OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.

DISCLAIMER

FAIR USE POLICY

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

RESTRICTED

MARCH 1989

English

17529

POLLUTION CONTROL RESEARCH INSTITUTE

DP/IND/83/008

Republic of India

Mission Report*

November - December 1988

Prepared for the Government of India

by the United Nations Industrial Development Organization

acting as executing agency for the United Nations Development Programme

Based on the work of Dr. Asit K. Biswas

President, International Society for Ecological Modelling

President, International Water Resources Association

Vice-President, International Association for Clean Technology,

76 Woodstock Close, Oxford OX2 8DD

England

Backstopping Officer: R.O. Williams, Chemical Industries Branch

United Nations Industrial Development Organization

Vienna

---

* This document has been reproduced without formal editing

MISSION REPORT

TO

POLLUTION CONTROL RESEARCH INSTITUTE

HARDWAR, INDIA

NOVEMBER - DECEMBER 1988

by

Asit K. Biswas
President, International Society for Ecological Modelling;
President, International Water Resources Association;
Vice-President, International Association for Clean Technology,
76 Woodstock Close, Oxford OX2 8DD
England

The main purpose of the present mission was to assist Pollution Control Research Institute to finalise all the arrangements for the International Conference on Environmental Impact Analysis for Developing Countries, which was held in the Hyatt Regency Hotel, New Delhi, India, during 28th November to 2nd December, 1988, and to review the post-Conference arrangements. This was a follow-up mission to the shorter mission undertaken in late August.

The Conference

On arrival in New Delhi, I was very pleasantly surprised to find the extent of good organization that had taken place since the last mission. Equally, the response to the Conference, both from within and outside India, far exceeded the initial expectations of every one. Overall 362 abstracts were finally received by PCRI, from which 109 were chosen for presentation over 4-1/2 days. A group of national and international experts, including myself were responsible for choosing the papers selected for the final presentation.

For a new Institute that had never organized a national conference, let alone an international conference where more than 300 participants from 26 countries participated, it must be admitted in retrospect that PCRI put on a remarkable performance. Full credit must be given to the new Head of PCRI Mr. S.B.C.Agarwala, and his staff for the excellent organization of the Conference.

A report on the summary of the Conference and the main recommendations which I prepared is attached to this report as Annexure-A.

The main post-Conference task remaining is the publication arrangements for the papers presented. The number of papers presented at the Conference was much higher than initially anticipated. To a great extent this was due to the extraordinary interest that was generated by the Conference. This also meant that time available for presentation of papers had to be reduced in order that they could all be presented.

On the basis of a quick initial review, it appears that nearly 60 of the 109 papers presented are of a quality that warrant publication. However, even these papers will require extensive editing. The balance of the papers should be returned to the authors. It is recommended that four types of publication should be considered.

1) A definitive book or environmental impact assessment which would include 30-35 of the best papers presented - This should preferably be published by an international publisher to ensure that good information and knowledge on EIA be disseminated widely all over the world. Such a wide distribution of the book is

bound to enhance the reputation and visibility of PCRI in the field of environment and pollution control. It is further recommended that nearly 500 copies of this internationally published book be distributed on a complimentary basis to important environmentalists in India and abroad and to PCRI's potential clients. It is expected that $ 10,000 would be available from UNEP which would enable PCRI to distribute such complimentary copies.

2) A book on EIA of thermal power stations since the subject is likely to be an area of concentration for PCRI - This topic was also one of the main themes of the Conference. Furthermore, it attracted the maximum number of papers. This book could be published by a major Indian Publisher. The funding for this publication is likely to come from the Indian Department of the Environment and Forests.

3) A small booklet containing only the "summary and recommendations" of the Conference - It is suggested that 1,000 copies of this booklet be published locally. This should be distributed to all the Conference participants, potential clients of PCRI and all potential funding agencies - both from India and outside. It should contain a Foreword by the Head of PCRI.

