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Report

The Use of EIA Methods in Sri Lanka

By
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THE USE OF EIA METHODS IN SRI LANKA

INTRODUCTION

The Environmental Impact Assessment is now recognized worldwide as one of the most effective national level strategies of achieving sustainable development It is further considered to be a very useful tool for early incorporating environmental concerns into the planning process Thus EIA is seen as a pro-active strategy which is aimed at preventing and or mitigating environmental problems which could arise from development activities

EIA was first legalized in the United States under the NEPA (1969) Since then a large number of countries from both the developed and developing world have followed the US example and enacted their own EIA regulations While there are some changes in the details of the regulations the fundamentals of the EIA remains the same world over

The most critical element in the EIA process is the EIA report The entire EIA process revolves around the EIA report Pre-EIA report stages i e scoping and setting Terms of Reference (TOR) provides the basis on which the report should be prepared and the post-EIA report stages are based on the content of the report Thus the preparation of the EIA report is the most important stage in the entire EIA process

THE EIA PROCESS IN SRI LANKA

As in the case of the rest of the world, Sri Lanka too became very concerned about its natural environment since the 1970s Although the contribution of Sri Lanka to global

environmental problems remains insignificant, the local natural environment came under increasing threat with the drive towards accelerated economic growth which started in the late 1970s The Sri Lankan government aware of this fact, enacted the National Environment Act No 47 of 1980 which provided the overall legal framework and the institutional infrastructure for environmental management in Sri Lanka The legal frameworks for the EIA was introduce by the National Environment (Amendment) Act No 56 of 1988 However legal provision for EIA in the coastal zone has been already introduced by the Coast Conservation Act No 57 of 1981 Today, both these acts provides the legal framework for EIA in Sri Lanka The Orders and Regulations required for EIA came into effect in June 1993 after they were published in the Government Gazette Extra-Ordinary No 772/22 Thus although, there have been some EIA reports (e g Accelerated Mahaweli Development Project) as early as late 1970s, the EIA process currently in force came into effect only after June 1993

The EIA process in Sri Lanka has two distinctive types - Environmental Impact Assessment and Initial Environmental Examination The former is required when the environmental impacts of a projects are very significant and the latter is prescribed when the impacts are less significant In Sri Lanka only the "prescribed projects" are subjected to EIA, in the case of projects in the coastal zone, the Director of the Coast Conservation Department can use his discretion The administrative part of the EIA process in Sri Lanka is schematically presented in the annex 2

GENERAL INTRODUCTION TO THE EIA METHODS

What is generally known as EIA methods includes the a range of techniques used to identify environmental impacts define and assess significance of impacts and to evaluate alternatives Identifying environmental impacts and defining and assessing their significance and comparing alternatives are at the heart of the EIA Thus they should be done as comprehensively and objectively as possible The use of EIA methods is expected to help the regulators the project proponents and preparers of the EIA reports

to achieve this goal successfully The most prominent methods of EIA are given below (Annex I Chapter on Methodology from Larry Canter, 1995)

1 Delphi Technique
2 Checklists
3 Matrices
4 Networks
5 Computer Modelling

The EIA methods can be used at different stages in the EIA process

1 Scoping by the Project Approving Agencies (PAAs)
2 Scoping by the EIA Consultants
3 Throughout the Preparation of the EIA report
4 Evaluating the EIA report

THE USE OF EIA METHODS IN SRI LANKA

The use of EIA methods vary according to the type, scale and location of the project Further the availability of resources time, data and trained personnel also play a role in selecting various types of EIA methods

In 1991, when the NAREPP project started, the EIA process in Sri Lanka was at its infancy The few EIA reports prepared by this time have not employed EIA methods Instead they included lengthy descriptive statements on selected environmental impacts and the reason for their selection were not explained Most of the EIA reports have been weak on use and presentation of quantitative information on cause-and-effect analysis, and on systematic comparison of project alternatives

NAREPP'S CONTRIBUTIONS TO IMPROVE USE OF EIA METHODS

NAREPP realizing this need decided that substantive attention need to be paid to EIA methods in its training programs Accordingly, a section on EIA methods was incorporated into the The Ten Day EIA Intensive Workshops conducted by NAREPP However, it was soon realized that this is not adequate to make a substantive change in the use of EIA methods and that special attention must be paid to EIA methods Based on this premise NAREPP organized a four day workshop on EIA Methods in October 1994 The improvement of technical skills for the preparation of EIA reports, specially the application and practice of advanced methodologies used in EIA were the main objective of the workshop The principal resource person at this workshop was Dr Robert Smythe and he received the active support of a few local resource persons The participants included a private sector EIA consultants, university lecturers, and the members from the Cental Environmental Authority (Annex II Agenda of the Workshop, Annex III List of Participants)

