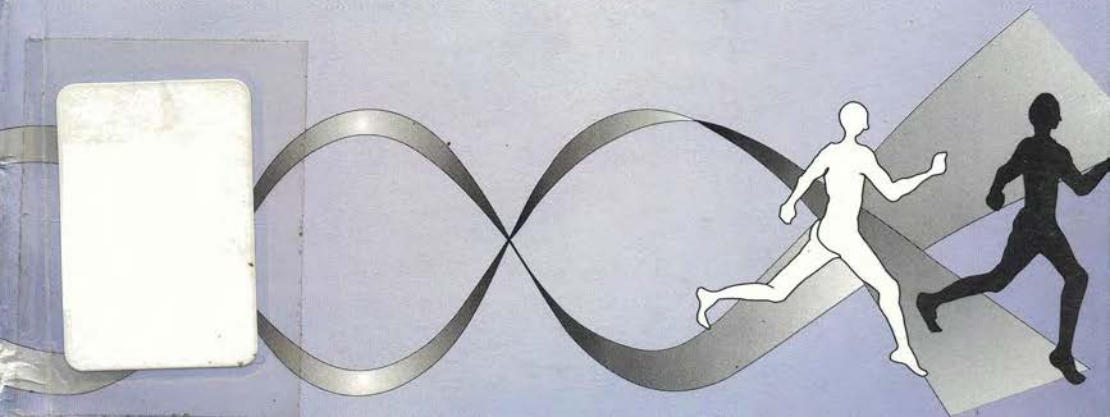




Information and Communications Technology and the Environment in Asia and the Pacific (ICTEAP)

2-3 May 2002, New Delhi, India



Useful web sites



**ASEAN (Association of South-East Asian Nations)
Haze Action Online**
<http://www.haze-online.or.id/>

Association of Indian Universities
<http://www.aiuweb.org/index.htm>



Baatchit, Jiva Institute, India (Media Lab Asia)
<http://www.jiva.org/outreach/baatchit/index.htm>

Central Pollution Control Board, India
<http://envfor.nic.in/cpcb/>



Confederation of Indian Industry, India
<http://www.ciionline.org/>

**Department of International Development,
Government of UK**
<http://www.dfid.gov.uk>



e-Choupal, ITC Ltd, India
<http://www.echoupal.com/>

Encore Software Ltd, India
<http://www.ncoretech.com/index.html>



Government of Andhra Pradesh, India
<http://www.andhrapradesh.com/>

**Honey Bee, Society for Research and Initiatives for
Sustainable Technologies and Institutions,
Indian Institute of Management, Ahmedabad, India**
<http://www.sristi.org/honeybee.html>



Institute for Global Environment Strategies, Japan
<http://www.iges.or.jp/>

International Global Change Institute, New Zealand
<http://www.waikato.ac.nz/igci/home/home1.html>



Management Development Institute, India
<http://www.mdi.ac.in/>

MIMOS Malaysia
<http://www.mimos.my/>



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Information and Communications Technology and the Environment in Asia and the Pacific (ICTEAP)

(Proceedings of the Regional Workshop for Asia-Pacific Region held
from 2 to 3 May 2002 in New Delhi, India)

Organized by



Ministry of Environment
and Forests



Confederation of
Indian Industry



Tata Energy Research
Institute



United Nations
Environment Programme

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Contents

| | | |
|----------|---|-----------|
| 1 | Introduction | 1 |
| 2 | Structure of the workshop | 3 |
| 3 | Summary of the proceedings | 6 |
| 4 | Recommendations | 22 |
| | Annexure 1: Workshop agenda | 25 |
| | Annexure 2: Speeches – Inaugural session | 30 |
| | Annexure 3: Participants | 45 |

1

Introduction

Background

The linkages between ICT (information and communications technology) and the environment have strong relevance for the Asia-Pacific region. To have an impact in the region, the GeSI (Global e-Sustainability Initiative) of the industry, UNEP (United Nations Environment Programme), and the International Telecommunications Union needs to be strengthened through a regional initiative. The ICTEAP (Information and Communications Technology and the Environment in Asia and the Pacific) initiative is an attempt to highlight complementary regional perspectives and priorities. It would be tailored to address practical realities of ICT applications as enabling mechanisms for improved environmental sustainability, particularly in developing countries. The initiative was formally launched through a regional workshop organized jointly by the MoEF (Ministry of Environment and Forests), Government of India; UNEP; TERI; and the CII (Confederation of Indian Industry) in New Delhi, India, on 2–3 May 2002.

Workshop objectives and key focus areas

- 1 Encourage South–South cooperation in the region through dissemination of experiences, best practices, approaches, and technologies.
- 2 Promote environmental rights and justice in the region, empower impoverished/underprivileged groups, facilitate transparent transactions, and enable public access to environmental information systems and ICT applications.
- 3 Explore and popularize ICT-based applications for NRM (natural resources management) as well as environmental management and initiation of pilot activities in the region.
- 4 Enhance regional cooperation and networking on ICT and the environment, including issues like eco-efficiency, cleaner production, sustainable consumption, and public–private partnerships.

Relevant stakeholders

- *Government* Regulatory bodies; policy-making agencies; and promoters of technology in the field of environment management
- *Industry* Corporate decision-makers; environment and technology directors; plant managers dealing with technology, environment, health and safety; and project developers
- *Technology vendors and consultants* Equipment suppliers; technology promoters and integrators; and consulting service providers
- *Financial institutions* Senior managers dealing with technology project evaluation, risk assessment, approval, funding, and monitoring in multilateral, bilateral, national financial institutions
- *Development agencies* Non-governmental organizations; community-based organizations; training agencies; and other relevant bodies.

2

Structure of the workshop

Inaugural session

The governments and institutional leadership from the partner organizations will provide an overview of the concepts by way of holistic perspectives, imminent challenges, available options, recognized opportunities, and roles/responsibilities of relevant partners in progress on the path to sustainability in South-East Asia.

ICT & Sustainable Development

Technical session 1

Sustainability is all about interaction of policy-makers and decision-takers with all their stakeholders in the economic development of a nation. This session will deliberate on how this encourages transparency of operations; enables the governments to take into account the real issues facing the masses; strengthens the democratic framework; and leverages the use of ICT tools for meeting the needs of the environment and society.

ICT & Sustainable Consumption/ Production

Technical session 2

This session derives from one pertinent definition of sustainable consumption—'the use of goods and services that satisfy basic needs and bring a better quality of life, while minimizing the use of natural resources and toxic materials and emissions of waste and pollutants over the life cycle, so as not to jeopardize the needs of future generations'. Embracing this principle would induce manufacturers and service providers to explore and focus on

those areas of their businesses where ICT can be utilized to strike a balance between patterns and levels of consumption, while ensuring that their companies remain profitable.

South-South & Regional Cooperation

Technical Session 3

This session will revolve around how current policies for promoting 'cleaner production' and 'sustainable consumption' are a good basis to start from but that they should reflect Asian priorities like the eradication of poverty and the provision of education and health care. Currently, national cleaner production centres fail to recognize consumer concerns; they should choose a holistic approach to help both producers and consumers achieve a better quality of life. Promotion of South-South and regional cooperation can be best achieved through learning from shared best practices, approaches, and technologies.

ICT in Urban Environment and Rural Development

Technical Session 4

The concept of 'sustainable communities' is one where all stakeholders are partners in progress and fellow travellers on the road to economic development. Corporate social responsibility is a necessary aid to balance the prevailing economic disparity. This session will showcase how ICT can be effectively deployed by public-private partnerships for developing rural areas, empowering the impoverished, generating income, and alleviating poverty.

ICT & Natural Resource Management

Technical Session 5

Natural resource accounting is a means of providing feedback on the impact of consumption/production patterns and of government policies aimed at reducing the environmental 'footprint' of all activities. This session will call for governments and businesses to intensify efforts to reduce energy and material intensities of production/consumption and promote the sustainable use

of all renewable resources. There is vast, untapped potential for the use of ICT in sustainable forestry; management of wetlands, ecosystems, watersheds, and river systems; sustainable mining; etc.

Valedictory session

The final session will bring forward the major points of discussion during and the broad recommendations of the workshop. It will attempt to link the outcomes with concrete steps that could be taken forward by the governments and indeed all other stakeholders as the policies from the developing countries at the WSSD (World Summit on Sustainable Development) to be held in Johannesburg in August–September 2002.