4) A shorter 1,000 - word report on the Conference - This should be published in 2 - 3 major international environmental journals to enhance the reputation of PCRI.

One of the main (but hidden) objectives of the Conference was to project PCRI as an important Institution on pollution control and environmental management, both nationally and internationally. To this effect, it was necessary to maximize the publicity of the Conference in the print media, radio and television. Since BHEL has a Public Relations Division, logically this task was entrusted to them. Initial recommendation was to have at least two press conferences during the Conference, one immediately after the opening session and the other following the closing session. Regrettably, the Public Relations Division failed to organize any of these two press conferences. During the Conference, I had asked them to organize

a press conference at the end, so that the Conference conclusions and recommendations could be outlined. The Division's response was that it was not possible due to lack of time. The fact that a press conference could not be organized at more than a day's notice (in reality they had more than 3 months, notice) is really a sad commentry on the effectiveness of the Public Relations Division.

Equally, a suggestion was made to organize a TV discussion programme on pollution control with a few select people, including Prof. M.G.K. Menon and Dr. T.N. Khoshoo, who were willing to participate. I had also offered to use my contacts to

get the necessary time on TV. It appears that the Division made no special effort to organize such a programme. Not surprisingly, there was no mention of the Conference in the national TV programme. While there was several newspapers reports, a golden opportunity was lost to enhance PCRI's reputation, image and visibility by a co-ordinated media assault. An important lesson to be learnt from this exercise is that PCRI cannot depend solely on BHEL's Public Relations Division : some of the essential and important activities must be carried out by PCRI itself

The second point worth noting is the visibility of UNIDO itself during the Conference. In my view, considering the importance of pollution control in India and elsewhere, the absence of a senior UNIDO official at the Opening Session left the impression that UNIDO's interest in industrial pollution control is lukewarm at best. The fact that the Director General of UNIDO did not even send a message for publiction in the Souvenir, inspite of an invitation, further enhanced this impression. The only message that was sent from UNIDO was by Dr. Sonia Maltezou, but unfortunately this was in her capacity as the Vice-President of the International Association for Clean Technology, one of the co-sponsors of the Conference. The presence of Mr. Williams during part of the Conference did retrieve the situation somewhat : otherwise UNIDO would not have been visible at all in the programme.

B. <u>OTHER ACTIVITIES</u>

Following the Conference, 2 weeks were available to discuss post-Conference follow-up arrangements, as well as to review other developments. During this period 5 other UNIDO experts were also present, though their visits to Hardwar were of different durations. This time period also gave me the first opportunity as CTA to review some PCRI activitirs other than the Conference.

On the basis of this initial review, folowing observations can be made.

1. <u>CTA</u> -While there are many reasons for the slow progress of the development of PCRI, of the main reason has to be the near invisibility of CTA during the project implementation. According to the record available at PCRI, the total time CTA a was present at Hardwar during November 1984 to August 1988, a period of almost 5 years is a little less than 2 months. This translates to an average of less than 10 working days per year. Having been involved in numerous UNDP projects, I cannot recall a single instance where a CTA did not spend at least 2 to 3 months every year. Considering the complexity of the project, it is clear that during the first tow years, the CTA should have spent at least 3-4 months each year at PCRI. It this had been the case, many of the problems PCRI is facing at present would not have occurred, or had they occured their magnitude would have been

significantly less.

Equally problematic has been some poor advice PCRI has received from certain experts. Who have given contradictory advice. In the virtual absence of a CTA and no comment whatsoever from UNIDO. on any report by an expert, these issues have never surfaced even though they were vital for project development. During the remaning months of the project, it is essential that either the CTA or UNIDO comment on the recommendatins of the UNIDO experts. It is also necessary that some priority be assigned to recommendations being made by the various experts. The project would substantialy benefit from such a practice.

