



Draft 060905

INDIAN-SWEDISH COLLABORATION FOR SUSTAINABLE DEVELOPMENT AND ENVIRONMENTAL TECHNOLOGY

Report from a first series of meetings in New Delhi

June 13 – 17, 2006



Summary

A Swedish delegation representing the academic network visited New Delhi during June 13–17, 2006. The purpose of the visit was to establish direct contacts and explore collaboration interest/possibilities with a few key individuals/institutions, in the area of Sustainable Development and Environmental Technology. Thanks to the generous effort and dedication by Prof S Valiathan (former president of Indian National Science Academy), Ms D. Gopalan (Indian Ambassador to Sweden) and Prof S. Seetharaman (KTH), contacts were established and meetings arranged. The key institutions visited are (3 ministries, Environment & Forests, Science & Technology, Urban Development, discussion with secretaries as highest officers), Industry (CII, TERI, FICCI), Academic (IITD, IITK) and institutes (NEERI). The response was overwhelmingly positive resulting in discussions that were very constructive. Two key directions were agreed on:

A. 1. Formulation of specific project areas/topics, that contain a dimension of technology development, which would be of interest for both India and Sweden, ultimately benefiting both the people and the environment. An interaction process will take place during the fall of 2006.

2. Planning of the workshop in early winter (December 2006).

B. A general strategy/vision document on an Indo-Swedish international centre for sustainable development (ISDET). Concept paper will be prepared by end of October 2006.

Background

With its rapid economic growth and technological development, with the increasing human and diminishing natural resources, India is in need to reshape its vision of a sustainable future and aggressively promote solutions toward fulfilling this vision. Swedish experience in environmental technology and system solutions can help India in this effort and there has been a long-time cooperation between India and Sweden on environment and natural resources management dating back to the early 1960's.

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. As a result of this the Country Strategy for Development Cooperation between Sweden and India defines the field of environment as one of the three focal areas for the cooperation.

Sida is in the process of establishing an environmental facility called "Indo – Swedish Facility for Environmental Initiatives and Innovations."

In December 2005, Sweden and India signed a Memorandum of Understanding (MoU) on Science & Technology. The purpose of the agreement is to promote and strengthen research cooperation between the two countries.

The network for "Indian - Swedish Collaboration on Technical Research and Education (INSTECH) footed a fact-finding mission to pursue the possibilities for Indo – Swedish cooperation, June 14-17, 2006.

The objective for the mission was to meet with Indian ministries and organisations as well as the Embassy of Sweden for discussions regarding future cooperation and to set the way forward for this venue.

Members of the Swedish mission were:

1. Dr. Ramon Wyss, Vice President, Royal Institute of Technology
2. Prof. Karin Andersson, Vice President, Chalmers University of Technology
3. Mr. Göran Westerström, Dean, Dept. of Civil and Environmental Engineering, Luleå University of Technology, Sweden
4. Prof. Seshadri Seetharaman, Dept. of Materials Science and Engineering, Royal Institute of Technology
5. Prof. Vladimir Cvetkovic, Dept. of Land & Water Resources Engineering, Royal Institute of Technology
6. Mr. Göran Baurne, Land & Water Resources Engineering, Royal Institute of Technology

Programme for the meetings held by the mission:

June 14.

- The Embassy of Sweden
- Ministry of Environment and Forests
- Confederation of Indian Industries – Centre of Excellence for Sustainable Development (CII –ITC CESD)

June 15

- The Embassy of Sweden
- The Indian National Academy of Engineering (INAE)
- Federation of Indian Chamber of Commerce and Industry (FICCI)
- Dinner hosted by KTH

June 16

- Indian Institute of Technology – Delhi (IIT-Delhi)
- The Energy Research Institute (TERI)
- Department of Science and Technology (DST)

June 17

- The Embassy of Sweden
- Ministry of Urban Development

This excellent program is due to the important inputs by the Indian Ambassador to Sweden, Ms Deepa Gopalan and by Professor Seshadri Seetharaman at KTH.