This workshop was a success as it for the first time in Sri Lanka, the need and the usefulness of the application of EIA methods were highlighted and all participants agreed that the application of objective and scientific EIA methods was essential in improving the quality of the EIA report which in turn will help EIA process to proceed smoothly (Annex IV Workshop Report by Dr Bob Smythe)

Subsequent to this workshop all Ten Day EIA Intensive Workshops devoted a substantial time and attention to EIA methods and the application of one or few EIA methods was made a compulsory requirement of the mini-EIA reports prepared by the participants

The impact of the workshop was also felt at the practical and regulatory level as well The EIA consultants began to pay greater attention to the application of EIA methods in preparing EIA reports and it was reflected in a number of subsequent EIA reports At the CEA, the application of EIA methods became a criteria in evaluation of

EIA reports

INDUSTRIAL SITING STUDY

With the new initiative of the government towards industrialization and with the full participation of the private sector, industrial siting became a concern As the Ministry of Industries and the Industrial Development Board did not have an objective and scientific method of selecting sites for various industries At this point NAREPP intervened and with the collaboration of the Ministry of Industries, and Industrial Development Board and the academics from the University of Maratha and a few other qualified professionals developed a checklist and it was tested (Annex V Industrial Estate Site Evaluation Checklist) As the Ministry of Industries accepted the checklist, it was computerized and was made available in the form of a user friendly software This is the first time such an attempt was made and became successful in Sri Lanka

EVALUATION OF THE USE OF EIA METHODS

NAREPP wanted to survey the use of EIA methods in Sri Lanka This was done in two ways

First it was decided to include a chapter on "Review of Methods Used in Environmental Impact Assessment" in the NAREPP sponsored publication on the *Environmental Impact Assessment The Sri Lankan Experience (1997)* published by the Centre for Environmental Studies at the University of Peradeniya (Annex VI The Chapter on "Review of Methods Used in Environmental Impact Assessment)

The main findings with respect to the use of EIA methods in Sri Lanka is as follows

1 Most EIAs conducted in Sri Lanka had been done in an ad hoc manner and failed to employ a methodical approach

2 The early EIAs were mainly of the descriptive type and were done by a single individual rather than by a team of experts from different disciplines

3 Most EIA reports do not indicate the basis for selection of the parameters used

4 Since 1993, more and more t of the EIA preparers have adopted a more methodical approach

5 Lack of methodical approach make it almost impossible to arrive at a judgement on the significance of the impacts described in the EIA reports

6 Lack of a methodical approach have made project evaluation difficult

Second NAREPP organized a workshop on "Improving Methods for Environmental Impact Assessment" in July 1997 The objectives of the workshop were as follows

1 To review EIA methodologies currently used in Sri Lanka

2 To present draft guidelines for use in EIA methodologies which are currently under consideration by the CEA

3 To make recommendations on ways to improve the quality and the effectiveness of the EIA process in Sri Lanka

The Workshop was conducted by Dr Robert Smythe with the help of local experts (Annex VII List of Resource Persons and Participants) The workshop reviewed various

EIA methods available and applicable to Sri Lanka including the extended Benefit-Cost Analysis and the Industrial Estate Site Evaluation Checklist (Annex VIII Program of the Workshop, Annex IX Workshop Report prepared by Dr Robery Smythe and Dr Shantha K Hennayake)

Recommendations for the Future

1 The clarity and usefulness of EIAs would be improved greatly, and the cost and time spent on them could be reduced, if the EIA prepares were required to state in the front of the report **what methods they are using** including any special methods developed for this particular EIA

2 The TORs for EIA should require that the **interactions** among relevant impacts be analysed including interactions that could result in cumulative and/or long-term biological, social and economic impacts

3 TORs should be used by reviewers during the evaluation of EIAs to determine whether the terms of the TOR have been adequately followed

4 CEA and the PAAs should provide more specific guidance and oversight to assure that the public (including known stakeholders) are both informed and consulted during the EIA process

5 Analysis of alternatives should be made more useful by doing the alternatives analysis early in the planning process for projects

6 A retrospective review of EIAs already completed should be done, and the findings used to identify preferred methods and more generally to identify ways to improve the clarity and information content of the documents