Furthermore, in India, like in most other countries, external comment and pressure normally do expedite performance of many tasks. This often is of considerable help to the National Project Director to perform his tasks. Proper advice of a CTA and/or the UNIDO backstopping officer at regular intervals to the BHEL senior management, and following up these issues again with them whenever necessary, is a very important task that would significantly help to ensure the expected progress of the project. This was never done during the entire history of the project until my last visit in September. Such dialogue with the top management of BHEL is essential in the future.

2. Library- The Library continues to be one of the major constraints for the development of PCRI. There is no trained Librarian, and one is urgently necessary. He should also have some experience in cataloguing. For the development of PCRI, the possibility of taking some one from the plant and then send that person on a three years study leave to become a Librarian is a totally unacceptable solution. Equally one should not relaistically expect that a person from the plant can be sent to a short course for 3 to 6 months, and in the process the person will be "transformed" into a Librarian. It should be realized that a Bachelor's degree in Library Science is a minimum 3 year course.

If,however, there is a trained and experienced Librarian elsewhere in BHEL, who can be transferred to PCRI, this would be an acceptable solution. However, it must be ensured that the person concerned is a good worker, and is not being transferred because the local management wants to get rid of him. In other words, PCRI must not be the dumping ground for excess, incompetent BHEL personnel, otherwise the whole concept of building a centre of excellence in pollution control in India and South Asia would be totally lost.

Procuring books and journals for the Library must be a priority task. Unfortunately the Project Document is incomprehensively inconsistent in this regard. At the one hand a well-functioning Library is supposed to be one of the main outputs of the project, and on the other hand there is not even

adequate funds provided in the budget to buy Library furnitures, let alone books. Equally no good pollution control information system can be organized without a good back-up Library. If one omits the books and journals I have given to the Library, or obtained for it using my personal contacts, 90 percent of the rest of the meagre collection can be best assigned to a museum. For all practical purposes, these very old books and journals would only be useful to write some sections on history of technology : they are certainly inadequate for a modern-day pollution control research institute.

Some of the books and journals I left with the Library this time is shown in Annexure II

3.Telecommunications- Finally the quality of UNIDO experts visiting PCRI has improved significantly during the past few months. Some changes are still necessary. However, if the overall quality of the experts recently visiting PCRI has to be maintained, and hopefully even further improved, it is essential that PCRI be connected with the outside world. Many of us are finding it somewhat difficult to keep in touch with our offices outside the country without proper telecommunication facilities. It is strongly recommended that PCRI obtain a STD telephone line with a fax. If this can be done, it should be possible for good experts to make return missions for reasonable periods. In view of the present discussions on the 2nd phase of the present project and also obtaining other bilateral and multilateral aid projects, a STD line with a fax is an absolute must. This issue was raised with the Director (Technical) of BHEL at the Corporate Headquarters, New Delhi. His response was most positive. This should be followed up on a priority basis.

4. Duration of expert missions- It is clear that visits of experts for less than 3 weeks' duration are marginal at best, and certainly not cost-effective. Since currently only limited expert man-months are available under the project, it is strongly recommended that no expert be recruited for less than 3 weeks' stay at PCRI. Missions of longer duration should be encouraged.

ANNEX A

SUMMARY AND RECOMMENDATIONS

OF

INTERNATIONAL CONFERENCE

ON

ENVIRONMENTAL IMPACT ANALYSIS

FOR DEVELOPING COUNTRIES

28 NOVEMBER - 2 DECEMBER, 1988

NEW DELHI, INDIA

POLLUTION CONTROL RESEARCH INSTITUTE

BHEL, RANIPUR

HARDWAR 249403

INDIA

CONFERENCE SUMMARY

An International Conference on Environmental Impact Analysis for Developing Countries was held in Hyatt Regency Hotel, New Delhi, during 28th November to 2 December 1988. The Conference was organised by the Pollution Control Research Institute, Hardwar, India, with the support and co-operation of the Government of India through BHEL, United Nations Development Programme, United Nations Environment Programme, United Nations Industrial Development Organization, International Association for Clean Technology, International Society for Ecological Modelling and International Water Resources Association.