The different meetings will be further described below

The Embassy of Sweden

(www.swedenabroad.se/)

Several meetings were held at the Embassy and staff from the embassy also accompanied the mission to the three meetings held with the ministries.

Attending the meetings from the Embassy were:

Mr Anders Sjöberg, Counsellor, Political and Economic Affairs.

Mr Carl - Gustav Svensson, Counsellor/Head, Development Co-operation Section.

Mr Ramesh C. Mukalla, Programme Officer, Environment & Governance.

On Wednesday the 14;th the mission made a brief visit to the Embassy to inform about the mission. Mr Svensson briefed the mission on the Environmental Facility being set up by Sida. The Ministry of Environment and Forests are now considering how to act on the environmental facility. Canada have had a facility that now is being closed down. Mr C-G Svensson later joined the mission to the Ministry of Environment and Forests.

On Thursday morning a longer meeting was held where the MoU and the Environmental Facility were discussed in more detail. Anders Sjöberg informed about the actions taken the last few years and visits made to India by Swedish ministers.

VINNOVA (The Swedish Governmental Agency for Innovation Systems) will station a technical attaché at the Embassy.

EU has placed a science attaché in India and in the 7:th frame-work programme there will be a window towards India.

The mission was informed about the country strategy for India and present Sida projects in India like Toxic links, support to CSE, OXFAM, WSP, UNICEF and others.

In November there will be an education fair in Delhi.

There might be an interest from Sida to support joint initiatives between Swedish and Indian institutes regarding training in prioritised areas related to environment using the present ITP-model (the Sida courses).

On Saturday morning a meeting was held at the Embassy to wrap-up most of the visit by the Swedish mission. A detailed discussion was held regarding the MoU and the six priority areas set forth, biotechnology, IT, environmental sciences, automotive, material and manufacturing. To implement the MoU a programme of cooperation (PoC) is needed. On August 29-30 there will be a joint committee meeting in Sweden.

The mission presented the way forward decided at the meeting at INAE regarding IISDET, the two different, parallel paths of actions that will be followed. It was proposed that a workshop should be held in Delhi in October/November/December where the proposals for cooperation can be discussed by Indian and Swedish scientists and more detailed plans elaborated. At this time the Environmental Facility could be presented/launched.

It was decided that a proposal for support for arranging the workshop and to support the participation of the Swedish scientists should be presented to Sida by KTH as soon as possible.

Memorandum of Understanding on Science & Technology

In December 2005, Sweden and India signed a Memorandum of Understanding (MoU) on Science & Technology.

The purpose of the agreement is to promote and strengthen research co-operation between the two countries. Vinnova is the nodal agency in Sweden for the implementation of the MoU. The MoU is presented in annex 2.

The Ministry of Environment and Forests

(www.envfor.nic.in/)

Meeting with

Dr. Prodipto Ghosh, Secretary

Mr Arghya Sardar and Mr Mukti Trivedi from Technology Information, Forecasting and Assessment Council (TIFAC).

“The Ministry of Environment and Forests is primarily concerned with the implementation of policies and programmes relating to conservation of the country’s natural resources including lakes and rivers, its biodiversity, forests and wildlife, ensuring the welfare of animals and prevention and abatement of pollution. While implementing these policies and programmes, the Ministry is guided by the principle of sustainable development and enhancement of human well-being.”

Dr Ghosh welcomed the mission and expressed his interest in the issue and highlighted the importance to address the environmental conditions within several areas in India. Pollution, natural resources conservation and energy are examples of broader areas of importance. Areas such as biomass energy, industrial pollution prevention, textile-, paper- and tinker industries, remediation, solid waste, passive solar technology, automotive and water were discussed.

Confederation of Indian Industries – Centre of Excellence for Sustainable Development (CII –ITC CESD) (www.cii-sustainability.org/)

Meeting with Mr K.P.Nyati, Principal Advisor, CESD and Mrs Seema Arora, Head , Environment Management Division.