7 All EIA professional teams should include one person with the appropriate qualifications to be the report editor, who will have primary responsibility for producing a concise, readable final EIA report

CONCLUSION

It is very important that all the EIA preparers become conversant with EIA methods The two workshops on EIA methods conducted by NAREPP in 1993 and 1997 was attended only by a small number of EIA consultants Thus there is a real need for all the consultants to be exposed to various EIA methods This can be done by a series of workshops aimed at the EIA preparers The Ministry of Forestry and Environment and the CEA in collaboration with the Centre for Environmental Studies can offer such training programs in the future Since the majority of the potential participants are from the private sector the participants can be asked to pay for the cost of the workshop

Further the TOR prepared by the PAAs can make it mandatory for the use of EIA methods in the EIA reports If the EIA reports do not comply with this TOR requirement, they can be sent back to the Project Proponent after the adequacy test

Since the first beneficiary of a well prepared EIA report is the Project Proponent himself it is in the best interest of the proponent that his EIA consultants adopt EIA methods in identifying and assessing impacts and comparing alternatives A well prepared EIA reports also make the administrative approval procedure smooth, thus once again benefitting the project proponent

CHAPTER 3

[illegible] Methods for Impact Identification: Matrices, Networks, and Checklists

Several activities are required in an environmental impact study including impact identification preparation of a description of the affected environment impact prediction and assessment selection of the proposed action from the alternatives evaluated to meet identified needs and summarization and communication of information. The objectives of the various activities differ as do the pertinent methodologies for accomplishing the activities. The term methodology is used herein refers to structured approaches for accomplishing one or more of the basic activities. The structured approaches encompass various substantive areas within the biophysical and socioeconomic environments thus distinguishing them from impact prediction methods or models for specific substantive areas. Numerous methodologies have been developed to aid in achieving the various activities in the EIA process. The purpose of this chapter is to describe simple methods for impact identification. This will be done by highlighting matrices networks and simple and descriptive checklists. Background information is provided on the overall purposes of the methodologies as well as a classification scheme. This information is also relevant to decision focused checklists and alternatives evaluation discussed in Chapter 15.

BACKGROUND INFORMATION

EIA methodologies can be broadly categorized into interaction matrices and checklists with networks representing variations of interaction matrices. Interaction matrices range from simple considerations of project activities and their impacts on environmental factors to stepped approaches which display interrelationships between impacted factors. Checklists range from simple listings of environmental factors to descriptive approaches which include information on measurement prediction and interpretation of changes for identified factors. Checklists may also involve the scaling rating (or ranking) of the impacts of alternatives on each of the environmental factors under consideration. Scaling or rating techniques include the use of numerical scores letter assignments or linear proportioning. Alternatives can be ranked from best to worst in terms of potential impacts on each factor. The more sophisticated checklists are those

APPENDIX I

involving the assignment of importance weights to environmental factors and the scaling rating of the impacts for each alternative on each factor. Resultant comparisons can be made through the development of a product matrix and overall impact index for each alternative. The index or score is determined by multiplying importance weights by the scale rating value for each alternative.

Methodologies can be useful although not specifically required throughout the impact assessment process with certain ones being of greater value for specific activities. Table 3.1 identifies five activities and relevant useful methodologies. For example matrices and networks are particularly useful for impact identification while weighting and scaling rating or ranking checklists find great application in the final evaluation of alternatives and the selection of a proposed action (Lee 1988). It is not necessary to use a methodology in entirety in an impact study. It may be instructive to use portions of several methodologies for certain requisite activities. In that regard methodology selection may be considered a part of an impact study. Some desirable characteristics of an EIA

TABLE 3.1

APPLICATIONS OF METHODOLOGIES IN EIA PROCESS

Process activity	Methodologies		Relative usefulness
Impact identification	Matrices	Simple	High
		Stepped	Medium
	Networks		High
	Checklists	Simple	Medium
		Descriptive	Medium
Describing affected environment	Matrices	Simple	Low
		Stepped	
	Networks		
	Checklists	Simple	High
		Descriptive	
Impact prediction and assessment	Matrices	Simple	Medium
		Stepped	Medium
	Networks		Medium
	Checklists	Descriptive	High
		Scaling rating ranking	Low
Selection of proposed action (based on evaluation of alternatives)	Matrices	Simple	Medium
		Stepped	Low
	Checklists	Scaling rating ranking	Medium
		Weighting scaling rating ranking	High
Study summarization and communication	Matrices	Simple	High
		Stepped	Low
	Checklists	Simple	Medium