3

Summary of the proceedings

Inaugural session



Speakers

- Mr Pradeep Mallick, Chairman, National Environment Committee, Confederation of Indian Industry, India; Managing Director, Wartsila India Ltd
- Dr R K Pachauri, Director-General, TERI, India
- Mr Rukman Senanayake, Minister of Environment and Natural Resources, Sri Lanka
- Dr Mok Mareth, Minister of Environment, Cambodia
- Dr Klaus Töpfer, Executive Director, UNEP (United Nations Environment Programme), Nairobi
- Mr T R Baalu, Minister of Environment and Forests, India

Welcoming the panellists and participants, Mr Pradeep Mallick reiterated the workshop's objectives and initiated a thought process examining the role of ICT as a 'vehicle of change' to attain sustainable development.

Dr R K Pachauri expressed his belief that the ICT revolution has the potential to transform the very paradigm of development; it can make an enormous difference, not only in terms of connectivity but also by providing a gateway, which adds value universally, across the board. Local content is essential, be it in the form of improving agricultural productivity, efficient use of water resources, use of biomass, or economic sharing of biodiversity. He also mentioned TERI's commitment

to use ICT to promote sustainability in at least 10 Indian villages.

Mr Rukman Senanayake spoke about the development of a number of information exchange mechanisms on the environment in Sri Lanka



The inaugural session in progress



“The prowess of the Indian ICT industry will significantly contribute to the ICTEAP initiative” – Mr T R Baalu



“We must assimilate the knowledge of the people in the field to give us guidance” – Dr Klaus Töpfer

and also about the establishment of a National Institute on Information Technology for strengthening the process. Dr Mok Mareth identified ICT as a key factor for development that will help bridge digital divides. He looked forward to replicating in his country the success stories that emerged in this workshop.

Stressing on the ‘empowering’ quality of ICT, Dr Klaus Töpfer hoped that the success stories would present guidelines for investment in future innovations. Mr T R Baalu said that efforts towards sustainable development could be strengthened through ICT intervention, drawing attention to the close association of ICT with effective micro-development planning and data storage, retrieval, and analysis for policy decisions.

Mr Nirmal Andrews concluded the inaugural session on an optimistic note, sharing the decision of the AP (Andhra Pradesh) government to host an ICTEAP Centre of Excellence with the support of the MoEF and the Department for International Development, UK. He commended TERI’s decision to make the ICTEAP web site – www.ictcap.org – a dynamic one and underscored the importance of sharing experiences and approaches in making ICT effective in environmental issues.

Display of innovations

During the workshop, a vibrant exhibition portrayed the unique synergy between ICT and the environment and how it can improve the quality of life of the poor, especially in rural areas. Models of interesting partnerships, innovative concepts, and effective software were on display. Some of them are listed below.



- 'Baatchit', a Media Lab Asia project led by Jiva Institute, Faridabad (India), aims to facilitate information access, communication, entertainment, and socio-economic opportunities within villages, while promoting traditional heritage and cultural values.
- Newgen Software Technologies Ltd provides e-governance solutions related to hazardous waste management, air and water pollution, etc.
- SRISTI (Society for Research and Initiatives for Sustainable Technologies and Institutions) and the Indian Institute of Management, Ahmedabad, provide a platform called Honey Bee to grass-roots inventors, innovators, and ecopreneurs engaged in conserving biodiversity.
- ITC Ltd showcased its e-Choupal initiative of successfully partnering with the Indian farmer.
- The CPCB (Central Pollution Control Board), Government of India, uses geographic information system to preserve natural resources.



The workshop co-organizers (MoEF, UNEP, TERI, and CII) as well as others like NIIT and Tata Consultancy Services displayed their diverse publications related to this field and also the various services they offer in the fields of ICT and the environment.

Session I

ICT & Sustainable Development

Highlighting the role of ICT as that of ushering in a new paradigm of development, this session compared it to the steam engine in the Industrial Revolution. ICT is one of the key engines of growth of the 21st century, with great potential for democratization by pioneering a new infrastructure for business, civil society, environment, and governance.

Prospects and challenges

ICT's successes, however, are numerous and diverse. Electronic fuel injection and catalytic converters can minimize an automobile's emissions. Along with land records, soil quality, type, and usage modes can be computerized and monitored. Projections of weather patterns/scenarios can feed into global climate change mitigation. Assessment of degradation in Mesopotamian grasslands through remote sensing catalyses remedial action. Beneficial deployment in India includes monitoring of forests to prevent spread of forest fires, assessment of air pollution, detection of tiger poaching, and strategic surveillance of glaciers.

Along with the biotechnology wave, ICT is causing yet another developmental shift. The Y2K bug may not have daunted today's 'plugged-in'



Chairperson

- Mr P V Jayakrishnan, Secretary, Ministry of Environment and Forests, India

Speakers

- Dr Klaus Töpfer, Executive Director, UNEP (United Nations Environmental Programme), Nairobi
- Mr Kiran Karnik, President, National Association of Software and Services Companies, India
- Ms Ama Dadson, Global e-Sustainability Initiative Coordinator, UNEP, Kenya
- Mr Mahesh Pradhan, UNEP, Bangkok
- Mr Badrul Hisham Jaffar, Manager, MIMOS, Malaysia
- Dr Ashok Khosla, President, Development Alternatives, India
- Ms Wee Huay Neo, Senior Manager, Multimedia Super Corridor, Malaysia

generation but the large presence of the 'digitally homeless' indicates an emergent concern. The digital divide could threaten social equilibrium as drastically as the developmental divide, the adverse environmental effects of which we are still struggling to redress.

ICT should graduate from being fancy jargon to being a meaningful input into the universal drive for sustainability. On the one hand, proactive South-South twinning is necessary to harness indigenous knowledge and combat common challenges. On the other, the North must also recognize its role in sharing the costs of this endeavour. Perhaps it is equally vital to understand that human resource capital is equivalent to, if not more significant than, monetary inputs.

Successful approaches

ICT can have varied impacts on the environment. While it accelerates manufacture-supply-use chains or multiplies efficiency gains through data dematerialization or transforms lifestyles, it can also result in e-waste, imbalanced substitution of printed information, and increasingly consumptive behaviour. Successful ICT applications should

- build on local needs and innovate creative uses,
- contain local content in local language,
- be economically sustaining,
- trickle down to rural populations,
- extend benefits beyond merely 'techies',
- voice concerns of disadvantaged groups, and
- share successes/failures.

DAGS (Demonstrator Application Grant Scheme) is a unique funding mechanism to acculturate Malaysians to ICT through projects focusing on content and community development and to transform Malaysia into a values-based knowledge society by 2020 as a 'model concept'. MIMOS, Malaysia, has mooted the creation of a dedicated environment fund for ICT-based applications for the regional environment.

Also coming up in Malaysia is the Multimedia Super Corridor, a 'digital utopia' of conducive social, business, and natural environments comprising smart homes, schools, cards, partnerships, and cities. Among the designated cybercities is Cyberjaya, Asia's proposed regional ICT hub, a holistic concept harmonizing man, nature, and technology. The ultimate goal is to develop it into a zero-emission city by 2020.

The session brought into sharp focus the fact that Asia and the Pacific are a landscape of growing poverty, inequity, and environmental degradation. Half a billion people in more than 500 000 villages do not have access to safe drinking water. Technology excludes the woman, the poor, the villager, the farmer, the South... Further, today's developmental strategies can neither eradicate poverty nor strengthen ecological security. 'Modernization and progress in essence' is the quest for sustainable development. The necessary condition for such developments is to meet the basic needs of all while preserving the resource base. It also represents equity, ecological security, economic efficiency, and endogenous choices. The key to sustainable development lies in sustainable enterprises for providing sustainable livelihoods. Dr Ashok Khosla's paper summarized some basic needs and approaches in this context. The power of the Internet lies in scaling up and maintaining them through its unique attributes, listed below.

- Universal access
- Decentralized nature
- Multiple entry points
- Existing knowledge
- Partnerships.

The key to success for leveraging the Internet lies in providing local content and services, which are sustainable at the village level through the most cost-effective technology. TARAhaat <www.TARAhaat.com> is a portal pioneered by Development Alternatives, which synergizes the best of the commercial world with developmental needs. The network is poised to expand to 25 centres by May 2002 with a target of scaling up to 300 centres by March 2003.

Future outlook

Resource optimization would work best where resource use actually occurs. With some awareness generation and capacity building that can be transmitted via ICT, a local community can become the ideal manager of its resources. Reciprocally, feedback on ground realities can be conveyed to the policy-makers. Radio has phenomenal potential, as it is inexpensive, mobile, and easily decentralized; it can be exploited for widespread benefits. Localized, folk mediums can be integrated through multimedia for greater reach and impact.