The Confederation of Indian Industry (CII) is a non-government, not-for-profit, industry led and industry managed organisation, which works to create and sustain an environment conducive to the growth of industry in India, partnering industry and government. It is India's premier business association, with a direct membership of over 5800 organisations from the private as well as public sectors.

The CII-ITC Centre of Excellence for Sustainable Development was launched in New Delhi in January 2006. It will make available the services of expert resources to advise Indian Industry on adopting Sustainability best practices. It will also engage in research on issues of Sustainable Development that are relevant to Indian Industry.

Some of the other activities envisaged are:

- Establishing the first Annual Sustainability Awards Programme
- Organising workshops for Small and Medium Enterprises to raise awareness and encourage adoption of TBL practices
- Motivating at least 50 companies to adopt Sustainability Reporting in line with GRI
- Disseminating relevant knowledge on cutting edge Best Practices in Sustainability
- Developing sectoral Sustainability Indices and establishing sectoral Sustainability Awards

The centre is a very interesting organisation to bring into the cooperation both due to the excellent work being carried out and the possibility to reach a large number of Indian industries.

Workshop at The Indian National Academy of Engineering on June 15.

The main objective of the meeting was to propose a broad framework for collaboration between India and Sweden in the environmental field.

Supporting this proposal are the following statements:

- Sustainable and environmental quality improvements are very much about technology, both as more classical approaches as well as a new focus on system solutions.
- India and Sweden has a great potential for cooperation within many environmental areas related to sustainable development both due to the importance of the issue stressed by both governments and the long-time cooperation.
- Indo-Swedish cooperation involving government organizations, universities and industry in both countries constitutes a valuable resource for cooperation in the field of sustainable development and environmental technology. The Swedish network for Indian - Swedish Collaboration on Technical Research and Education (INSTEC) will be an important partner.

A specific idea discussed at the meeting was a vision of a new organization with a working title *Indian Institute for Sustainable Development and Environmental Technology* (IISDET). IISDET would constitute five centres/working areas of which one has an integrating role. The overall mission of IISDET would be on the one side to initiate and coordinate development of environmental technology and system solutions, and on the other to funnel these into

specific, hands-on implementation projects on local, regional and state levels that will lead to improving both quality of life and environmental quality.

The tentative agenda for the meeting was

- Background
- Indian vision for a sustainable future
- A new implementation platform: IISDET
- Discussion
 - IISDET a realistic platform?
 - modes of collaboration
 - priority areas
 - funding
 - education
 - specific project ideas?