Simple checklists questionnaire methods

APPENDIX II

Workshop on
Environmental Impact Assessment Methodology
25 - 28 October, 1994
(Hotel Villa Ocean View, Wadduwa)

LIST OF PARTICIPANTS

Mrs C Wethasinghe
Project Engineer/Scientist
National Building Research Organization

Mr K M Manickavasagar
Head/Environmental Division
National Building Research Organization

Mr Priyalal Dias
Director/Geologist
Foundation & Waterwell Engineering (Pvt) Ltd

Dr C S S de Silva
Managing Director
Bamber & Bruce Ltd

Mrs S Ambalavanar
Chief Analyst
Bamber & Bruce Ltd

Ms Sujeewa Radampola
Chartered Civil Engineer
Engineering Consultants Limited

Mr S Manoharan
Director
Agriculture Industry Consultancy & Services (PTE) Ltd

Mr Preethi de Silva
Consultant
Agriculture Industry Consultancy & Services (PTE) Ltd

Dr S Buvendralingam
Dept of Civil Engineering
University of Moratuwa

Mr B S Kahawita
Director/Coast Conservation
Coast Conservation Department

Mr R A D B Samaranayake
Manager (Coastal Resources Development
Coast Conservation Dept

Mr K Suntharalingam
Managing Director
Environmental Engineering Consultants

Mr Lal Rupasinghe
Director Projects
Venture Projects & Development (Pvt) Ltd

Mr H N Gunadasa
Manager/Environmental Technology Group
CISIR

Mrs K D Attanayake
Technical Officer
CISIR

Mr Asoka Cooray
Nippon Koei & Co

Mr W V D Albert
Agronomist
Resources Development Consultants Ltd

Mr K Jinapala
Senior Consultant
Resource Organization & Management International (Pvt) Ltd

Mrs Thusitha de Alwis
Dept of Chemical Engineering
University of Moratuwa

Dr (Mrs) Ajantha Perera
Senior Lecturer
University of Colombo

Dr (Mrs) Y N A Jayatunga
Senior Lecturer
University of Colombo

Mr H K N Karunaratne
Department of Geography
University of Colombo

Mr W M Wilson
Department of Geography
University of Colombo

Mrs Ramani Ellepola
Director (Environmental Protection)
Central Environmental Authority

Mr H L Susiripala
Asst Director (Environmental Protection)
Central Environmental Authority

Mr W A D D Wijesooriya
Senior Environmental Scientist
Central Environmental Authority

Mr Anura Jayathilleke
Asst Director (Natural Resources Management)
Central Environmental Authority

Mr N Sureshkumar
Senior Environmental Officer
Central Environmental Authority

Resource Persons

Dr Robert Smythe Course Leader	-	Owner/Principal Potomac Resource Consultants, USA
Mr Pradyuma Kumar Kotta	-	GIS Specialist SENRIC Project
Mr Glenn Rutanen-Whaley	-	Chief, Environmental & Capital Projects Division USAID
Mr Avanthi Jayatilleke	-	Environmental Specialist, USAID
Dr Samantha Hettiarachchi	-	Senior Lecturer University of Moratuwa
Dr Shantha Hennayake	-	Senior Lecturer University of Peradeniya
Dr H B Kotagama	-	Senior Lecturer, University of Peradeniya
Mrs Shirani Yasaratne	-	Director (NRM), Central Environmental Authority
Mrs Nilanthi Bandara	-	Senior Lecturer The Open University of Sri Lanka

NAREPP

Mr Edward J Scott	-	Advisor Natural Resources & Institutional Development
Mr Ariyaratne Hewage	-	Director Policy & Institutional Development
Ms Shenuka Chanmugam	-	Program & Policy Analyst

APPENDIX III

Workshop on
Environmental Impact Assessment Methodology
25 - 28 October, 1994
(Hotel Villa Ocean View, Wadduwa)

AGENDA

Monday October 24

4 00 pm	-	*Departure from NAREPP Office, Colombo*
5 00 pm	-	*Arrival at the Hotel*
6 00 pm	-	*Welcome Remarks -* *Mr G K Amaratunga and Mr Edward Scott*
6 20 pm	-	*Introduction of Participants*
8 00 pm	-	*DINNER*