It is important, however, to appreciate the (limited) percentage of the globe's burgeoning population that has access to ICT. It is imperative to supply affordable ICT tools like telephones, televisions, computers, and Internet access to as many as possible. Meanwhile, it must also be remembered that an overkill of data without substance or credibility defeats the purpose of networking and globalization. It is a grave political responsibility to look beyond the plethora of facts and figures and distil the essence.

Session II

ICT & Sustainable Consumption/Production

Now a farmer has, at his fingertips, the ability to quickly determine whether the next day's weather forecast is favourable for his crops. Just as easily and swiftly, he can also learn the best practices of pesticide use and apply them to his fields. This is a true scenario in a village that has been penetrated by ICT. Technologies for information and communication can increase the sustainability of agricultural production, enable rural prosperity, ensure environmental safety in production through information databases, and encourage interactive environmental learning. These were the central themes of this session that highlighted how ICT can be used both by farmers and corporates alike to ensure sustainable consumption/production.

The manufacture and use of goods and services that satisfy basic needs and result in a better quality of life, while minimizing harmful impacts to the environment, aptly describes sustainable consumption/production. It is that consumption and production, which does not wastefully consume natural resources or toxic materials and does not lead to emissions of waste and pollutants. In essence, sustainable consumption does not jeopardize the needs of future generations. Increasing the efficiency of production processes and consumption patterns is crucial to this concept, falling in line with a 'more for less' philosophy.

A primary production concern in the Asia-Pacific



Chairperson

- Mr Pradeep Mallick, Chairman, National Environment Committee, Confederation of Indian Industry, India; Managing Director, Wartsila India Ltd

Speakers

- Mr Madaswamy Moni, Deputy Director-General, Agricultural Informatics Division, NIC (National Informatics Centre), India
- Ms Madhulika Tripathi, Chief Executive Officer, Elquest, India
- Mr Sanjay Singh Gehlout, Senior Technical Director, NIC, India
- Mr S Sivakumar, Chief Executive Officer, International Business Division, ITC Ltd

region is the agricultural sector—the economic base for many developing countries of the region. Pioneering the concept of the e-Choupal, ITC Ltd has successfully partnered with the Indian farmer. By zeroing in on trends in Indian agriculture that are unsustainable, such as the meagre livelihoods of small farmers, ineffective government subsidies, and inefficient use of inputs, ITC Ltd has identified ways to overcome these barriers. The solution lies not in subsidies but in providing efficient services to the farmer. The power of scale must reach the small farmer. The market should be linked to output in such a way that the value chain is demand-driven and not supply-based. Non-farm employment should be emphasized. A new business model is, therefore, required with more vertical integration, i.e. relationships at the grass-roots level combining different types of knowledge (climate, agricultural science, etc.), and is fundamental to this process. To make the process more streamlined and profitable to the farmer, non-value-adding activities (unnecessary packaging, for instance) and excessive intermediaries/processes should be eliminated.

ITC Ltd has set up 1000 e-Choupals in 1000 villages in four states and is upscaling this network at the rate of 5 per day with a target of adding 5000 e-Choupals in 14 states by 2005. A practical approach of ‘rollout, fix it, and scale up’ provides a useful basis for replication in the region.

The Indian government, through its National Informatics Centre, is taking several initiatives to reduce the marginalization of small farmers – its AGMARK (Agri Market Network) – and aims to set up 7000 agricultural e-markets on the Internet. Similarly, its National Hazardous Waste Management System, run as a pilot in Vapi (Gujarat), is being extended to several other states by the CPCB.

The Planet Protect portal, developed by Elquest, is a knowledge bank that aims to reach government, industry, and NGO stakeholders with information on improving the efficiency of natural resource usage and on creating awareness about environmental problems in the country.

Session III

South-South and Regional Cooperation

In the Asia-Pacific region, diversity – in terms of physical, cultural, and economic conditions – poses a great challenge for cooperation. This challenge, however, can be met through developing mechanisms that involve all stakeholders. ICT is a great tool in this regard, especially with respect to enhancing cooperation on the environmental front.

Some studies reveal that recycling computers is a more energy-, and hence, cost-intensive process as compared to upgrading the systems. Though this opens up immense opportunities for cooperation between developed and developing countries in terms of hardware imports, the issue needs to be addressed with sensitivity given the popular perception of ‘dumping’ normally associated with such transactions. Interestingly, studies of business-to-consumer e-commerce reveal that it may not necessarily be more environmentally friendly and hence needs a more in-depth analysis.

Another area that opens up interesting possibilities, but is yet to be studied in detail, is the ICT-based industrial waste exchange system. It aims to promote reuse and recycling of industrial waste and decrease its illegal disposal, through firms involved in these processes. By creating an industrial-waste Internet market, ICT brings producers, intermediates, and users of industrial waste together and gives them access to



Chairperson

- Dr Corazon Claudio, President, Asian Institute of Journalism and Communication, The Philippines

Speakers

- Mr Eric David Williams, Coordinator, Information Technology and Environmental Issues Project, United Nations University, Tokyo
- Dr Kenichi Imai, Senior Research Associate, IGES (Institute for Global Environmental Strategies), Japan
- Ms Davina Boyd, International Global Change Institute, New Zealand
- Mr Shuzo Katsumoto, Senior Research Associate, IGES, Japan
- Dr Raman Letchumanan, Assistant Director (Environment), Association of South-East Asian Nations

detailed information about all components of this market. Though this system has been tried in Japan and The Philippines (with results undemonstrated as yet), it holds a potential opportunity for cooperation in the Asia-Pacific region. These opportunities are in the form of possibilities of information exchange among the intermediates (businesses, local governments, etc.); technology transfer among producers of industrial waste; and establishment of a certification system common to the region to acknowledge the users of industrial waste with good performance and technology; it has good potential for regional cooperation.

e-Learning for ESTs (environmentally sound technologies) is also important; while these technologies have the potential for increasing economic efficiencies, enhancing quality of life, and improving environmental outcomes, the rate of their uptake is very low, especially in developing countries. The main reason for this is the limited range of such technologies and a lack of awareness. The barriers to implementing these technologies are related to information, education, training, institutionalization, economics, and motivation. This places emphasis on awareness generation, improved access to information, and capacity building. EnTA (Environmentally-focused technology assessment) is an initiative that facilitates identification and selection of ESTs, encourages consensus amongst multiple stakeholders, and improves quality of decision making. There is a need for person-to-person support for e-learning that can only be solved by South-South cooperation.

Another case in point is the potential of reducing GHG (greenhouse gas) emissions utilizing ICT, which can serve as a powerful tool to enhance energy efficiency through initiatives such as telework (videoconferencing), intelligent transportation systems, computer-aided design/manufacturing, and digital governance. Further research, through collaborative studies by research institutions in the Asia-Pacific region, must explore how and to what degree ICT can help reduce GHG emissions.

There is also a need to showcase successful cases and make them serve as catalysts and actively work towards raising people's awareness. The eASEAN Task Force initiative and ASEAN (Association of South-East Asian Nations) Haze Action Online are examples of how information provision can be a powerful tool in streamlining efforts. International conferences, summits, and workshops involving all stakeholders – from technology innovators to technology providers to potential technology users – sharing best practices in the field of 'ICT for the environment' would be a beginning in this respect.

Session IV

ICT in Urban Environment and Rural Development

Can ICT equal Gandhi's *charkha*? The revolutionary spinning wheel advocated by Mahatma Gandhi in India's pre-Independence period symbolized, among other things, the provision of self-sufficiency among users by ensuring employment, using low-cost raw material, and requiring little skill to draw out saleable yarn. The session focused on the use of ICT for empowerment of the impoverished, income generation, and poverty elimination. ICT should serve as a force multiplier to help the poor attain some degree of self-reliance.

Corporates have a vital role in helping use ICT for sustainability and rural development. There are certain prerequisites for ensuring the efficacy of ICT in rural and poor markets. The tools of ICT need to be within the reach of the masses, as does the provision of a citizen interface and the back-up machinery to support it. The recipients need to be educated about the usage of ICT devices and the infrastructure needs to support the whole framework. The key hurdle is not the dissemination of the technology but a lack of leadership that prevents good ventures from attaining fulfilment and achieving the required results.

