A Report

Lund, 20th April 2008.

- by
- **Baboo M. Nair**
- Professor emeritus
- Dept of Food engineering, Food technology and applied Nutrition,
- LTH, Lund University, SWEDEN

- on a visit of Swedish Scientists to India - April 2008.
- Organised by

- INSTEC -Centre for Indian-Swedish Cooperation on Technical Research and Education,
- KTH, Valhallavägen 79, Stockholm, SWEDEN.

Title of the project

- INSTEC Mobile workshops on sustainable urban development

Objectives

- To establish a platform in India for the Swedish network INSTEC
- To conduct a Mobile Workshop (Road-show) visiting 3-4 Indian cities
- To develop an Indian counterpart network on Sustainable Development and Environmental Technology including the establishment of regional focal points for Indo-Swedish cooperation
- To participate in the creation of an academic research/development centre at an Indian IIT or University focussing on Sustainable Development and Environmental Technology
- To Carry out Indo-Swedish workshops on environmental technology and sustainable development, as step-stones towards the Millennium Development Goals
- To work for the development of an Indian Institute for Sustainable Development and Environmental Technology (IISDET)

(taken from the minutes of the INSTEC meetings)

Background:

The effects of the globalisation process are leading to the movement of people, capital, goods, services, information and technology across regional and national borders, resulting in a growing global competition. Investments in R&D are also becoming more and more internationally mobile seeking the regions and countries that offer the best conditions. This means that not only production and services are outsourced, but also research. Companies that wish to carry out research can now establish facilities in any part of the world and they are more prone to base their decisions on available local capabilities, costs and availability of qualified researchers. The development of new knowledge and innovations is increasingly taking place in different partnerships between research organisations and enterprises in different countries. Cross-border flows of research and development are now changing from USA, Europe and Japan towards emerging economies like China, India and Brazil.

Industry and the business community need incentives to collaborate in research networks and better information about how such collaboration can be brought about. If Sweden wants to be able to continue to compete successfully in a knowledge-based economy, it is of fundamental importance that Swedish research and education is of world class.

With its emerging economy and a rapidly growing technical base, India is becoming an increasingly interesting potential partner in the area of education, research and joint ventures. The traditionally good technical educational level, neutral geopolitical positions and more recently significant technological advances in the two countries, point to many potential areas for active and fruitful collaboration between India and Sweden.

In this context it is of particular importance to point out that collaborations within science and technology are based on long term interests and can act as doorways for contacts between industries. Expansive and knowledge-intensive industries, traditional industries and the public sector all need access to new knowledge in order to develop technological innovations and modernize their operations. Research provides the basis for developing new knowledge.

On its path of rapid economic growth, India has a unique opportunity to become a leading nation in environment technology and system solutions for sustainable development. Several facts make India potentially a strong force in implementing innovative approaches for sustainable development, taking into account its great biodiversity, variety of its climatic and other conditions, and huge human capital but relatively lean per capita natural resources, on the basis of its increasingly powerful technology and economy. Sweden and India can be viewed as natural partners in the global effort towards sustainable development. Sweden has a unique tradition among the industrialized nations regarding development and implementation of environment technology. The particular strength of the Swedish model, which maintains a balance between state, industry and basic research, is striking. India can expand its know-how by its collaboration with the Swedish experts and in turn offer them the benefit of Indian experience and tacit knowledge. An active collaboration can lead to breaking new ground in developing and implementing technology for sustainable development on a large scale. Sustainable Development is an overreaching goal for Swedish Government policy and the Swedish Policy for Global Development clearly emphasizes sustainable use of natural resources and protection of the environment.

In December 2005 Sweden and India signed a Memorandum of Understanding (MoU) on cooperation on Science and Technology. Another MoU on sustainable development and environment was signed in February 2008. These agreements form a basis for the Indo-Swedish

cooperation through the Swedish network INSTEC (Centre for Indian-Swedish Cooperation on Technical Research and Education) with the aim to provide a long-term basis for expanding exchanges of human resources between India and Sweden on technical/engineering research as a platform for joint ventures and expanding industrial collaboration.

The three specific objectives of INSTEC are to:

- Promote and support collaboration between Indian and Swedish academic/research institutions and industry in *research* (development of joint research projects, exchange of researchers/ post-graduates.
- Promote and support exchange between Indian and Swedish academic/research institutions and industry in *education* (MSc, continuing and distant education programmes, exchange of students, teachers and teaching materials)
- Stimulate and help establish *industrial contacts* and promote *joint ventures* between interested Swedish and Indian enterprises and research institutes in all areas of technological and natural resource development.

(taken from the minutes of the INSTEC meetings)

The Mobile workshops :

The network decided that sustainable development and environmental technology will form the first area of cooperation with India. KTH and IVL jointly agreed to act through, the centre CUH, as a coordinator for the INSTEC activities. A set of meetings has been held during 2007 and 2008. Following the discussion within the network, funding agencies and our contacts in India it was decided as a first step, to organise three workshops at three different places in India during the week March 30 to April 6.

The workshop will focus on the aspect of sustainable urban development, comprising system and technology aspects. Sustainable urban development comprises areas of energy, transportation, water, sewage, waste and ecosystem services.

The specific purpose of the workshops is to:

- Make a benchmarking of the present status of research in the field of sustainable urban development in Sweden and India
- Determine joint research and/or development projects of mutual interest that can be funded by Indian and Swedish agencies
- Form an Indo-Swedish platform/network of actors in the field of sustainable development and environmental technology, consisting of universities, government institutions and private industry.
- Investigate the possibilities of establishing regional focal points for Indo-Swedish cooperation within sustainable development and environmental technology.

(taken from the minutes of the INSTEC Meeting documents)

The visit to India with INSTEC. 29/03-2008 – 15/04-2008.

On 29th of March 2008 I travelled to India together with a few scientists from different universities and institutions of Sweden. The objective of the trip was to collect information about Indian research and also inform Indian scientists on Swedish research.

