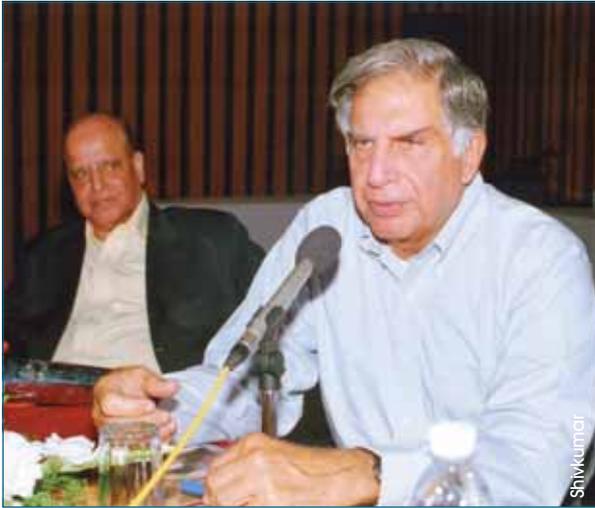
The ability of NIAS to continuously innovate on its courses is one of the consequences of the

foundation for multi-disciplinary research that has been created over the last two decades. This foundation too is the result of a willingness to learn from experience. The initial efforts to generate multidisciplinary research were focused on inviting individuals who had already distinguished themselves in their fields and had shown an inclination to pursue research involving more than one discipline. This saw a number of very distinguished senior scholars joining the faculty of NIAS, covering a very diverse set of interests. This individual-centric system did a great deal to set the standards for research in NIAS, but over time it also raised questions about the future of these activities if an individual chose other options.

At an administrative level the response to this challenge was to set up separate schools. This ensured that each activity was not completely identified with individual members of the faculty, and could continue even if that particular member was not available. At a more academic level there was recognition that several of the sciences NIAS had pursued over the



Mr Kapil Sibal, Honourable Union Minister for Science, Technology and Earth Sciences being greeted by Dr Norman Neureiter, Co-Chairman, Indo-US Science and Technology Forum at the inauguration of the China-India-US Science, Technology and Innovation Workshop at NIAS.



Mr Ratan Tata addressing the faculty of NIAS as the Director Dr K Kasturirangan looks on.

years were relevant for more than one discipline. Philosophy, mathematics and cognition all play a role in a variety of disciplines. They thus have an in-built multidisciplinary character to them. At the same time, each time they are used in a different discipline these sciences themselves get enriched. It is thus hardly surprising that philosophy has developed into a very strong field within NIAS. The Centre for Philosophy has a number of achievements to its credit, ranging from contributions to the discipline, to very successful efforts at exposing doctoral and Masters students from across the country to the philosophy of social sciences. It has carved a niche for itself at a time when centres for philosophy elsewhere in the country are being forced to close down.

Thus, by accident or by design, NIAS had developed an effective mechanism for multidisciplinary research. This research had the potential to provide fresh insights into several aspects of the Indian reality. The insights could be put to a variety of uses from advising governments to strengthening the quality of our courses.

The challenge before us today is to use what has been developed over the last two decades to address the major problems facing India today. To this end NIAS has launched a series of programmes dealing with specific issues. The oldest of them, the International Strategic and Security Studies Programme, has already established a considerable reputation in strategic circles. Two years ago a much smaller programme was started with support from the Reserve Bank of India on interdisciplinary approaches to

economic issues. A programme on cognition is set to receive support from the Department of Science and Technology. In addition, four other programmes have been launched on water, education, urban issues and conflict resolution.

In choosing the new programmes and the goals to be set for them several considerations had to be kept in mind. We had to choose areas where NIAS had already developed some expertise. The faculty members who will anchor each of these programmes have already worked on these specific areas. The tasks set out for each programme too had to be identified in a way that ensured the programme had a sharp focus, even as it did not get so narrow as to be irrelevant in addressing the wide range of challenges confronting Indian society, economy and polity. We also had to keep in mind that no matter what level of competence we manage to achieve it was unlikely to be enough to provide a comprehensive answer to some of the questions that needed to be asked. It is for this reason that the programmes were also designed to tap resources that are available outside NIAS.

The pursuit of these goals is too important a matter to be left unmonitored. We at NIAS are acutely aware of the need for a careful and consistent appraisal of our performance, both in terms of following the directions that have now been laid down, as well as the pace at which we move down those roads. The mechanisms for sustained review both within NIAS and with the help of external experts are being set in place.

This approach undoubtedly brings to the forefront the magnitude of the task that lies ahead of these programmes. If I am still confident that they will succeed it is not without reason. The programmes have the potential to harness the unique combination of skills available at NIAS to address a wide range of issues that are of great concern to India today. These skills have been recognized on several occasions. For instance, the Government of Karnataka has set up a knowledge commission to look into a variety of dimensions of the knowledge challenge facing the state. Several of us at NIAS have been given important roles in this exercise.

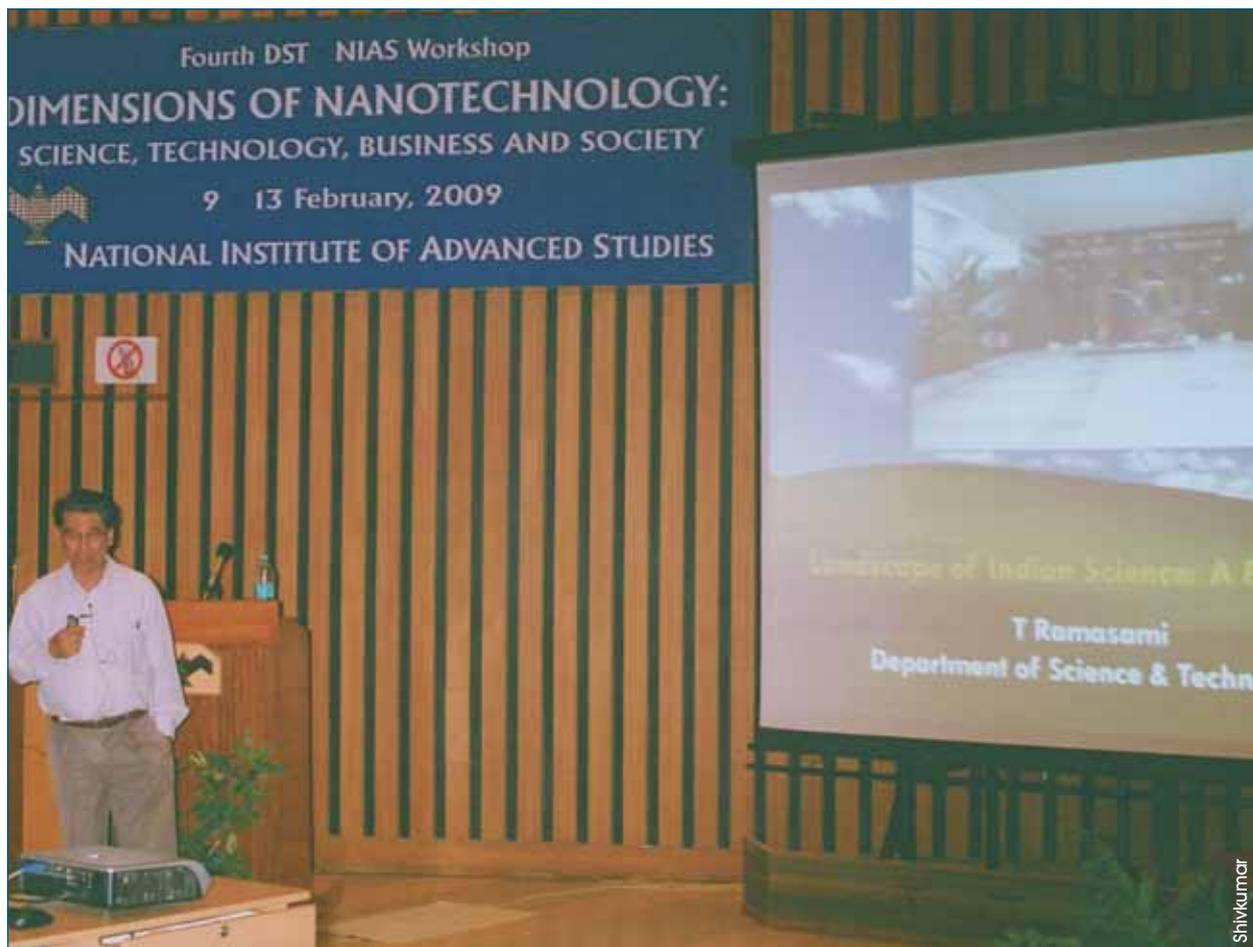
I am also confident of achieving the goals we have set for ourselves because of the support we have received from the Sir Jamsetji Tata Trust. The Trust has committed to providing Rs.17.19 crores over the

next five years. Important as the financial support itself is, I would like to believe this support goes beyond the finances to recognize the importance of the task that NIAS has set for itself.

Closely following the announcement of this support the institute had a visit from Mr Ratan Tata. Accompanied by Mr RK Krishnakumar and Mr AN Singh, Mr Tata was taken around the campus and spent time with the faculty. The visit gave us an opportunity to present the work that is being done at NIAS and spell out where the institute would like to go. A formal presentation was followed by brief statements by individual faculty members outlining their work. The exercise helped focus the spotlight on the wide range of multidisciplinary work being carried out at the institute. Mr Tata expressed interest in the work being done to understand several dimensions of terrorism, including the mind of the terrorist. The visit was also an opportunity to thank all those who have supported the goals of NIAS.

I must also place on record my deep appreciation of the support we have received from the NIAS Council of Management under the eminent leadership of Prof MS Swaminathan. Without the encouragement and guidance of the Council it would not have been possible for us to get the financial and other support we have now received.

It would not be an exaggeration to say that the National Institute of Advanced Studies is today at a critical point in its evolution into an institution that brings the best of multidisciplinary research to the challenge of building a new kind of leadership in India. As we go forward there will undoubtedly be new challenges. I am confident that no matter what the future holds for us it will not find us wanting in effort and commitment.



Dr T Ramasami, Secretary, Department of Science and Technology outlining the science and technology landscape in the country when inaugurating the DST-NIAS workshop on "Dimensions of Nano-Technology: Science, Technology, Business and Society".



School of Humanities

Prof Sundar Sarukkai, *Professor and Dean*
Prof Arindam Chakrabarti, *Professor*
Prof Sangeetha Menon, *Professor*
Prof BV Sreekantan, *Visiting Professor*
Prof S Settar, Dr S Radhakrishnan *Visiting Professor*
Prof S Ranganathan, *Homi Bhabha Visiting Professor*
Dr MG Narasimhan, *Fellow*
Dr Sharada Srinivasan, *Fellow*
Dr Rajesh Kasturirangan, *Fellow*

The School of Humanities represents an eclectic mix of work drawing upon different disciplines and different traditions. The defining character of research in this school is that the work is essentially interdisciplinary and that too not in a conventional sense of the term. Two of our faculty members have been continuing their work in archeometallurgy bringing together insights from the ‘hard’ metallurgical discipline to the ‘soft’ culture studies approach. Part of this work therefore engages with the larger discourse of art and science. The work by other members of the school also succeeded in broadening the parameters of engagement between natural science and other disciplines such as social sciences, philosophy and so on. The continued interrogation of the nature of consciousness reflected a sustained enquiry into the nature of reality at various levels – empirical (including the psychological) and the transcendental (including the logical). In such explorations, many of the faculty drew upon Indian traditions in innovative ways – this led to interesting insights in work on emotions, defining psychology in Indian traditions, cognitive science, astronomy, biology and history.

Cognition

The year saw the launch of the Cognition Programme with **Dr Rajesh Kasturirangan** as the anchor. The programme seeks to study cognition comprehensively as opposed to bits and pieces (which is the usual scientific approach), with the larger view of life on the one hand and classical problems in the social sciences and the humanities on the other. Such a view of cognition inherently calls for an interdisciplinary approach, with crucial inputs from biology, philosophy, mathematics and cognitive science. To understand cognition at its most fundamental level, we have to explore a small set of key philosophical, psychological, mathematical and biological concepts. The fundamental concepts can be fleshed out in terms of detailed mathematical models. One prominent activity of the cognition programme will be to build

and test these models. Empirical research coming from different species will provide key data on integrating models across spatio-temporal scales and species boundaries. The models of cognition developed above can be fruitfully used to understand classical problems in the social sciences and humanities, such as violence.

In addition, as coordinator of the National Cognitive Science initiative, involving researchers from universities all over India, Dr Rajesh Kasturirangan also oversaw two major proposals, one on language and the other on cognitive networks. These proposals were submitted in May 2008. The Department of Science and Technology has granted funding to the language project and is likely to grant funding to the other project in April 2009. A Bangalore group was also formed to coordinate the cognition related activities in Bangalore, involving researchers from NIAS, NIMHANS, IISc and NCBS.

Exploring the Past

The school of humanities saw several initiatives in using scientific tools to better understand history and archeology. **Prof S Settar** used some of the tools of space archeology, together with more traditional historical methods, in his work on Somnathpura. The study of the 13th century Hoysala monument was published during this year in two languages, Kannada and English. In the realm of classical texts Prof Settar made further progress in his work on the critical edition of the oldest Kannada text called Kavirajamarga (mid 9th centuryAD) He also continued to work on the Annotated Dictionary of the Kannada Language of the First Millennium AD.

Members of the school were also part of several other initiatives that celebrated the use of technology to understand the Vijayanagar kingdom, particularly its capital, Hampi. In keeping with the larger effort to make history more accessible, Prof Settar authored a script for the production of a sound-and-light documentary on Hampi.

NIAS, Friends of Hampi and Chitrakala Parishat, Bangalore arranged an Exhibition of rare and historical photographs from the Alkazi Foundation for the Arts, entitled *Vijayanagara: Splendour in Ruins*. Perhaps the first photographer to reach Vijayanagara in South India in 1855 was Alexander Greenlaw and his remarkably accomplished work is known principally through his monumental wax-paper

negatives of this great imperial Hindu city, a majority of which are housed in the Alkazi Collection of Photography, New Delhi. Greenlaw, an army officer, explored the vast site, capturing the temples, shrines, palaces and pleasure pavilions through his camera, as well as recording the dramatic landscape that surrounds the ruins of this once majestic capital. While Greenlaw's response to the architecture within its spectacular natural setting is the principal focus of this exhibition and publication, the work of subsequent photographers at the site was also explored.

Against the backdrop of this exhibition a conference looked at, among other things, scientific applications in the art history and archaeology of Hampi, ranging from the archaeometallurgy of bronzes to the acoustics of the resonant pillars and applications of satellite imagery and digital technology, alongside the intangible heritage of its performance arts.

Myths travel through time and space and acquire many dimensions in multiple versions. In writing about the classic epic Ramayana, AK Ramanujan spoke of three hundred Ramayanas. Reading the lively exchange about the early years of the Indian Institute of Science and the different perspectives on the role of Burjori Padshah, confirms the view that history can take on mythical proportions and multiple perspectives. In this study **Prof S Ranganathan** looks at the roles of JN Tata and sons, Burjori Padshah, Swami Vivekananda, Viceroy, Maharajas and Dewans in the creation of the institute. The extraordinary stamp of the scientists from England and in particular the University College London and Cambridge and the Knights of the Realm at Bangalore will be emphasized. The question of the late start of the Metallurgy Department (it ought to have been the first Department in 1909) in 1945 will be answered in collaboration with the historian Prof Kim Sibaly. It will also look at the concept and gestation of NIAS as seen through the eyes of JN Tata, B Padshah, John Matthai and JRD Tata over a century before its birth in 1988. The creative tension between Science and Humanities and the necessity for their harmonious existence will be touched upon.

This tension between the Sciences and the Humanities is being further explored from a historical viewpoint by Prof S Ranganathan and **Dr MG Narasimhan**. The use of the Periodic Table, the lives of the

renaissance men, Georgius Agricola and Cyril Stanley Smith, will be profiled.

Consciousness

The school also saw further progress in its work on the relationship between science and consciousness. **Prof BV Sreekantan** was engaged in writing a book on the theme *Oneness (unification), reality (absolute and relative) and consciousness (individual and universal)* in which he presents the current status of scientific understanding of these topics in the light of twentieth century developments in physics, astronomy and neuroscience and compares and contrasts the same with ancient and modern philosophical insights. While diverse views have been there in philosophical insights right from ancient times, they have not drastically changed with time. However, scientific views on these have been changing quite frequently because of the unfolding of newer features of fundamental parameters like space, time, mass, energy, vacuum, causation etc. through the enhanced power and capabilities of experimentation and observations.

The school also pursued discussions on emotion, its relation with brain (body) and mind, and how it influences healing and neural progress. These discussions along with spectacular discoveries of the yet unmapped neural spaces and processes have brought forth a renewed but humanistic approach to the study of emotions. One such study was initiated during **Prof Sangeetha Menon's** visit to Oxford University. Prof Menon's work on aesthetic emotions, and expressions of emotions, raises questions about the specific and universal features of emotions apart from the subjective experience of emotion. Prof Menon has also been actively involved in the follow up of the Pondicherry declaration that, among other things, called upon scholars to prepare suitable reading materials for offering courses in Indian psychology. Being the principal investigator and a member of the Editorial Board, she has developed a framework for publishing a Sourcebook of Indian psychology, with support from Indian Council of Philosophical Research. In her work on *Consciousness and Experiential Primacy*, Prof Menon has also argued that the Indic emphasis on transcendental experiences does not imply a division between the ordinary experience of life and spiritual experience.

An International Seminar entitled "Self and Self-transformation: Concept and Implications" was

inspired by the contemporary academic and medical fields and their understanding of the self and personal identity. The disciplines of consciousness studies, cognitive sciences, health-care ethics, culture and art studies, along with the wider recognition of the spiritual and therapeutic nature of Indian philosophy and psychology, have their focus on what constitutes the Self and its influence on human personality and society as a whole. The aim of the meeting was to evolve some amount of consensual information about the major challenges and solutions to this field was sponsored by Indian Council of Philosophical Research New Delhi, and jointly organised by Prof Sangeetha Menon and Prof Philip Clayton of the University of California at Claremont.