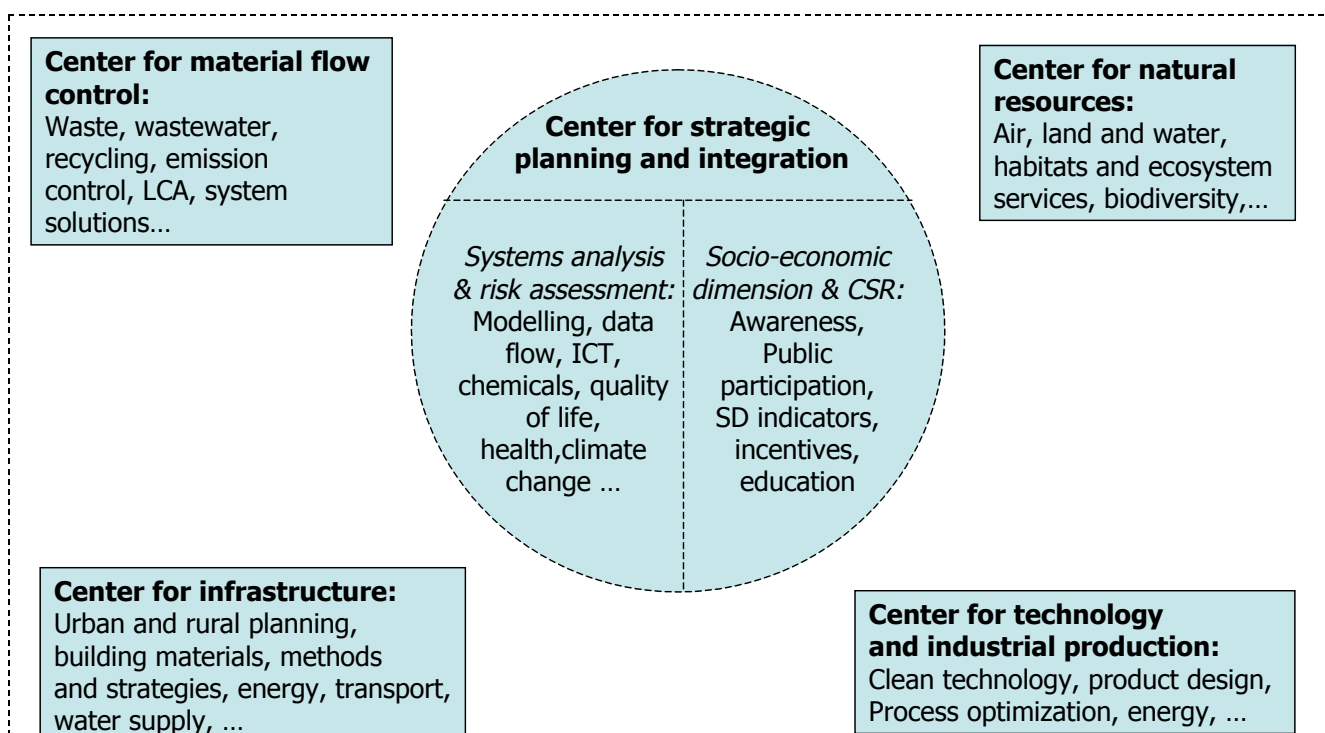
A number of presentations were made by Indian and Swedish representatives describing research and development activities focusing on environmental science and technology. Professor Cvetkovic presented the concept for IISDET as an introduction to the discussions.

A fruitful discussion followed on the presentation of IISDET and it was proposed that the name should be changed to International instead of Indian. The idea per se was welcomed by the Indian participants and issues like framework, resources, modality, coordination and pilot projects were discussed.

The Memorandum of Understanding between India and Sweden forms the backbone for this cooperation and has to be ratified in both countries in order to be instrumental. It was decided to continue along two pathways, one with the aim to establish an environmental network organisation and the other to get started on project level. The outcome of the meeting is described in the minutes of meeting enclosed below:

Indian Institute for Sustainable Development and Environmental Technology (IISDET)

Organizational structure in five Centers/working areas



Minutes of the meeting held jointly by a delegation from Sweden and representatives of Institutions in India

A meeting was held on June 15, 2006 in the Committee Room of TIFAC, Vishwakarma Bhawan to discuss collaboration programs in Environmental Technology.

The following attended the meeting:

Sweden

1. Dr. Ramon Wyss, *Royal Institute of Technology, Sweden*
2. Prof. Seshadri Seetharaman, *KTH Land & Water Resources Engineering*
3. Prof. Vladimir Cvetkovic, *KTH Land & Water Resources Engineering*
4. Prof. Karin Andersson, *Vice President, Chalmers University of Technology, Sweden*
5. Mr. Goran Westerström, *Lulea University of Technology, Sweden*
6. Mr. Goran Baurne, *KTH Land & Water Resources Engineering*

India

1. Prof. DV Singh, *INAE*
2. Prof. Surendra Prasad, *Director, IIT Delhi*
3. Dr. MJ Zarabi, *INAE*
4. Dr. Sukumar Devotta, *Director, NEERI*
5. Prof. Kripa Shanker, *Dy. Director, IIT Kanpur*
6. Prof. Sneha Anand, *INAE*
7. Prof. Manoj Dutta, *IIT Delhi*
8. Mr. JK Bassin, *NEERI*
9. Brig. SC Marwaha (Retd.), *INAE*

Presentations were made by Indian representatives highlighting the Research and Development activities at their Institutes focusing on Environmental Science and Technology as given below:

- | | |
|--------------------------|---------------|
| 1. Prof. Surendra Prasad | IIT Delhi |
| 2. Prof. Kripa Shanker | IIT Kanpur |
| 3. Dr. Sukumar Devotta | NEERI, Nagpur |

This was followed by presentations by Swedish participants as given below:

- | | |
|-----------------------------|--------------------------------|
| 1. Prof. Vladimir Cvetkovic | Concept of IISDET |
| 2. Ms. Karin Andersson | Chalmers University |
| 3. Mr. Goran Westerström | Lulea University of Technology |

Detailed discussions were held for evolving joint programs of mutual interest in the area of Environmental Technology.