The visit was organised by INSTEC to carry out a number of mobile workshops on the theme sustainable urban development. To start with the visits were planned only to Hyderabad, Pune and New Delhi. Later on a group of six scientists (Prof. Ramon Wyss and Dr. Göran Baurne of KTH, Prof. Lars-Christer Lundin of Uppsala university, Lars Öberg of Umeå University and Björn Karlsson of LTH, Lund University) including me extended the visit to go to the southern state of Kerala where KSCSTE-Kerala State Council for Science Technology and Environment with its Chairman Chief minister of the state Sri V. S. Achudanandan and the Vice Chairman Dr. Yesodharan were willing to receive us for a meeting and negotiations leading to feasible collaborative projects.

I left home on 29th March at 05.15 by taxi to Copenhagen to take the flight from Copenhagen at 7.30 to Frankfurt and then at 11.20 from Frankfurt to Hyderabad. At about midnight to be exact at 00.25 on 30th March we arrived at a new modern Rajiv Gandhi Airport in Shamshabad which was in use only for a week before our arrival. After collecting the baggage, it took almost an hour and a half to reach the hotel by road. After some rest and sleep we had a meeting at the evening to inform all the participants about the programme of the meeting to be conducted on 31st march at Hyderabad.

Hyderabad – seminar and workshop

In Hyderabad the meeting was organised by CII-Confederation of Indian Industry and Shorabji Godrej Green Business Centre. The Shorabji Godrej Green Business Centre was an interesting complex/concept. The whole building occupying an area of about 20 000 sq feet and its near by surroundings were built following an American building design concept called LEED-Leadership in energy and environmental design and with support from USAID . Special features of the building were zero water discharge, wind tower for ventilation solar PV for energy roof garden recycled materials for construction and facility for rain water harvesting. The idea is being commercialised and market for green building is estimated to increase in India. An international conference & exhibition on green building is to be organised in Mumbai on 24th to 27th Sept 2008. Green building also offers evaluation of building design, advice on green building design and training and education in LEED concept.

Dr. S. Reghupathy Senior director and head of the Green building Centre of the CII talked about migration and the growing cities to come to the conclusion that waste disposal will be a great problem and in this context he estimated that the market for green building would increase quickly in India.

Prof. Ramon Wyss talked about the INSTEC and its intentions.

Presentations of Prof Lars Christer Lundin on his model for water management, Per Angelstams presentation "from sustainable yield to sustainable landscape", Björn Karlsons presentation on" use of solar energy for sustainable built environment", and presentation of Bo Mattiasson on "biotechnological methods for environment remediation" were interesting contributions

Prof. Bo Mattiasson talked about bio-remediation

From the Indian side Vishal Garg made a presentation on IT in building design, while Sultana Razia of EPTRI- Environment Protection Training and Research institute, Mukanti of the centre for environment at Jawaharlal Nehru Technical Institute and Venkateswara Rao of the Institute of Water Management talked about the sustainable development and problems of water

management in the city. In the following group discussion, water supply, Sewage disposal and system approach to sustainable cities were discussed.

The meeting concluded with a guided tour of the green building and its salient features. As far as I am concerned the fact that the CII-Confederation of Indian industry have a number of food processing companies among its members and that I have initiated some contacts with our network SASNET-Fermented foods and agreed to have a meeting with our Indian coordinator Dr. Jb Prajapati to establish closer links was of greatest benefit. I have also made a point that any sustainable urban development should, to be fully holistic, also address rural development and development of the Indian Agro–food sector as a whole for increasing its productivity providing room for a substantial increase in income of the rural population. This would to a great extent inhibit migration of people from villages to the cities in search of employment.

Pune - seminar, workshop and meeting with MCCIA

In Pune, the meeting "workshop on sustainable urban development" on 2nd April was organised by The department of environmental sciences and international students centre of the University of Pune in collaboration with INSTEC at the department of business management University of Pune. A presentation from the school of energy studies included information about their masters degree programme in renewable energy sources and various research projects on solar thermal, solar PV, and production of bio energy from domestic waste by fermentation and by gasification. Peter Hagström of IVL Stockholm made a presentation on gasification of domestic waste and forestry waste for production of energy while Hans Blomquist of Uppsala University was more interested to know as to what makes the difference in energy policy of various societies. A presentation of the non governmental institute "world institute of sustainable energy" who handle projects related to this area for governmental as well as non governmental agencies was interesting. Sven Nimmermarck from SLU described how he studies odour pollution to take control over emissions of gases and foul smelling in the agricultural environment. Lennart Nilsson of KTH talked about various ways of energy conservation and Poorva Keskar talked about policies for sustainable city development. Most of the afternoon was spend on group work and a summary of the discussion by Christer Bengs of SLU is given below.

At MCCIA Mrs Leela Poonawala a previous managing director of Alfa Laval and Tetrapak was our host.

At the end of the meeting a nongovernmental organisation called BAIF development research foundation and its activities were presented by the chairman of its executive committee Dr. NG. Hegde who pointed out the fact that rural development is urgent and it is necessary for inhibiting urbanisation and for sustainable management of cities. Urban waste management and production of biogas from domestic waste were also identified as possible areas of collaboration.

While in Pune we also visited MCCIA – Mahratta Chamber of Commerce, Indistries and Agriculture.Pune is a place in India where many Swedish Industries have their head quarters and production units. Among the various matters which came up for discussion, a joint seminar for networking among the small and medium scale industries of Sweden and India specially in the agro food sector for building strategic alliances for development of new products and new markets was also suggested. Mr. Surendrakumar Jain the honorary secretary and Mr. S. H. Kopardekar, Manager Intl business forum were positive about the bringing food industries of Sweden and India together on a common platform.

Memorandum concerning 9.4.2008

Workshop on Systems, Pune 2nd of April 2008

Christer Bengs
Professor DrSc
Department of urban and rural development
Swedish University of Agricultural Sciences SLU
christer.bengs@sol.slu.se

Background

The workshop in Pune was part of a mobile workshop in Hyderabad (31st of March), Pune (2nd of April) and Delhi (4th of April) arranged by INSTEC[1] and Indian partners at the spot.