ICT also has immense use in environment protection. A good example is the National Air Quality Monitoring cell started in 1984 with a view to



Chairperson

- Prof. M G K Menon, Member of Board of Directors, United Nations University / Institute for Advanced Studies, Tokyo

Speakers

- Prof. Dhruv Nath, Management Development Institute, India
- Mr D K Biswas, Chairman, Central Pollution Control Board, India
- Mr Kamal Meattle, Chief Executive Officer, Paharpur Business Centre, India
- Mr Yusuf Samiullah, Senior Engineering and Environment Advisor, Department for International Development, New Delhi
- Mr V P Jauhari, Principal Secretary, Government of Andhra Pradesh, India
- Mr Vinay Deshpande, Chief Executive Officer, Encore Software Ltd, India

sensitize citizens about the need for environment protection. The CPCB proposes to create Environment Cells that would essentially focus on developing web-based applications to disseminate the results of air/water quality monitoring across cyberspace, create 'urb-envis' (urban environment information systems), and a network for sharing information among the various municipalities.

Perhaps one of the more important aspects of ICT dissemination in developing countries is the need for a change in the attitude of the 'facilitating' agents that are responsible for the implementation of the programmes related to deployment of ICT be they government bodies or similar institutions. ICT needs to be used as a force multiplier—as a tool for, rather than a means to, development.

Exemplifying the efficacy of ICT in the development of the masses were the case examples of the AP government, which effectively uses cyberspace as a canvas for development activities. Horizontal and vertical integration of various activities of different government departments is ensured by using an Online Transaction Processing system, an AP State Wide Area Network, and AP Online, the AP portal. With a strong leadership prompting the use of ICT in the state, pilot projects and new ventures were encouraged, especially ones that could enhance the transparency of the government. Success stories of the AP government were stated with a view to create a model for replication by other governments, especially in developing countries.

The case example of the Simputer or the 'simple-to-use computer' revealed the uniqueness of a relatively simple innovation and how it has meant a world of difference to both developers and end users of the technology. Inspired by the 'Bangalore IT declaration' of 1998, this innovation was meant to prevent money being pilfered by certain unscrupulous employees of a cooperative bank and has developed into one of the most sought-after innovations in the ICT world. Referred to as 'a Net-linked, radically simple portable computer' by the New York Times, the Simputer is available for low investment and offers multilingual output, audio input/output, and touch features among a host of benefits. It has a wide range of uses, including high-end uses like providing assistance to the visually impaired, even in unelectrified areas of the country. Poised for large-scale production in June 2002, the Simputer promises to establish a strong link between ICT and empowerment of the masses.

Session V

ICT & Natural Resource Management

This session explored the use of space technology and the GIS (geographical information system) in NRM (natural resource management). ICT advances provide information on natural resources at various geographical units with just a few mouse clicks. Space technology, by means of resource satellites, provides information on natural resources in a spatial format at different levels and, through communication satellites, offers tools for information dissemination. The latter also provides meteorological information and helps to predict natural disasters such as cyclones. Images from resource satellites enable the inventorying of natural/cultural resources (like India's forest cover) and the detection of changes in them (like changing cropping pattern or area under wetlands) along with the quantitative estimation of parameters that cause the changes. In India, satellite images are successfully used for crop inventorying; drought monitoring; water resources and glacier inventorying; watershed development; forestry and biodiversity management; mineral targeting; and mapping of soils, salinity, wasteland, coral reefs, and sea surface temperature.

Space technology also supports disaster monitoring and management. During the Orissa supercyclone in 1999, satellite images were readily available to map the flood-inundated villages and launch appropriate action. In China, remote sensing technologies are used for integrated assessment of the eco-environment.



Chairperson

- Dr R R Navalgund, Director, National Remote Sensing Agency, India

Speakers

- Mr Sudhir Ahluwalia, Head – Social Sector, Tata Consultancy Services, India
- Dr Rajesh Gopal, Director – Project Tiger, Ministry of Environment and Forests, India
- Dr B B Dhar, Director – Research, Association of Indian Universities, India
- Dr V S Vijayan, Director, Salim Ali Centre for Ornithology & Natural History, India
- Mr Bin Wei, State Environment Protection Administration, China

The GIS is another tool used widely for NRM as well as conservation and management of protected areas. It has been in use independently and in conjunction with satellite images and GPS (global positioning systems). For example, at the Kanha National Park, Madhya Pradesh (India), the GIS, the GPS, and wireless communication infrastructure were integrated to map tiger habitats and monitor wildlife poaching. Using the GIS and satellite images, a wetland information system was developed at the national level to protect them from further degeneration. A web-map server is the next step towards disseminating this information. The GIS is in place for the management of mine environments as well. Mines management information systems are used both at the mine and company levels for augmenting resource production/management.

A new concept of national resources information system has been evolved and demonstrated in several districts of India; spatial decision support systems have been installed to facilitate decision making. The use of these technologies needs to be strengthened to provide equitable access to ICT and address the community's resource management concerns.

Valedictory session

Mr K P Nyati welcomed the guests of honour and panellists at the valedictory session of the workshop. Mr Gautam Soni presented a summary of the discussions in the various technical sessions and proposed the workshop recommendations. He highlighted the fact that such a workshop – explicitly linking ICT with the environment – was being held for the first time; it could be considered a trailblazer for the rest of the world.

Mr K C Mishra praised the workshop for coming up with a concrete action plan. He said that most national governments face environmental problems and, while working on national plans, the questions of sustainable development and environment inevitably take centre-stage. At the regional level, there is a need for tie-ups and collaboration but any such venture requires a comprehensive database. Lack of such databases has been a major reason that many environmental problems have not been solved. Another problem is that even when data is available, it is not easily accessible. The establishment of a regional network for data sharing requires a framework; the workshop was a good augury in the establishment of such a network.

Mr P V Jayakrishnan said that the workshop was a success and the enthusiasm of the participants was palpable. In his previous stint as Secretary for Information Technology (Government of India), he helped set up information kiosks in India's north-eastern states. The ensuing enthusiasm of the people from the rural areas in these states showed that ICT is not merely an urban phenomenon. There should be more workshops that present case studies of ICT helping rural areas in the countries of the south.

Dr Klaus Töpfer praised TERI for making information about the workshop available, through its web site, to all those who could not attend it. He said that there were common denominators between the ICTEAP workshop and another workshop on climate change and agricultural productivity that was concurrently being held in Delhi. The first was that both showed the link between urban and rural areas. Second, both are linked in that they depend on partnerships. Third, both have drawn up a concrete action plan. He said that there was need for cooperation rather than competition. He also spoke of the need for a clearing house that disseminates best practices in the area of environmental management. The fourth common point was that both workshops depend on education of the masses, including managers of companies, even our own families. He concluded on the note that we can and must use the systems discussed at the workshop for increasing efficiency in resource use. Mr Nirmal Andrews presented a vote of thanks to the participants and the co-organizers of the workshop.



4

Recommendations

- 1 Having addressed a novel topic, the ICTEAP has emerged as a 'trailblazer' for the region and the rest of the world and could provide a global direction.
- 2 There is a need to build on successful approaches focusing on development already going on in the region as well as on specific strengths of the region—human resources, software, or hardware. The lessons learnt and success factors must be incorporated in new initiatives.
- 3 Several suggestions for pilot projects emerged during the workshop but these need to be developed further before funding can be expected. Examples, *inter alia*, are
 - ICT-based environmental education (Centre for Environmental Education, India; C P Ramaswamy Environmental Education Centre, India; TERI, India)
 - e-urban centres (CPCB, India)
 - ICT-based industrial waste exchange systems (IGES [Institute for Global Environmental Strategies], Japan)
 - Research on ICT-based GHG reduction models (IGES, Japan)
 - ICT-based EnTA (Environmentally-focused technology assessment) systems (IGCI [International Global Change Institute], New Zealand)
 - Promoting effective utilization of bio-resources (Elquest, India)
 - Greening ICT parks/estates (Multimedia Development Corporation / Multimedia Super Corridor, Malaysia)
 - ICT-based reporting systems for multilateral environmental agreements (United Nations University, Japan)
 - Village kiosks on energy (TERI, India).

At the level of technology, a close look is required to support projects like the Simputer (Indian Institute of Science and Encore Software, both India) and Wireless in Local Loop (Indian Institute of Technology, Madras).