Prof. Ramon Wyss informed that there are several possibilities to apply for financial support to joint research projects and co-operation. One option is through the environmental facility being established by SIDA.

Dr. DV Singh pointed out that similar support could become available from DST only after the MOU signed by the Indian and Swedish Ministers is processed and DST receives directions thereon.

The following recommendations emerged from these discussions:

1. IIT Delhi, IIT Kanpur and NEERI should together prepare six brief proposals outlining the project objectives, methodology and the expected outcome and their significance. This initiative will be coordinated by Dr. Sukumar Devotta, who will compile the proposals and forward their e-mail copies to Prof. DV Singh in the INAE office by July 31, 2006 at the latest. Prof. DV Singh will interact with Dr. S Devotta, take any actions, if necessary and then forward the proposals to Prof. Vladimir Cvetkovic.
2. Prof. Vladimir Cvetkovic will identify those proposals which are also of strong interest to Sweden, identify the Swedish experts in the concerned areas and together with Prof. DV Singh, facilitate that the Swedish expert and the Indian counterpart jointly prepare formal project proposals in sufficient details for implementations.
3. The concept of International Institute of Sustainable Development and Environmental Technology (INSDET) was discussed in detail and accepted in principle. It was decided that Prof. Vladimir Cvetkovic would prepare a zero draft document developing this concept which would include;
 - i. Specific objectives and goals of the Institute
 - ii. The need of an International Institute located in India and importance of the Indo-Swedish collaboration.
 - iii. Framework and structure of the Institute and its nodal Centres.
 - iv. The organizational strategy of the Institute and the manpower required.
 - v. Outline of the budget of the Institute and the source of funding.
 - vi. Role in terms of providing services nationally and internationally

Federation of Indian Chamber of Commerce and Industry (FICCI)

(www.ficci.com/)

Meeting with Mr Rajan Kohli, Deputy Secretary General, Mr John Thomas, Joint Director and Mr Salil Dutt, Senior Asst. Director.

“FICCI is the rallying point for free enterprises in India. It has empowered Indian businesses, in the changing times, to shore up their competitiveness and enhance their global reach. With a nationwide membership of over 1500 corporates and over 500 chambers of commerce and business associations, FICCI espouses the shared vision of Indian businesses and speaks directly and indirectly for over 2,50,000 business units. It has an expanding direct membership of enterprises drawn from large, medium, small and tiny segments of manufacturing, distributive trade and services. FICCI maintains the lead as the proactive business solution provider through research, interactions at the highest political level and global networking.”

At the meeting with FICCI Karin Andersson and Ramon Wyss from the Swedish side participated. The response from FICCI to SIDA proposals were very positive and there is a

large interest to join one or several of the possible projects with respect to industrial activities.

Indian Institute of Technology – Delhi (IIT-Delhi)

(www.iitd.ac.in/)

Meeting with Prof. Surendra Prasad, Director, Prof. Manoj Datta, Dean, Alumni Affairs & International Programmes.

“Indian Institute of Technology Delhi is one of the seven Institutes of Technology created as centres of excellence for higher training, research and development in science, engineering and technology in India, the others being at Kanpur, Kharagpur, Madras, Bombay, Guwahati and Roorkee. Established as College of Engineering in 1961, the Institute was later declared an Institution of National Importance under the "Institutes of Technology (Amendment) Act, 1963" and was renamed "Indian Institute of Technology Delhi". It was then accorded the status of a deemed university with powers to decide its own academic policy, to conduct its own examinations, and to award its own degrees.”