In his keynote address, H.E. Z.R.Ansari, the Indian Minister of Environment and Forests, pointed out that the environmental factors have become increasingly important considerations in recent years for project planning in India. Environmental impact assessment (EIA) has now become mandatory for all public sector projects.

Inaugurating the Conference, H.E. J.Vengala Rao, the Indian Minister of Industry, argued that environmental protection is as important in developing countries as in developed countries.However, developing countries like India, on their way to industrialization, could usefully adopt the experience of developed countries. India has been giving utmost importance to economic and industrial growth that is consistent with environmental preservation.

As the Minister of Industry, H.E. Rao, had to endeavour always to strike a balance between industrial growth and environmental protection. Industry has environmental impacts in terms of consumption of raw materials and discharge of waste products. There is often conflict between environmentalists and people interested in growth and industrial expansion. He pointed out that the adocates of industry argue that industrial growth will be hampered if environmental regulations are applied too rigidly but the environmentalists maintain that unless there is a certain rigidity in the enforcement of anti-pollution regulations, the long-term environmental impact due to unregulated industry is injurious to the society at large. In India, legal requirements for environmental clearence of projects have been made quite strict. While these environmental measures will require additional capital costs as well as extra time for project clearence, the Government considers these costs worthwhile for the long term interest of the country as a whole.

The Minister further said that developing countries must strike a reasonable balance between industrial growth and

environmental preservation. The underlying concept has to be that human beings must approach nature with reverence. The bounty of nature in all its aspects should be used with caution and restraint. Development must avoid over exploitation and abuse of nature and resources. Ultimately human happiness will depend upon our ability to live in harmony and peace with nature.

In addition to the opening and valedictory sessions, the Conference was organized into 13 major technical sessions:EIA Methodology, EIA for Developing Countries, Water Pollution Impacts, Environmental Impact of Water Systems, Noise Impacts and Case studies, Waste Management and Land use Impacts, Air Pollution Impacts, EIA Case Studies, Biological Impacts, Environmental Impact of Industry, Environmental Impact of Thermal Power Plants, EIA Case Studies from Industry, and Education and Training for EIA.

A total of 109 papers were presented during the 13 sessions over a period of 4 1/2 days. These papers were selected by an international panel of experts from 362 abstracts initially received by the Pollution Control Research Institute. As to be expected for a Conference with such a comprehensive scope, discussions were wide ranging and covered practically all aspects of environmental impact assessment.

Since it will not be an useful task to review all the issues that were raised during the Conference, the present summary covers primarily the main issues raised by the participants.

1. <u>Complementarity between environment and development issues</u>- There was complete unanimity among the participants about the need for a proper balance between environmental conservation and the overall development. N.C. Thanh (Thailand) and D.C.Tam (Canada) summed up this view succintly: environment must not be ignored and development must not be impeded. Most of the debates so far on environment and development issues have often involved considerable amount of emotions from all sides but not enough reasoning and facts. Ideally, every environment-development issue should be analysed objectively and dispassionately so that informed decisions can be made which will enable development to proceed without destroying the resource base and the environment on which the very process of development depends. For this to occur, it would be necessary to create rational and sensible environmental awareness in all people concerned : planners environmentalists, engineers, economists and other related professionals, politicians and the general public.

2. <u>EIA must be made mandatory</u>- It was agreed that all developing countries must strive for a legal framework which would make EIA mandatory for new projects or expansion of existing projects. While the legal basis for carrying out EIA is an essential prerequisite, it was cautioned that it is one of the several other considerations which need to be satisfied concurrently in order that the environment can be protected.

The countries that make EIA mandatory must have the appropriate institutional framework within which such assessments can be objectively carried out. Equally, it is important to ensure that adequate manpower with appropriate expertise is available within the country to carry out the impact assessments and to review them objectively. An example was given of an Asian country, where EIA has been made mandatory for sevearl years, but out of several thousand projects subjected to EIA, not even one was ever denied clearence.