Place: University of Pune, Department of Environmental Sciences
Participants:

Avinash Madhale, CEE	avinash.madhale@ceeindia.org
Sujit Patwardhan, PARISAR	sujit@vsnl.com
Josefin Wangel, KTH	wangel@infra.kth.se
Per Angelstam, SLU	per.angelstam@smsk.slu.se
Aneeta Gokhale-Benninger, CDSA	aneetabenninger@gmail.com
Poorva Keskar, HOD	poorvakeskar@gmail.com
Nachiket Patwardhan	nachiket48@sediffmail.com; nachiketsanket@gmail.com
Anand Damle, Damle Clay Structurals (P) Ltd	
Hans Lundberg, IVL	hans.lundberg@ivl.se
Magnus Carle,	magnus.carle@ellemce.se
Pratap Raval, Coll.of Eng.	pushpak20@yahoo.co.uk
Göran Johnson, Ramboll	goran.johnson@ramboll.se
Praveen G. Saptarshi, UniPune	praveensaptarshi@vsnl.net; pgsaptarshi@unipune.emet.in
Christer Bengs, SLU (moderator)	christer.bengs@sol.slu.se

[1] INSTEC stands for *A national network centre for Indian-Swedish Cooperation on Technical Research and Education*, which includes nine Swedish universities

The discussions during the workshop were very vivid and most participants expressed their views on various subjects. During the morning session all the participants presented themselves and their interests, and during the afternoon session the decisions of the workshop were confirmed. In addition, two Indian colleagues (Prof. Aneeta Gokhale-Benninger and Prof. Pratap Raval) delivered very interesting lectures.

The following is not a summary of all the discussions of the workshop, but rather a review of decisions made including additional motivations. The author is of course solely responsible for the ideas expressed in this memo.

1. The question of knowledge and knowledge production

Knowledge is directly connected to civilised collaboration between people of different kind, status and cultural aspirations. In Europe, the idea of civilised relations emerged as the fundament of the *polis*, the Greek city states of the Antiquity (from 8th century BC). The tenet was that civilised collaboration implies discussions and arguments instead of crude force, and this was actually the basic character of the *polis* even before the introduction of democracy (c. 500 BC). Any rational discussion as a means for promoting understanding between people requires the ability to convince one's opponents by putting forward rational (truthful and relevant) arguments and to shape one's performance in an appealing manner. Consequently, both science and rhetoric emerged as particular forms of skilful knowledge already in the *polis*.

Now, claiming that knowledge is a crucial part of civilised collaboration does not exclude the fact that knowledge is part of power relations as well. Actually the case that crude force was substituted for speech and words indicates that knowledge is part of any social contest. Francis Bacon, the English philosopher of the early 17th century, is connected to the allegation that knowledge implies power. In a fairly trivial sense, increased knowledge can promote power. With regard to technology, the European universities were developed into research institutions in the wake of the industrial revolution in Europe. This was done in order to establish a formalised system for the production of useful knowledge. Concerning political power, knowledge of societal processes enhances the potential for affecting and manipulating people, and the task of social sciences has been, at least to some degree, to provide means for social engineering.

There is, however, another aspect of knowledge as power. Leaders do not only as a rule possess superior knowledge compared to the subdued, but they are also in the position of defining what counts as knowledge. Many NGOs are convinced that they possess relevant knowledge about controversial matters within their own field of activities, but the political elite does not necessarily recognise that knowledge as relevant or truthful. Institutions such as universities with an approved and formalised status as knowledge producers are therefore in an elevated position. They do not only have the widely accepted task to produce knowledge, but also the status of being the possessors of recognised knowledge. That status is of course anchored in factual evidence, and can easily be spoiled by bad research.

The Swedish government has decided that the country shall take a leading position with respect to sustainable development. This implies a great variety of measures directed to technical development and innovation as well as economically viable and socially acceptable solutions. For years, research has been geared to comply with these requirements, and many practical solutions have been implemented as a result of applied studies. In the face of climate change and other threats, matters are not approached only from the point of technical solutions but also with respect to governance as well as spatial development.

The idea of *governance* encompasses of course various political institutions at different geographical levels (national, regional, local), but also a stakeholder approach. Those affected by political decisions should have a saying, which would exceed the mere poll at regular intervals. *Spatial planning* is understood to be something that surpasses traditional land use planning at the local or regional level. It is supposed to be an activity, which does not only produce plans and various land use strategies, but includes and analyses any political decision with spatial implications. Consequently, one could say that spatial planning provides services for bridging land use with governance and policy making.

During the workshop many speakers made evident that India possesses very advanced knowledge as well as technologies for facing environmental challenges in the future. During the whole tour, it became evident that a huge number of institutions work with sustainability matters in a very professional manner. It seems that much of required knowledge and technologies is available in India, but not necessarily utilised at the moment. In this respect, India does not differ from most other countries. Cooperation between India and Sweden in the field of sustainable development could address this very question. How to get knowledge available for all who really need it, without discriminating thresholds? How to arrange knowledge and how to give it a form that renders acquisition possible for different stakeholders? The two countries could definitely learn from each other in this respect.

The issue of knowledge and knowledge production concerns the question of democracy in the sense that discussion, rational argumentation and the free flow of information promote equity among different groupings in society far more that any other forms of governance.

2. Cooperation in the near future on knowledge production

The participants of the workshop agreed to start cooperating in the field of environmental improvements and sustainable development. The focus of the common endeavour at this stage would be knowledge and knowledge production. An initial project would be to write a report or book together within the coming six months. Each author would through her/his contribution define a position of expertise and/or interest in knowledge production. All the writings should stick to the overall topic of what kind and form of knowledge is needed in the face of future environmental challenges. All the writers do not necessarily have to come from the group of participants of the workshop, and a distinct academic profile is not required, albeit it is not rejected either.

As the participants of the workshop represented different fields of interest or professions such as politics, civil administration, consultants, planners and architects, engineers, university teachers and researchers, independent research institutes and NGOs, it was thought that when each one writes from her/his point of view, a multitude of various interests of knowledge would be expressed. Such a common endeavour will get the involved persons to know each other a bit better and conditions will be set for further cooperation. It was agreed that Christer Bengs and Praveen G. Saptarshi should function as editors of the forthcoming book.