4 Regional funding mechanism and modalities

- The proposal by MIMOS/NITC (National Information Technology Council), Malaysia for the creation of a regional trust fund on ICT and the environment needs to be actively pursued. MIMOS has offered to administer such a fund, based upon the successful DAGS (Demonstrator Application Grant Scheme) model.
- The ASEAN Secretariat has invited pilot project proposals with India on ICT and the environment for consideration under the ASEAN–Indian Cooperation Fund.
- The AP (Andhra Pradesh) state government has also offered to support the ICTEAP initiative through its new centre on good governance.

5 Regional network of centres

- A regional network of existing centres of excellence in the field needs to be created, possibly around the four ICTEAP themes.
- One of these centres could be the new good governance centre of the AP government.
- The need for a strong information collection and dissemination component like the existing ICTEAP web site comprising success stories database, pilot projects, discussion forum, and training and reference resources should be supported.
- The regional ICTEAP secretariat is to be located at UNEP/ROAP.

6 Capacity building

- *South Asia* There is need for twinning between NITC Nepal and the proposed NIIT (National Institute on Information Technology) Sri Lanka with counterpart organizations in India as well as with relevant institutions in Malaysia, such as MIMOS/NITC.
- *Greater Mekong Sub-region countries* The ICT-based ASEAN Environmental Education inventory database should be strengthened with possible involvement of Malaysia.

Thursday, 2 May 2002

9.30–10.45 a.m. *Registration and exhibition visit*

Inaugural session

10.45–10.50 a.m. *Welcome address*

Mr Pradeep Mallick, Chairman, National Environment Committee, CII (Confederation of Indian Industry), India; Managing Director, Wartsila India Ltd

10.50–10.55 a.m. *Introductory remarks*

Dr R K Pachauri, Director-General, TERI, India

10.55–11.35 a.m. *Ministerial panel*

- Mr Rukman Senanayake, Minister of Environment and Natural Resources, Sri Lanka
- Dr Mok Mareth, Minister of Environment, Cambodia
- Dr Klaus Töpfer, Executive Director, UNEP (United Nations Environment Programme), Nairobi
- Mr T R Baalu, Minister of Environment and Forests, India

11.35–11.45 a.m. *Vote of thanks*

Mr Nirmal Andrews, Regional Director and Representative for Asia and the Pacific, UNEP/ROAP (Regional Office for Asia and the Pacific), Bangkok

11.45–12:00 noon *Tea/coffee Break*

Session I ICT & Sustainable Development

Focus Use of ICT for leveraging environment and social needs

12.00 noon–12.10 p.m. *Overview by session chairperson*

Mr P V Jayakrishnan, Secretary, MoEF (Ministry of Environment and Forests), India

12.10–12.40 p.m. *Keynote addresses*

- Dr Klaus Töpfer, Executive Director, UNEP
- Mr Kiran Karnik, President, National Association of Software and Services Companies, India

12.40–1.00 p.m.

- Ms Ama Dadson, GeSI (Global e-Sustainability Initiative) Coordinator, UNEP

Introduction to GeSI, UNEP

- Mr Mahesh Pradhan, UNEP

Introduction to ICTEAP pilot projects / regional issues

1.00–1.45 p.m. *Experience sharing followed by discussions*

- Mr Badrul Hisham Jaffar, Manager, MIMOS, Malaysia
Demonstrator Application Grant Scheme
- Dr Ashok Khosla, President, Development Alternatives, India
Digital equity for a durable environment
- Ms Wee Huay Neo, Senior Manager, Multimedia Super Corridor, Malaysia

Greening Malaysia's Multimedia Super Corridor

1.45–2.45 p.m. *Lunch*

Session II ICT & Sustainable Consumption/Production

Focus Possible utilization of ICT by businesses to make consumption/production patterns sustainable

2.45–3.00 p.m. *Overview by session chairperson*

Mr Pradeep Mallick, Chairman, National Environment Committee, CII, India; Managing Director, Wartsila India Ltd

3.00–4.30 p.m. *Technical session on ICT & Sustainable Consumption/Production followed by discussions*

- Mr Madaswamy Moni, Deputy Director-General, Agricultural Informatics Division, NIC (National Informatics Centre), India
- Ms Madhulika Tripathi, Chief Executive Officer, Elquest, India

e-Learning on sustainable management of environment

- Mr Sanjay Singh Gehlout, Senior Technical Director, NIC, India
National Hazardous Waste Management Information System

- Mr S Sivakumar, Chief Executive Officer, International Business Division, ITC Ltd

e-Choupal

4.30–4.45 p.m. *Tea/coffee break*

Session III South–South and Regional Cooperation

Focus Promotion of South–South and regional cooperation through dissemination of best practices, approaches, and technologies

4.45 p.m.–4.55 p.m. *Overview by session chairperson*

Dr Corazon Claudio, President, Asian Institute of Journalism and Communication, The Philippines

4.55–6.30 p.m. *Presentations followed by discussions*

- Mr Eric David Williams, Coordinator, Information Technology and Environmental Issues Project, UNU (United Nations University), Tokyo

Virtual University Networks

- Dr Kenichi Imai, Senior Research Associate, IGES (Institute for Global Environmental Strategies), Japan

ICT-based industrial waste exchange systems

- Ms Davina Boyd, IGCI (International Global Change Institute), New Zealand

EnTA Web-Based

- Mr Shuzo Katsumoto, Senior Research Associate, IGES, Japan

Reducing greenhouse gas emissions utilizing ICT

- Dr Raman Letchumanan, Assistant Director (Environment), ASEAN (Association of South-East Asian Nations)

ASEAN's ICT applications for the environment

8.00 p.m. *Reception and Dinner*

Friday, 3 May 2002

Session IV ICT in Urban Environment & Rural Development

Focus How can ICT be effectively deployed for rural development, empowering the impoverished, income generation, and poverty alleviation?

9.30–9.45 a.m. *Overview by session chairperson*

Prof. M G K Menon, Member of Board of Directors, UNU Institute for Advanced Studies, Tokyo

9.45–11.00 a.m. *Panel discussion*

- Prof. Dhruv Nath, Management Development Institute, India
Corporate role in sustainability and rural development

- Mr D K Biswas, Chairman, Central Pollution Control Board, India
Clean air and water quality monitoring
- Mr Kamal Meattle, Chief Executive Officer, Paharpur Business Centre, India
Environmental entrepreneurship
- Mr Yusuf Samiullah, Senior Engineering and Environment Advisor, Department for International Development, New Delhi

11.00–11.15 a.m. *Tea/coffee break*

11.15 a.m.–12.30 p.m. *Case studies followed by discussions*

- Mr V P Jauhari, Principal Secretary, Government of Andhra Pradesh, India
- Mr Vinay Deshpande, Chief Executive Officer, Encore Software Limited, India

12.30–1.45 p.m. *Lunch*

Session V ICT & Natural Resource Management

Focus The use of ICT for sustainable forestry, management of wetlands, ecosystems, watersheds, river systems, and sustainable mining

1.45–2.00 p.m. *Overview by session chairperson*

Dr R R Navalgund, Director, National Remote Sensing Agency, India

2.00–3.30 p.m. *Technical session followed by discussion*

- Mr Sudhir Ahluwalia, Head – Social Sector, Tata Consultancy Services, India
- Dr Rajesh Gopal, Director – Project Tiger, MoEF, India
Satellite imagery and habitat mapping
- Dr B B Dhar, Director – Research, Association of Indian Universities, India
- Dr V S Vijayan, Director, Salim Ali Centre for Ornithology & Natural History, India
ICT for inventorization of wetlands and river systems
- Mr Bin Wei, State Environment Protection Administration, China

3.30–3.45 p.m. *Tea/coffee break*

Valedictory session

Welcome

Mr K P Nyati, Head – Environmental Management Division,
CII, India

Summary presentation of discussions and recommendations

Mr Gautam Soni, Senior Fellow, TERI, India

Addresses

- Mr K C Mishra, Special Secretary, MoEF, India
- Mr P V Jayakrishnan, Secretary, MoEF, India
- Dr Klaus Töpfer, Executive Director, UNEP, Nairobi

Vote of thanks

Mr Nirmal Andrews, Regional Director and Representative for
Asia and the Pacific, UNEP/ROAP, Bangkok

Speeches: inaugural session

Pradeep Mallick

Welcome address

It is my great pleasure and honour, on behalf of CII's National Environment Committee, to welcome all of you to India and to this workshop on ICT (information and communication technology) on the one hand and the EAP (environment in Asia and the Pacific) on the other. This conference, organized by the MoEF, UNEP, TERI, and the CII is very welcome and timely at this point. The four objectives of this event are as follows.