3. Current EIA methodologies and processes are flawed - Current EIA methodologies and processes are seriously flawed, and not surprisingly their application to developing countries leave much to be desired. EIA, as it is practised at present, is an art and not a science. Furthermore, EIA process has been defined in different ways in different developing countries. No two developing countries appear to have defined it in the same way.

As the Executive Director of the United Nations Environment Programme, Dr. Mostafa K. Tolba, in his message to the Conference pointed out, the linkages of EIA to the "planning of social and economic developments are still not clear. What is needed most are cost-effective and efficient means of implementing EIA as part of the approaches to achieving sustainable development."

All development projects have both negative and positive impacts but EIA, as it is currently practised, only concentrate on negative environmental impacts. It is unfortunate that the positive impacts are now completely ignored. As Prof. Asit K. Biswas, President of the International Society for Ecological Modelling, pointed out in his valedictory address to the Conference, EIA must address itself to both positive and negative impacts. The overall thrust of EIA must be shifted to maximizing the positive environmental impacts and minimizing the adverse impacts rather than focussing exclusively on negative impacts. Only by taking such a holistic approach, environmental conservation can be practised and enhanced.

Despite numerous EIA handbooks, manuals and guidelines prepared by national organizations and academic institutions, participants felt that the EIA reports are still too academic, bureaucratic, mechanistic and voluminous. Often they do not concentrate on major environmental issues but provide lengthy deliberations on fringe issues that could be counterproductive and consume resources that are more urgently needed for analyses of other important problems.

4. EIA reports are mostly too mechanistic - An objective analysis of EIAs carried out in developing countries indicate that they are often too mechanistic. For example, waste discharges and effluent emissions are generally described in terms of concentration levels in the atmosphere and surface waters. The entire emphasis of the analysis is whether the concentration

levels are permissible or not. What these discharges and emissions actually mean in terms of human and animal health and the biota are mostly ignored. If indeed there is any discussion, it tends to be somewhat general or superficial.

Analysts often appear to have no clear idea as to what type of information is needed by the decision-makers. Accordingly, they may count the number of trees in one area, but may not consider what could be the long-term impacts on the forest due to the increased levels of pollution. It is assumed that as long as concentration levels are within permissible limits, no other problem exists.

Equally, many EIA reports now contain numerous tables of collected data, without any clear idea about their relevance and even necessity. In many developing countries there is now far too much emphasis on data collection but not enough on their analysis, interpretation and their environmental implications.

5. Lack of follow-up monitoring - EIA, as it is practised now, ends immediately after the environmental clearence of a project has been received. Compliance monitoring is seldom carried out, either by the project authorities or by the responsible government agencies. This practice is contributing to several problems, among which are the following:

i) Psuedo-analysis - In the absence of any follow-up monitoring, many psuedo-analysis of EIA, are now being carried out with the main objective of only getting the projcts cleared quickly, for implementation irrespective of the environmental costs. are now being carried out. The whole purpose of such psuedo-analyses is to justify projects based on "manufactured" data and/or deliberately skewed analyses. Such pseudo-analyses, whenever carried out, circumvent the whole purpose of EIA.

ii) Prediction difficulties - In most EIAs of major development projects, it is impossible to predict with complete reliability all potential environmental impacts, their magnitudes and times of occurence. Uncertainty is unavoidable in most environmental prediction. Thus, follow-up monitoring must be an essential requirement, if environmental impacts are to be properly managed.

iii) Effe iveness of EIAs - Without follow-up monitoring, it is not possible to judge the overall effectiveness of any EIA. Proper monitoring and evaluation are essential to ensure that the recommendations made by the study will actually be implemented.Reliable data on post-project observed impacts and their comparison with the predicted ones can give a clear indication of the accuracy of the earlier EIA predictions. Such results could be sucessfully used to develop more cost-effective methodology in the future.