As stated above, the idea of focusing on knowledge springs from the demand for knowledge that is publicly available in a form suitable for many. This idea deserves some comments.

Firstly, knowledge may concern professional matters within different fields of technology or social sciences, planning or the humanities. As a rule, the results of university research are public, but not necessarily in case they are commissioned by external funding and the results are agreed

to be the property of the commissioner of the project. A major difficulty with university research is however something else. Research reports may simply not be accessible for outsiders due to limited issues or because the mode in which results are presented is inconceivable for laymen. Even other professionals within the same field of science may find it easier to apprehend research results, which are expressed in a fairly non-technical way. There is a constant demand for producing knowledge that is publicly available, preferably on the web, and expressed in a form that is comprehensible for laymen, i.e. in a non-technical form.

Secondly, knowledge is constantly produced by public authorities, e.g. planning agencies, and much of such material is not public in case it is related to forthcoming political decisions or classified for other reasons. Different countries have of course very different legislations in this respect. Sweden is renowned for promoting its citizens to access public documents, and has advocated the principle of enlarging the bulk of documents labelled public in the context of the European Union. The idea behind such claims is that taxpayers should possess the right to information, which they are, as a matter of fact, financing. The claim is also based on the fact that governance cannot be improved and stakeholders cannot respond unless relevant information is available. An inspiring example of an elaborated information system concerning cities and city regions is the Urban Audit initiated and promoted by the European Union (see http://www.urbanaudit.org/). The Urban Audit enables politicians and citizens to compare the profile of their own city with those of some 250 other cities in Europe. The number of cities will be extended to 350.

The writers are urged to analyse their respective field of expertise and their experience in terms of knowledge they would need if they would live in the best of worlds. As each one is to some extent a producer of knowledge, the writers are also requested to consider how their own knowledge could be made available for a larger circle of stakeholders and citizens. The contributions could include examples of obstacles to the free flow of information or views with respect to structural properties of the society, which hampers information flows. The contributions could hopefully also deal with cases of best practice and constitute a kind of benchmarking with regard to country, region and field of knowledge.

3. Case study Pune region

It was decided that the region of Indian Pune would be chosen as a case study. The reason for choosing the region of Pune and not only the city as such is that cities have a symbiotic relation with their surrounding region. There is a constant flow of people, material and assets between the city and its rural hinterland. Much of the necessities of life (clean water, food, energy) are flowing in and problems (rain water, sanitation, and solid waste) are exported to the near surroundings. To get a comprehension of the local totality of various flows and functional relations, the whole region has to be considered. Swedish cases, which could function as regions of reference are the greater region of Stockholm (Mälardalen) and the Malmö region. In both these cases, newly built city blocks have been erected with the aim to promote sustainable development and test advanced environmental technology.

The decision what to study and how to do it was not discussed during the workshop mainly due to lack of time. It was thought that the initial writing exercise would set the scene for further cooperation. Of importance though is to get this work started as soon as possible, and one possibility is to link up the study with progressive planning activities in the case regions. Of course the study should not be subdued to singular planning problems, but a systems approach is needed and the bridging of technology with governance and spatial planning is essential. The

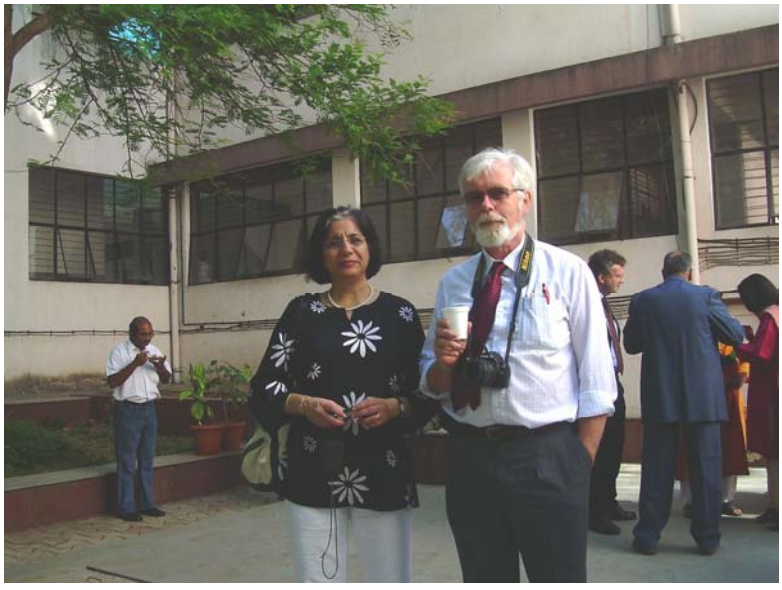
needed expertise is manifold, including civil engineers, social scientists, anthropologists, economists, architects and planners.

The availability of suitable technologies is of course always relative to the global supply of various technologies as well as local needs and means. Therefore, supply and demand is in constant flux. Any solution should be judged according to size of investments and implications for the future. Such implications are not only technical, but economical, social and cultural as well. Future flexibility is definitely a foreseeable asset. A minimum requirement when applying new solutions is that the effects of various technical applications should not counteract one another. Therefore a systematic view should be applied and the various subsystems should be investigated in relation to overall effects.

New Delhi – seminar and workshop

In New Delhi the Indo-Swedish Workshop on Sustainable Urban development was carried out on 4th April at the International Habitat Centre, Lodi Road. The programme was initiated by the executive director of The Environment Research Institute Dr. Leena Srivastava who also aptly connected rural development as a part of sustainable urban development in India. The Swedish Embassy was represented by Stefan Jonsson who made some opening remarks before Ramon Wyss made an introduction of INSTEC and its intentions followed by a special address on various aspects of sustainable urban development by Mr. R. Sethuraman of the ministry of urban development of the government of India.