Tuesday October 25

8 30 am	-	*Current Status of EIA in Sri Lanka - Mrs Shirani Yasaratne, CEA*
9 30 am	-	*Issues on Current EIA Preparation* *Panel Discussion -* *Dr Samantha Hettiarachchi* *Dr Shantha Hennayake* *Mr Lalanath de Silva*
10 30 am	-	*TEA*
10 45 am	-	*Review of Selected EIAs - Dr Shantha Hennayake*
12 00 pm	-	*Discussion of EIA Issues - Dr Robert Smythe* *Mrs Shirani Yasaratne, moderators*
12 30 pm	-	*LUNCH*
1 30 pm	-	*Overview of Current EIA Methodologies* *- Dr Robert Smythe*
3 00 pm	-	*TEA*
3 15 pm	-	*Experience with EIA Methodologies in Sri Lanka* *Panel Ms Nilanthi Bandara* *Dr Samantha Hettiarachchi*
4 30 pm	-	*Discussion - Dr Robert Smythe*
5 00 pm	-	*Briefing on Field Visit and Group Exercise*
5 30 pm	-	*Adjourn*
8 00 pm	-	*Dinner*

Wednesday October 26

8 00 am	-	*Use of Extended Benefit/Cost Analysis in EIA - with an exercise - Dr H B Kotagama*
10 15 am	-	*TEA*
10 30 am	-	*In-depth Presentation of a Current EIA Methodology and Discussion - Dr Robert Smythe*
11 30 am	-	*In-depth Presentation of Alternative Methodologies*
12 30 pm	-	*LUNCH*
1 30 pm	-	*Field Visit Application of Two EIA Methodologies*
5 00 pm	-	*Return to Hotel*
6 00 pm	-	*Group A & B Working Sessions*
8 00 pm	-	*Dinner*

Thursday October 27

8 00 am	-	*Use of Geographic Information Systems in EIA - with Computer Display Mr - Pradyuma Kumar Kotta*
10 15 am	-	*TEA*
10 30 am	-	*Water Quality Standards and Modeling of Aquatic Systems - Mr W A D D Wijesuriya and Dr Samantha Hettiarachchi*
11 30 am	-	*EIA Monitoring Methods - Mr Glen Whaley and Mr Avanthi Jayatillake*
12 30 pm	-	*LUNCH*
1 30 pm	-	*Exercise on EIA Team Management - Mr Ariyaratne Hewage*
3 15 pm	-	*TEA*
3 30 pm	-	*Evaluation of Social Impacts - Methods - Dr Shantha Hennayake*
5 00 pm	-	*Group A & B Working Sessions*
6 30 pm	-	*Rehearsal of Presentations*
8 00 pm	-	*Dinner*

Workshop on
Environmental Impact Assessment Methodology
25 - 28 October, 1994
(Hotel Villa Ocean View, Wadduwa)

REVISED AGENDA

Friday October 28

8 00 am	-	Economic Valuation Techniques - Dr T Gunaruwan Consultant National Planning Dept
9 30 am	-	Use of Geographic Information Systems in EIA - with Computer Display - Mr Pradyumna Kumar Kotta G I S Consultant South Asia Co-operative Environment Programme (SACEP)
10 30 am	-	TEA
10 45 am	-	Discussion on GIS
11 45 am	-	Water Quality Standards and Modeling of Aquatic Systems - Mr W A D D Wijesooriya and Dr Samantha Hettiarachchi
12 30 pm	-	LUNCH
1 30 pm	-	Evaluation of Social Impacts - Methods - Dr Shantha Hennayake
3 15 pm	-	TEA
3 30 pm	-	EIA Team Management - Mr Ariyaratne Hewage
4 30 pm	-	Short break
5 00 pm	-	Group A & B Working Sessions
6 00 pm	-	Rehearsal of Presentations
6 30 pm	-	Presentation - Group A
7 00 pm	-	Presentation - Group B
7 30 pm	-	Critiques of Methods
8 00 pm	-	Social Evening

Saturday October 29

8 30 am	-	Development of Recommended Guidelines for Appropriate EIA Methodology
10 00 am	-	Discussion of EIA Methodology Guidelines as Developed by Participants
11 00 am	-	Participants Evaluation of the Workshop
12 00 pm	-	LUNCH/Departure to Colombo