Professor Prasad gave an introduction to IIT Delhi explaining how the IIT:s works, education system, research etc. This was followed by a visit to water laboratory facilities.

Indian National Academy of Engineering

(www.inae.org/)

“The Indian National Academy of Engineering (INAE), founded in 1987, comprises India's most distinguished engineers, engineer-scientists and technologists covering the entire spectrum of engineering disciplines. The aims and objects of the Academy are to promote and advance the practice of engineering and technology, related sciences and disciplines and their applications to problems of national importance. INAE also encourages inventions, investigations, and research in pursuit of excellence in the field of "Engineering".”

During a meeting with Dr. D.V.Singh, INAE and colleagues cooperation within the field of automotive was discussed.

The following areas could be considered for research priorities in the automotive sector.

1. Electronic Management of IC Engines.

In place of map driven electronic management of IC engines, the current trend is towards model driven engine management system, which more extensively needs multidisciplinary expertise, such as engine process modeling (combustion, fluid dynamics and heat transfer), embedded electronics to monitor engine parameters, control system strategy (fuel metering and ignition), design of controller (hardware and software) and integration of embedded system and the controller.

2. Hybrid Vehicles

Decades of research for a viable battery for electric vehicles (EV) have failed to produce a techno-economically feasible product which could meet the requirements of EVs. Hydrogen fuel-cell vehicles are generally regarded as options of a some what distant future. In the mean time hybrid vehicles are poised for making a dominant entry into auto-market. The

technologies of drive-by-wire power train, the steering system and regenerative braking are receiving priority research and development attention.

3. Manufacturing of Automotive Components

Lightweight, high-strength materials (Aluminum and Magnesium alloys, recyclable composite plastics) for manufacturing automobile components and state-of-the art manufacturing and joining processes are areas of current research. Processes which give NNS (near-net-shape) components, save material and are eventually cost effective. Hydroforming and other manufacturing processes are receiving much attention from automakers.

4. Structural and Styling Software

Better structural analysis software are needed to design for light weight, higher loads and crash worthiness. Proficient software are also needed to provide a better blend of aesthetics, utility and styling for low drag with an interface with structural design modules. This area requires skills across disciplines and joint projects will have great relevance with the needs of automobile industry.

5. Vehicle Dynamics, Stability and Safety

With the advent of powerful softwares for studying the dynamics of multi-body-systems, it is possible to arrive at design and layout configurations for automobiles to ensure maneuverability, good drivability, stability and excellent ride quality. Stability control systems with motion sensors and warning sensors are becoming more common and standard items in vehicles. Tyre performance characteristics play a key role in the dynamics of vehicles. Technological gaps require research inputs in the area of vehicle dynamics and safety.

The Energy Research Institute (TERI)

(www.teriin.org/)

Meeting with Dr. Rajendra K. Pachauri, Director General, Dr Leena Srivastava, Executive Director, Dr Sameer Maithel, Director, Dr Kapil K Narula, Associate Director, Dr Vidya Subramanian Batra, Fellow and other scientists.

TERI was formally established in 1974 with the purpose of tackling and dealing with the immense and acute problems that mankind is likely to be faced with in the years ahead

- on account of the gradual depletion of the earth's finite energy resources which are largely non-renewable and
- on account of the existing methods of their use which are polluting

Over the years the Institute has developed a wider interpretation of this core purpose and its application. Consequently, TERI has created an environment that is enabling, dynamic and inspiring for the development of solutions to global problems in the fields of energy, environment and current patterns of development, which are largely unsustainable. The Institute has grown substantially over the years, particularly, since it launched its own research activities and established a base in New Delhi, its registered headquarters. The central element of TERI's philosophy has been its reliance on entrepreneurial skills to create benefits for society through the development and dissemination of intellectual property. The strength of the Institute lies in not only identifying and articulating intellectual challenges straddling a number of disciplines of knowledge but also in mounting research, training and

demonstration projects leading to development of specific problem-based advanced technologies that help carry benefits to society at large.