Technology

The implications of nanotechnology for Indian society are being explored from the perspectives of education, commercialization and nanotoxicology by Prof S Ranganathan, Dr MG Narasimhan and Dr RV Krishnan. A comparative study of the development of nanotechnology in the West, China, India, Brazil and South Africa has been completed

The third edition of the Roundtable on Indo-US perspectives in Science and Technology was held at NIAS on a much larger scale than the two earlier events. Nineteen delegates drawn from Organization of Naval Research, Organization of Naval Research -Global, US Army and other constituent laboratories participated in the event. The US delegation was led by Dr BB Rath of Naval Research Laboratory, Dr Robert Bolia and Dr Clayton Stewart of ONRG. Thirty six Indian delegates were drawn from NIAS, IISc, IITs, CSIR, CSTEP, ARCI, JNCASR and a few universities. The proceedings were inaugurated by Dr K Kasturirangan who recollected the long-standing cooperation that exists between the scientific institutions in the country and NRL. The various mechanisms that are available for collaboration between the laboratories in the two countries were also enumerated. It was also clarified that there was no requirement for the collaborative projects to be aimed at military applications. In the final round-up of discussions several areas were identified for collaboration and the individual scientists were expected to interact further and finalise the individual project proposals. It was also agreed that ONR-G would play a facilitating role in bringing scientists of the two countries together.

The school of humanities also contributed to the Encyclopaedia Project planned by the Kannada University, Hampi. Dr MG Narasimhan is currently the Section Editor of the Section on Women, Science and Technology in the project.

Archaeo-metallurgy

In this field the focus is on steel and bronzes. Under the UKIERI (UK-India initiative) project a mapping of the early development of iron and steel is under way, involving **Dr Sharada Srinivasan** of NIAS and Dr Gill Juleff of Exeter as Lead Researchers and with Prof Ranganathan as a core Indian team member. This study will include geomatics. Experimental archaeology to reproduce ancient wootz steel with alloying additions have been planned. The splendours of Indian bronzes will be analysed from our knowledge of modern metallurgy. In particular the image casting at Swamimalai of icons and bronze mirrors at Aranmula will be studied from the points of composition, processing and an unusual breadth in properties. Under collaboration with the Japanese a comparative study of bronze mirrors of China, Korea, Japan and India will focus on possible origins and diffusion of technologies

A four-year project on the 'Development of Indian Science and Technology through the Ages: Metallurgy and Astronomy Modules' is part of a larger collaboration with Prof Mahank Vahia of the Tata Institute of Fundamental Research to chart aspects of the development of science and technology in India in a range of subjects, including mathematics, astronomy, metallurgy and epigraphy, especially in the aspects of inter-disciplinarity. Dr Sharada Srinivasan and Prof S Ranganathan are co-investigators on this project.

During the course of a DST-SERC sponsored project numerous specimens of copper-bronze artefacts were sampled during two field trips to Dholavira, one of the five largest of Harappan cities, and explorations were made with respect to pyrometallurgical or pyrotechnical evidence include remains of furnaces and related debris and slag etc. Some preliminary results were presented earlier and more detailed results are under preparation. Some specimens are under investigation through lead isotope analysis with the co-operation of T Fenn, University of Arizona. Dr Sharada Srinivasan has also been principal investigator on a project on 'Analysis of ferrous artifacts' excavated from the site of Kadabakele,

North Karnataka by the teams of University of Michigan, University of Chicago and Karnataka State Department of Archaeology.

PANEL DISCUSSIONS/CHAIRING SESSIONS

Prof Sangeetha Menon

Participated in the panel on *World Religions and Liberalism*, International Whitehead Conference, Christ College, Bangalore, January 6, 2009.

Dr Sharada Srinivasan

Participated in the panel on *Southeast Asian and Peninsular Indian Statuary: Stylistic and Technological Comparisons*, organised in honour of Ian Glover, 12th International Southeast Asian Archaeology Conference, Leiden, Netherlands, September 3, 2008.

OUTREACH AND OTHER ACTIVITIES

Prof Malavika Kapur conducted a workshop on Child Development and Mental Health to the Staff of the Nele Institutions for Orphans and Street Children, in Bangalore. She also conducted a training workshop for INSA-India (International Services Association, Bangalore) on Child Development and Child Mental Health. She was appointed the co-convenor for the seminar on Child Development and Education to be held in September 2009 in Cambridge UK as the Indian representative of the Indian Council of Social Science Research (ICSSR) and the Economic Social Research Council (ESRC) UK.

Prof Sangeetha Menon organised the first meeting of Editors and Authors at ICPR, Delhi towards the Sourcebook of Indian Psychology. She co-edited with Prof Roddam Narasimha the volume entitled *Nature and Culture* commissioned by PHISPC, Delhi. She is contributing editor for International Society for Science and Religion, St Edmund's College, Cambridge and reviewer for the International Journal of Cross-Cultural Psychology. She coordinated NIAS Wednesday Discussion Meetings and with Dr Sharada Srinivasan, NIAS Literary, Art and Heritage Forum.

Prof S Ranganathan visited Slovenia, Brazil, UK during May to July 2008.

Prof S Balachandra Rao successfully completed the research project *A Critical Study of Indian Astronomical Tables - Sarinis, Koshtakas, Vakyas*

sponsored by INSA, New Delhi. He conducted a three-day workshop on *Calculations in Ancient Indian Astronomy*, Mumbai University & DAE, Centre for Excellence in Basic Sciences, Vidyanagari, Mumbai. He also conducted a three-day workshop on *Computation of Planetary Positions and Almanac*, National Workshop organised by Institute of Scientific Research on Vedas (I-SERVE), Hyderabad.

Prof Sundar Sarukkai was Chairman for the Fourth Asia-Pacific Conference on *Computation and Philosophy* (APCAP), NIAS. He was also Chairman (along with Dr R Ramanujam) of the international conference on *Logic and Its Applications*, Institute of Mathematical Sciences, Chennai. He coordinated the ten day Advanced Winter School on *Philosophy for the Social Sciences: Phenomenology*, ICSSR Western Regional Centre, Mumbai, Academic Writing Workshop, ICSSR Western Regional Centre, Mumbai, and Module on Philosophy of Science, IISER Mohali.

Prof S Settar conducted three workshops on behalf of the Indira Gandhi Centre for the Arts, New Delhi, on the traditional art of carving twenty-one divine images of Shiva, strictly adhering to the iconographic canons laid down in an ancient *Silpa* text called *Kasyapa Silpa*, involving five dozen traditional *silpins* across the Karnataka State. Each workshop was held for the duration of 21 days. The images are now exhibited in the IGNCA Museum on the Kengeri Road in Bangalore.

Dr Sharada Srinivasan was co-chairperson for the international conference on the Beginning of the Use of Metals and Alloys, BUMA 2009 in Bangalore. She was an invited delegate on EU ARCHAIA Training Programme and Seminar on *Geoarchaeology and Archaeological Parks* at University of Bologna, Italy. She held photographic exhibition entitled *Cosmic Dance of Siva* at Alliance Francaise Bangalore exploring art-science-dance perspectives in the study of Chola and Nataraja bronzes and this exhibition is likely to travel to Toulouse, France for their Art-Science Festival in October 2009.

Dr Sharada Srinivasan has been advising the Dharwar University and Cambridge University International Project under the initiative of Prof Ravi Korisetar and Dr Nicole Biovin on the Neolithic

site of Sanganakallu in North Karnataka on aspects of archaeotechnology such as the metal finds and acoustic archaeology in connection with the manmade percussive (singing) rocks. She has also been invited to join as a team member as an advisor on Ancient Metallurgy in the excavation of the Indo-Roman settlement of Pattinam, headed by Dr Cherian, Director, Kerala Council of Historical Research.

NEW FACULTY

Prof Arindam Chakrabarti, *Professor* (Joined NIAS on January 1, 2009)

Prof Arindam Chakrabarti did his doctoral work on contemporary Anglo-American philosophy of language at Oxford University, England. Subsequently, he has been trained in traditional scholastic Indian logic and semantics and has published books and papers in English, Sanskrit and Bengali on epistemology, metaphysics, philosophical logic, aesthetics and philosophy of mind. After teaching at Calcutta, London, Seattle, and Delhi, for the last twelve years he has been a Professor at the Department of Philosophy, University of Hawaii, USA. He has been a Visiting Fellow at Edinburgh, IAS Shimla, University College London, RS Vidyapeetha Tirupati, and Trinity College Cambridge. He joined NIAS as a Professor of Philosophy in January 2009, and is planning to spend at least one semester every year here working on different research projects in philosophy of language, theories of perception, action and emotion, and on moral psychology of revenge, jealousy, fun, boredom, disgust etc. With Prof Prahladachar, former Vice-Chancellor of Tirupati Sanskrit Vidyapeetha, Prof Arindam is engaged in a long-term project of translating and commenting upon difficult classics of Dvaita and Advaita Vedanta and Nyaya.



Participants of the 3rd Roundtable on Indo-US Perspectives in Science and Technology.

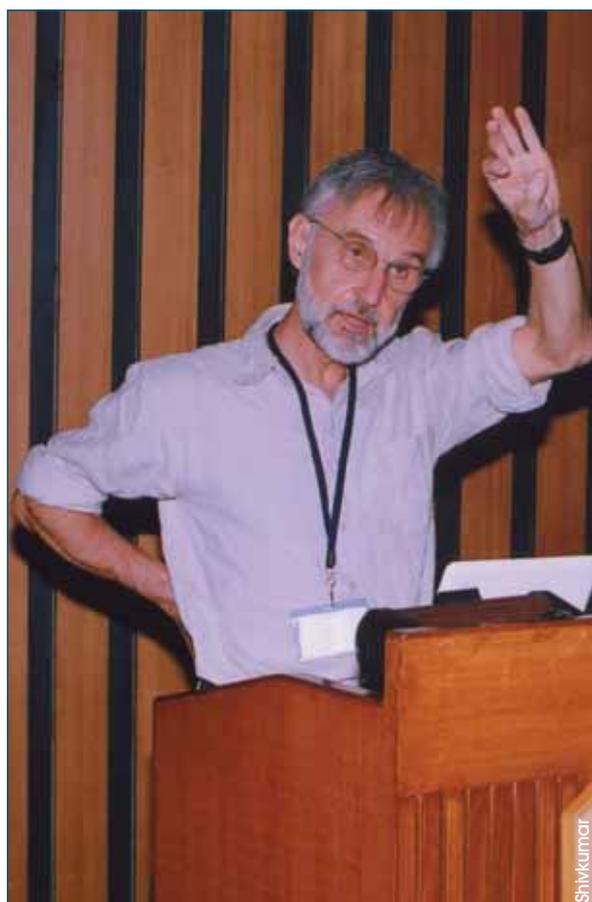
CENTRE FOR PHILOSOPHY

A major thrust of the Centre continued to be its summer schools in philosophy. A three-week summer school on *Philosophy for the Social Sciences and Humanities* was held at NIAS from June 2 to 20, 2008. This workshop for MA, M.Phil and PhD students from all over the country, organised by the Centre for Philosophy at NIAS for the third consecutive year, introduced the forty participating students to philosophy drawn from both Indian and Western traditions. With a plan to focus on philosophy education both for students in philosophy and in other disciplines, primarily in the Social Sciences and Humanities, eminent philosophers lectured on both fundamental and applied aspects of philosophy. Some important speakers included Dr Ramchandra Guha and Dr Raghuram Raju. As a part of this course, Professor Mohan Matthen, Canada Research Chair in Philosophy, Perception and Communication, University of Toronto gave two talks on perception.

Following the overwhelming response to the three summer schools, an advanced winter school was held in Mumbai from January 23 to 31, 2009 with the support of ICSSR, Western Region Centre and the Rajiv Gandhi Centre for Contemporary Studies. The theme of the course was the new and exciting field of phenomenology. The principal coordinator of the course was Prof Sundar Sarukkai. Prof Arindam Chakrabarti, Prof Sanil R and Prof Raghuramraju were some of the faculty for the course. The workshop-cum-course was an innovation in both conceptual and experiential learning. Intensive workshop sessions were followed by lectures by eminent social scientists during evening sessions. Students reported that this course transformed their style of thinking and conceptualizing problems within their own disciplines and research. Dr S Parasuraman, Director, Tata Institute of Social Sciences, Prof SK Bhoumick, Dr Xaxa were some of the eminent invited speakers.

The fourth Asia-Pacific Computing and Philosophy Conference, AP-CAP 2008, was part of the series of conferences organised by the International Association for Computing and Philosophy (IACAP) in various regions of the world. It was held at NIAS between December 5 and 7, 2008. This was the first time this conference was held in India. It was jointly organised by the Centre for Philosophy, NIAS, and

the Association for Logic in India (ALI). It was sponsored in part by Infosys Technologies Limited and Microsoft Research India. Prominent speakers included Dr Paul Humphreys (University of Virginia) and Dr Elizabeth A Buchanan (University of Wisconsin-Milwaukee). Many eminent scientists and philosophers from India and abroad discussed the all aspects of the “computational turn” that is occurring through the interaction of the disciplines of philosophy and computing during this conference. Some of the other themes covered were contemporary issues in philosophy of information and computation; computation, algorithm and mathematics; computation and algorithms in Indian mathematics and linguistics; Indian logic and its relationship with computation/computer science; and culture and information technologies.



Prof Paul Humphreys, Professor of Philosophy at the University of Virginia, delivering the keynote address at the fourth Asia-Pacific Computing and Philosophy Conference, AP-CAP 2008, held at NIAS.



School of Natural Sciences and Engineering

Prof PK Shetty, *Professor and Dean*
Prof Prabhakar G Vaidya, *Professor*
Prof Anindya Sinha, *Professor*
Prof K Ramachandra, *Visiting Professor*
Dr Sindhu Radhakrishna, *Fellow*
Dr Kshama Lakshman, *Post-doctoral Fellow*

The School of Natural Sciences and Engineering covers research in the field of engineering and mathematics, agriculture, ecology and conservation biology. Current research interests of faculty members include various aspects of signal and image processing; cryptography; number theory; mathematical modelling of complex chaotic systems; studies on agro-ecology and biosecurity; pesticide and environmental stewardship; conservation of wildlife; primate behaviour; and cognition.

Biosecurity

In an effort to further develop its earlier work the school has launched a programme on biosecurity. A comprehensive biosecurity policy for India is urgently needed to cope with bioterrorism and other biosecurity threats. With **Prof PK Shetty** as anchor, the biosecurity programme aims to bring about right practices and develop a scientific approach to biosecurity. It aims to address stewardship in implementing security options keeping in view India's socio-cultural character and also research on the lacunae in the system in order to support regulatory and policy decisions. The main objectives of the research programme fall broadly into the four subsets of biosecurity viz., biosecurity and society, biosecurity and economy, legal and regulatory aspects of biosecurity and the science of practicing biosecurity. The research projects will include creating databases on emerging infectious diseases and also those that are categorised as reportable diseases. A complete database on surveillance systems in India will also be taken up to improve response preparedness and track any attempt at bioterrorism. Other projects such as biosecurity documentations for food industries, food operations, hospitality industry, environment, agriculture and marine biosystems will be carried out.

The Environment

A study was conducted to analyse various issues associated with crop protection stewardship in India by Prof PK Shetty along with **Mr M Murugan** and **Ms KG Sreeja**. This resulted in a policy paper titled *Crop protection stewardship in India: wanted or*

Rhesus Macaque Statue in Hiranya Varna
Mahavihar, Patan, Nepal.

Dey Alexander

unwanted. Use of pesticides in India has substantially increased in recent years. It is increasingly becoming an inevitable input in intensive agriculture systems, which have mainly been fuelled by changes in cropping pattern and practice. Survey results confirmed that there has been a widespread lack of awareness on pesticides and their appropriate handling among the applicators in India. Implementation of alternate pest management strategies to reduce pesticide consumption was found to be ineffective. The study argued that pesticide policies must be effectively linked with appropriate pest management strategies in order to achieve systematic reduction in the usage of pesticides for agricultural sustainability.

Mathematical Modelling

The research in the unit spanned a wide range of topics from number theory to predicting heart attacks. Prof Vaidya and co-workers over the number of years have been developing connections between dynamical systems, (especially those showing chaos) and cryptography and coding theory. This year the work of **Mr Nithin Nagaraj**, **Prof Prabhakar G Vaidya**, **Ms PS Sajini Anand**, and others represents advances in this area on many fronts.

There is another type of cryptography. A kind that is central to mathematic modeling in any subject. This is the problem of finding equations from observed data. Prof Vaidya and **Ms Swarnali Majumder** demonstrated out that this problem leads to fundamental ambiguities and this in turn can lead to false instabilities in mathematical models. They have shown how a model can be modified in some cases to remove the instabilities. It is now well known that many cryptographic systems are based on searching and using large prime numbers. A related problem is to find the density of square free (and cube free etc., or in general k^{th} power free) numbers. **Prof K Ramachandra**, along with **Mr Kishor G Bhat**, has come up with a result that addresses this problem.

For over a hundred years, the method of singular value decomposition (also known as Factor Analysis) has been used in most areas of science. Prof Vaidya and Ms Sajini Anand have generalised this idea so that it can be used with nonlinear models. They have also (along with Mr Nithin Nagaraj) made an advance in understanding imprecise chaotic synchronization. Prof Vaidya has continued his work

on how heart cells synchronise to push blood in a coordinated way in the ventricles. His work explains why absolutely uniform heart beats are dangerous.

Ecology, Behaviour and Conservation

As in earlier years, the group of Ecology, Behaviour and Conservation continued to function both independently and in collaboration with other institutions. This work involves a number of specific projects.

The bonnet macaque, a cercopithecine primate endemic to southern India, is believed to consist of two subspecies with subtle morphological differences: the northern *Macaca radiata radiata* and the southern *Macaca radiata diluta*, restricted to southeastern peninsular India. There has been a virtual absence of any comparable study on the southern subspecies. Over the last year, Mr Subhankar Chakraborty, Mr Debapriyo Chakraborty, **Mr Mayukh Chatterjee** and **Prof Anindya Sinha** have examined the morphology, demography and life history strategies of identified individuals to confirm the biological legitimacy of the two subspecies using several alternative empirical field and laboratory approaches.