- 1 To encourage South-South cooperation through dissemination of experiences, best practices, approaches, and technologies
- 2 To promote environmental and social rights and justice in the region, to empower the impoverished or underprivileged masses, and to make transactions transparent by enabling public access to environmental information systems and ICT applications
- 3 To explore and popularize ICT-based applications for NRM as well as environmental management and initiation of pilot activities in this region
- 4 To enhance regional cooperation and networking on ICT and the environment under topics like eco-efficiency, cleaner production, sustainable consumption, public-private partnerships, etc.

The linkage between ICT and the environment has strong relevance for the Asia-Pacific region. The global sustainability initiative of the ICT with the support of UNEP and the ITU needs to be strengthened through a regional initiative. The ICTEAP will highlight complementary regional priorities and perspectives and will be tailored to address practical applications of ICT as enabling mechanisms and initiatives for improved environmental sustainability in developing countries. Relevant stakeholders for this include government policy-makers, corporate decision-makers, technology vendors, consulting service providers, financial institutions, and development agencies. The concept of sustainable communities is one where all stakeholders are partners in progress on this road to economic development.

We are honoured to have with us today Mr T R Baalu, India's Minister for Environment and Forests. We all know that the MoEF is deeply concerned about emerging problems of the environment in India and has taken a number of preventive and ameliorative measures. During Mr Baalu's leadership, several initiatives have been taken in terms of policy measures—strengthening of administrative, institutional, and legislative mechanisms; enactment of regulation encompassing diverse aspects of environment; and a wide range of other activities.



'We have been attempting to bring on the radar screen of Indian thought-leaders some emergent issues that could affect India'

We are very fortunate to have in our midst Mr Mok Mareth, Cambodia's Minister for the Environment. It is worthwhile to note that the Cambodian government regards environmental issues as a top priority in implementing its social and economic policies to alleviate poverty. This requires amazing self-sacrifice, concerted efforts, and a strong political will. In the last four years, Cambodia's budget for environmental management has more than tripled. India and the CII look forward to a partnership with Cambodia at the national and regional levels.

We have Mr Rukman Senanayake, the Sri Lankan Minister for Environment and Natural Resources. We are very proud of what Sri Lanka is doing and of the fact that you have taken pains to visit India on your own. While you have visited South India, a trip to North India to study the various initiatives we have taken is indeed very laudable. For Sri Lanka too, this subject is of great priority and Mr Senanayake and his ministry are here to enlist people's participation in the conservation and protection of all natural resources in their beautiful country—the Pearl Island.

Legal cover alone is not enough so we need to enlist people's participation in this movement. This is a common need felt in many nations and there is immense potential for ICT to be a vehicle of change in many geographies around the world. It is a further privilege to have with us Dr Klaus Töpfer, the Executive Director of UNEP. Dr Töpfer is not new to India; he has been

visiting us for several years to engage with us on different initiatives that UNEP takes and how those can be translated to India's benefit. Why I say this is because we are all aware that one-third of the world's population lacks access to commercial energy; one-fifth of the world's population survives on less than one dollar a day; one-sixth of the world's population is undernourished. Under these circumstances, there is a lot that we can do.

Due to a plethora of multilateral agreements and growing friction between trade and environmental issues, as we have seen in the WTO (World Trade Organization), there is need for better coordination by UNEP. For this, we believe that UNEP needs to evolve from its current programme stature to that of a World Environment Organization, a WEO. We have confidence in Dr Töpfer's leadership to combine the best international knowledge in the fields of organizational management and strategy, strategic use of ICT, empowerment of people, and environmental management to provide a process of sustainable development.

The CII's Environmental Management Division has been attempting to bring on the radar screen of Indian thought-leaders some emergent issues that could affect India. The development of corporate sustainability management systems, implications of the Stockholm Convention on Persistent Organic Pollutants, and environmental accounting and performance rating are some examples of the thrust that the division provides to Indian industry. An insight into what the world is rapidly transforming into can be seen by some very interesting facts. The Internet has grown exponentially, from 16 million users in 1994 to over 400 million users in 2000, and is expected to reach 1 billion users in three years—from 16 million to 1 billion spanning just 10 years. Computing power is doubled every 18 months; communication power is doubled every six months. In 2001, more information could be sent over a single cable in one second as compared to the amount of information that was sent over the entire Internet in one month in 1997—that's the kind of amazing change taking place around us. E-mailing of a 40-page document from Chile to Kenya costs less than 10 cents. If you courier, it costs 50 dollars; faxing it costs 10 dollars—those are the amazing time–cost changes sweeping across the world. It is this powerful tool called ICT that can harness the benefit of the environment. We can use this to great advantage to have what I call real, rapid, and sustainable progress.

I am certain that this workshop will present many innovative ideas, which we can utilize to make the earth more liveable now and in the future. We can all contribute to leaving behind an earth better than we inherited.

Dr R K Pachauri

Opening remarks

The ICTEAP is a very timely initiative; let me, at the outset, compliment UNEP on bringing this activity to New Delhi, India. ICT is really a revolution, which rivals almost any that has taken place throughout history. If you go back in time, when the steam engine was invented, you realize that it did not merely revolutionize transportation by replacing the horse as the major motive force. In fact, it made an enormous difference to all forms of industry. Similarly, there have been other such inventions and revolutions that have spurred human activity forward. The rate at which progress in this area is taking place opens up infinite opportunities and that is the crux of the challenge before us. While ICT may appear like a very narrow field of specialization, we really have to harness it in every possible way to see that it makes a comprehensive difference to global sustainability and brings about an improvement in all activities that human beings are involved in.

If you go back in time, not very long ago, when the energy crisis first took place in 1973/74, there was an enormous movement towards bringing about higher energy efficiency. However, in the process those that wanted to implement more efficient energy use, looked at the entire process of production and as it happened they not only saved money in reducing energy consumption but were also able to bring about great efficiency in the process of production itself. ICT can also follow a similar path and I am happy to see that in this particular workshop we are taking a comprehensive approach by looking at a design that



‘ICT can make an enormous difference in rural areas by providing a knowledge gateway to transform every single activity that takes place there, thereby tackling poverty’

covers almost every aspect of management of the environment, of natural resources, and of sustainable development.

In this regard, countries like Cambodia, Sri Lanka, and India have a common challenge. Each has a large rural population, which is essentially the root of the poverty that in the countries. I am happy that one of the topics to be addressed in this workshop is South–South cooperation. ICT can make an enormous difference in rural areas not merely by providing connectivity but by providing a gateway by which information and knowledge can transform every single activity that takes place in rural areas and thereby tackle the enormous and widespread problem of poverty.

I will give you a few examples, which I know would be discussed in considerable detail in the next two days. TERI does a lot of work in rural areas but we are now very eager to get into IT (information technology). Perhaps what we might do is go out to 10 villages and set up computer-based information and networking in the local language so that people can access information and make use of it. However, if you set up a computer in a rural area, you first need power. Since you cannot rely on power from the grid, you need a decentralized energy production method, which means that you must create local capability to harness renewable forms of energy in an efficient and cost-effective manner. Besides the information to be provided cannot comprise mundane things that do not affect their lives; it must pertain to agricultural technology or efficient use of water or managing biomass. ICT not only opens up, in a narrow technical sense, innovations in IT but also opportunities whereby you look at development in its entirety and provide information/knowledge that can bring about a major transformation in the way development takes place in these areas. I was very happy to hear from Mr Nirmal Andrews that the follow-up of this activity would be in the form of pilot projects and networking.

I had the opportunity to compliment Prof. Töpfer, a person whom I have deep respect and admiration for, for the emphasis that UNEP is placing on networking. A number of things that really take a leap into the future are done today in isolation. If we do them through networking – and this is particularly important in the case of South–South cooperation – we would enhance each other's capacities and capabilities and the consequent benefits would be substantially higher.

I would like to end by talking about biodiversity, an area where perhaps we need to provide information and knowledge that would make an enormous difference to the natural richness and wealth that we have inherited in our part of the world. I am happy to announce that this evening, at this very complex, Prof. Klaus Töpfer is giving a public talk on the economic sharing of bioresources. I urge all of you to participate because there is much that we could learn from the work that UNEP has done in this area.

I would like to once again compliment the MoEF, UNEP, and all our partners in this initiative. We are eagerly looking forward to learning from what transpires in this workshop. This first step and the others that will follow will lead to a lot of excitement and benefits to all the developing countries of the world.