After the tea break, Christer Bengs of SLU was the chairman when Hans Lindberg talked on "the concept of sustainable cities", Mili Majmumdar of TERI talked on "Green infra structure initiatives in India" Shikha Gandhi of TERI on "Challege of sustainable urban development in India".



Before lunch Rajni Hatti Kaul could make a presentation of her research in Lund dealing with effective utilisation of biomass for production of chemicals and bioenergy"

A. K. Singhal talked about "Solar energy for urban areas" and Shirish Garud talked on Role of Renewable energy in Urban development" followed by Meenakshi Munshi of the department of biotechnology who talked about biotechnological interventions for improved

bio-fuel production. In the after noon most of the presentations were on management of eco systems and environment. Lennart Nilsson of KTH talked about Environmental management and environmental system analysis. Josefin Wangel of KTH presented some points of view on environmental strategies for social change. S. Gangopadhyay talked about sustainable urban transport and T. S Panwar TERI talked on "Air quality issues and initiatives" from an Indian perspective. Prof. Ramanathan of JNU-Jawaharlal Nehru University talked about water and sustainability, Dr. RC Trivedi of CPCB – Central Pollution Control Board talked on "wastewater management in India". and Suneel Pandaey of TERI discussed the status and issues of municipal solid waste. Concluding session was used mostly for discussing formation of a common platform in the field of sustainable development and environment technology with out making any clear decision.

Last evening in New Delhi we were invited to a get together at the residence of Carl-Gustav Svensson who is the chief of the development division of the Swedish Embassy. Here Prof Hans Lundberg of IVL, Stockholm with Arathi David and Ramesh Mukalla of the Swedish Embassy.

Kerala - seminar, study tour and meeting with the chief minister

On 6th of April six of us proceeded to Kerala to meet the representatives of the KSCSTE- Kerala State council for Science Technology and Environment **www.kscste.org** and the directors of its individual institutions. The main aim of the visit was to have meetings with the president, the executive vice president of the Kerala State council for Science Technology and Environment as well as the directors of the different centres of research and development to discuss one of the main objectives if INSTEC namely "To work for the development of an Indian Institute for Sustainable Development and Environmental Technology"

Professors Lars Öberg, of Umeå University, Lars-Christer Lundin of Uppsala University, Göran Baurne of Royal Institute of Technology, Stockholm, and Björn Karlsson LTH, Lund University at the back, with Prof Ramon Wyss of Royal Institute of Technology, Stockholm and Prof Baboo M. Nair of LTH, Lund University in the front.

We arrived at 12.30 PM and we were received at the Thiruvananthapuram airport by Dr. Prakashkumar for further transport to Mascot Hotel located at the centre of the city with a view over the skyline of the city including the state legislative assembly building. Some of us were a bit ill with fever and common cold and wanted to rest the rest of the day. I took the opportunity in the after noon to discuss the organisation of the visit and its various details with Dr. Prakashkumar before retiring for the day.

On 7th April we were picked up from the hotel for a scientific session at the conference hall of the KSCSTE at Sasthra Bhavan, Pattom. The day started with a warm floral welcome by the ladies of the council following the age old tradition of Kerala "Ethirellpu" which was deeply appreciated by all the Swedish visitors even though there was no "kottum kuravayum". After some social activity including small visit to the office of the executive vice president Dr. E. P. Yesodharan, the formal meetings were started.

The executive vice president of the KSCSTE Dr. EP Yesodharan welcomed the Swedish delegates and expressed his wish to have a fruitful discussion during the visit and valuable cooperation in the future presenting the genesis and mission of the KSCSTE which has the chief minister of the state as its president.

Then I introduced the Swedish delegates to the participants of the meeting and expressed my gratefulness to my Swedish colleagues for coming with me to Kerala and to my Kerala friends for preparing grounds for a meeting like this for discussing collaboration in research and higher education between institutions of Kerala where I was born and institutions of Sweden where I am living.

KSCSTE is an autonomous body of the government of the Kerala State dealing with policy matters related to Science and Technology of the state.

The KSCSTE- Kerala State Council for Science, Technology and Environment was constituted in November 2002 as an autonomous body to encourage and promote Science and Technology related activities in the Kerala State by restructuring the erstwhile State Committee for Science, Technology and Environment (STEC) established in 1972 in concurrence with the Science Policy of Government of India.

The apex body of KSCSTE is the State Council with Chief Minister of Kerala as the President. The chief executive officer of the Council is Executive Vice President (EVP).

The Main functions of the State Council are to:

- Plan, formulate and implement Science and Technology Promotion and other related research and development programmes.
- Provide overall guidance to the programmes and the developments of R&D centres of the Council.
- Withdraw and disburse the grant-in-aid funds from the Government and sponsoring agencies to R&D Centres and other grant-in-aid institutions.

The decisions of the State Council and Executive Committee are implemented by the Council Headquarters (CHQ) based in Thiruvananthapuram. The functions of CHQ are carried out under the overall guidance of Executive Vice President who is also the ex-officio Principal Secretary of Science &Technology Department (S&TD). The executive functions are administered by the Member Secretary. The Science and Technology programmes are managed by the Principal Scientific Officers, Scientific Officers and other staff members, both technical as well as administration.

KSCSTE also have initiatives in popularising education in science in the schools and institutions of higher learning in the state.

KSCSTE has its own R&D centres and the presentations of the technical session were done by the directors of the respective institutions. There are six R&D centres under the umbrella of the Council which does research work in specific identified domains. Presentations of the activities of the centres were done under the chairmanship of Prof. Ramon Wyss.

In an impressive presentation **Dr. M. Baba,** director of the The Centre for Earth Science Studies **(**www.cessind.org) talked about the genesis, vision, mission and activities of the centre which was started as a Centre of Excellence in Earth Sciences instituted by the Government of Kerala in 1978. It is an Autonomous Research Centre and it promote and establish modern scientific and technological research and development studies in earth sciences. CESS pursues multidisciplinary approach in problems related to land, sea and atmosphere, does Research & Development activities in basic and applied fields, conducts user training, academic programs, consultancy and popularisation of Science.