In a long-term project, begun in 2000 and proposed to continue for twenty years, Mr Mayukh Chatterjee, Dr Kakoli Mukhopadhyay and Prof Anindya Sinha are investigating the demographic structure and ecology of a population of wild bonnet macaques in the Bandipur National Park – Mudumalai Wildlife Sanctuary complex in the states of Karnataka and Tamil Nadu. During the last year, they have continued their demographic monitoring of twenty-two troops of the species and quantitative observations on the behavioural ecology of five of these groups.

Another long-term interest has been to investigate the social and mechanical cognitive abilities of wild bonnet macaques with particular reference to the cognitive mechanisms underlying specific behavioural processes including the acquisition of social knowledge and tactical deception as well as the origin, development and function of vocal communication in this species. **Dr Rajesh Kasturirangan**, Dr Michael A Huffman and Prof Anindya Sinha have continued their inter-disciplinary projects on the cognitive mechanisms underlying individual and social behaviour as well as on behavioural transmission and cultural traditions in this macaque species.

Mr Rishi Kumar and Prof Anindya Sinha have also completed a field study on the demography of pure and mixed-species troops of rhesus and bonnet macaques in the states of Andhra Pradesh and Maharashtra. Two important accomplishments of this project are: (1) Delineation of the distribution boundary of rhesus and bonnet macaques in peninsular India, and (2) studies on the behavioural ecology, demography and conservation status of the two species and their mixed troops in selected sites in Maharashtra.

In 2006 Dr Charudutt Mishra and Prof Anindya Sinha described a primate, new to science, from the Tawang and West Kameng districts of western Arunachal Pradesh – the Arunachal macaque (with the scientific name *Macaca munzala*). Over the last year, they completed a field survey on the macaques of Central Arunachal Pradesh, possibly related to the Arunachal macaque, in the districts of Upper Subansiri and West Siang.

Mr Narayan Sharma, Dr MD Madhusudan and Prof Anindya Sinha continued their research programme to investigate the demography, behavioural ecology and conservation status of a highly-endangered primate community, consisting of four macaque species – the Assamese macaque, the pigtailed macaque, the rhesus macaque and the stump-tailed macaque, together with the hoolock gibbon, the capped langur and the slow loris – in several fragments of low-lying tropical rainforests of the Brahmaputra Valley in Assam.

The lion-tailed macaque is a highly-endangered primate that is facing imminent local extinction or is on a sharp decline in many protected areas over its distributional range in the Western Ghats mountains. An important population in this regard is the newly-discovered Sirsi-Honnava population of the macaque, which might mark the northernmost point of its distribution. Over the last year, Dr HN Kumara and Prof Anindya Sinha continued their studies on the ranging and feeding ecology of this population and initiated conservation measures to protect its habitat and its last constituent groups.

A collaborative project, initiated in January 2006, has been exploring the molecular phylogeny of the *sinica* group of the genus *Macaca*, consisting of five species, in general and those of the bonnet macaque and the newly-discovered Arunachal

macaque, in particular. During the last year, Mr Debapriyo Chakraborty, Mr Subhankar Chakraborty, Dr Uma Ramakrishnan and Prof Anindya Sinha developed and identified species-specific microsatellite DNA sequences, and began an investigation of the population genetic structure of the Arunachal macaque in western and central Arunachal Pradesh, and the molecular population genetics of bonnet macaques over its entire distribution range in peninsular India. They also continued their exploration of the subspecies status of the bonnet macaque using a molecular taxonomic approach.

Another collaborative project, initiated in May 2007, has been investigating the genetic basis of social behaviour in macaques. During the last year, Mr Subhankar Chakraborty, Mr Debapriyo Chakraborty, Dr Uma Ramakrishnan and Prof Anindya Sinha studied the genetic polymorphism of the promoter region of a gene, responsible for the uptake and transport of the important neurotransmitter serotonin, in three macaque species: the behaviourally well-studied bonnet macaque, the recently-discovered Arunachal macaque and the ecologically restricted lion-tailed macaque.

Over the last year, **Dr Sindhu Radhakrishna** and Prof Anindya Sinha have continued to explore the geographical range limits of the two Indian slender loris subspecies, the Mysore slender loris and the Malabar slender loris, their population densities, and factors affecting their abundance in the Eastern and Western Ghats mountains. They also initiated a project last year to survey forested areas in Mizoram and Meghalaya in northeastern India, in order to estimate the population status of the slow loris. The results of this study will provide more information on the distribution status of the species in India and the threats affecting the long-term survival of the slow loris in the country.

The group's theoretical research on primate societies has been largely exploring non-cognitive hypotheses that aim to explain the behavioural complexity of these societies arising from general individual-based rules, as predicted by principles of self-organisation and chaos. Over the last year, Dr Sitabhra Sinha and Prof Anindya Sinha investigated appropriate agent-based models that could account for several emergent properties of bonnet macaque social networks on which they have empirical data.

The white-bellied shortwing is a threatened bird of the Western Ghats mountains. Over the last year, Mr Robin Vijayan, Dr Uma Ramakrishnan and Prof Anindya Sinha have continued their investigations into (1) the population dynamics, foraging ecology and vocal communication of populations in natural forests and along a disturbance gradient, and (2) the population genetic structure of the species along the Western Ghats and the molecular sexing of individuals.

Flying squirrels are nocturnal, arboreal small mammals, distributed largely in the fast disappearing tropics of south and southeast Asia. India has up to 11 species of flying squirrels, and two of these are distributed in the Western Ghats: the endemic and vulnerable Travancore flying squirrel and the Indian giant flying squirrel. During the last year, Ms Nandini Rajamani, Dr F Stephen Dobson and Prof Anindya Sinha continued their exploration of whether the two species are sympatric across different forest types and altitudes, and to record their natural abundance levels in such habitats.

The pygmy hog, a critically endangered species with only a single remnant population in the wild, has been successfully captive bred at the Pygmy Hog Conservation Centre in Guwahati, Assam and 16 such captive individuals were reintroduced into the wild last year. Mr Robin Abraham, Mr Goutam Narayan and Prof Anindya Sinha conducted an observational study on the behaviour of the species in captivity followed by documentation on the habitat use by individuals at the pre-release site in the Nameri National Park in Assam.

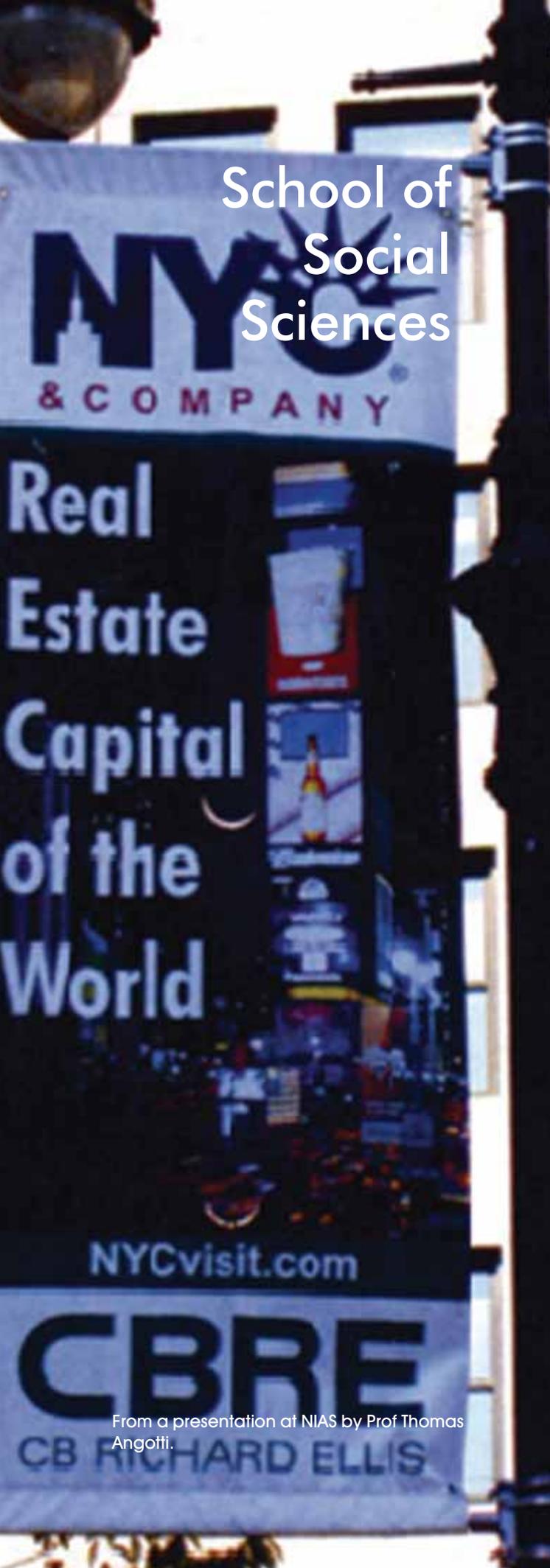
Of the nearly 40 species of flying lizards found across India and southeast Asia, the Western Ghats flying lizard *Draco dussumieri* is endemic to southern India. During the last year, Ms Dipti Hamraskar, Dr Suhel Quader and Prof Anindya Sinha conducted a study on the behaviour of the Western Ghats flying lizard across the breeding and non-breeding seasons in the Dandeli Tiger Reserve in Karnataka. They examined its mating system and spacing patterns, and also conducted some preliminary observations on microhabitat use by the species.

Prof PK Shetty has been appointed as Member of Technical Committee for the implementation of Solid Waste Management Programme in Karnataka, Directorate of Municipal Administration, Government of Karnataka. He has also been appointed as Member of Advisory Board of Eminent Experts for assisting POWERGRID in the Research and Development and also a member of ESPP Review Committee of Eminent Experts, PGCIL, Government of India.

Prof Anindya Sinha was nominated Adjunct Teaching Faculty, National Centre for Biological Sciences, Bangalore, January 2009 to December 2012. He guided a dissertation entitled *Ecology and Behaviour of Captive-bred Pygmy Hogs Prior to Reintroduction into the Wild* by Robin Abraham, submitted in partial fulfilment for a Master's degree in Wildlife Biology and Conservation at the Post-Graduate Program in Wildlife Biology and Conservation, Bangalore, under the aegis of the Manipal Academy of Higher Education, Manipal. He also guided a dissertation entitled *Ecology and Behaviour of the Western Ghats Flying Lizard Draco dussumieri* by Dipti Hamraskar, submitted in partial fulfilment for a Master's degree in Wildlife Biology and Conservation at the Post-Graduate Program in Wildlife Biology and Conservation, Bangalore, under the aegis of the Manipal Academy of Higher Education, Manipal. He coordinated and taught a two-credit course, consisting of lectures, seminars, and project assignments, on *Philosophy of Science* for Master's degree students of the Post-Graduate Program in Wildlife Biology and Conservation, Bangalore.

Prof Prabhakar G Vaidya gave invited lectures in the area of education at Purdue University and Virginia Polytechnique and State University on making Math easy. He carried out workshops with biomedical groups to teach them Dynamical Systems and Differential Equations without assuming knowledge of calculus.





School of Social Sciences

Prof Narendar Pani, *Professor and Dean*
Prof Dilip R Ahuja, *Professor*
Prof AR Vasavi, *Professor*
Prof N Shantha Mohan, *Professor*
Dr SS Meenakshisundaram, *Visiting Professor*
Dr Malati Das, *Visiting Professor*
Dr BK Anitha, *Fellow*
Dr Carol Upadhya, *Fellow*

The School of Social Sciences researches problems facing India's economy, society and polity and disseminates these results to the bureaucracy, industry and civil society. During the year the school took several concrete steps in a number of areas including urban issues, water, education, energy and conflict resolution.

Urban Issues

The foundations were laid for the Urban Research and Policy Programme with **Prof Dilip R Ahuja and Dr Carol Upadhya** as its anchors. The programme addresses a pressing need for a creative initiative that will foster innovative thinking on cities and the urban crisis, and that could push policy makers, administrators and researchers beyond the routine responses and technical solutions offered by conventional urban planning and policies. The programme began by plunging directly into the debate on the governance of Bangalore. The Karnataka government had set up an Expert Committee to look into the governance of Bangalore under Dr K Kasturirangan. The report generated a variety of reactions. The Urban Research and Policy Programme brought these reactions into focus by organising a Round Table Discussion on the 'Report of the Expert Committee on Governance in the Bangalore Metropolitan Region and Bruhat Bangalore Mahanagara Palike', June 26, 2008. The programme also organised a workshop on 'Alternative Urban Futures for Bangalore'.

Urban issues were also the focus of the activities of the Reserve Bank of India programme on interdisciplinary approaches to economic issues. There was further progress on the project to look at the impact of globalization on Indian cities through the lens of Bangalore's garment industry being undertaken by **Prof Narendar Pani**. Through an in-depth study of the garment industry the project hopes to throw light on a variety of urban issues ranging from transportation to labour standards.

From a presentation at NIAS by Prof Thomas Angoffi.

Another initiative addressed the issue of Bangalore's relationship with its history. It argued that the facts chosen to represent the city's history are overwhelmingly influenced by present-day concerns. Indeed, on controversial figures like Tipu Sultan historical statements often tell us more about the historian than about history. Prof Narendar Pani, **Dr Sindhu Radhakrishna** and **Mr Kishor G Bhat** made an effort, based on some less explored philosophical traditions, to begin the exercise of developing a history based on the imaginations of those who made it happen. A book-length manuscript was produced presenting, in their context, documents that represented changes in Bangalore's history.

The need to go beyond metropolitan centres and understand smaller towns was also recognised. Dr Carol Upadhaya organised a proposal development workshop for a collaborative research programme (with Prof Mario Rutten, University of Amsterdam) on 'Provincial Globalisation: The Impact of Reverse Transnational Flows in India's Regional Towns', under WOTRO Integrated Programme (Netherlands).

Education

Towards the end of the year the Education Programme was launched with **Prof AR Vasavi** and **Dr BK Anitha** as anchors. The programme aims to initiate key activities in the realm of educational policies, curricular networks, open courseware, undergraduate/post graduate fellowships, teacher fellowships and collaborations with institutions actively engaged in the field of education. Alongside, it will adopt an approach of undertaking in-depth research in key areas at all levels of education to gain a comprehensive understanding of the educational problems in the country and seek to initiate changes in it.

The year also saw the *District Quality Education Project* adapting to its changed character. The project had been set up and incubated by NIAS before becoming autonomous in February 2008. Prof AR Vasavi, who was in charge of the project when it was under NIAS, assisted in developing the new team, including help it strengthen contacts and linkages to the education department, funding agencies and resource persons. She also facilitated the development of new programmes, strengthening and broadbasing of earlier programmes and activities, finalizing all the materials for placement on the web as an archive

of the project, and the compilation and translation of essays on DQEP.

Significant progress was also made in the project on *Trained Scientific Women Power: How Much are We Losing and Why?* with the Indian Academy of Sciences, Bangalore, with Dr BK Anita as the Co-principal Investigator and Ms Maithreyi R as the Research Associate. The total registration of women scientists with a Ph.D. in science, engineering and medicine was 1823. Men scientists too have been invited to be a part of the study. While registering women scientists an effort has been made to cover poorly represented areas such as the North East as well as under represented categories such as *Not Employed* and *Not in Science*.

This year, the Emerging Directions in Global Education (EDGE forum) initiated the research project on *Institutional Studies of Best Practices of Higher Education in India* covering both public as well as private higher educational institutions. As Co-organizing Secretary of EDGE, Dr BK Anitha was also part of the organising committee for the second edition of the International EDGE Conference. The conference attracted over 50 speakers from India and abroad and was attended by over 300 delegates who were mainly educators, administrators: vice chancellors, principals, directors, registrars, management professionals, representatives from industry and the corporate world, publishers/content developers, educational administrators, policy makers and representatives of international education missions. Dr Anitha was also involved in the efforts of the Indira Gandhi National Open University (IGNOU) to launch a globally acceptable knowledge module series in higher education management (HEM) for educational leaders, vice chancellors, registrars, college principals, deans and heads of departments, to professionalise the management of their administrative responsibilities. In December 2008 a project was launched by Dr BK Anitha and Ms Hamsa Kalyani on *Trends in Higher Education: Creation and Analysis of Database of PhDs in the Country*. This project is carried out in collaboration with INFLIBNET, Ahmedabad and is supported by Tata Consultancy Services.

Water

The year also saw the consolidation of the work on water with the launch of a specific programme with **Prof N Shantha Mohan** as anchor. The primary

objectives of the water programme include generating a data and information base that can be analysed using a multidisciplinary conceptual framework; providing platforms for sharing the results of research and to facilitate multi stakeholder dialogues to influence policy; and strengthening networks to facilitate partnerships from the local to the global, i.e. Zonal Water Partnerships, Country Water Partnerships and Global Water Partnerships in research, dialogue and advocacy activities.

A research project was initiated on *River Basin Water Sharing and Integrated Water Resource Management in India*. The main objectives of the project are to develop a comprehensive toolbox which responds to the country's needs in relation to inter-state water sharing and conflict resolution by generating data and information, case studies on best practices to resolve conflicts and disseminating the same for debate. The development of the toolbox is an evolving process which adopts a multidisciplinary and a participatory process involving stakeholders representing six river basins in the country.

Two national level consultations were held supported by Global Water Partnership and Global Water Partnership- South Asia. A national level multi-stakeholder consultation was held to identify the gaps in the information with regard to trans-boundary water sharing, arrive at a format and develop a set of comprehensive templates to generate data that could be used for resolving conflicts between states sharing water. Another two-day multi stakeholder national workshop was held to review and compile the data and material collected from the six inter-state rivers across the country, document the best practices in resolving conflict between states, and facilitate experience sharing. The participants in both consultations included academics from the social and natural sciences, researchers, policy makers, representatives from the government, civil society organizations and the end users.