APPENDIX IV

SRI LANKA EIA METHODOLOGY TRAINING WORKSHOP

October 3-16

On Monday, October 3, I met in Colombo with NAREPP senior staff and Ms Shirani Yasaratne, Mr Wijesooriya, and Mr Sureshkumar of the Central Environmental Authority to develop a preliminary agenda and plans for the EIA Methodology training course The approach agreed upon was to review several EIA methodologies in current use, and to address two of them (Matrix and Network methods) in greater depth, by including a field exercise involving use of these methodologies by workshop participants to evaluate a hotel construction project on a site near the workshop location The actual site would be nominated by CEA staff after reviewing current applications, and inspected by a CEA representative and myself prior to the workshop to allow us to plan the field trip details and to be sure that we had proper approval to enter the selected site The agenda would also include presentations by various lecturers on water quality standards and modeling of aquatic systems, use of GIS, EIA team management, and evaluation of social impacts The workshop was set for Monday evening through Friday afternoon, October 24-28, at the Hotel Villa Ocean View, in Wadduwa, south of Colombo

During the next two weeks my time was devoted almost entirely to the industrial siting activity including the field trip and briefing, however I did review some of the training materials I had brought with me to select items appropriate to reproduce for distribution at the workshop During this time the NAREPP staff sent out and began confirming invitations to potential workshop participants The list, which was compiled by CEA and NAREPP staff, was focused on persons with prior "hands-on" EIA experience, either as EIA team leaders or members, plus a few CEA officials responsible for oversight of the EIA process As such, the list included a mix of university lecturers, senior professionals from Sri Lanka engineering firms and consultants to those firms or to government agencies subject to the CEA's environmental impact assessment requirements

October 17-23

Discussion with CEA staff narrowed the field exercise site to two locations along the beach area near Bentota Plans were made to inspect these sites on Friday CEA staff provided a background document on the general area, entitled Wetland Site Report, Bentota Estuary, that had been completed for the CEA by a Dutch consulting firm in February 1994 The document contains physical, biological, and demographic information and maps of the area, as well as a general assessment of the comparative value of various natural resources and their existing or potential uses Arrangements were also made for audiovisual equipment a copier, sound system, and other workshop items needed at the hotel On Thursday, October 20 Ed Scott and I met with Avanthi Jayatilake of USAID to discuss the issue of EIA monitoring It was decided that this was a key element of EIA training, but that it deserved treatment in greater depth than would be possible at the upcoming workshop and therefore we would not include Mr Jayatilake's presentation in the agenda

On Friday October 21, the final workshop agenda and other reference materials for the workshop were printed and/or sent for copying, and assembling of the "docket" folders to be given to each workshop participant was begun, to be completed on Saturday and Monday morning On Friday afternoon Mr Sureshkumar of CEA and I drove to Bentota to inspect the potential sites for the workshop's field exercise There was active construction at both of the sites, which raised concerns about safety and access After discussion with the site managers we chose the site adjacent to the Bentota Beach Hotel, where the hotel was building a sports complex, and decided to treat it for training purposes as if it were a separate hotel site The site, on a narrow spit of land between the ocean beach and the Bentota River estuary, presented several significant environmental impact issues Mr Sureshkumar agreed to fill out the CEA's environmental Check-List for hotel applicants as if he were the developer which would then be distributed to the workshop participants as part of the EIA training exercise

October 24-25

As a result of the assassination of the Opposition Leader Mr Gamini Dissanayake early Monday morning, a 24-hour curfew was imposed and travel to the workshop location as scheduled that afternoon was not possible The following day, after the NAREPP staff quickly polled the workshop participants by phone, it was decided to reschedule the workshop at the same location with a somewhat condensed schedule to begin Wednesday morning October 26 and to end Saturday around lunchtime Final assembly of materials and equipment was completed on Tuesday afternoon

October 26-29

The Workshop on EIA Methodology was held as rescheduled Approximately 35 participants were originally expected, despite the changed schedule, 21 participants, plus 7 of the 9 resource persons were able to attend the workshop (See Attachment A Workshop Agenda and List of Participants) During the first day several presentations on the current status of EIA and a discussion of EIA issues took place The second day was devoted to more detailed review of current EIA methodologies, and to preparation for the afternoon field training exercise The participants were divided into two teams, each of which focused on using one EIA methodology to develop an assessment of the potential environmental impacts of the project as presented Working sessions were held after dinner by both groups The third day included lectures on economic valuation techniques, use of GIS, evaluation of social impacts, and EIA team management During the afternoon, the two teams rehearsed and then gave their presentations on their application of the two respective methodologies, this was followed the next morning by a general critique of these methods and a concluding evaluative discussion Participants were given copies of most of the transparencies used by me and other lecturers plus several other resource documents (A list of all documents distributed is given in Attachment B)