Dr. MD Nandeswar. Director of The Centre for Water Resources Development and Management (CWRDM) located at Kozhikode presented various the activities of his institution. CWRDM has a Research Council and a Research Committee consisting of all scientists of the Centre which assist in monitoring the progress of research works and in carrying out preliminary screening of the project proposals.

The management of the Centre is done by a Management Committee chaired by the Executive Director of CWRDM. There are 37 scientists belonging to multifarious disciplines like civil engineering, hydrology, hydrogeology, environmental sciences, agriculture, biological and chemical sciences, social sciences etc carrying out research on ' WATER' in CWRDM. The technical staff and project staff provide support to the scientific teams. The scientific activities of the Centre are organized into seven scientific divisions, five units/central facilities and five regional centres:

Scientific Divisions	Units/Central Facilities
Surface Water	Central Water Analysis Laboratory
Ground Water	Manned Observation Stations Unit
Environmental Studies	Water Resources Museum
Library, Documentation & Information Division	Remote Sensing Cell
Water Management (Agriculture)	LIWAMP
Computer Applications	
Isotope geology	

Dr. R. Gnanaharan presented the activities of The Kerala Forest Research Institute (KFRI)which was established to undertake research in areas like forestry, biodiversity etc., that are vital to the development of the Kerala State. .

The KFRI main campus at Peechi is designed and constructed by the reputed architect Mr. Laury W. Baker in his unique low-cost style. It has laboratories, library and other facilities attached to various Divisions. The Divisions are well equipped to undertake researches of disciplinary and multi-disciplinary nature.

Nilambur Subcentre and Palappilly Field Research Centre have facilities for laboratory work and raising nurseries and experimental plantations. The Subcentre at Nilambur has a unique Teak Museum displaying artifacts and utility items of teak wood, scientific information on various aspects of teak cultivation and wood utilization.

In addition, the museum has a library of world literature on teak, a modern auditorium and nature trail displaying various wild animals.

The Institute has well equipped laboratories to carry out modern research in tropical forestry to cater to the needs of various stakeholders. Some of the major facilities are:

Herbarium: Represented by more than 25,000 specimens of the flora of Kerala, recognized by International Association of Plant Taxonomists with the acronym KFRI.

Medicinal Plants Garden: Live reference collection of about 350 medicinal plant species of the forests of Kerala.

Orchidarium and Fern House: Live-collection of 52 wild orchids and 30 fern species of Kerala forests.

Butterfly Garden: Park attracting and sustaining over 70 varieties of colourful species.

Insect Collection: Reference collection of about 1000 insect species of the Western Ghats of India.

Wildlife Museum: Reference collection of more than 400 specimens of fresh water fishes, amphibians, reptiles and mammals of the Western Ghats.

Wood Treatment Plant: Pilot-scale facility to assess treatability and treatment schedules of different timbers.

Biotechnology and Tissue Culture Facility: Sophisticated facility for molecular characterization and micro-propagation of forest plants.

Nursery and Field Trial Facilities: Attached to Subcentre, Nilambur and Field Research Centre, Velupadam, for laboratory experiments and nursery, species and plantation trials.

Teak Museum: The only one of its kind in the world with exhibits on history, research and development of Teak.

Bambusetum: Live-collection of over 65 native and exotic bamboo species of the world.

Cane Germplasm: Live-collection of 30 species of indigenous and exotic canes.

Xylarium: Collection of over 600 authentically identified wood samples from Kerala and different parts of the world.

National Transportation Planning and Research Centre (www.natpac.org) was established in 1976 as a Division of Kerala State Electronics Development Corporation (KELTRON), a Public Sector Enterprise under the Government of Kerala. In 1982, it was reconstituted as an R&D institution under the Department of Science, Technology and Environment, Government of Kerala. In November 2002, Kerala State Council for Science, Technology and Environment (KSCSTE) was formed, with the objective of adopting a concerted and integrated approach to the research and development activities in Kerala. In February 2003, NATPAC was amalgamated to the new Council and accordingly is functioning as an R&D unit under KSCSTE which is fully funded and supported by the Government of Kerala. The Centre is undertaking research and consultancy works in the fields of traffic engineering and transportation planning, highway engineering, public transport system, inland water transport, tourism planning, rural roads, environmental impact assessment and transport energy.

Rajiv Gandhi Center for Biotechnology (http://www.rgcb.res.in) was established exclusively for pursuing research in Biotechnology. RGCB's new, 1,10,000 square feet laboratory complex. In addition, the center has an excellent 350 seat convention center, guest house for visiting faculty and on-campus student accommodation. Rajiv Gandhi Center for Biotechnology is the only institution of its kind within the country, exclusively devoted to Biotechnology, focusing precisely on translational research. All RGCB research programs are created with the underlying concept seeking to promote better health care and improved productivity of spices and medicical plants. The institute has 6 highly focused research departments working on medical

biotechnology and plant genetic engineering (Molecular Medicine, Molecular Endocrinology & Reproduction, Molecular Microbiology, Cancer Biology, Neurobiology and Plant Molecular Biology). The institute has major interdisciplinary consortium research programs on vaccine development, bioinformatics and bioprospecting for clinically bioactive compounds. A Program of Excellence in Translational Research (PETR) in collaboration with the Regional Cancer Center allows RGCB to carry out leading translational cancer research. True to it's commitment to translating biotechnology for economic development, RGCB has started strong industrial collaboration and offers incubator facilities for start up biotech companies. RGCB has also not forgotten its social commitments to the State and provides critical services for the community.

The Center has a Regional Facility for Genetic Fingerprinting, which provides DNA analysis services for forensic & criminal investigations, paternity disputes, identification of wildlife remains, authentication of plants and seeds besides a battery of molecular diagnostics for genetic and infectious diseases. RGCB is also a major provider of laboratory and infrastructure services to other academic and research institutions. A small efficient administration runs the affairs of the center with gracious management from the Kerala State Council for Science, Technology and Environment. The institute is a major stakeholder in human resource development having one of the best doctoral programs in Biotechnology. Admissions to PhD programs take place twice every year in July and December with students being selected from those with National Research Fellowships. Rajiv Gandhi Center for Biotechnology is an institute with a national character led by scientists & research students from various parts of India and a truly national agenda for translating biotechnology into reality at international standards."