Energy

A report was prepared for TWAS – the academy of sciences for the developing world – by Prof Dilip Ahuja on *Sustainable Energy for Developing Countries*. The report argued that historically, humanity's use of energy has been marked by four broad trends: (1) rising consumption and a transition from traditional sources of energy (e.g. wood, dung, agricultural residues) to commercial forms of energy

(electricity, fossil fuels); (2) steady improvement in the power and efficiency of energy technologies; (3) a tendency (at least for most of the 20th century) toward fuel diversification and de-carbonization, especially for electricity production; and (4) improved pollution control and lower emissions. These trends have largely been positive – the problem is that the rate of technology improvement has not been sufficient to keep pace with the negative consequences of rapid demand growth. The task, then, is not so much to change course as it is to accelerate progress, especially toward increased energy efficiency and lower-carbon energy sources. To the extent that sustainable energy policies promote the development of indigenous renewable-energy industries they will have the added benefit of creating new economic opportunities, reducing countries' exposure to volatile world energy markets, and conserving resources for internal investment by reducing outlays for imported fuel.

As a means for introducing experts from China, India and the US to the science, technology, and innovation policies of the other two countries, a Workshop on Science, Technology and Innovation Policy was held with Prof Dilip Ahuja as a Co-chair. Shri Kapil Sibal, Union Minister for Science, Technology and Earth Sciences inaugurated the Workshop and Dr Samir K Brahmachari, made the valedictory address. Professor CNR Rao and Dr R Chidambaram made keynote addresses during the Workshop. The proceedings of the workshop are being disseminated globally.

Rural Society

The school has also continued developing its understanding of rural India. Prof AR Vasavi undertook a ten-day re-visit study in January 2009 of a village in Bijapur which she had started studying in 1989 and which formed the basis of her book, *Harbingers of Rain: Land and Life in Bijapur*. She conducted focused group discussions, informal interviews and visited some agricultural sites.

At a broader level that includes rural society, Prof Vasavi has also been involved with a group of independent scholars and civil society members in developing 'indicators' to continuously assess the functioning of the state government. She has also continued to provide support to four organizations as a trustee/advisor: SAMAVESH (Madhya Pradesh);

Centre for Excellence (Kerala), and Green Foundation (Bangalore) and Deenabhandu Children's Home (Chamrajnagar).

A chapter on *Panchayats and District Planning* was written by **Prof SS Meenakshisundaram** in the *State of the Panchayats Report 2007-08: An Independent Assessment* published by IRMA, Anand on behalf of the Ministry of Panchayatiraj (MoPR), Government of India. He prepared modules on *Institutions for Rural Development* and *New Initiatives in Panchayatiraj* for the IGNOU-MOPR-UNDP distance learning project on *Capacity Building of Panchayatiraj Representatives through Multi-mode Training Interventions*. He is currently involved in preparing a paper on *Structures for Decentralised Governance and their Implications on Centre-State Relations* for the Commission on Centre-State Relations, set up by the Government of India and also in completing a study for the Public Affairs Centre, Bangalore on the role of Civil Society Organizations in the implementation of Rural Development programmes in India. Prof Meenakshisundaram led the outcome evaluation team for UNDP's Governance and Livelihood programmes implemented during 2003-07 and also reviewed the Country Programme Action Plan under UNDP's Democratic Governance Programme for 2008-12. He was Advisor to WaterAir India and finalised the study of the Total Sanitation Campaign in Five States of India.

Conflict Resolution

The Conflict Resolution Programme, with Prof Narendar Pani as anchor, aims to develop an inclusive knowledge base that would help effectively address the major conflicts that affect India or have the potential to do so. The conflicts that are addressed could be at any level from the local to the national, regional and global. They could also be of varying degrees of intensity, ranging from a full blown crisis to a potential problem. The programme will study individual conflicts in depth with the twin purpose of identifying elements that can be used to resolve them, as well as to further develop the overall understanding of conflicts and their resolution. In the process it would also link up with individuals and institutions to generate information and analytical tools to understand conflict. It would also use a variety of tools, including short-term courses, workshops with bureaucrats, institutional networks etc., to disseminate the results of the work done.

PANEL DISCUSSIONS/CHAIRING SESSIONS

Prof Dilip R Ahuja

Presented a paper on *Why is Climate Change a Difficult Problem to Address Internationally?* in the panel discussion on Climate Change: Ethical and Scientific Concerns, Jaipur, November 19, 2008.

Presented a paper on *Climate Change and Stratospheric Ozone Depletion: A Comparison of International Responses* in the panel discussion on Climate Change: An Indian Perspective, IISc Centenary Conference, IISc, Bangalore, December 15, 2008.

Dr BK Anitha

Chaired a session on Contemporary Research Initiatives: Four Research Reports brought out by EDGE Conference 2009 on February 11, 2009.

Prof N Shantha Mohan

Participated in the panel discussion on Great Rivers of the Himalayas organised by GWP-SAS and the World Bank, New Delhi, April 30, 2008.

Outreach and Other Activities

Prof Dilip R Ahuja organised NIAS Vicennial Celebration on June 20, 2008. He coordinated the Climate Change, Energy and Sustainable Development, Training Programme organised for the Swiss Development Corporation at NIAS. He also organised Bangalore Forum on Climate Change: Talk by Mr Shyam Saran followed by Discussion. Prof Ahuja, as Chairperson of the NIAS Course Cell, drafted Course Cell Manual and Recommendations for the conduct of future NIAS post-employment Training Programmes. He has peer reviewed papers for *Energy Policy* (May 2008) and *Current Science* (October 2008), reviewed chapter on Meeting the Demand for Energy in South Asia to appear in *Global Change and Sustainable Development: Asia-Pacific Perspectives*, Low, Pak Sum (Editor) Cambridge University Press.

Prof Ahuja provided consultancy for the Academic Review Panel for McKinsey and Company project on Developing a Greenhouse Gas Abatement Cost Curve for India, (Attended Meetings in Bombay). He is advising the Scientific and Technical Advisory Panel of the Global Environment Facility on their Strategic Priorities for Climate Change during the

fifth replenishment cycle 2010-2013. Prof Ahuja was a Member of the Shell Foundation Advisory Board Meeting and Indira Gandhi National Open University Board of the School of Interdisciplinary and Trans-disciplinary Studies. He was also Member of the State of Karnataka Climate Change Advisory Council (May 2008).

Dr BK Anitha was special invitee, Karnataka Knowledge Commission constituted by the Karnataka State Government under the Chairmanship of Dr K Kasturirangan. She was Member of the Working Group on Literacy and School Education constituted by the Karnataka Knowledge Commission, Government of Karnataka.

Prof SS Meenakshisundaram continues to be the Executive Vice-Chairman of MYRADA, a voluntary organization specializing in building poor-peoples' organizations for development in South India. He is also Chairman of MYKAPS, an offshoot of MYRADA concentrating in the districts of southern Karnataka as well as a Member of the Research Programmes Committee of ISEC, Bangalore.

Prof N Shantha Mohan was elected as the Joint Secretary of the Governing Board of India Water Partnership, the country organisation of the Global

Water Partnership, New Delhi. She was nominated as an advisory member of the National Resource Group of Mahila Samakhya, MHRD, Government of India.

Prof Narendar Pani is Member of the Board of Governors of Institute for Social and Economic Change, Bangalore. He is also Member of the Governing Body of MYRADA, Bangalore.

Dr Carol Upadhya was Senior Resource Person for the Cultural Studies Workshop organised by Centre for Studies in Social Sciences, Calcutta and held at Northeast Hill University, Shillong.

Prof AR Vasavi along with Mr Rahul Mukhopadhyay has written an article, Learning Loss and the Education Bureaucracy - that appeared in India Together (online journal), August 2008. Her article Public Concern and Private Growth, (A review of the Karnataka Vision Document, has appeared in Deccan Herald, February 18, 2009. She is on advisory committees of four students at NIAS and field supervisor for three international students. She is also on the Board of International Advisors, Journal of Peasant Studies UK and Editorial Advisory Group, Studies in Humanities and Social Sciences, IIAS, Shimla.



PROF CV SUNDARAM



Prof CV Sundaram passed away on August 15, 2008 at Chennai. He came to NIAS after his retirement from Indira Gandhi Centre for Atomic Research, Kalpakkam. In the eleven years he was at NIAS after 1991, he was a great influence, especially to the younger faculty at that time. Although a metallurgist, he was very interested in the history of science and technology. This discipline and the area of science and society were

his main interests while he was at NIAS. One of the important contributions he made was to increase the awareness towards ancient Indian contribution to technology. Over the years, his interest in the history of science moved from ancient Indian contributions to the history of Indian science organizations. This led him to write an account of the atomic energy programme which was published later as a book. One of the endearing traits of Prof Sundaram was his great interest to learn new ideas from other disciplines and other faculty in the institute, however young they were. He thus played an important part in establishing the multi-disciplinary nature of the institute in its formative years.

Prof S Chandrashekar, *JRD Tata Visiting Professor*
Prof Rajaram Nagappa, *Visiting Professor*
Prof N Ramani, *Visiting Professor*
Dr Lalitha Sundaresan, *Visiting Professor*
Dr Srinath Raghavan, *Associate Fellow*

The International Strategic and Security Studies Programme continued to maintain its focus on China, Pakistan and the United States with a science and technology bias during the reporting period. Most of the work carried out was oriented towards meeting the first year objectives of the sponsored study on 'Science and Technology Dimensions of National Security'. As a part of this study, Chinese capabilities in select sectors of science and technology, the safety and vulnerabilities of Pakistan's nuclear assets, implementation aspects of the Indo-US civil nuclear deal and space security issues have been taken up by the members of the Group. The recent launch by Iran of the Omid satellite has in addition prompted a study on the Iranian space and missile capabilities. The major highlights of the activities of the programme are provided in the following sections.

Study of Sensitive Locations Using Satellite Imagery

The aim of this study is to identify and monitor sensitive installations using publicly available civilian space imagery like that provided by Google Earth. Through study of known sites, signatures specific to particular operations can be developed. These could then be extended to other locations. Nuclear reactors, nuclear weapons storage and test sites, missile manufacturing, test and deployment sites have been areas of investigation under this programme. Nuclear test site locations in Pakistan and China have been identified. They have been compared with nuclear weapon test sites in the US in order to establish similarities and differences. A detailed study of the Magna site which makes solid rocket motors in the US was carried out. Work is in progress to apply the markers gleaned from this to possible propellant and solid rocket motor manufacturing locations in other areas of interest. Typical Google earth imagery pictures are shown in figure 1. The functional requirements of a nuclear weapon storage site have been worked out and efforts at identifying locations fitting the functional criteria are underway.

Ra'ad Air Launched Cruise Missile carriage on Pakistan Air Force Mirage Aircraft from a presentation by Prof Rajaram Nagappa.



International Strategic and Security Studies Programme



Figure 1: Google Earth Imagery.

Terrorism

As a part of the continuing interest in terrorism, a panel discussion was held on February 27, 2009 on the topic India – Pakistan – US relations in the context of Terrorism in the subcontinent. The panellists were Maj Gen Dipankar Banerjee, Prof PR Chari and Dr Suba Chandran of the Institute of Peace and Conflict Studies, Delhi. The panel was chaired by Prof KP Vijayalakshmi, Professor, Jawaharlal Nehru University, Delhi.

Update on Shaheen II

Pakistan launched two Shaheen II missiles—one on April 19 and the other on April 21, 2008. Image analysis of these yielded dimensions different from the earlier launches. This prompted the programme to carry out a detailed calibration exercise to assess the measurement error. A process and an algorithm have been developed to quantify the measurement error for various images. These procedures and algorithm were applied to the various Shaheen II images.

Missile Trajectory Computation

The currently available Excel spread sheet based trajectory computation model is being modified to build in more flexibility. A new formulation based on 2-D gravity turn equations of motion with state variables of range, altitude, velocity, flight path angle and instantaneous mass is being readied. This will be used to re-compute all our earlier estimates of range and performance.

Nuclear Weapons Storage

The functional requirements of a nuclear weapon storage sites have been worked out. Assessment of security layers, number of personnel, movement requirements under ‘normal’ and ‘alert’ conditions, transportation, assembly and checkout operations have been studied. Scenarios for different vulnerability conditions have been worked out.

As part of this exercise on vulnerability of nuclear weapon sites, the US Permissive Action Links (PALS) associated with securing the nuclear device has been studied. Nuclear weapon programmes in other countries may not have adopted such an approach for securing their devices and may have adopted a simpler ‘enable/disable’ device. The study suggests the use of Public Key Cryptography and Digital signatures for secure transmission of information and enabling codes on an open network as a possible implementation strategy for nuclear weapons.

Pakistan Air Launched Cruise Missile

Images of the Pakistani Air Launched Missile Ra’ad have been examined to derive its dimensions and layout. Based on these the range of the missile has been estimated. It is clear that Pakistan uses two different cruise missile systems for its ground and air launched versions. The assessment concludes that Pakistan is in a position to fabricate the airframe, while it may still be dependent on foreign sources for the procurement of the engine. The capability to deploy an air launched cruise missile adds depth to the Pakistani capability in terms of increased range and ability to deploy a missile from a safe stand-off distance.

China’s Aviation Capability

As part of the S&T dimensions study, a detailed study of the Chinese aeronautical industry has been undertaken. Preliminary data collection has been completed and a chronology of developments has also been worked out. The early Russian pedigree of Chinese fighter aircraft, Chinese reverse engineering efforts and quality problems, China’s sales of aircraft to other countries and the successful realization of the fourth generation JL-10 aircraft are some aspects that have been covered so far. The study also examines the aggressive off-setting policy associated with the procurement of civil aircraft and how this has helped technology advances in China.

Iran’s Satellite Launch

Iran successfully orbited its Omid satellite on-board the Safir 1 launch vehicle on February 02, 2009. A detailed assessment of the launch vehicle has been prepared for release. The study traces the Scud missile connections to the Shahab 3 missile of Iran from which the first stage of the launch vehicle is derived. It also provides visual evidence of the links between the Iranian, North Korean and Pakistani missile programmes. The advances made by Iran in adapting

the technology for a twin-engine second stage configuration is also brought out. The need of a third stage based on velocity requirements to achieve orbit have been established. Possible candidate systems for this third stage have been identified and their pros and cons discussed. The implications of the satellite launch capability for Iran's missile programme and its likely range are also addressed.

Space Security

The International Strategic and Security Studies Programme contributed to the Indian Pugwash Society's draft working group report on Space Security – Need for a Proactive Approach. Subsequently a round table was organised at NIAS on December 27, 2008 to discuss the report.

CISAC-NIAS Dialogue

The track two dialogue between the Committee on International Security and Arms Control (CISAC) of the National Academy of Sciences, USA and NIAS—8th in the series was held in Washington DC during October 6 to 8, 2008. Dr K Kasturirangan, Director NIAS led the Indian delegation.

On October 6, the Indian delegation made a presentation to the American Association for Advancement of Science on the Indian Space Programme, the Indian Nuclear Programme and the implications of the UN Security Council Resolution (UNSCR) 1540—role for scientists and technologists. The delegation also met with some congressional staffers, officials of the US Department of Energy and attended a talk on 'Reducing Global Nuclear Threat' by William Perry former US Defence Secretary at the University of Maryland.

The topics presented and discussed in the dialogue included the status of the Indo-US Civil Nuclear Deal;



Prof Raymond Jeanloz, Chair, CISAC and Dr K Kasturirangan, Director, NIAS at the Eighth CISAC-NIAS Dialogue Meeting.

new dimensions of space security; internationalization of the nuclear fuel cycle; obstacles to implementing UNSCR 1540; and the future of Global Cooperative Threat Reduction Efforts and G8 Global Partnership.

PANEL DISCUSSIONS/CHAIRING SESSIONS

Prof Rajaram Nagappa chaired panel discussion on *Road Map for Advancing Solid Propellants and Energetic Materials*, Workshop on Advances in Processing of Solid Propellant Rocket Motors, DRDO Golden Jubilee Celebrations, Pune on October 23, 2008. He also chaired panel discussion on *Missile Propulsion Technologies in the Near Future*, Workshop on Missile Propulsion Technologies, DRDO Golden Jubilee Celebrations, Hyderabad on October 30, 2008.

OUTREACH AND OTHER ACTIVITIES

Prof S Chandrashekar submitted draft paper to the MIT Science Technology and Society Programme, entitled *The Emerging World Space Order and Its Implications for India's Security*. The paper was an invited paper arising from attending an earlier conference on Security and Cooperation in South Asia – A Global Perspective organised by MIT in Berlin in 2007.

Prof N Ramani served as Member, Project Review and Steering Group of CERT / MCIT project at Jadavpur University and member, Project Review and Steering Group of CERT / MCIT project at Gorakhpur University. He also served as a member of the team that reviewed a proposal for a National ASTROSAT Science Facility at IUCAA, Pune.

NEW FACULTY

Dr Lalitha Sundaresan, *Visiting Professor* (Joined NIAS on May 14, 2008)

Dr Lalitha Sundaresan has a doctorate from the Indian Statistical Institute, Kolkata where her work was on digital processing of multi-satellite data. She was a scientist at the Indian Space Research Organization where she carried out studies to evaluate the usefulness of satellite remote sensing for monitoring natural resources, and natural disasters with special reference to India. She worked as a Principal Scientific Officer at the Department of Science and Technology, India where she was involved with the setting up of Natural Resources Data Base Centers in the districts of Karnataka.