6. Data availability and reliability- One of the most important constraints for carrying out reliable EIAs in developing

countries, within a reasonable timeframe, was identified by the participants to be poor data availability and reliability. It was pointed that very often much more environmental data exist in a developing country than people generally believe. However, poor or non-existent data retrieval and management system, inter-Ministerial and/or inter-institutional rivalry, unnecessary classification of data as secret or confidential, and official apathy, often ensure that data collected are not easily available. Many time people who need the information may not even know who are the people collecting various environmental data, where they are stored and how these can be obtained.

An equally serious problem is the reliability of available data. While much of the data collected are of reasonable quality, equally there are several instances of unreliable data which were collected at wrong places, or with improperly calibrated equipments, incorrectly analysed, or simply "manufactured". It is a very difficult, expensive and time-consuming process to separate unreliable data from good data within any given data set.

There is an urgent need to develop proper environmental data management systems, which are easily available to the analysts within reasonable time and cost. Since the availability of computers is not a major problem in most developing contries, it should be possible to develop appropriate environmental data management systems.

7. Cost-effective of EIA- Opponents of EIA have some time claimed that the benefits from such assessments are outweighed by the delays in project implementation, which generally tend to increase their costs. While on the basis of the present practice there is partial validity to this claim, many speakers pointed out that the main reason for such delays was that EIA was either not properly conceived or not integreted in the project cycle from the begnining. Often, only after project planning has been completed, people think about EIA. This is why delays sometimes could occur in project implementation. Properly conceived EIAs must be integreted in the project planning right from the initial stage. This would not only improve the overall quality of the project but would also reduce substantially or even elimnate, any delay mainly due to EIA.

On the basis of the case studies presented during the Confernce and published literature, EIA costs are found to be relatively small, when compared to the total project costs. Depending on the complexities associated with EIA , institutional procedures to be followed, and data and expertise availabile, the cost of carrying out EIA appears to average between 0.05 to 0.15 percent of the total project cost. Time required appear to vary from 6 weeks for relatively simple projects to 1.5 years for complex cases.

An important observation was that even when the qualities of EIA predictions were somewhat poor, and they caused cost and time overruns, they did, however, contributed to measurable environmental benefits.

It was argued by Prof. Biswas that in developing countries often best is the enemy of good. What one should be aiming for is a good EIA study that could identify say, some 80 precent of the potential environmental impacts within a reasonable time frame and acceptable cost. If proper follow-up monitoring is ensured, whatever may be the lacuna in the analysis, these can be identified in time and appropriate remedial actions can be taken.

8. Presentation of EIA results - Many of the participants raised the issue of poor presentation of EIA results. For complex EIAs, the reports often are presented in several very bulky volumes. Very few people, if any, actually have time to study such reports in depth, let alone understand them. There is an urgent need to present the results of such analyses succintly and clearly. To the extent it is possible, attempts should be made to present results in graphic forms which could be easily understandable by non-experts. As computers become widely available in developing countries, their costs continue to decline and the technology of computer-graphics improves substantially, computers should play more and more important role not only for carrying out analyses but also for displaying EIA results graphically.

9. Public Participation - During the entire Conference, considerable debate centred on what should be the role of public participation in the EIA process. The overall view of the participants was that the public currently has very little say in the process in nearly all developing countries. It is difficult, often even impossible, to obtain or consult copies of the EIA reports. Public has equally limited, if any, role in most developing countries to question or comment on the quality of the reports or conducting of the environmental clearence process.

While overwhelming number of the participants favoured more public involvement, there were a few dissenting voices preaching caution due to such problems as illiteracy and ignorance that currently exist among many who could be involved in the process.

10. Education and Training- Many argued that one of the most important factors that could significant improve the EIA process is good education and training. Currently very few educational and training courses exist in developing countries that properly consider various EIA methodologies available in depth. Information on the legal and regulatory frameworks and institutional arrangements are also necessary. Education and training processes are important since the fundamental factors behind all EIA predictions are still best the professional judgement and/or experience with similar projects earlier.