Recommendations of Workshop Participants

Because this was the first NAREPP/CEA workshop with a specific focus on EIA methodology, at the conclusion of the workshop participants were asked to offer suggestions for improving the course content and for their views on how what they had learned might be incorporated into the EIA process itself A summary of their recommendations, developed separately by the two groups that conducted the field exercise, is included here as Attachment C

In brief, the group recommended additional training and practical experience in data collection methods and also in analytical, or synthesis/presentation, methods They requested additional case studies, perhaps involving in-depth analysis of the effects of one specific activity on a few key environmental parameters With regard to the EIA process itself, they suggested that more emphasis be given to the interdisciplinary nature of EIA, both at the time that TORs are prepared and when the documents are later reviewed It was also suggested that as an intensive real-world training exercise, a group be assembled to prepare an actual EIA with appropriate expert oversight, which might then serve as a possible model for CEA to refer to It was also suggested that the CEA might require future EIA team members, or at least the team leaders, to have completed one or more training courses approved by the CEA thereby helping to improve both the quality of the documents and the likelihood that the proposed project would receive rapid CEA review and approval

October 31-November 1

On Monday, October 31, a debriefing meeting was held at the NAREPP office in Colombo which included CEA officials Chairman G K Amaratunga, Ms Shirani Yasaratne workshop lecturers-resource persons Dr Samantha Hettiarachchi, Dr Shantha Hennayake Mr W A.D D Wijesooriya, and Mr Kumar Kotta, Mr Avanthi Jayatilake of USAID, and NAREPP senior staff The discussion focused on how the EIA methodology course might be improved or modified, and what sort of further EIA training was appropriate as a next step

Recommendations of Workshop Leaders/Sponsors

Regarding the methodology course, it was generally agreed that the course accomplished its objectives given the time constraints and the level of expertise of the participants However, several recommendations were made for future versions of the course, as follows (not necessarily in order of importance

- A similar course should be provided again probably next March or April the course outline should be available in advance and the participants should be more carefully selected to include persons with prior leadership or advanced technical experience in EIA preparation
- The course should include how to plan and implement the collection and analysis of various types of data for specific use in the EIA process
- Several specific methods/techniques should be selected, and participants should apply them as part of one or more specific case studies

- Course organizers should consider a 4-5 day course in which certain core training sessions should be held for all of the participants, and other sessions should be offered on more specialized subjects, which participants would sign up for in advance and which might be held concurrently, to allow more options for advanced training in the same time frame

- The course should include additional training in EIA team management and in the use of interdisciplinary (as contrasted with multi-disciplinary) approaches

- Course organizers should consider a) charging a fee to help assure full and active participation, b) screening applicants based on their résumes to assure that those selected have appropriate qualifications, and c) providing certification for participants who satisfactorily complete such a course These suggestions are intended to further raise the standards for and improve the effectiveness of future courses

As a final task before leaving Sri Lanka, I assembled a "library list" of documents in the NAREPP Colombo office on environmental impact assessment that I and others have provided Those documents are available for review and/or loan under the supervision of Mr Anvaratne Hewege That list is included here as Attachment D

Some Personal Observations regarding the Workshop

1 I believe that the workshop went generally as planned, with most in attendance actively participating and contributing with comments or questions based on their own experience In part due to the last-minute rescheduling, the average participant s direct experience with EIA preparation was somewhat less than expected, nevertheless, most appeared to be generally familiar with the purposes of EIA, the process as followed in Sri Lanka, and some of the current problems associated with EIA preparation

2 Most workshop participants seemed to be very interested in learning how to use specific methodologies to improve the scientific and analytical content of EIA documents To date these have been narrative and descriptive in format and quite weak on use and presentation of quantitative information, on cause-and-effect analysis and on systematic comparison of project alternatives (In the last 3 years, some 60 EIA documents have been prepared for various types of major government projects and a series of hotel development proposals in Sri Lanka)

3 There was a desire, as expected, for participants to want a rather detailed prescription for the best EIA methodology, with examples that could be readily modified to fit most if not all future needs I did not attempt to fulfill that desire, and instead tried to demonstrate that there is no single best EIA methodology, because projects and their potential impacts are so variable, but that more than one method can often be used in combination to provide a technically sound and informative assessment of potential environmental impacts of a proposed activity The field exercise, in which two teams of participants each used a different methodology to assess potential impacts of the demonstration project and to report their findings to the entire group, helped to make that point