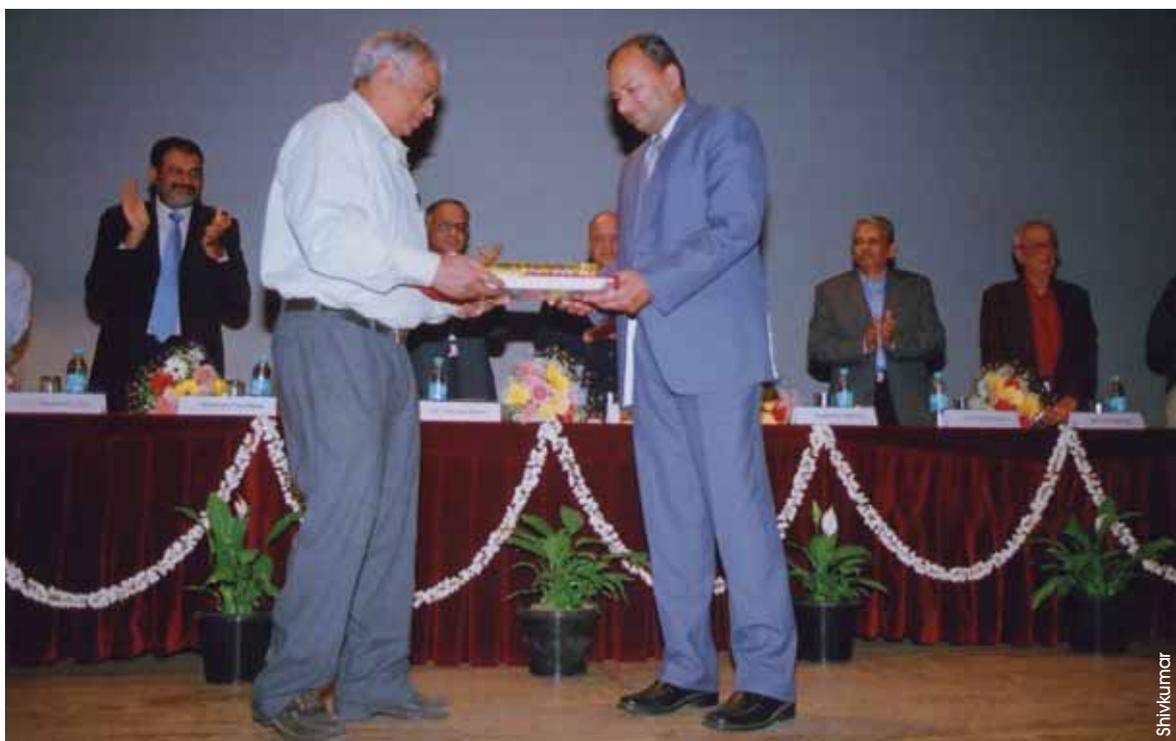
Dr Srinath Raghavan, *Associate Fellow* (Joined NIAS on July 29, 2008)

Dr Srinath Raghavan's research interests are in the international diplomatic history of post-colonial South Asia, Indian military history, strategic theory and civil-military relations. He has recently

completed a book manuscript on foreign policy crises during the Nehru years. He is now writing an international history of the 1971 India-Pakistan war and the creation of Bangladesh. He is also working on a conceptual project on strategies of coercion.



INFOSYS PRIZE FOR MATHEMATICS



The Infosys Prize for Mathematics 2008 being presented to Dr Manindra Agrawal of IIT Kanpur, for his work on complexity theory, by Prof SR Srinivasa Varadhan. NIAS played an active role in setting the norms for the award and constituting the distinguished jury. Prof Srinivasa Varadhan who headed the jury is the winner of the Abel Prize in 2007 and Professor at Courant Institute of Mathematical Sciences and Department of Mathematics, New York University. Other members of the jury were Prof George C Papanicolaou, winner of the SIAM von Neumann Prize 2006 and Robert Grimett Professor of Mathematics, Department of Mathematics, Stanford University; Prof Peter Clive Sarnak, winner of the Polya Prize of Society of Industrial and Applied Mathematics in 1998, the Ostrowski Prize in 2001, the Levi L Conant Prize in 2003 and the

Frank Nelson Cole Prize in Number Theory in 2005, and Eugene Higgins Professor of Mathematics at Princeton University; Prof Alain Bensoussan, winner of the Legion d'Honneur (Officer) 2003 and Research Professor of Operations Management and Director of the International Center for Decision and Risk Analysis, University of Texas at Dallas; Prof Shigefumi Mori, winner of the Fields Medal in 1990 and AMS Cole Prize for Algebra in 1990 and Professor at the Research Institute for Mathematical Sciences, Kyoto University, Japan; Prof MS Narasimhan, co-winner of the king Faisal International Prize in 2006 and Professor of Mathematics at the Tata Institute of Fundamental Research in Mumbai and Head of the Mathematics Section at ICTP, Trieste.

Courses at NIAS have been a constant learning experience not just for the participants but also for the institute. They have had to be continuously transformed in order to adapt to the rapidly changing economic and work environment. In the process the courses have evolved to develop some unique features. The long duration of the courses in earlier years was based on the recognition of the need for extensive interaction not only between the participants and the speakers but also among the participants themselves. Even as the duration of the courses have been substantially reduced over the years, keeping in mind the pressures on the time of the participants, NIAS has worked hard to retain this essentially interactive character. Participants are provided opportunities to interact with eminent personalities and the course is structured in a way that they also get formal as well as informal opportunities to exchange ideas among themselves. Over the years NIAS has taken the method of its courses from its original focus on senior executives, to more specialised areas. The last year saw a continuation of this process.

Senior Executives Course

This is the flagship course of the National Institute of Advanced Studies. The 23rd edition of this course for senior executives, on *Excellence in Leadership*, was organised between January 19 and 24, 2009. Inaugurated by Mr Mohandas Pai, Director [HR & ER], Infosys Technologies Limited, the course saw the number of nominations far exceeding the forty-five participants, including two women, who could be accommodated. The participants were from government, various public and private sector companies, research institutions and armed forces. The seniority of the participants and their diverse backgrounds provided for an extremely interesting exchange of experiences. Among the most striking of these exchanges was the exposure of the participants to a senior army officer's first-person account of dealing with terrorists on the ground.

The speakers invited to address the participants also came from backgrounds ranging from culture, sports and media to information technology. They included Dr A Ramakrishna, Mr Balan Nambiar, Prof S Sadagopan, Prof J Ramachandran, Mr Abhinav Bindra, Prof Pankaj Chandra, Mr Shrikumar Suryanarayan, Prof NR Madhava Menon, Mr Sashi Kumar, Ms Sevanti Ninan and Ms Gayatri Chandrashekar. In addition there were also speakers from NIAS including the Director,

Courses



Dr Anil Kakodkar, Chairman, Atomic Energy Commission and Secretary, Department of Atomic Energy, delivering the Raja Ramanna Memorial Lecture, one of the events during the 23rd Senior Executives Course.

Dr K Kasturirangan, Prof BV Sreekantan, Prof Narendar Pani and Dr Srinath Raghavan. The course was also not confined to the discussion rooms, it included a visit to ISTRAC and the Chandrayaan facility in Bylalu and early-morning yoga classes. A cultural programme by Margi Sathi and her troupe from Kalamandalam featured *Nangiarkuttu* that falls in the 2000 year old genre of Kutiyattam, a classical Sanskrit theatre form from Kerala.

The fourth Annual Dr Raja Ramanna memorial lecture was organised in conjunction with the course, with Dr Anil Kakodkar, Chairman, Atomic Energy Commission, speaking on Science for National Development. The valedictory address was given by Mr Suresh P Prabhu, Member of Parliament, Loksabha.

The course was coordinated by Prof Sangeetha Menon.

Energy Security and Management

NIAS, on the request of the Department of Science and Technology, organised a week-long training programme for thirty senior executives between February 22 and 28, 2009 on *Energy Security and Management* for a second year in a row.

With our heavy dependence on oil imports (over 70 percent currently, and projected to grow to 90 percent by 2030), and with our modest endowment of hydro, coal and uranium resources, India is vulnerable in

the face of its growing energy demand, uncertainties in the international energy markets, and daunting environmental and social challenges. The Planning Commission defines energy security for the country as follows: *The country is energy secure when we can supply lifeline energy to all our citizens and meet their effective demand for safe and convenient energy to satisfy various needs at affordable costs at all times with a prescribed confidence level considering shocks and disruptions that can be reasonably expected.*

Improving energy security involves minimizing risks by measures such as conservation and increased efficiency, and expanding and diversifying indigenous resource base and supply sources including renewable energy sources, and by managing risks through better preparedness to market vagaries and strategic actions of others.

Mr Anil Razdan, the former Secretary in the Ministry of Power inaugurated the Programme with his talk on Power Sector in India. Dr Ajay Mathur, Director-General of the Bureau of Energy Efficiency delivered the valedictory address on Energy Efficiency Initiatives in the country. Other prominent speakers included Dr SL Rao, Prof J Srinivasan of IISc, and Dr RB Grover of BARC. Ms Kaushiki Desikan gave a Hindustani vocal recital that was much appreciated.

The course was coordinated by Prof Dilip R Ahuja and Dr Sindhu Radhakrishna.



Shivkumar

Prof J Ramachandran interacting with the participants of the 23rd NIAS Course for Senior Executives on "Excellence in Leadership".

Multidisciplinary Perspectives on Science and Technology

The Sixth NIAS-DST COURSE on *Multidisciplinary Perspectives on Science and Technology* was held from July 21 to August 2, 2008. This course, in which Senior Scientists and Engineers drawn from various laboratories of Department of Science and Technology participated, covered a wide variety of issues related to Scientific and Industrial Developments both within the country and elsewhere. Some of the topics covered were Human Genome Project, Contemporary Developments in Brain research, Different Aspects of Climate Change and so on. The course also included an outdoor visit where participants shared their experiences in terms of their professional work.

The speakers included Dr VS Arunachalam, Dr Ajay Darshan Behera, Dr Samir K Brahmachari, Prof A Damodaran, Dr RS Deshpande, Prof Peter Ronald de Souza, Mr Suramani Praveen Godkindi, Dr Ramachandra Guha, Dr Sonika Gupta, Prof Rajesh Kochhar, Mr Rahul Matthan, Prof Partha P Mazumdar, Prof Dinesh Mohan, Prof Vidyanand Nanjundaiah, Prof Vijay Paranjpye, Mr TCA Srinivasa Raghavan, Prof Shobini L Rao, Prof R Sukumar, Prof J Srinivasan and Mr Devinder Sharma.

The speakers from within NIAS were Dr K Kasturirangan, Prof SS Meenakshisundaram, Prof Anindya Sinha, Prof BV Sreekantan, Prof Dilip R Ahuja, Prof N Shantha Mohan, Prof Sundar Sarukkai, Prof Narendar Pani, Dr MG Narasimhan and Dr Rajesh Kasturirangan.

The course was coordinated by Dr MG Narasimhan and Dr Sharada Srinivasan.

Impact of Globalisation

The First NIAS-DST Training Programme on the *Impact of Globalisation* for Science-Administrators was organised between October 20 and 24, 2009. The main objective of the programme, in which thirty science-administrators from all over the country participated, was to provide an overview of globalization through lectures on the concepts involved in understanding globalization, on the latest research findings from around the world, and on individual case studies.

The course began with a panel discussion on the global financial crisis and covered a range of issues from the rise of Indian multinationals to the globalisation of materials and cities. The speakers included Prof SL Rao, Prof R Narasimha, Prof Prakash Apte,



Margi Sathi and Troupe from Kalamandalam performing Kutiyattam, a Classical Sanskrit Theatre from Kerala at the Course for Senior Executives.

Mr Prem Chandavarkar, Prof VS Ramamurthy, Mr Ramesh Hariharan, Mr Sashi Kumar, Mr Anal K Jain, Dr Srinath Raghavan, Prof Rupa Chanda, Mr Subroto Bagchi, Prof Madhav Gadgil, Dr Samar Singh. There was also a public lecture on patents by Dr Anji Reddy. NIAS faculty who participated in the course included Prof Dilip R Ahuja, Dr Carol Upadhaya, Prof Narendar Pani and Dr Srinath Raghavan. There was also a Fusion Music Concert by 'Layatharanga', Bangalore.

The course was coordinated by Prof Narendar Pani and Dr Srinath Raghavan.

Dimensions of Nanotechnology

The fourth DST-NIAS Workshop on *Dimensions of Nanotechnology: Science, Technology, Business and Society* was held from February 9 to 13 February, 2009. This workshop had thirty participants drawn from a host of scientific organisations within the country. In his inaugural lecture Dr T Ramasami, Secretary, DST outlined the Science and Technology landscape in the country and stressed the need for providing the right encouragement and ambience to

carry out R&D in frontier disciplines. There were fourteen lectures delivered by experts in the core area of nanotechnology covering various aspects, including its science and technology, application in various disciplines including medicine and electronics, experimental techniques including observation at high resolution, mechanical behaviour, risk perceptions, commercialization and education. There was also a special presentation on the Indo-Brazil-South Africa initiative in Nanotechnology. In addition special lectures were arranged in the evenings on general topics such as Biomimetics, the Energy Scenario in the Country, and the Chandrayaan Mission. Visits were also arranged to the nanocentres at IISc. Two sessions were devoted to give an opportunity to the participants to describe their work and organisation and enable networking among them. The programme ended with a valedictory lecture by Prof Sundar Sarukkai, Dean, School of Humanities, NIAS.

The course was coordinated by Prof S Ranganathan.



Ms Sevanti Ninan and Mr Sashi Kumar during a panel discussion on the Media at the Course for Senior Executives.

Prof BV Sreekantan, *Chairman*
Dr Carol Upadhya, *Academic Head*
Prof Sundar Sarukkai, *Member*
Dr MG Narasimhan, *Member*
Dr Sindhu Radhakrishna, *Member*

The highlight of the Ph.D. Programme this year was the completion of the doctoral thesis by Mr Nithin Nagaraj. He is the first student of the Doctoral Programme of the Institute to complete his thesis. He has since joined as a Visiting Faculty in the Mathematics Department at the Indian Institute of Social Science Education and Research, Pune.

The Doctoral Programme was initiated at the Institute in 2005, with the aim of developing a cadre of young scholars who could pursue and develop interdisciplinary research in a variety of areas as envisaged in the foundational document of the Institute, the Memorandum of Association. The Programme is financially supported by the Indian Space Research Organisation and the Department of Science and Technology, Government of India, and the Sir Dorabji Tata Trust.

A Ph.D. Committee oversees the functioning of the programme. Rules for coursework and other requirements for completing the Ph.D. have been framed. NIAS faculty have been offering a range of courses keeping in view the research interests and needs of the students.

Till date, six batches of students have been admitted to the NIAS Doctoral Programme, bringing the total number of students to twenty-five in 2009-10 – seven in the School of Humanities, nine in the School of Natural Sciences and Engineering, and nine in the School of Social Sciences. Prior to 2005, three students completed their dissertations from NIAS through Manipal Academy of Higher Education.

NIAS has received recognition as a research centre from Manipal University and the University of Mysore. NIAS faculty members have been recognised by both institutions as Ph.D. guides. Till date, fifteen students have been registered with Manipal and one with Mysore, while three are in the process of registering at Mysore and one with Manipal. The remaining students are in various stages of coursework and preparing their research proposals.

Ph.D. Programme

Leena Pascal

A student observed for the thesis on Pictorial Representation and its Development in Children.

The NIAS Doctoral Programme has now completed four years and is developing into a well-integrated and unique programme with an emphasis on multi-disciplinary work. Most of the students are working across disciplines, often in areas which they have not earlier studied, creating a vibrant intellectual atmosphere on campus. For instance, interdisciplinary projects are marrying philosophy with biology, environmental science with sociology, education with anthropology, and remote sensing with archaeology.

The Programme is growing in strength, enabling the Institute to produce a set of scholars who will carry forward the research programmes and traditions already established by the distinguished faculty of the Institute. In future, the Doctoral Programme will be put on a more sustainable foundation and will expand both in terms of its scope and depth in order to meet the upcoming challenges of the nation. Towards this end, NIAS is initiating new areas of research and is upgrading the research facilities (including laboratories for environmental science and remote sensing) in accordance with international standards.

A list of the students who have registered with a University and their topics is given below:

School of Humanities

Ms Meera Baidur, Philosophy & Wildlife Biology
Conceptualization of Nature: Towards a Philosophy of Conservation and Action from Indian Traditional Thought

Mr SK Arun Murthi, Philosophy
Philosophical Problems of Laws of Nature and Explanation

Ms MB Rajani, Space Archaeology
Archaeological Investigations using Remote Sensing Techniques

Mr Navneet Chopra, Ms Rolla Das, Ms Lakshmi K and Ms Hema Thakur
Not yet registered

School of Natural Sciences and Engineering

Mr Kishor G Bhat, Mathematics
Games in the Garden of Numbers

Mr Mayukh Chatterjee, Wildlife Biology
*Social Behaviour, Ecology and Population Dynamics of the Northern Bonnet Macaque (*Macaca Radiata Radiata*)*

Mr Rishi Kumar, Wildlife Biology
Behaviour and Ecology of Selected Indian Macaques

Ms Swarnali Majumder, Mathematics
Theory and Practice of Inverse Problem: Finding Equation from ECG and Speech Data

Mr Muthuswamy Murugan, Environmental Science
Factors and Patterns of Pesticide Usage in Cardamom Hill Agro Ecosystem and its Impact on Ecosystem Sustainability

Mr Nithin Nagaraj, Mathematics
Novel Applications of Chaos Theory to Coding and Cryptography



The Director, Dr K Kasturirangan, prompts Mr Nithin Nagaraj, the first student of the NIAS Ph.D. Programme to complete his thesis, to present a bouquet to his Supervisor Prof PG Vaidya.