Both short-term and long-term courses are necessary. These courses, however, must be multi-disciplinary, and the focus should be on the practical and operational aspects of EIA and not on the theoretical implications.

In his closing address, H.E. Madhavsinh Solanki, the Indian Minister of Planning, said that the view that the pursuit of environmental and developmental goals could be combined has now been accepted, and India has endeavoured to incorporate this philosophy in her development planning and also to devise mechanism to operationalize in practice. India's Seventh Five Year Plan (1985-90) states that "if the gains in productivity are to be sustained, resources must also continue to be available over time. This requires that, while providing for current needs, the resources be so managed as to enable sustainable development."

The Minister pointed out that a country like India faces many problems due to the enormity of her development needs and the paucity of resources. But in the area of the environment, India has three distinct advantages. First, the country as a comparitively "late-comer" in the area of the environment, can learn from the experiences of other countries that are ahead of her. Second, India effectively uses the planning mechanism for steering and guiding socio-economic development which provides a balance between the public and the private sectors as well as short-term and long-term interests of the country. Thus, a conscious effort can be made to incorporate long-term environmental considerations in the development programmes on a systematic manner. Third, most of the large projects in the area of industry, power and infrastructure are in the public sector, where again it is easier with take care of the environmental considerations in accordance with the public policy and long-term social interest. The fact that the Pollution Control Research Institute of Bharat Heavy Electricals Ltd., a major public sector undertaking, organized a major international EIA Conference is a manifestation of that public concern.

At the conclusion of the meeting, the delegates unanimously expressed their appreciation to Mr. S.B.C. Agarwala, Head, Pollution Control Research Institute, and his staff for organizing a highly successful and productive Conference on a timely subject that is of great importance to all developing and developed countries.

RECOMMENDATIONS

On the basis of papers presented and the ensuing discussions, there was general agreement among the participants on the following recommendations.

1. EIA should be made mandatory in all developing countries. Those countries that do not at present have the necessary legislative frameworks should take immediate steps to make EIA mandatory.

Laws and regulations,however, by themselves, are not enough. All efforts should be made to ensure that the legal requirements are actually properly implemented. UNEP and UNDP should assist those countries that require assistance to develop appropriate legal framework and their implementation.

2. Methodologies that are currently available for EIA are generally not appropriate for developing countries. much of the work that is now being carried out in this area are somewhat academic in nature. Their operational applications leave much to be desired. What is urgently needed are cost-effective and efficient means of carrying out as well as implementing EIA as an integral component for achieving sustainable development. It is also necessary to ensure that the methodologies developed would enable developing countries to carry out EIA within limited cost and expertise available and that it can be completed within a reasonable timeframe. Equally, EIA must consider both positive and negative environmental impacts. National and international organizations should work together to develop operational EIA methodologies. Special consideration should be given as to how best to handle the environmental impacts of small-scale industry.

3. While developing countries can get information on EIAs carried out in developed countries, south-south information transfer in this area is currently almost negligible. What is immediately needed is an objective and reliable review of the current status of the effectiveness of using EIA in developing countries, methodologies used, and their relative merits, and constraints, main features of their implementation processes and the emerging trends. As a first step, it is recommended that UNEP,UNDP and the Asian Development Bank (ADB) prepare such a review for the Asian region.

4. In many developing countries, considerable problems and constraints exist for carrying out EIA. There is an urgent need for establishing clear and unambiguous guidelines for EIA that are acceptable to relevant Ministeries, United Nations Agencies, Asian and other Development Banks and bilateral aid organizations. It is recommended that National Workshops be organized, which would include all the relevant parties, including environmental non-governmental organizations, to develop acceptable guidelines.