After a general presentation by Dr Pachauri a scientific presentation was made enlightening some of the research areas where TERI is active. TERI is working within several fields among others biotechnology, energy and water. Areas are for example water modelling, wastewater technology , drinking water wastewater treatment in the industrial sectors etc.

Department of Science and Technology (DST) at the Ministry of Science & Technology
(dst.gov.in/index.htm)

Meeting with Dr T. Ramasami, Secretary, Dr. Rajiv Sharma, Director and Dr A.K.Kalva, Advisor.

“India is one of the top-ranking countries in the field of basic research. Indian Science has come to be regarded as one of the most powerful instruments of growth and development, especially in the emerging scenario and competitive economy. In the wake of the recent developments and the new demands that are being placed on the S&T system, it is necessary for us to embark on some major science projects which have relevance to national needs and which will also be relevant for tomorrow's technology. The Department of Science & Technology plays a pivotal role in promotion of science & technology in the country. The department has wide ranging activities ranging from promoting high end basic research and development of cutting edge technologies on one hand to service the technological requirements of the common man through development of appropriate skills and technologies on the other.”

Dr Ramasami explained about his back-ground and work carried out in Tamil Nadu regarding industrial pollution. The importance of water issues in development was also stressed. DST will be the formal host for the proposed workshop in Delhi in November/December.

Ministry of Urban Development
(urbanindia.nic.in/)

Meeting with Mr M. Rajamani,

“The Ministry of Urban Development & the Ministry of Urban Employment and Poverty Alleviation are the apex authority of Government of India at the national level to formulate policies, sponsor and support programme, coordinate the activities of various Central Ministries, State Governments and other nodal authorities and monitor the programmes concerning all the issues of urban development and housing in the country.”

The first meeting with Mr Rajamani took place at a reception at Ms Gopala's home a few days prior to the trip; Mr Rajamani was at the time heading a delegation that visited Sweden at the invitation of Swedish Ministry for Sustainable Development. Already at that first meeting, Mr Rajamani and his colleagues expressed clear interest in collaboration with Swedish partners in the area of urban planning and infrastructure renewal. The subsequent discussions in New Delhi with Mr Rajamani confirmed this interest and outlined directions for collaboration. First, The Ministry of Urban Development would support and take active part in the planned Workshop. Second, specific projects are to be outlined which contribute to the success of the JNN Urban Renewal Mission (URM). The two issues of particular interest are planning for sustainable infrastructure (including transport, energy, water supply &

sanitation), and new technology for decentralized waste water treatment methods. An interesting idea put forward by Mr Rajamani is to select a specific city eligible for the JNN URM support and propose development and implementation of new technologies, eg membrane bio-reactors (MBRs) for waste water treatment.

National Environmental Engineering Research Institute (NEERI)
(neeri.res.in/)

Dr. Sukumar Devotta, Director of NEERI participated in the INAE-meeting where he presented NEERI.

National Environmental Engineering Research Institute (NEERI), a constituent laboratory of The Council of Scientific & Industrial Research (CSIR) endeavours to provide Leadership in environmental science and engineering for sustainable development. NEERI dedicates itself in the service of mankind by providing innovative and effective solutions to environmental and natural resource problems.

Conclusion and Way Forward

The visit to India by the Swedish delegation representing the INSTEC-network was very successful thanks to the great preparatory efforts made by the Indian Ambassador Mrs Deepa Gopalan and Professor S. Seetharaman of KTH. The delegation was very well received with great hospitality by the Indian hosts and counterparts.

The objective for the mission was to meet with Indian ministries and organisations as well as the Embassy of Swedish for discussions regarding future cooperation and to set the way forward for this venue. A more specific issue was to propose a broad framework for collaboration between India and Sweden in the environmental field, a vision of a new organization with a working title *International Institute for Sustainable Development and Environmental Technology* (IISDET).