Mr Narayan Sharma, Wildlife Biology
Behavioural Ecology and Conservation of Primate Communities in the Lowland Evergreen Forests of Upper Brahmaputra Valley, Assam

Ms Sreeja KG, Agroecology
Emergent Non-agrarian Livelihoods and Resource Linkages in the Agroecosystems of a River Basin: A Case Study of Chalakudy River Basin, Kerala

Mr Robin V Vijayan, Wildlife Biology
Conservation Biology of a Threatened Endemic Bird -The White-Bellied Shortwing Brachypteryx Major in the Western Ghats, Southern India

Ms PS Sajini Anand
Not yet registered

School of Social Sciences

Ms Anu Joy, Education
Children's Understanding of Scientific Concepts

Mr Rahul Mukhopadhyay, Social Anthropology
Anthropology of the Education Bureaucracy

Ms Leena Pascal, Art Education
Pictorial Representation and its Development in Children

Mr Sailen Routray, Development Studies
Shifting Waterscapes: Tradition, Development and Change in Orissa

Ms Sahana Udupa, Social Anthropology
Informing News: Information Revolution and the Transformation of News Media in Bangalore

Ms Indira Vijayasimha, Education
Understanding Science Teachers' Praxis

Ms Sowjanya R Peddi, Ms Asha KG and Mr K Jafar
Not yet registered

STUDENTS WEDNESDAY PRESENTATIONS

Mr Robin V Vijayan
Mind the Gap: Geographical Gaps in the Western Ghats Affect Montane Bird Population Structure
April 23, 2008

Mr Sailen Routray
50/10: Contemporary Voices from Oriya Poetry
April 23, 2008

Mr Kishor G Bhat
A Talk of Two Cultures: A Problem of Erdős and The Use of Arithmetic by Gargantua
May 21, 2008

Ms Indira Vijayasimha
Teaching for Exams: Mrs Oublier Adopts Fatima's Rules!
July 16, 2008

Ms Sahana Udupa
What is the Role of Language in Thinking?
July 16, 2008

Ms Sowjanya R Peddi
Names from the Economy: Objects of Anthropology
August 13, 2008

Ms Sajini Anand
Chaotic Synchronization
August 20, 2008

Ms Swarnali Majumder
Local Embedding for Modeling Data
September 26, 2008

Ms Meera Baidur
Nature as Sacred: Natural Landscapes and Place in Indian Thought
September 26, 2008

Ms Sahana Udupa
A New Era of Production? Debates Around Creative Industries
October 8, 2008

Ms MB Rajani
Seven Pagodas of Mahabalipuram
November 5, 2008

Mr Rahul Mukhopadhyay
Eating, Hogging, Swallowing: A Spectrum of Possibilities of Corruption
November 26, 2008

Ms Swarnali Majumder
Vasanth Bahar: Rabindrasangeet
December 31, 2008



NIAS Library

NIAS library continued to support the research activities of the Institute by acquiring the required reading materials for its faculty and students. The library has acquired over 450 books during the year and continued to subscribe to 54 journals. The online public access catalogue is available on the Intranet. The library continued to display new books every fortnight and sent email alerts of acquisitions. The collection in the areas of Economics, International relations, Indian philosophy and Religion, Sociology and Education was strengthened during the year. Faculty and students were provided with barcoded library user identity cards to facilitate automated circulation. Students continued to use the inter library loan arrangements with libraries in the city.

The infrastructure of the library includes two linux servers and one windows server. Application software being used in the library includes LibSys, CDISIS and Eprints. The library users utilised Internet access, printing, scanning and photocopying facility extensively.

The library continues to update and maintain the webpages of the Institute as well as endeavours to support dissemination of faculty and student research through the eprints repository, which is now accessible over Internet. The url is <http://nias.res.in:8081>

Library Resources	Number
Books	10353
Current Subscriptions	54
Bound Volumes	1571
Audio Tapes and Videos	1450
NIAS Lectures on DVDs	199
CDROMS	65
Articles and Clippings	750
NIAS Publications	113



Institutional Repository of NIAS.

Administration

As a registered society, NIAS derives its administrative and financial authority through the society, represented by the general body. The Council of Management which is currently chaired by Dr MS Swaminathan, is vested with full power and authority to do all acts, deeds, etc which are necessary for the promotion and fulfillment of the objectives set out in the Memorandum of Association. The Director, presently Dr K Kasturirangan, is the chief executive and exercises general, administrative and financial control over the affairs of NIAS. The Director is assisted in administrative and finance matters by the Head-Administration.

Besides management of all resources such as infrastructure, finance, human resources, estates etc., general administrative matters are also handled by the Head-Administration. The Administration enables recruitment and deployment of staff, servicing their needs and empowering them to effectively contribute to the objectives of NIAS. It services the students programme in which twenty-five students work for Ph.D. The Administration also takes care of the campus, its facilities such as auditorium, lecture halls, meeting rooms, classrooms, guesthouse, dining halls, etc. and all other infrastructure of NIAS. The Administration also plays a unique role in conducting various programmes including training courses. Procurement of materials and consumables, maintenance of facilities, inventory control, etc. is also done by the Administration. Compliance with various statutory requirements such as Provident Fund, Income Tax, VAT, etc. is also taken care by the Administration. The administrative set up consists of an Office Manager, an Administrative and Accounts Officer, an Assistant Office Manager and other secretarial / office / supporting staff, in all numbering 28.

During 2008-2009, Prof Arindam Chakrabarti, Dr Srinath Raghavan and Dr Lalitha Sundareshan have joined the Faculty community of the Institute and Dr Kshama Lakshman as Post-Doctoral Fellow to work in the area of Biosecurity. The year also witnessed the promotion of Dr Sangeetha Menon from the position of Fellow to Professor.

Finance management, accounting and auditing are also being done by the Administration. It carries out resource mobilization and expenditure control. The Administration provided all the support necessary

for financial review organised by Sir Dorabji Tata Trust before the release of additional grant towards strengthening the capacity of the Institute to achieve the goals contained in the "Vision Document September 2008". Expenditure incurred for regular activities of NIAS including students programme is Rs.278.11 lakhs during 2008-2009. Corresponding amount handled in respect of activities such as projects, courses, training programmes etc is Rs. 234.04 lakhs. NIAS has a specified investment of Rs.1,442.39 lakhs (exclusive of project funds) as on March 31, 2009.

The agreement with Global Water Partnership (GWP) to host the GWP-South Asia Regional Secretariat in NIAS has been extended till December 31, 2009. As the host institution, NIAS has handled foreign exchange worth Rs.154.36 lakhs in 2008-2009 in close liaison with GWP, Stockholm, and Regional Water

Partnerships of six countries in this region. This has enhanced the revenue of NIAS by Rs.12.04 lakhs in 2008-2009.

Overall, the year 2008-2009 has generated a carry-over surplus of Rs.26.51 lakhs. The year also witnessed the commencement of modification of old building to a hostel building for Ph.D. students with a cost estimate of Rs.30 lakhs.

Mr P Srinivasa Aithal, hitherto Administrative and Accounts Officer assumed additional charge as Head-Administration. He continues to hold the current responsibility with regard to the post of Administrative and Accounts Officer. Mr EK Kutty handed over the charge of Head-Administration to Mr Srinivasa Aithal on January 30, 2009. Mr Kutty continues to serve NIAS as Advisor in the areas of Finance and Administration.



PROF MGK MENON IS 80



Mr MV Rajashekarani presenting a memento to Prof MGK Menon on the occasion of his completing 80 years. Dr K Kasturirangan, Director of NIAS is also seen. This function on September 5, 2008 was jointly

organised by Raman Research Institute, National Centre for Biological Sciences, Indian Institute of Astrophysics and NIAS. The felicitation was followed by a dance performance by Ms Vani Ganapathy.

As in other years NIAS saw a stream of visitors in a variety of fields. These visitors play an important part in keeping not just the institute but also the city of Bengaluru in touch with the latest developments in a number of disciplines in different parts of the world.

MEMORIAL LECTURES

NINTH MN SRINIVAS MEMORIAL LECTURE

Prof André Béteille

Former Chairman, Indian Council of Social Science Research, New Delhi

Sociology and Ideology

November 14, 2008

FOURTH RAJA RAMANNA MEMORIAL LECTURE

Dr Anil Kakodkar

Chairman, Atomic Energy Commission and Secretary, Department of Atomic Energy, Mumbai

Science for National Development

January 20, 2009

PUBLIC LECTURES

Prof Ramanath Cowsik

Director, McDonnell Centre for the Space Sciences, Washington University, USA

Explorations of Quark - Cosmos Interconnections

July 25, 2008

Mr Shyam Saran

Special Envoy of Prime Minister, New Delhi

Climate Change and Energy Security - How Indian Science Can Make India A Leader of Global Change

September 30, 2008

Prof Subrata Ghoshroy

Massachusetts Institute of Technology, USA

Debunking the Rationale for Weaponization of Space

December 1, 2008

Prof Thomas Angotti

Hunter College, City University, New York

Globalised Real Estate and Displacement: New Spaces for Community Control of Land

March 6, 2009

Visitors

Shivkumar

Mr Suresh P Prabhu, Member of Parliament, Lok Sabha delivering the valedictory address for the 23rd NIAS Course for Senior Executives on "Excellence in Leadership".

Dr Bharath Gopaldaswamy

Peace Studies Program, Cornell University, Ithaca, New York

The Potential of the International Monitoring System Infrasound Network for the Detection of Rocket Launches

March 30, 2009

GUEST AND SPECIAL LECTURES**Mr Jacob Ninan**

Programme Director, International Cooperation, Indian Space Research Organisation, Bangalore

Marriage Enrichment Seminar

April 3, 2008

Prof Diane Elson

Department of Sociology, University of Essex, UK

Unpaid Work and Economic Development

April 11, 2008

Dr V Siddhartha

Expert on UNSCR 1540 Committee

The United Nations Security Council, Non-State Bad Actors and India

May 22, 2008

Dr Deepak Malghan

New India Foundation Fellow, Bangalore

Ends, Means, and Economics: A Framework for India's Energy and Ecological Predicaments

July 23, 2008

Ms Bhuvaneshwari Raman

Department of Social Policy, London School of Economics

Spatial Governance and the Urban Poor: Claiming City Places for Street Trading and Squatter Settlements

October 20, 2008

Dr K Anji Reddy

Chairman, Reddy's Laboratory Limited, Hyderabad

Intellectual Property Rights in Pharmaceutical Industry

October 21, 2008

Mr K Thyagarajan

Outstanding Scientist, Program Director-IRS&SSS (Retd), ISRO Satellite Centre, Bangalore

Chandrayaan-1: The First Indian Mission to the Moon

November 7, 2008

Prof KP Vijayalakshmi

Jawaharlal Nehru University, Delhi

2008 US Elections – Its Impact on India

December 16, 2008

Dr Antarian Chakrabarty

Department of Urban Design and Planning, Norwegian University of Science and Technology, Trondheim, Norway

The One Foot Model...and the Giant Buddha

December 22, 2008

Prof Dean Wilkening

Stanford University

Technical Effectiveness of Indian Missile Defence Options

December 23, 2008

Dr Peter Fenner

Director of Education, Center for Timeless Wisdom, California

Therapeutic Presence: The Union of Love and Wisdom

December 24, 2008

Dr Isabelle Soubres-Vergher

CNRS, France

Space as Strategic Issue

January 13, 2009

Prof David Bayley

Department of Criminal Justice, SUNY, Albany

Policing Terrorism

February 19, 2009

Mr Lawrie Jordan

Director of Imagery Enterprise Solutions, ESRI, USA

Image and Web Solutions

February 13, 2009

Dr Ashwin Sabapathy

Graduate Degree Fellow, East-West Center,
Honolulu, USA

*Environmental Equity in Globalizing Cities of
Developing countries: An examination of work
travel patterns and commuting exposures to air
pollution in the 'New Economy' of Bangalore*

February 16, 2009

NATIONAL SCIENCE DAY 2009 -
SCIENCE DAY LECTURES

Prof N Kumar

Former Director, Raman Research Institute,
Bangalore

A Random Walk in Science

February 28, 2009

Prof Raghavendra Gadagkar

Professor and J.C. Bose Fellow, Indian Institute of
Science, Bangalore

Honey Bee Dance Language

February 28, 2009

WEDNESDAY DISCUSSION MEETINGS

Dr Lata Mani

Is a dew drop Sacred, or is it Secular?:

Experiments in Contemplative Cultural Critique

April 2, 2008

Prof Trent Schroyer

The Fall of Western Certitudes

April 9, 2008

Prof BV Sreekantan

Science, Reality and Consciousness

April 16, 2008

Dr Sharada Srinivasan

Art and Technique of Image Casting at

Swamimalai – Some Reflections

May 7, 2008

Dr Ramesh Bairy TS

Reproducing Dominance: Querying the Idea of the

Creamy Layer

May 14, 2008

Mr Sheshanarayana

Cauvery

June 4, 2008

Dr MG Narasimhan

Reductionism in Biology

July 2, 2008

Dr Radhakrishna

Particles or Waves? A Century of Modern Physics

August 27, 2008

Prof Narendar Pani

*Globalization and Labour Standards: Some
Insights from Bangalore's Garment Industry*

September 10, 2008

Dr Srinath Raghavan

The Strategy of Terror

September 17, 2008

Dr Rajesh Kasturirangan

Cognition, Culture and Computation

October 15, 2008

Prof GK Govinda Rao

Shakespeare in the 21st Century

October 22, 2008

**Prof Narendar Pani and Prof Prabhakar G
Vaidya**

The Global Financial Crisis

October 29, 2008

Prof S Ranganathan

*Many Ramayanas: In Pursuit of the History of the
Foundation of IISc & NIAS*

November 12, 2008

Dr MS Sriram

*Yukti-bhasa of Jyesthadeva (c.1530): A seminal
text of the Kerala School of astronomy and
Mathematics*

November 19, 2008

Prof Dilip R Ahuja

A Solution Waiting for Problems

December 3, 2008

Ms Tania Pérez Bustos

*The Fringe of Science and Technology
Popularization: Feminist Connections between Two
Southern Countries*
December 10, 2008

**Mr S Gopal, Ms Sahana Udupa and Dr
Srinath Raghavan**

Panel Discussion: The Mumbai Attacks and After
December 17, 2008

Prof S Ramaswamy

*Indian Philosophical Ideas and Western
Literature*
December 24, 2008

Prof Philip Clayton

*Reality Consists of Events not Things: Process
Philosophy,
Social Responsibility, and the Indian Traditions*
January 7, 2009

**Prof Narendar Pani and Dr Srinath
Raghavan**

Obama and the World
January 15, 2009

Dr Carol Upadhyia

*Provincial Globalisation: Transnationalism and
Social Transformation in
India's Regional Towns*
January 28, 2009

Dr Neela Bhattacharya Saxena

*In the Beginning IS Desire: Tracing Kali's
Footprints in Indian Literature*
February 4, 2009

Dr SS Meenakshisundaram

*Corruption: An Issue More Talked About and
Less Acted Upon*
March 11, 2009

Prof Rajaram Nagappa

Iran's Safir Launch Vehicle
March 18, 2009

**Prof Narendar Pani, Dr Sindhu
Radhakrishna and Mr Kishor G Bhat**

*Bengaluru, Bangalore, Bengaluru-Imaginations
and Their Times*
March 25, 2009

OTHER VISITORS

Dr Diane Elson, Department of Sociology, University of Essex visited NIAS as a visiting faculty during April 6 to 20, 2008. In addition to interacting with faculty members, she delivered a special lecture on April 11, 2008 on the topic Unpaid Work and Economic Development.

Dr Max Stumpff, Program Officer, International Peace and Security, Dr John D and Dr Catherine T, MacArthur Foundation, USA visited NIAS on April 16, 2008 and discussed avenues for collaborative project studies.

Dr Adam Segal, Council on Foreign Relations, Washington, USA visited NIAS on April 29, 2008. He had discussion with Professors Dilip R Ahuja, S Chandrashekar, Narendar Pani and S Ranganathan on Globalisation of Science and Technology in India and China.

Prof Venkatesh, Professor at University of Mumbai and the Director of the ICSSR Western Region visited NIAS on August 11 and 12, 2008.

Dr MS Sriram, Professor and Head, Department of Theoretical Physics, University of Madras was at NIAS from September 1, 2008 to February 29, 2009 on sabbatical.

Dr Hanna Scseponwska, Conservator, Smithsonian Institution, Washington DC visited NIAS on September 25, 2008 and discussed the organization of Space Heritage Seminar at NIAS towards end 2009.

Mr Rajiv Malhotra, President of Infinity Foundation (at Princeton) who has funded some of the NIAS international conferences on indic traditions and consciousness visited NIAS to have discussions with Prof Sangeetha Menon and some other scholars on an ongoing work on alternate epistemologies in Indic traditions from September 29 to October 1, 2008.

Dr Ebrahim Janahi, President (Vice-Chancellor), Dr Kathryn Bindon, Advisor and Mr Ali Al Jamea, Business Manager of University of Bahrain along with Dr JW Lobo, Director, Indian Council for Cultural Relations visited NIAS on October 8, 2008. Prof Dilip R Ahuja welcomed the delegates. Prof Narendar Pani made a presentation on NIAS which

was followed by remarks by Dr Ebrahim Janahi / Dr Kathryn Bindon and interactive session.

Prof Bhupendra Jassani, Department of War Studies, Kings College, London visited NIAS on November 19 and 20, 2008. He discussed on remote sensing and key feature identification.

Dr Victor Reis, Senior Advisor, Department of Energy, Washington DC, USA visited NIAS on December 8, 2008 and had discussion on Nuclear Energy, Non-Proliferation and Climate Change: An Integrated Approach.

Commodore SN Singh, Regional Director (West), National Maritime Foundation visited NIAS on December 19, 2008 for general exchange of ideas.

Prof Bruno Latour, the most influential writer on science studies in the world, visited NIAS on January 2, 2009. He informally met Ph.D. students and faculty.

Prof Philip Clayton, Professor at Harvard and Claremont, Berkley, visited NIAS from January 6 to 8, 2009 during his Distinguished Visiting Professorship with ICPR for one month.

Brabant Delegation which included Mr Pauli, Vice-Mayor, City of Den Bosch; Mr Rosman, Director, Chamber of Commerce, Brabant; Mr De Pont, Director, Economic Affairs, City of Den Bosch; Ms Kamsma, Member, Board of Directors, Avans University and others visited NIAS on February 10, 2009 and had an interaction with Prof S Settar, Prof S Ranganathan, Prof Rajaram Nagappa, Prof N Ramani, Mr EK Kutty and Mr P Srinivasa Aithal.

Prof Thomas Angotti, Professor of Urban Affairs and Planning and Director of the Center for Community Planning and Development of Hunter College, CUNY, visited NIAS as a Fulbright Senior Specialist between February 25 and March 25, 2009 under the Urban Research and Policy Programme.



Prof André Béteille delivering the Ninth MN Srinivas Memorial Lecture.