T R Baalu

Ministerial panel

It gives me great pleasure to participate in this regional workshop, which is an effort to promote the ideals of sustainable development by harnessing the power of ICT and is expected to provide the participants with deep insights into specific linkages between ICT and the environment.

As we know, ICT is a vital engine for development in the 21st century. The Asia-Pacific region can address its poverty issues by effective use of e-governance and ICT applications in environmental management because there are inherent linkages among poverty, environment, and governance. Improved governance by using ICT can have a direct impact in reducing poverty and safeguarding the environment.

Sustainable development is the slogan of the environment-conscious global community today. The process can be strengthened in many ways through IT. Increased connectivity between computer systems and networks and the immense power of computer hardware and software make seamless information flow possible. Expert systems and other software applications as well as environmental databases accessible over Internet are important means for enabling access to environmental information and informed decision making on environmental concerns.



'ICT is a comparatively clean industry, reduces transaction costs, and has the potential of outsourcing millions of jobs from developed to developing economies'

We all know very well that the demand for natural resources is growing with the expanding population. This is especially true in the rural and agrarian context and more so in the context of low-income populations. Therefore, successful planning of developmental programmes at the micro-level depends heavily on the availability of quality and quantity of information on natural and socio-economic resources. For this, GIS (geographical information systems) applications are widely available to store,

retrieve, and analyse different types of data for the management of natural resources; there is the added capability of superimposing socio-economic data as well. This plays an important role in evolving alternative scenarios for natural resources management. In addition, promotion of indigenous knowledge in natural resources management can be complemented by IT.

Besides resource management, in finding solutions to a number of issues such as solid waste management and air pollution monitoring, we are confronted with the task of handling voluminous and complex data. In fact, environmental problems themselves are getting more acute with the rapid population growth and unsustainable consumption patterns. Environmental management calls for a large number of people from different streams of expertise to be engaged. Therefore, we have to bear in mind that to address such complex and inter-related issues, the role of IT in promoting reliability and efficiency is critical.

Globally, the ICT industry, comprising hardware, software, and telecom services, generates a huge resource of 4 trillion dollars annually. Not only is it the fastest growing industry but also a mega-resource with the ability to transform productivity and efficiency in all sectors. It is a comparatively clean industry, reduces transaction costs, and has the potential of outsourcing millions of jobs in the IT service sector from the developed to the developing economies. India, in terms of its IT software services, and China, in terms of its hardware manufacturing capability,

have amply demonstrated this shift and their relative strengths in the IT sector. In the Asia-Pacific region, many countries have ventured to ride on this new 'digital wave'. Singapore and Malaysia have already emerged as major IT players. The Multimedia Super Corridor in Malaysia, the Cyber Korea version, and the technological advancement of Japan in hardware are examples of the unique direction in which the IT leadership in the Asia-Pacific region has proceeded.

It is essential for us to guard against the danger of the goodwill and motivation, which has led to this workshop, getting buried in copious reports; the workshop should lead to action and progress. Under this initiative, I hope that tangible projects are developed and implemented in the region. Perhaps, the essential ingredients of these projects could be discussed and agreed upon during the course of our deliberations. An important point we have to note is that the resources for shaping regional IT initiatives are available within the region itself.

I am optimistic that the prowess of the Indian ICT industry will significantly contribute to this regional initiative in promoting South-South cooperation and facilitating the transfer of environmentally friendly technologies and know-how. Participation of key governments and research institutions of countries such as China, Japan, Malaysia, and The Philippines, has added a valuable dimension to this endeavour. We will have to strive to establish a nexus between IT and environment, make them mutually supportive, and work hard to promote South-South cooperation in the Asia-Pacific region through dissemination of experiences and technologies.

Mok Mareth

Ministerial panel

It gives me great pleasure to be here today at the opening session of this ICTEAP regional workshop. I have been following the development of this regional initiative with great interest and I am pleased to witness today the organization of this regional workshop, which has brought together various stakeholders related to ICT and the environment for the first time.

World Summit on Sustainable Development

In the run-up to the WSSD (World Summit on Sustainable Development), which will take place in Johannesburg later this year, a high-level regional meeting for the Asia-Pacific region was convened in Phnom Penh during 27–29 November 2001. This meeting, which I happened to chair, was the culmination of a regional preparatory process whereby governments and other stakeholders conducted an assessment of the implementation of *Agenda 21* and identified the key sustainable development issues for the region in preparation for the WSSD. The meeting also adopted the Phnom Penh Regional Platform on Sustainable Development for Asia and the Pacific, which outlines seven initiatives to address sustainable development in the region.

Among these initiatives, the use of ICT has been specifically advocated for disseminating information on the efficient use of natural resources and promoting public participation in implementing sustainable development efforts. I am pleased that today's workshop already adds a voice to the Phnom Penh Regional Platform.

Information and communications technology

To make globalization work for sustainable development, the urgency of fully integrating developing countries and economies in transition into the world economic and trade system is well recognized. It should take into account national requirements and the needs for a level playing-field between developed and developing countries; promote capacity building and provide technical assistance to developing countries and economies in transition; and promote trade and investment to attain a fair and broad-based distribution of the benefits of globalization. In addition, the need for enhancing ICT is seen as a key factor for development and bridging the digital divide.

ICT and the environment

I am pleased to see the thematic approach being undertaken in the application of ICT for the environment through this initiative. Empowerment of impoverished groups, promotion of environmental governance, promotion of sustainable consumption and production, and South–South and regional cooperation are the

key themes of ICTEAP. These are all extremely pertinent to the needs of developing countries in the region, particularly the LDCs (least developed countries), in their bid to bridge the growing divide.

Further, national autonomy, good governance, economic growth with equity, political stability, democracy, minimum levels of education, and public disclosure of information have been identified as prerequisites for sustainable development. The need to consolidate best practices in the region in supporting the implementation of *Agenda 21* has been emphasized. For this, the use of ICT for disseminating information on the efficient use of resources and promoting public participation in implementing sustainable development efforts is well recognized.

Conclusion

I would like to congratulate the organizers for convening this very timely initiative. I am optimistic that, through the ICTEAP initiative, the Asia-Pacific countries can draw upon the ICT strengths already existing in the region. Over the next two days, I am looking forward to personally learning more about the various ongoing initiatives and success stories, particularly those in India, on ICT and the environment. I also hope that there will be specific and tangible pilot projects under this initiative, aimed at promoting sustainable development for the LDCs, particularly in the context of Cambodia and the other countries of the Greater Mekong Sub-region.

I hope that this initiative will provide yet another opportunity for us to strengthen our good partnership with UNEP/ROAP, which over the recent past, has supported our efforts on environmental law and education. Similarly, through the ASEAN Secretariat, and its senior officials on the environment, the ROAP has been extremely supportive in capacity-building on the conventions related to chemicals and hazardous waste as well as on issues of coastal and marine environments.



"I am optimistic that, through the ICTEAP initiative, the Asia-Pacific countries will draw upon the ICT strengths already existing in the region"

Finally, I would like to convey my sincere gratitude to Mr Baalu, Minister of Environment and Forests, Government of India, for hosting this important workshop in the capital city of New Delhi. We all look to the leadership and support of India on ICT and the environment and I am confident that together we all stand to benefit tremendously from this regional UNEP-led initiative.

Rukman Senanayake

Ministerial panel

I consider this ICTEAP workshop a very timely meeting, as there is a tremendous impact that ICT could have on developments in the field of environment. On behalf of the Ministry of Environment and Natural Resources of Sri Lanka, I wish to extend my good wishes to the organizers of this workshop and thank them for giving me this opportunity.

We are in the 21st century, in a hi-tech society and a global village, where we mostly talk about common global issues. What has helped us come to the current state of mutual relationship among nations is primarily the development in communication technology. This is a very important topic and, therefore, I consider this workshop a very important regional event.

I am glad to mention that Sri Lanka has been able to build very important international relationships. We are partners of regional and global bodies, especially those related to the environment. We are partners of various organizations dealing with North-South and South-South cooperation, mainly in economic, political, social, cultural, and environmental realms. Where the environment is concerned, the globe is facing very important issues such as shrinking forests, falling water tables, soil erosion, rising temperatures, a depleting ozone layer, biodiversity loss, water pollution, etc. All these are global problems and ICT has helped the global community in identifying the intensity and commonality of these problems as well as the imperative for promising solutions.