The meetings held were very constructive, having a generally positive attitude toward a future Indo-Swedish collaboration on environmental technology and sustainable development. Several environmentally related issues were discussed during these meetings for example activities within the urban, water and energy sectors. There was a focus on system solutions such as decentralised systems for water and sanitation and environmental issues within the industrial sectors for textile, paper and mining.

The workshop on June 16 recommended that:

1. IIT Delhi, IIT Kanpur and NEERI should together prepare six brief proposals outlining the project objectives, methodology and the expected outcome and their significance. This initiative will be coordinated by Dr. Sukumar Devotta, who will compile the proposals and forward their e-mail copies to Prof. DV Singh in the INAE office by July 31, 2006 at the latest. Prof. DV Singh will interact with Dr. S Devotta, take any actions, if necessary and then forward the proposals to Prof. Vladimir Cvetkovic.

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- xi. Outline of the budget of the Institute and the source of funding.
- xii. Role in terms of providing services nationally and internationally

Areas for future cooperation could be:

1. **Risk assessment.** This is related to various types of contamination, in soil, water and air. Here we could choose a case that from an Indian perspective seems both very relevant and difficult. There is considerable experience in risk assessment methodology, however, the range of cases and types of problems found in Sweden are presumably quite different than those found in India. A description of a specific case that needs attention and where there is a need for development in terms of methodology, monitoring, sampling, etc, can be a starting point for future cooperation. This should then be followed by a match of appropriate Swedish partners with which a more detailed project description/proposal can be formulated.

2. **Decentralised systems for water and sanitation and wastewater recycling.** This is a very relevant topic not the least in the context of the Urban Renewal Mission. The focus here is on technology development and system solutions and India do have experience with decentralized methods for wastewater treatment and reuse. One emerging method is MBRs (Membrane Bioreactors) which have great potential. NEERI may already have some experience with MBRs and a project can be defined to further develop the technology with the help of Swedish know-how, adopted to Indian conditions and needs of course. A particularly exciting dimension is the use of Swedish-Indian nano-technology know-how for design on the membranes that would be most suitable for Indian needs.

3. **Sustainable urban development.** This is very broad field and covers infrastructure in general, but also many other aspects, including strategic planning. There is considerable experience in Sweden in this respect, of course for Swedish type of conditions. Based on Indian experience, needs/gaps in the know how can be identified, followed by the bringing together a few groups from Sweden and India to outline a more detailed project proposal.

4. **Clean technology and treatment of industrial pollution.** Indeed there are many areas of clean technologies for pulp, textile, and mining for instance, on which a few projects can be formulated. There are Indian experiences on these issues as well as Sweden too has considerable experience, thus projects can be further developed regarding certain technologies/methods, adopted to Indian needs and pilot plants implemented for specific industries.

5. **Groundwater.** Water is an important factor for the sustainable development in India and for the possibilities to achieve the Millennium Development Goals. Groundwater is not only important for drinking and hygienic purposes it also have great economic implications in

Indian society. Water quality problems regarding Arsenic and Fluoride are well known as well as the increasing pollution problems related to pesticides.

The key task now is to start formulating the projects, which can jointly be iterated. Part of this iteration process can be a presentation at a Workshop late fall/winter this year that is tentatively being planned with Sida and Dept. of Science & Technology joint support. When outlining the projects it is paramount that they demonstrate the technology development of interest to both sides, having a high practical relevance benefiting both people and the environment. This would guarantee the support both from the Swedish and Indian side to initiating the projects.

As a follow up to our meetings in Delhi the way forward consists of:

1. Formulation of specific project areas/topics that contain a dimension of technology development, which would be of interest for both India and Sweden, ultimately benefiting both the people and the environment. Interaction process during the fall of 2006.
2. Planning of the workshop in early winter (December 2006).
3. A general strategy/vision document on an Indo-Swedish international centre for sustainable development. Concept paper will be prepared by end of October 2006.

**Further information such as the Memorandum of Understanding between India and Sweden, Power Point presentations, pictures, related reports and information is available for downloading at \\Vatten\users\GEMENSAM\Baurne\INDIA
Some material is in Swedish.**

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