ASSOCIATES' PROGRAMME

The NIAS shares its experiences, both intellectual and cultural, with a select group of distinguished persons who have established track records in their career. They are called Associates. By becoming a member, an Associate will enjoy certain privileges, including access to the NIAS library, invitations to all major events and opportunities to dine with the NIAS Faculty and distinguished visitors. During the year 2008-2009 the number of associates who enjoyed these privileges was 120. The major events of the year 2008-2009 are as follows:

Padma Shri Malavika Sarukkai

Bharat Natyam Recital
June 20, 2008

Ms Suramani Pravin Godkhindi

Music Concert
August 1, 2008

Layatharanga Bangalore

A Fusion Music Concert
October 23, 2008

Kalamandalam Margi Sathi Devi and Troupe

Nangiarkuthu: A Classical Sanskrit Theatre Performance
January 19, 2009

Sangeet Samrat Chitravina N Ravikiran

Classical Music Concert
February 12, 2009

Ms Kaushiki Chakraborty Desikan

Hindustani Vocal Music Concert
February 27, 2009

NIAS LITERARY, ART AND HERITAGE FORUM

The NIAS Literary, Arts and Heritage Forum had a successful and well appreciated series of events in 2008 and 2009 which drew a wide and appreciative audience in Bangalore. The events combined aspects of the humanities, social science, art and the interfaces with science, society and heritage. They included a well received play on Gandhi and Tagore;

presentations by writers and artists such as Dr Shanu Lahiri on Tagore's visual language; Mr Suresh Jayaram and others on the visual history of Bangalore; a talk by a UNESCO official Dr Sarah Gaines on science communication through art; Dr Jyoti Hosagrahar on conservation challenges in Karnataka, and a multimedia presentation by Dr Anne-Marie Gaston and Dr Tony Gaston on the social concerns of the environment conveyed through the language of Bharata Natyam and art forms of the world.

Convenors (Dr Sharada Srinivasan, Prof Sangeetha Menon and Ms Leena Pascal)

Bangalore Little Theatre

Gandhi and Tagore: A Play in Progress Based on Letters
April 4, 2008

Dr Sarah Gaines

Earth Science Division, UNESCO
Communicating Science: The Role of Art
October 21, 2008

Dr Jyoti Hosagrahar

Columbia University, New York
Modern Lives of Historic Cities: Conservation and Development in Karnataka
November 25, 2008

Dr Anne-Marie Gaston (Anjali) and Dr Tony Gaston

Dance Theatre of the Earth
A Mixed Media Presentation: Dance, Video, Images and Poetry
December 11, 2008

Dr Shanu Lahiri

Former Dean of the Faculty of Visual Arts
Rabindra Bharathi University Kolkata
Tagore's Visual Language – An Informal Discussion
December 12, 2008

Mr Suresh Jayaram and Mr Raghavendra Rao

Bengalooru - A Visual History of Bangalore and Its Multicultural Landscape
December 30, 2008



The faculty at NIAS reflects the multidisciplinary character of the institute. Coming from specialisations as diverse as particle physics and anthropology they are held together by their focus on multidisciplinary work and a willingness to engage with the larger community. This is captured by this list of the awards received by them, the lectures delivered and the papers presented in conferences during the year.

HONOURS AND AWARDS

Dr K Kasturirangan, Director, was conferred *Rajayogindra Award* by the Brahmailydia Foundation for Indian Arts, Maharaja of Mysore on July 18, 2008. He received *Vikram Sarabhai Memorial Gold Medal* from the Indian Science Congress on January 3, 2009. He was also conferred the *Sasthrabooshan Award* by His Highness Pazhassiraja Charitable Trust, Kerala on February 27, 2009. He received *Prof YT Thathachari Lifetime Achievement Award* by Bhramara Trust of Prof YT Thathachari and Smt Madhuri Thathachari of Mysore on March 14, 2009.

Prof Malavika Kapur was bestowed the *Lifetime Achievement Award* and *Honorary Fellowship* of the National Academy of Psychology (NAOP) in Gauhati, Assam in December 2008.

Prof Rajaram Nagappa was among 10 eminent persons felicitated for his contribution to solid propellant rockets during the Golden Jubilee Celebrations of DRDO at the High Energy Materials Research Laboratory, Pune.

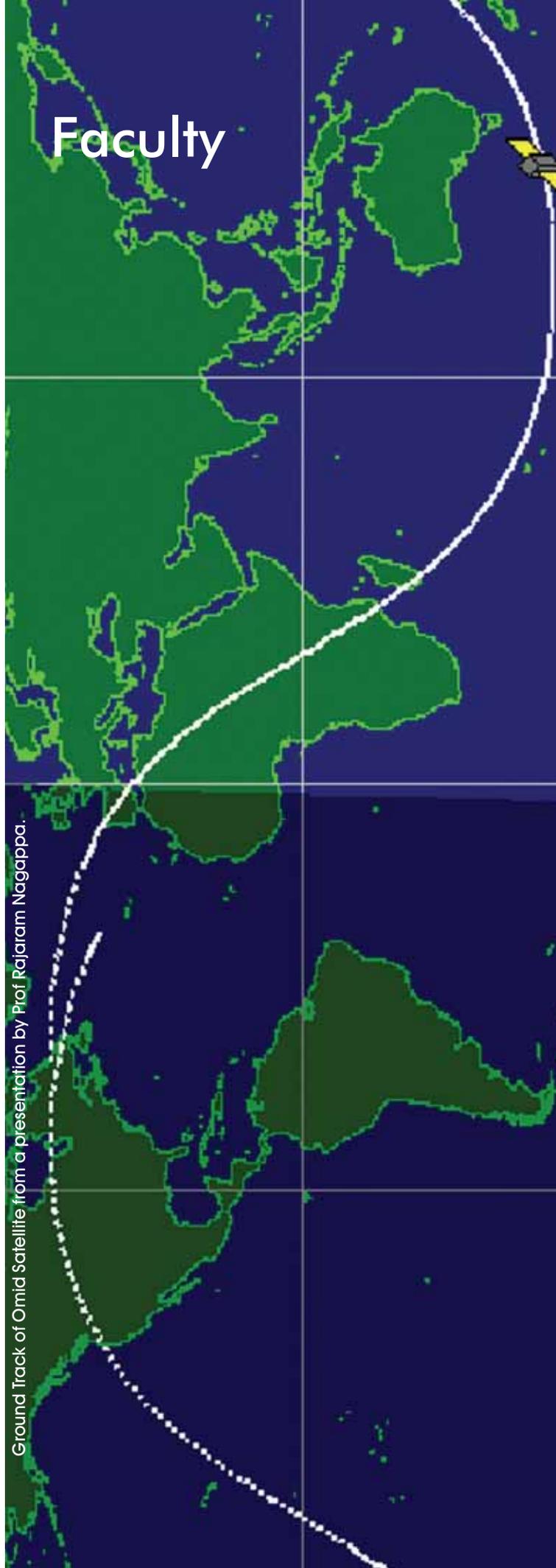
Prof S Settar was conferred the *Bhasha Samman Award* from the Central Sahitya Akademy, New Delhi for his book *The Sangam Tamilagham and Kannada Nadu Mattu Nudi: A Study of Early Dravidian Relations* (in Kannada, Pub. Abinava, Bangalore) published in 2007.

Prof Anindya Sinha was nominated Chairperson of the International Jury, 19th International Biology Olympiad, Mumbai, India, July 13 to 19, 2008. He is elected Member of the International Group of Coordinators, International Biology Olympiad, Prague, Cseh Republic, August 2008 to August 2011.

Dr Sharada Srinivasan received *V&A Nehru Fellow* through Nehru Trust for Victoria and Albert Museum, UK Collections.

Faculty

Ground Track of Omid Satellite from a presentation by Prof Rajaram Nagappa.



Dr K Kasturirangan, Director

Future Technology Trends in GIS / IT: How Society will Benefit, Future Technology Vision of UAE Conference, RAS AL-Khaimah, United Arab Emirates, Dubai, June 23, 2008.

Indian Space Programme, Committee on International Security and Arms Control (CISAC) – NIAS Dialogue Meeting and Briefings, Washington, October 6, 2008.

First Memorial Lecture of Sri Lankabhimanya Sir Arthur C Clarke, Arthur C Clarke Institute for Modern Technologies (ACCIMT), Colombo, March 19, 2009.

Totally delivered fifteen public lectures on a variety of topics.

Delivered eight convocation addresses.

Prof Dilip R Ahuja

Why is Climate Change such a Difficult Problem to Address? Keynote Address, Environment Association of Bangalore Annual Seminar on Climate Change, Bangalore, June 14, 2008.

International Framework Related to Climate Change, Swiss Development Workshop on Climate Change, Energy and Sustainable Development, NIAS, September 9, 2008.

Indian Landscape: Actors and Experiences, Swiss Development Workshop on Climate Change, Energy and Sustainable Development, NIAS, September 9, 2008.

Making Energy Systems More Sustainable, TWAS Regional Office for Central and South Asia, Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore, January 16, 2008.

Dr BK Anitha

Restructuring of Higher Education: Recommendations of the National Knowledge Commission, Keynote Address, National Seminar, Hindu College, Machalipatnam, Andhra Pradesh, November 8, 2008.

Prof S Chandrashekar

Indo-US Nuclear Deal – Is it Good or Bad for India, Samvada Trust, Bangalore, September 2008.

Prof Malavika Kapur

Learning from Children What to Teach Them, Department of Philosophy, University of Hawaii (Manoa), Hawaii, May 5, 2008.

Child Development in Bangalore, Seminar organised by I Prajna, an NGO Working with Teachers, Bangalore March 8, 2009.

Learning from Children What to Teach Them, Programme organised by Youth for Seva in Bangalore, March 22, 2009.

Prof Sangeetha Menon

Hinduism and Consciousness Studies: Alternate Ways of Knowing, International Conference on Hinduism in the Changing World, Hindu Centre, Singapore in connection with its 30th anniversary celebrations, September 23, 2008.

Transpersonal Psychology of the Gita and Participative Living, National Seminar on Bhagavad Gita and Mental Health jointly organised by Sri Sarvajendra Saraswati Pratishtanam, Sirsi, SVYASA and NIMHANS, at NIMHANS, Bangalore, September 21, 2009.

Universality of Self, International Seminar on Self and Self-transformation, sponsored by Indian Council of Philosophical Research and held at NIAS, January 8, 2009.

Prof N Shantha Mohan

Gender and Water Governance in India, CAPNET South Asia Regional Meeting, Bangladesh Centre for Advanced Studies and CAPNET International in Dhaka, Bangladesh, June 8, 2008.

Knowledge Management on River Basin Water Sharing and IWRM Through Active participation of Zonal Water Partnerships in India, Toolbox Focal Point Meeting, Global Water Partnership in Stockholm, Sweden, August 17, 2008.

Preventive Measures to Combat Sexual Harassment at the Workplace, Institute of Public Administration, Bangalore, August 30, 2008.

Gender, Caste and Water Governance, Voices from the Waters 3rd International Film Festival and Conferences, Bangalore University, September 17, 2008.

Transboundary Water Sharing and Conflict Resolution-Toolbox, Global Water Partnership, New Delhi, November 2, 2008.

Prof Rajaram Nagappa

Chemical Micro-propulsion Devices, International Workshop on Advances in Processing of Solid Propellant Rocket Motors, DRDO Golden Jubilee Celebrations, Pune, October 23, 2008.

Missile Propulsion Technologies, Workshop on Missile Propulsion Technologies, DRDO Golden Jubilee Celebrations, Hyderabad, October 30, 2008.

Chandrayaan Mission, Keynote Address, MIT Golden Jubilee Seminar ASYMPTOTE 2009, MIT, Anna University, Chennai, January 11, 2009.

Dr MG Narasimhan

The Concept of Self and Nonsself in Immunology, International Seminar on Self and Self-transformation, sponsored by Indian Council of Philosophical Research and held at NIAS, January 8, 2009.

Darwin (lecture in Kannada) on the occasion of National Science Day, Gandhi Sahitya Sangha, Bangalore. The talk was specially organised to mark the 200th birth anniversary of Charles Darwin, February 28, 2009.

Prof Narendar Pani

Applied Research in Social Sciences as part of the lecture series on Issues of Contemporary Relevance, Bangalore University, April 4, 2008.

Credibility and Competition in the English Media in India, KC Mammen Mappilai Memorial Lecture, Kochi, February 7, 2009.

Dr Srinath Raghavan

Civil-Military Relations Late Colonial and Early Independent India, Department of History, Delhi University, November 25, 2008.

Prof K Ramachandra

Transcendental Numbers: Transcendence of a^b (known as Hilbert's seventh problem), NIAS, January 19, 27, February 2, 9 and March 30, 2009.

Prof S Ranganathan

Materials and Civilization, Prasthutha, Indian Institute of Science, Bangalore, May 8, 2008.

Nanotechnology: The Second Industrial Revolution, National Technology Day, Bharath Earth Movers Limited, Bangalore, May 12, 2008.

Splendours of Indian Bronses, Centre for Basic Sciences, University of Mumbai, (with Dr Sharada Srinivasan) February 2009.

The Landscape of Indian Science and Technology, Johannesburg Biopad, February 2009.

Splendours of Indian Bronses, Inaugural Address, National Seminar on Materials Technology in Ancient India, Pune, March 20, 2009.

Prof S Balachandra Rao

Astronomy in Vedanga Jyothisha - The Most Ancient Indian Astronomical Text, International Conference on Vedas - The Treasure House of Mathematics and other Sciences, Madurai April 2, 2008.

A Critical Study of Indian Astronomical Tables, INSA Workshop held at IIT-B, Mumbai, April 9, 2008.

Indian Astronomical Tables-Sarinis-Koshtakas, Padakas and Vakyas, National Symposium on Science in India - from Early Times to Independence, National Centre for History of Science, Mysore, April 21, 2008.

India's Contribution to Mathematics, Sri Ramakrishna-Vivekananda Math, Ulsoor, Bangalore, May 8, 2008.

Transits and Occultation's in Indian Astronomy, Bangalore Science Forum, Bangalore, May 9, 2008.

The Scientific Temper, Workshop for Science Writers in Kannada organised by KRVP at Vain Science Park, Bangalore, May 25, 2008.

Dr H Narasimhaiah and His Scientific Attitude, Bangalore Social Science Forum, Bangalore, January 31, 2009.

Prof TS Kuppanna Sastry's Contribution to Indian Astronomy, IIT-B, Mumbai, February 21, 2009.

Ancient and Medieval Indian Contributions to Astronomy, Nehru Centre, Mumbai, February 21, 2009.

Prof Sundar Sarukkai

The Nature of Necessity (three lectures), Department of Philosophy, University of Hyderabad, August 26 to 31, 2008.

Dalit Experience and Theory, National Seminar on Ethics of Theorizing, University of Hyderabad, August 29, 2008.

Mathematics and Virtue Epistemology, Conference on The Myth of Knowledge without Value, Department of Philosophy, Jadavpur University, November 27, 2008.

The Immateriality of Matter, Monastic Dialogue, Bylakuppe Monastery, December 10, 2008.

Phenomenology of Untouchability, ICPR International conference on Phenomenology, Globalisation and Indian philosophy, India International Centre, New Delhi, January 6, 2009.

Science and the Ethics of Curiosity, International Conference on Buddhism and Science, Central University of Tibetan Studies, Sarnath, January 17, 2009.

The Missing Science in Social Science, Institute for Social and Economic Change, Bangalore, February 24, 2009.

Thinking Experience, National Seminar on Politics of Experience, JNU, March 7, 2009.

Non-Reducibility of Chemistry to Physics: A Philosophical Perspective, AI(1)chemists' Club Special Lecture, IPC Department, IISc, March 20, 2009.

Prof S Settar

Sharing Knowledge: Past and Present, 9th Annual Convocation of the Karnataka State Open University, Mysore, March 6, 2009.

Prof PK Shetty

Grid Security and Management, National Workshop on Grid Security and Management, organised by Power Grid Corporation of India Limited and Karnataka Power Transmission Corporation Limited, held at NIAS, April 28, 2008.

Science and Society, *HMT Ground*, organised by *HMT Residential Welfare Association*, August 15, 2008.

Prof Anindya Sinha

The Monkey in the Mirror: Social and Cultural Evolution in Wild Bonnet Macaques, 150 Years Since Darwin: Lecture Workshop on Behavioural Adaptations and Evolution, Sophia College, Mumbai, August 30, 2008.

Prof BV Sreekantan

Current Status of Scientific and Philosophical Studies on Consciousness, VG Kulkarni Memorial Lecture, Homi Bhabha Centre for Science Education, Mumbai, September 18, 2008.

Frontiers of Physical Sciences, DRDO Golden Jubilee Year-2008 Lecture, Aeronautical Development Establishment, Bangalore, October 20, 2008.

Scientific Contributions of Dr Homi Bhabha, Founder's day Celebration, TIFR Centre for Applicable Mathematics, Bangalore, October 30, 2008.

Dr Homi Bhabha and the Nuclear, Elementary Particle Era, Raja Ramanna Centre for Advanced Technology, Indore, February 20, 2009.

Dr Homi Bhabha: His Life and Works, Bhabha Atomic Research Centre, Mumbai, March 30, 2009.

Dr Homi Bhabha: His Life and Works, National Centre for Radio Astrophysics, Pune, March 31, 2009.

Dr Sharada Srinivasan

Musical Pillars of Hampi, Lecture-cum-Dance Demonstration, General Electric (GE), Bangalore, July 8, 2008.

Skilled Metal Craft of Delta Bronze Mirrors at Aranmula, Kerala, University of Toyoma, Japan, Seminar on Heat-treatment of high-tin bronzes, August 3, 2008.

Communicating Science: The Place of Traditional Knowledge, Crafts and Arts, World Academy of Art and Science, General Assembly, Hyderabad, supported by UNESCO, September 19, 2008.

Materials and Culture, Lecture-cum-Bharatanatyam Dance Recital, National Metallurgical Day, Indian Institute of Metals, New Delhi, India Expo Centre, November 14, 2008.