Sustainable development is meeting the needs of the present generation without compromising the ability of the future ones to meet theirs. Since the entire world is getting prepared for the WSSD to be held this year to mark the 10th anniversary of the Rio

Earth Summit held in 1992, we should seriously look at some of the global development trends that worry us. At the time of the Rio Summit, we were facing a range of complex and long-term environmental problems with dire consequences for the economic well-being and security of people as a whole. We adopted *Agenda 21*, the programme of action for global sustainability, to address these issues. At the Rio

Summit, we accepted the fact that the future viability of the planet depended to a large extent on our ability to maintain a dignified balance between resources and people. It was also realized that given the magnitude of the emerging environmental, social, and political threats (which are universal in nature) no individual nation – be it developed or developing – could tackle them alone. We have been continuously communicating with each other, trying to find solutions by having important regional and global environmental forums.

The service provided by ICT in finding solutions to vanishing biodiversity, land degradation, air pollution, etc. is most remarkable. This has been mainly achieved through providing information, creating awareness, and collecting and sharing information relevant to the newest developments in the field of environment.

Sri Lanka has developed a large number of important information exchange mechanisms relevant to relevant environmental issues. Networking and mass communication have helped us a lot in sharing our information with regional partners and the global community. We have moved a step forward by establishing a National Institute on Information Technology that serves as an authority on the subject.

ICT has helped Sri Lanka immensely in working towards achieving its sustainable development goals. We have already drafted our national report to be submitted to the WSSD, with maximum consultation with all stakeholders of sustainable development. Civil societies, NGOs, private sector, academics, politicians, and policy-makers are fully involved in the process. Sri Lanka has undertaken a comprehensive review of all 40



“ICT has helped Sri Lanka immensely in working towards achieving its sustainable development goals”

chapters of *Agenda 21* and has made recommendations for the sustainable development in the country for the next 10 years. In building up relationships with the members of the civil societies, NGOs, and private sector, we have found ICT contributions efficient and essential. We look forward to the invaluable recommendations of this workshop.

Klaus Töpfer

Ministerial panel

When ministers are really very dedicated, then they have a lot of stewardship in the global environmental field, especially in the environmental component of sustainable development. I believe that environment is also an end in itself with regard to ethics; to respect the diversity of creation but, more importantly, of environment is a contribution to development and to overcoming poverty. In this 30th year of its existence, UNEP has decided to advocate 'environment for development'. We know that environment is a pre-condition for overcoming poverty and for development.

I am glad to have the champions of this cause with me. A year-and-a-half ago, in Sri Lanka, we had a meeting of the Conference of Parties to the Convention on the Protection of the Ozone Layer. I mention this here knowing that today I will sign, with the Indian industry, a very forward-looking agreement to phase out CFCs (chlorofluorocarbons)—the ozone-depleting substances. India is one of the main producers of CFCs in the developing world and they are voluntarily committed, quicker than requested by the protocol, to phase out the production. This is a good indicator of how to handle international conventions.

Apart from this convention, there is also the Montreal Protocol on Substances that Deplete the Ozone Layer and linked with this is a multilateral fund to pay the additional cost of shifting from CFCs to other non-ozone-depleting substances. This is integrated with an overall package of 82 million dollars for Indian industry to change its existing CFC production. It is a good symbol of cooperation between governments, multilateral institutions, and private businesses—something we undoubtedly need.

I would like to congratulate Dr Pachauri on being elected as Chairman of the IPCC (Intergovernmental Panel on Climate Change), one of the main global bodies on scientific research concerning climate change and the impact and adaptation linked with this. This is a very good decision knowing Dr Pachauri's dedication to socio-economic consequences. Meteorological developments are important but we need increasing activity on impacts and adaptation. I believe we can work very closely together, knowing that UNEP is a 50% parent of IPCC; we want to play our role as efficiently as possible. Dr Pachauri

mentioned genetic resources; today we have a chance to discuss this topic at greater length in the evening. I was convinced to elaborate on this topic here in India knowing that India is one of the founding countries for the like-minded group of mega-biodiverse countries of the world, which decided to work together within the framework of the Convention on Biological Diversity to make sure that this asset of biodiversity is developed in benefit of the common people, the grass-roots people. I do not want to give away my evening speech; I only want to interest you in attending!

I would like to praise India for its emphasis on intellectual property rights, indigenous knowledge, and genetic resources. This has been stimulated in India by the minister himself. I am happy to announce that the minister will be the chairman of this like-minded group next year; I have been assured that we will be back in India to work together in this field. We also had the great chance to be in Phnom-Penh in Cambodia for the Asia-Pacific preparatory meeting for the WSSD. I believe it was a very necessary regional preparation for the Summit.

The WSSD directly gives us a good reason why we must convene meetings and workshops like today's. Because at the centre of the WSSD is the inevitable question of how to change



"On the way to Johannesburg, we must narrow down on possible means to stabilize various perspectives of people in rural areas and integrate all countries into globalization"

consumption patterns while fighting poverty. You cannot do it without modern technology; therefore I am convinced that we must do whatever is possible to bridge this infamous digital divide.

Again, I believe that this must start in the rural areas. To penetrate rural areas, you must, as Dr Pachauri mentioned, single out where the energy comes from, where electricity production is possible to make those technologies available. We must realize that if we cannot bring energy and electricity to the rural areas, the rural citizens will come to the energy and electricity in the cities. As you know, the Asian continent has the highest level of urbanization globally and there are numerous associated problems. So, on the way to Johannesburg, we must narrow down on the possible means to stabilize the various perspectives of people in the rural areas and integrate all countries into the ongoing globalization process. Whether you like it or not, we must make globalization work for the poor, for the environment—as Mr Kofi Annan mentioned, ‘Give globalization a human face’.

This is not a workshop for the sake of a workshop but with its clear aim and target, it must evolve concrete solutions and projects; this is my expectation. Instead of creating new declarations and new papers, we must assimilate the knowledge of the people in the field to give us guidance on where to invest and where to concentrate most.

I express my gratitude to all the organizers, especially the Indian government, the CII, TERI, and also the two ministers from Sri Lanka and Cambodia for coming quite a way to be with us and to underline their interest and dedication to this issue. I also want to express my gratitude to other governments in the region for giving us their support now and signalling their interest to also back us in the future with the implementation of the results of this workshop. I expect this to be a very professional and focused workshop, which forms a good input into the work of the UN. We want to integrate our colleagues from the UNDP, UNEP, The World Bank, the ITU, and so forth, knowing that without their contribution we cannot be successful. Thank you very much for the good work.

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Multimedia Super Corridor, Malaysia
<http://www.mdc.com.my/>



National Informatics Centre, India
<http://www.nic.in/>

National Remote Sensing Agency, India
<http://www.nrsa.gov.in/>



Newgen Software Technologies Ltd, India
<http://www.newgensoft.com/Home/home.htm>

NIIT Ltd, India
<http://www.niit.com/India/default.htm>



Project Tiger, Ministry of Environment and Forests
Government of India
<http://envfor.nic.in/pt/>

Salim Ali Centre for Ornithology and Natural History
<http://envfor.nic.in/saconh/saconh.html>



Simputer, India
<http://www.simputer.org/>

State Environmental Protection Administration of China
<http://www.zhb.gov.cn/english/SEPA/index.htm>



TARahaat, India
<http://www.tarahaat.com/tara/home>

TERI
<http://www.teriin.org>



United Nations Environment Programme, Nairobi
<http://www.unep.org>

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Information and communications technology (ICT) is a leading-edge area and key growth engine of the 21st century, with enormous potential for pioneering a new infrastructure for business, civil society, environment, and governance. Its linkage with the environment is strong and relevant, especially for the Asia-Pacific region. This regional initiative – ICTEAP (Information and Communications Technology and the Environment in Asia and the Pacific) – of the United Nations Environment Programme will strengthen the Global e-Sustainability Initiative (GeSI) by encouraging South–South cooperation and popularizing ICT-based applications for natural resource management at the regional level.

This publication documents the proceedings at the first regional ICTEAP workshop (2–3 May 2002), which was attended by over 250 participants comprising government officials, industry representatives, technology vendors/consultants, and executives from financial institutions and development agencies from across the Asia–Pacific region. The discussions encompassing a diversity of themes, including *sustainable consumption and production*; South–South and regional cooperation; urban environment and rural development; and natural resource management are summarized. It includes a write-up on the exhibition of innovative concepts and software portraying the ICT–environment synergy and its effectiveness in ameliorating poverty. The workshop recommendations, inspiring inaugural remarks, a comprehensive list of participants, as well as a list of useful web resources add further value to this publication.