5. It is a very difficult, if not impossible, task for analysts in developing countries to find good case studies examples of cost-effective EIAs that have been carried out in other dveloping countries. It would be very helpful if good EIA case studies from developing countries could be identified and

then published as a Handbook that would be easily available to those who require them. It is recommended that:

i) UNEP, UNDP and International Society for Ecological Modelling collaborate together to prepare such a Handbook ;

ii) UNIDO and International Association for Clean Technology collaborate to prepare a Handbook of good EIA case studies from industry; and

iii) UNDP,UNEP and International Water Resources Association work together to prepare a similar Handbook for the water sector.

6. Very little monitoring and follow-up work has been done in developing countries to see how the forecasts made by the initial EIA studies compare with the actual impacts after the implementatin of the projects. If the reliability of the EIA methodologies are to be improved, environmental impact monitoring after project implementation is an essential requirement. It is recommended that national and international organizations collaborate on a series of specific case studies where EIA forecasts made during the project approval phase are compared with the observed impacts after implementation. Results of such intercomparision studies should be made widely available.

7. R sk analysis and social impact analysis should be integrated within the framework of EIA Methodologies for risk and social impact analyses are still far less advanced than for EIA. UNDP, UNIDO, UNEP and ADB, in collaboration with IACT and ISEM, should sponsor research to develop operational methodologies for risk analysis and social impact analysis.

8. Public participation is an important requirement for EIA, UNEP, UNIDO, and UNDP should sponsor studies to review the extent of public participation and their relative effectiveness in conducting EIA studies in various developing countries. Such comparitive studies would assist contries to determine the best alternative available to them to ensure public involvement in EIA.

9. Education and training in EIA are essential for all developing countries. Training of trainors needs priority attention. All international and national organizations should encourage education and training on EIA to develop adequate expertise in developing countries. The ultimate objective of such education and training exercises should be to develop an adequate number of professionals in each country who should be able to carry out EIA with indigeneous expertise.

10. Pollution Control Research Institute should be complimented for organizing a very successful, productive and much-needed Conference on EIA for developing countries. PCRI should be encouraged to convene seminars, workshops and training

courses on EIA of specific industrial sectors, individually or in co-operation with appropriate national and international organizations. One of the priority sectors could be EIA of thermal power stations.

FORWARD

Pollution Control Research Institute was established within Bharat Heavy Electricals Ltd. (BHEL), at Hardwar, U.P., with financial assistance from the United Nations Development Programme and with United Nations Industrial Development Organization as the executing agency.

One of the main areas of concentration of the Institute is environmental impact assessment. The Institute has already carried out several major environmental impact assessment studies. Because of this interest, it was decided to organize a major International Conference on the subject in order to review the effectiveness of present methodologies, the efficiency of their implementation, legal and institutional frameworks within which such analyses take place, and the opportunities and constraints faced by developing countries to carry out such analyses. It was also expected that such an important conference would facilitate information, knowledge and experience transfer between various developing countries as well as between developed and developing countries.

Accordingly, Pollution Control Research Institute convened the International Conference on Environmental Impact Analysis in Developing Countries in New Delhi, India, 28th November - 2 December 1988. This was the first time an important Conference of this nature was organized in any developing country. The Conference was supported by the Government of India through BHEL, United Nations Development Programme, United Nations Environment Programme, United Nations Industrial Development Organization, International Association for Clean Technology, International Society for Ecological Modelling and International Water Resources Association.

Over 300 participants from 26 countries disussed 109 papers during the Conference. Because of the importance and timeliness of the subject and the overwhelming success of the Conference, threre has been a strong demand for copies of the "Summary and Recommendations" of the Conference. This report is being published as a direct response to that demand.

I would like to express my sincere appreciation to Prof. Asit K. Biswas, Oxford, England, the Chief Technical Advisor to the PCRI on behalf of UNIDO/UNDP, for assisting us to finalize the "Summary and Recommendations" of the Conference.

Hardwar, India
January 31, 1989

(S.B.C. Agarwala)
Head
Pollution Control Research Institute