Dr Lalitha Sundaresan

Six-Sigma Awareness (series of lectures), Mount Carmel Institute of Management, Bangalore, July to August, 2008.

Applications of Statistics (series of lectures), Nathan & Nathan Consultants Private Limited, Bangalore, November, 2008.

Dr Carol Upadhy

Work and Labour in the Indian IT / ITES Industries: Social and Ethical Issues, Workshop on Understanding India's Information Society: Ethical Responses to New Communication Technologies, Christian Institute for the Study of Religion and Society (CISRS) in association with Communication Department, United Theological College, Bangalore, November 14, 2008.

Prof Prabhakar G Vaidya

Perfect Secrecy Systems, Lossless Compression and Logic Gates: An Unifying Theme Using Nonlinear Dynamical Systems, International Conference on Nonlinear Dynamical Systems and Turbulence, IISc, Bangalore (with Mr Nithin Nagaraj), July 18, 2008.

Some Possible Remedies for the Problem Caused by Embedding a System in a Higher Dimension, poster presented at Conference on Non-linear Dynamics and Turbulence, Indian Institute of Science, Bangalore (with Ms Swarnali Majumder), July 18, 2008.

Imprecise Synchronisation - A Study, International Conference on Nonlinear Dynamical Systems and Turbulence, IISc, Mathematics Initiative (IMI), Indian Institute of Science, Bangalore (with Ms PS Sajini Anand and Mr Nithin Nagaraj), July 18, 2008.

Joint Source Coding, Channel Coding, and Encryption Using Nonlinear Dynamical Systems Approach, International Conference on Recent Developments in Nonlinear Dynamics, School of Physics, Bharathidasan University, Trichy (with Mr Nithin Nagaraj), February 16, 2009.

Multiplexing of Discrete Chaotic Signals in the Presence of Noise, National Conference on Non-linear Systems and Dynamics, Saha Institute of Nuclear Physics, Kolkata (with Mr Nithin Nagaraj), March 5, 2009.

Prof AR Vasavi

Reflections and Lessons from the District Quality Education Project, Department of Economics, Mysore University, April 24, 2008.

Pluralising the Sociology of India, Indian Institute of Advanced Studies, Shimla, June 25, 2008.

School Differentiation, Indian Institute of Advanced Studies, Shimla, June 25, 2008.

Social Sciences and Options for Further Education, Scindhi High School, Bangalore. July 31, 2008.

System, Institution and Agency, Indian Institute of Management, Bangalore, August 8, 2008.

Dowry and the Multiple Violences, Vimochana, Bangalore, December 13, 2008.

The Cultural Grammar of Indian Democracy, Centre for the Study of Social Sciences, Kolkata, January 9, 2009.

Classes in Rural and Urban India, Fireflies, Ramapo College Students' Course, Bangalore, January 20, 2009.

The Predicament of Rural India, Kannada University, Hampi, February 5, 2009.

Regional Writings and Sociology of India, Kannada University, Hampi, February 7, 2009.

Contexts and Trends in Rural Distress, Fireflies, Ramapo College Students' Course, Bangalore, February 18, 2009.

PAPERS PRESENTED IN CONFERENCES**Dr BK Anitha**

Strategic Planning for Emerging Landscapes of Internationalization: A Focus on India in the International Institute of Education and the Annual Conference of International Administrators Pre-Conference Workshop—Strategic Planning for Emerging Landscapes of Internationalization: A Focus on China and India, AIEA Annual Conference, Atlanta, Georgia, February 22, 2009.

Transforming Educational Institutions for Global Opportunities: New Directions for Higher Education, Workshop on Emerging Directions in Global Education, AIEA Annual Conference, Atlanta, Georgia, February 23, 2009.

Prof Malavika Kapur

Ethical Issues in Counselling, Workshop by the

NCERT for the Stakeholders in Counselling at the DSERT Bangalore, March 19, 2009.

Dr Rajesh Kasturirangan

Tacit Belief and Appropriate Action, 1st Young Investigators in the Life Sciences Meeting. Poovar, Kerala, February 26, 2009. This talk has also been partly published as: Kasturirangan, R. (2009). Cell Biology, Like Physics, Has Logic. Nature India.

Prof Narendar Pani

On New Institutional Structures, Workshop on Institutional Collaborations, CSCS, Bangalore, June 19, 2008.

Gandhian Approaches to Social Conflict, Symposium on Gandhi and Religious Freedom and Harmony, Sarvodaya International, Bangalore, January 29, 2009.

Reservations and Inclusiveness, National Seminar on Positive Discrimination: Some Unexplored Dimensions, Institute of Development Studies, Mysore, March 13, 2009.

Dr Srinath Raghavan

Terrorism, State Sponsors and Deterrence: the Indian Experience, International Studies Association Annual Convention, New York, February 17, 2009.

Dr Carol Upadhy

Return as Reciprocity: Reverse High-tech Migrants and the “New India”, *Conference on Return Migration in Asia; Experiences, Ideologies and Politics*, Asia Research Institute, National University of Singapore, July 31 to August 1, 2008.

CONFERENCES ATTENDED

Prof Dilip R Ahuja

Beijing High-Level Conference on Climate Change: Technology Development and Technology Transfer, Beijing, China. Helped draft the Conference Declaration, November 7 to 8, 2008.

Scientific and Technical Advisory Panel (STAP) *Workshop: GEF-5 and Climate Science*, Washington, DC, USA. Help recommend strategic priorities, March 30 to 31, 2009.

Prof Sangeetha Menon

Compassion and Conflict, Indian Business Academy, Bangalore, January 3, 2009.

Prof PK Shetty

Conservation and Stewardship of Agricultural Biodiversity in an Era of Climate Change, International Forum, MS Swaminathan Research Foundation and Food & Agriculture Organisation (FAO), Chennai, August 7 to 9, 2008.



NIAS IS 20



Prof MGK Menon, Prof P Balaram, Mr MV Rajashekar, Mr Xerxes Desai, Dr K Kasturirangan, His Excellency the Governor of Karnataka Mr Rameshwar Thakur and others during the Vicennial Celebrations on June 20, 2008.

BOOKS

Rao S Balachandra (2008) *Eclipses in Indian Astronomy*. Bangalore: Bhavan's Gandhi Centre of Science and Human Values.

Rao S Balachandra (2009) *Transits and Occultations in Indian Astronomy*. Bangalore: Bhavan's Gandhi Centre of Science and Human Values.

Settar S (2008) *Somanāthapura*, Bangalore: Ruvani (Abhinav Imprint). (In English and Kannada).

Ramanujam R and **Sundar Sarukkai** (eds.) (2009) *Logic and Its Applications*, Springer Lecture Notes in Artificial Intelligence (LNAI 5378), Heidelberg: Springer-Verlag.

Chakraborti MK, Benedikt Lowe, MN Mitra and **Sundar Sarukkai** (eds.) (2008) *Logic, Navya-Nyaya and Applications*, Studies in Logic Series Vol.15 London: College Publications.

EDITED PROCEEDINGS / JOURNALS

Mu Rongping, **Dilip Ahuja** and Ralph Suttmeier (Co-Chairs) and William A. Blanpied (Editor) (2009) *Proceedings of the China-India-US Science, Technology and Innovation Workshop*, NIAS, Bangalore, March 2009.

Ramachandra K (2008) *Hardy-Ramanujan Journal* Vol.31.

PAPERS

Anitha BK and Bhushan Patwardhan (2008) 'India Education Vision Document, Emerging Directions in Global Education', EDGE Secretariat, Bangalore. www.edgeforum.in.

Anitha BK and Bhushan Patwardhan (2008) 'Feature on Indian Higher Education, The Road Ahead' *World Education News*, New York. pp.1-10.

Anitha BK and Bhushan Patwardhan (2008) 'Emerging Directions in Global Education: A Report', *Current Science* 95(3):303.

Rao S Balachandra and SK Uma (2008) 'Karanakutuhalam of Bhaskara-II', An English Translation with Math Notes etc., (Ch.6 to 8), *Indian Journal of History of Science* 43: S109-S150.

Publications

Mūlārāṭhā Contrroversy Among Advaita Vedāntins: Bhaskara Himself Responsible?

The concept of *avidya* or ignorance is central to the Advaita Vedānta of Śaṅkara. The post-Śaṅkara Advaitins were self-conscious in the use of terms of Śaṅkara with the intention of strengthening his views. One of the aims of this study is to trace the views of these self-conscious Advaitins in regard to the concept of *avidya*. Before Śaṅkara's time, a scholar named Hoteṣa, challenged the accepted tradition through the publication of his work *Uddiṣṭa*, particularly with regard to the *avidya* doctrine. It was his view that the post-Śaṅkara commentators brought their own innovations to the notion of *avidya*. This was the idea of *avidya* in the material world, which argues that such an idea of *avidya* is not to be found in the Advaita tradition of Śaṅkara and is based upon Śaṅkara. This paper attempts to show although Śaṅkara may not have explicitly favoured such a view of *avidya*, lack of clarity on the nature of *avidya* left enough scope for the post-Śaṅkara commentaries to take such a position on *avidya*.

śaṅkara Advaita Advaita Avidya Ignorance Mūlārāṭhā Vedānta

*A concept of ignorance, known as *avidya*, is central to the position of Advaita Vedānta. Śaṅkara gives an exposition about the nature of *avidya* in his commentary*

*K. S. Murthy (2008)
School of Education, National Institute of Advanced Studies,
Central Institute of Science Campus, Bangalore
560012, India
Email: msmurthy@nias.res.in, msmurthy@iisc.ernet.in*

History of Science, Philosophy and Culture in Indian Civilization

General Editor: D.P. Chattopadhyaya

Volume II Part A

A Social History of Early India

CHAPTER 15

Early Social History of Indian Metal Crafts: Some Archaeometallurgical and Ethnoarchaeological Perspectives

Manohar Srivastava

This essay attempts to throw light on the social history of ancient Indian metal crafts through exploring the period from prehistory to the early medieval period by exploring ethnoarchaeological, archaeometallurgical and technological perspectives along with conceptual or epigraphic evidence, concerning metal crafts in India. A rich tradition of traditional Indian metal crafts, *śaṅkara*, which can be traced to three centuries with technology followed over a millennium. Most Indian metal traditions were practiced independently with few instances of becoming being associated where they co-existed and under the influence of technology or technology left behind by the tradition in the ancient times. There is some evidence of epigraphic or historical evidence to gain better insight into the social history of these crafts and traditions. Within this context, ethnoarchaeological perspectives (based on existing metal traditions) can be used to understand the existing metal traditions of the region and nature of metal of these metal traditions.

The specialization of metal traditions as evidenced by artifacts of traditional metal crafts spread out with a wide range of materials from iron, metal, wood, pottery, etc., but has also included individual usage of metal crafts with several of these materials. In the case of metals, these specializations extended across different metals to allow, as well as for the spread, in southern India where the crafts were for the metal traditions, the metal was used for the metal and gold workers and the tradition work was largely for metal and gold. The metal specializations had their own historical background and their own different stages and stages of development. For example, the metal of the metal traditions making the tradition of being developed in the ancient world than the metal of prehistoric period was in metal crafts with other metal being of metal crafts.

Moreover, although ancient Indian metal traditions did not have their own specializations in religion, tradition and technology, however, the metal's traditional specializations as a range of metal crafts and workers from the prehistoric knowledge of metal crafts provided a greater part than history of the metal traditions of metal crafts and the importance of metal crafts in the ancient world. The metal of metal crafts in these regions had their own traditions. The

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Financial Statements

For the year 2008-2009

**NATIONAL INSTITUTE OF
ADVANCED STUDIES**

Indian Institute of Science Campus
Bangalore 560 012

BRV GOUD & CO.

Chartered Accountants

'Sai Complex' 1st Floor
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Bangalore - 560 001

Auditors' Report

1. We have audited the attached Balance Sheet of "NATIONAL INSTITUTE OF ADVANCED STUDIES", Indian Institute of Science Campus, Bangalore – 560 012, as at 31st March 2009, the General Income and Expenditure Account and Sponsored Projects Income & Expenditure Account for the year ended on that date, annexed thereto. These Financial Statements are the responsibility of the Institute's Management. Our responsibility is to express an opinion on these Financial Statements based on our Audit.

We conducted our audit in accordance with Auditing standards generally accepted in India. Those Standards require that we plan and perform the audit to obtain reasonable assurance about whether the Financial Statements are free of material misstatement. An Audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the Financial Statements. An audit also includes assessing the accounting principles used and significant estimates by Management, as well as evaluating the overall Financial Statement presentation. We believe that our audit provides a reasonable basis for our opinion.

2. We have obtained all the information and explanations, which to the best of our knowledge

and belief were necessary for the purpose of our Audit.

3. In our opinion, proper Books of Accounts as required by law have been kept by the Institute so far as appears from our examination of such books.
4. The Balance Sheet and the Income and Expenditure Account dealt with by this report are in agreement with the books of account.
5. In our opinion and to the best of our information and according to the explanations given to us, the said accounts read with the schedules and notes thereon give a true and fair view in conformity with the accounting principles generally accepted in India:
 - a) In the case of the Balance Sheet, of the state of affairs of the Institute as at 31st March 2009,

AND

In the case of Income and Expenditure Account, of the surplus in both the General and Sponsored Projects Income & Expenditure Accounts for the year ended on that date.

for BRV GOUD & CO.
Chartered Accountants

PLACE : BANGALORE
DATE : MAY 13, 2009

Sd/-
(AB SHIVA SUBRAMANYAM)
PARTNER
M.NO. 201108

NATIONAL INSTITUTE OF ADVANCED STUDIES
Indian Institute of Science Campus, Bangalore 560 012

BALANCE SHEET AS AT MARCH 31, 2009

Particulars	As on 31/03/2009 Rs.	As on 31/03/2008 Rs.
I. SOURCES OF FUNDS:		
a) Capital Fund	56373079	32833106
b) Other Funds	211843989	200885031
c) Current Liabilities	1434154	847490
d) Depreciation Fund	63505622	56958496
Total Rs.	333156845	291524123
II. APPLICATION OF FUNDS:		
a) Fixed Assets	138979945	136914269
b) Investments	183079000	145514000
c) Advances & Deposits	723427	3401196
d) Cash at Banks	10374473	5694658
Total Rs.	333156845	291524123

As per our report of even date
for BRV GOUD & CO.
CHARTERED ACCOUNTANTS

Sd/-
(DR K KASTURIRANGAN)
DIRECTOR

Sd/-
(AB SHIVA SUBRAMANAYAM)
PARTNER

PLACE : BANGALORE
DATE : MAY 13, 2009

Sd/-
(P SRINIVASA AITHAL)
HEAD-ADMINISTRATION

NATIONAL INSTITUTE OF ADVANCED STUDIES

Indian Institute of Science Campus, Bangalore 560 012

GENERAL INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED MARCH 31, 2009

Particulars	2008-09 Rs.	2007-08 Rs.
A. INCOME:		
Grants and Donations	35400000	1000000
Interest on Investments	10401773	10770074
Overhead & Administrative Charges Received	6923702	4796172
Research, Symposia & Course Receipts	4507476	4358863
Miscellaneous Income	3178408	2507838
TOTAL (A) Rs.	60411359	23432946
B. EXPENDITURE:		
Administrative Expenses	16762518	15190951
Travelling Expenses	386049	574492
Repairs and Maintenance Expenses	2829702	2386412
Research, Symposia and Course Expenses	4647983	5147177
Professorship Expenses	1105512	323051
Miscellaneous Expenses	70982	23017
TOTAL (B) Rs.	25802745	23645100
C. SURPLUS/(DEFICIT) BEFORE DEPRECIATION (A-B) LESS: DEPRECIATION	34608614 6032088	(212153) 5354205
D. SURPLUS/(DEFICIT) AFTER DEPRECIATION	28576526	(5566358)

As per our report of even date
for BRV GOUD & CO.
CHARTERED ACCOUNTANTS

Sd/-
(DR K KASTURIRANGAN)
DIRECTOR

Sd/-
(AB SHIVA SUBRAMANAYAM)
PARTNER

PLACE : BANGALORE
DATE : MAY 13, 2009

Sd/-
(P SRINIVASA AITHAL)
HEAD-ADMINISTRATION

NATIONAL INSTITUTE OF ADVANCED STUDIES

Indian Institute of Science Campus, Bangalore 560 012

SPONSORED PROJECTS INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED MARCH 31, 2009

Particulars	Scientific Research As on 31/03/2009 Rs.	Scientific Research As on 31/03/2008 Rs.	Social Science Research As on 31/03/2009 Rs.	Social Science Research As on 31/03/2008 Rs.
A. INCOME:				
Projects Receipts	29614408	16756345	18124400	20242543
TOTAL (A) Rs.	29614408	16756345	18124400	20242543
B. EXPENDITURE:				
Projects Expenditure	27939661	15809062	18861703	19641457
Depreciation	468855	566166	46184	94672
TOTAL (B) Rs.	28408516	16375228	18907887	19736129
C. SURPLUS/(DEFICIT) FOR YEAR (A-B) TRANSFERRED TO PROJECTS FUND	1205892	381117	(783487)	506414

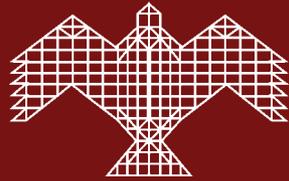
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PLACE : BANGALORE
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HEAD-ADMINISTRATION



The NIAS emblem can be traced back to a remarkable Sanskrit work called the *Sulva-sutras*, literally 'The rules of the cord'. The text is a handbook of ritual geometry, and describes a series of geometric 'constructions' or procedures (using only strings and pegs) for the layout of sacrificial altars and fires of various shapes and dimensions, usually specified with extraordinary precision. To this day a cord is a part of the basic equipment carried by an Indian mason, to be used in surveying or in laying out a structure in any construction activity.

Scholars are not agreed on the precise dates of the *Sutras*, but the text clearly pre-dates Panini and must have been composed before the 6th century BC. The text acknowledges that the procedures it describes were even older.

NATIONAL INSTITUTE OF ADVANCED STUDIES

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