Dr. S. Ganeshan Director of the institute talked about the Tropical Botanic Garden and Research Institute (www.tbgri.in) which was established with the vision of Conservation and sustainable utilization of the plant biodiversity of India, particularly of Kerala for the well being of her people". The mandate of the institute is

> To make a comprehensive survey of the economic plant wealth of Kerala.
>
> To conserve, preserve and sustainably utilise the plant wealth of Kerala.
>
> To introduce, cultivate and culture plants of India/other countries with comparable climatic condition for the economic benefit of Kerala and India.
>
> To carry out botanical, horticultural and chemical research for plant improvement and utilization.
>
> To offer facilities for the improvements of ornamental plants and to propagate them in the larger context of establishment of nursery and flower trade.
>
> To organize germplasm collections of economic plants of interest to the state in the case of those species for which separate centers are not already in existence.
>
> To establish a model production center for translating the fruits of research to public advantage leading to plant-based industrial ventures.
>
> To engage in activities, conducive to help botanical teaching and to create public understanding of the value of plant research in general, and the need for preserving our plant wealth.
>
> To establish an arboretum in approximately half the area of the Garden, with representative specimens of trees of Kerala and India, and trees of economic value from other tropical areas of the world.

To establish a garden consisting of medicinal plants, ornamental plants and various introduced plants of economic or aesthetic value.

To establish laboratories for botanical, horticultural and chemical research, with the aim of improvement and utilization of plants of medicinal and ornamental value.

To prepare a flora of Kerala.

To establish tissue culture facility with special reference to the improvement of seeds/fruits/flowers and quick and easy propagation.

To organize breeding for plant improvement and production of hybrid seeds, in the case of species for which such facilities are currently lacking or inadequate.

To be engaged in garden planning and research.

To serve as a source of supply of improved plants not readily available from other agencies.

To do chemical screening of plants of potential medicinal importance.

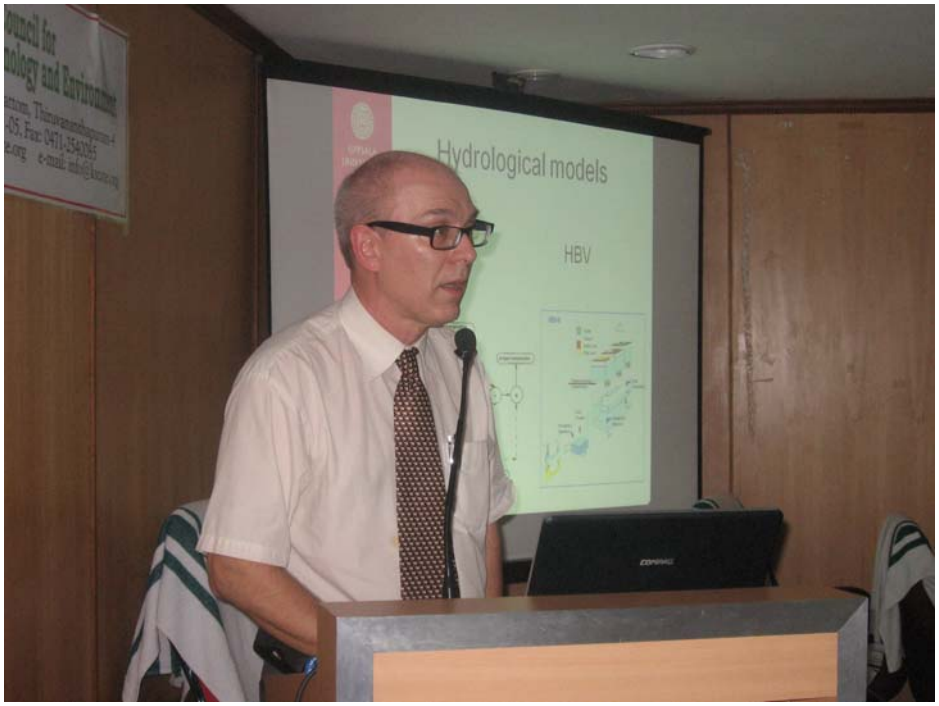
To work in collaboration with similar institutes in India and outside

To promote and establish modern scientific research and development studies relating to plants of importance to India and to Kerala in particular.

Thus TBGRI functions for inventory, conservation and sustainable utilization of the plant wealth through appropriate R & D efforts for the welfare of the state and the country at large.

After the lunch presentations were done by the members of the INSTEC deligation under the chairmanship of Dr. EP Yesodharan.

Prof Ramon Wyss of KTH Stockholm talked about the INSTEC, how it was formed and how it would like to work and what it want to achieve. He said INSTEC at present is a consortium of nine universities of Sweden and it would like to expand to contain all universities and probably even industries and NGOs. On eof the objectives of INSTEC is to initiate a centre for advanced research in environmental Science and engineering in India to carry out collaborative research programmes between India and Sweden.



Prof. Lars Christer Lundin of Uppsala University talked about a model system for water management, which was very interesting for the participants from the Centre for Water Resources Development and Management located at Kozhikode in Kerala. Dr. Kamalakshan kokkal of KSCSTE have already established a research link with him.

Prof Björn Karlsson of Lund University talked about various methods of using solar energy for heating and cooloing of the built in environment. One research link proposal on solar energy for cooling is being processed between Dr. Ajit Prabhu of KSCSTE and Prof Björn Karlsson of LTH, Lund University.

Prof. Göran Baurne of the royal institute of technology was familiar with kerala state and he had visited kerala in connection with a project on water management a few years ago. He presented the activities of his department of land and water resources enginnering at KTH, Stockholm

Prof. Lars Öberg from Umeå University talked about his department of environmental chemistry its research projects and the mastes degree programme in environmental science and chemistry which he is in charge of off. A collaboration between Dr. Prakashkumar of the KSCSTE and Prof. Lars Öberg has been also initiated

Sri Chitra Thirunal Institute for Medical Sciences and Technology (http://www.sctimst.in)

In the afternoon we were taken to Sri Chitra Thirunal Institute for Medical Sciences and Technology for a study tour. "The Sree Chitra Tirunal Institute for Medical Sciences & Technology (SCTIMST), Thiruvananthapuram is an Institute of National Importance established by an Act of the Indian Parliament. It is an autonomous Institute under the administrative control of the Department of Science and Technology, Government of India.
.

The Institute signifies the convergence of medical sciences and technology and its mission is to enable the indigenous growth of biomedical technology, besides demonstrating high standards of patient care in medical specialties and evolving postgraduate training programs in advanced medical specialties, biomedical engineering and technology, as well as in public health.

It has a 239-bedded hospital for tertiary care of cardiovascular and neurological diseases, a biomedical technology wing with facilities for developing medical devices from a conceptual stage to commercialization, and a center of excellence for training and research in public health.

The Institute has the status of a University and offers postdoctoral, doctoral and postgraduate courses in medical specialties, public health, nursing, basic sciences and health care technology. It is a member of the Association of Indian Universities and the Association of Commonwealth Universities."

The Biomedical Technology Wing (BMT Wing), instituted for the promotion of Biomedical Engineering and Technology, is located at the Satelmond Palace at Poojappura, about 10 kilometers away from the hospital campus.

A multidisciplinary team of scientists and engineers along with the supporting staff work here in multidisciplinary areas, varying from biomaterial development and characterization to medical device development, testing and evaluation. A Technoproove Facility exists for the pilot production of medical devices as a link between the institute and industry.

BMT Wing has been instrumental in establishing a medical device industry base in India by successfully developing and commercializing technologies of a number of devices and implants. Some of the commercialised technologies include the production of blood bag, blood oxygenator, hydrocephalus shunt, artificial heart valve, concentric needle electrode etc. Many medical device technologies are at various stages of development, including scale up.

The Biomedical Technology wing has implemented a quality system to meet the requirements of international standard ISO/IEC 17025. About twenty of these tests are accredited by Le Comite Francais d'Acreditation (COFRAC) of France. Test services are open to customers across the globe either from industry, research institutions or academicians.

Meeting with the honourable chief minister of the Kerala state

After the visit to SCTIMST we went to the secretariat of the government of kerala to meet the honourable chief minister Sri V. S.. Achudanandan who is also the president of the KSCSTE.

KSCSTE-Kerala State Council for Science Technology and Environment with its Chairman Chief minister of the state Sri V:S. Achudanandan and the Vice Chairman Dr. Yesodharan received us (Prof. Ramon Wyss and Dr. Göran Baurne of KTH, Prof. Lars-Christer Lundin of Uppsala university, Lars Öberg of Umeå University and Prof. Björn Karlsson and Prof. Baboo M. Nair of LTH, Lund University) and we had a hearty discussion about cooperation in research and education inenvironmental science and engineering.

Meeting with the honourable chief minister Sri V. S. Achudanandan and the executive vice president Dr. EP. Yesodharan to discuss the cooperation between INSTEC and KSCSTE

The out come of the visit.

In the concluding session we made a review of the visit, presentations study visits and other activities in general, some time was allotted for making a presentation of some concrete proposals from the scientists of Kerala to the visiting delegates to take home to Sweden for further action.

Full political support and cooperation

Personally my judgement is that the visit was reasonably successful. I feel satisfied that I could bring the Swedish university network INSTEC with many different plans and ideas about collaboration with Indian institutions to a meeting table where they could talk to an Indian counter part endowed not only with required political power but also clear understanding of the acute necessity to attack serious problems of environmental pollution and management of waste, water, land, energy and bio-mass by carrying out advanced research and higher education.

Letter of intent /Memorandum of understanding

Kerala government is planning to establish an institute for carrying out advanced research in environmental science and engineering and the chief minister extended an invitation to Swedish counter part to take a 50% stake. A letter of intent or MoU is to be drafted by the vice president of KSCSTE to be sent to Dr Ramon Wyss of INSTEC for further action in Sweden.

Concrete research link projects evolved at the meetings

1. Dr. Ajit Prabhu of the KSCSTE and Prof. Karlsson of LTH. Lund University have already identified "solar energy for cooling as a theme for a research link project between their respective institutions.
2. Dr. Kamalakshan Kokkal of KSCSTE and Prof. Lars Christer Lundin of Uppsala university also have established contact with each other in producing a research link project on water management
3. Dr, Harikumar of The Centre for Water Resources Development and Management, is al ready involved in a collaborative project with KTH, Stockholm.
4. Dr. Prakashkumar of KSCSTE and Lars Öberg of Umeå University on environmental science and chemistry.

Future plans

1. Organisation of an international seminar and workshop on sustainable development at the end of this year probably/possible in connection with the arrival of the VOLVO ocean race
2. To further develop the details of the proposal on cooperation in establishing an international institute for advanced research and education in environmental science and engineering.
3. A visit by officers of KSCSTE (president, vice president and the principal scientific officer) to Sweden for processing the proposals
4. Visit of Dr. V. Shobha, professor of environmental science, Kerala University, Trivandrum to visit Lund University
5. Preparation of a concept note on the centre for advanced research in environmental science and engineering

In conclusion and to acknowledge

I hope that the good and valuable contacts established and developed during the visit is nurtured and further developed by all the participants and become fruitful not only in an individual level but also in an institutional level to all those students and colleagues whom they represent. I want to thank the honorary chief minister of Kerala State for finding some substance in my letter to him, to the honourable Indian ambassador to Sweden Mrs Deepa Gopalan for timely support and necessary endorsement, to the executive vice president Dr. EP Yesodharan for showing the way, and to the principal scientist of KSCSTE Dr. Prakashkumar for preparing grounds for such a nice meeting and lastly but not the least leadership of LTH, Lund University to appreciate my participation in this mobile workshop and for financial support.

I am rather sure that a few more people in India came to know about Lund University and where it is located in this world after our last visit.

Baboo M. Nair , Lund, 20 April, 2008