4 Although most workshop participants possessed special knowledge in their respective areas of expertise, the applied nature of environmental impact assessment requires knowledge and experience in field methods of data collection, including sampling of environmental media, gathering of social and economic information, etc that most participants are not skilled in, and which were beyond the scope of this course to present For example, the theory behind economic and social impact analysis was summarized by workshop lecturers, but time did not allow for any practical training or experience in carrying out such analyses

5 There was a general opinion that the EIA documents prepared to date in Sri Lanka had not been objective, and had not been very useful in the actual decision process for project approvals or for selection of alternatives less damaging to the environment (This criticism is frequently heard in the U S as well) The project participants were quite outspoken about the problem that EIA preparers, including consultants, are expected to present findings that support the proposed action and that if they do not their work may be rejected or rewritten by others There followed some discussion about how this problem of bias could be addressed there was some consensus that the CEA should empanel perhaps on an ad hoc or rotating basis a panel of independent reviewers who would be expected to provide objective critiques of draft EIA documents to assure the integrity of the process This suggestion in my opinion, has considerable merit and would help relieve the burden of EIA review and oversight now carried by a very small number of CEA staff members

6 I agree with most of the comments and recommendations made by the workshop participants and by the workshop leaders/sponsors There is, however a practical limit to what can be effectively taught, particularly about methods and their application in any training course Case studies and field exercises are generally more effective than classroom lectures, and should continue to be emphasized in future courses Both case studies and field exercises require considerable advance preparation and planning, which should be factored into future course plans But the best technique for information transfer on this methodology is actual experience, where those with less experience work with or under the supervision of persons with greater experience Therefore, as others have suggested, future courses should concentrate on advanced training of persons capable of being EIA team leaders, and should include training in team organization and management, so that these persons can go on to employ and train others in Sri Lanka as part of their own conduct of environmental impact assessment assignments

7 As was also suggested by several workshop leaders and participants, quality control including review of EIA documents and post-EIA monitoring of approved projects to ensure that they are built and operated as stated in the EIA, and to provide feedback for improving the accuracy and specificity of future EIA efforts, will be essential and should be required as a condition of project approval The review of EIA documents and the design and implementation of environmental monitoring programs are both important topics that could be the subject of separate workshops in the future

Robert B Smythe
Chevy Chase, Maryland, USA
December 1994

MINISTRY OF INDUSTRIAL DEVELOPMENT - SRI LANKA

INDUSTRIAL ESTATE SITE EVALUATION

LOCATION .
DIVISION
DISTRICT
PROVINCE .

	Signature	Name	Designation
PREPARED BY :			
Director, RISC:			
Date .			

WATER AVAILABILITY

SURFACE WATER BODIES WITHIN 10KM FROM SITE				
RIVERS/STREAMS from which water is legally available for use				
River/Stream No (Add a sheet for each River or Stream) Name of River or Stream				
Distance from Site (in kilometers)	>5 0	1 0 5 0	<1 0	1 M H
At the river/stream reach of observation (closest to site)				
Flow Characteristics	Perennial	Perennial but significant difference in seasons	Seasonal (Non Existent in one Season)	H M I
Average width (in meters)	>6	3 6	<3	H M I
Average depth of flow across a section (in milluneters)	>1 0	0 6 1 0	<0 6	H M I
Average Speed of Flow	Fast	Moderate	Slow	H M I
Down Stream Uses (amount of Usage relative to flow) Domestic (drinking washing bathing)	Large	Medium	Small	H M I
Fishery/wildlife	Large	Medium	Small	H M I
Drinking Water Supply	Large	Medium	Small	H M I
(Anicut Reservoir Pumping) Agriculture/livestock	Large	Medium	Small	H M I
Industries (including recreation)	Large	Medium	Small	H M I
Type of Water Use (Based on Water Quality)	Drinking/ Cooking	Tourism/ Fishery et	Washing/ Irrigation/No Use	H M I
Complaints about Water Quality	None	Saline Hard	Suspected to be Disease Causing/ Unusual Taste/Odour/ Acidic	H M I

WATER AVAILABILITY (Contd)

TANKS/LAKES/ESTUARIES from which water is legally available	for use			
Tank/Lake No				
Name of Tank or Lake	(Add a sheet for each Tank or Lake)			
Distance from Site (in meters)	>5000	1000 5000	<1000	I M H
Water Spread Area (in Hectares)	>75	25 75	<25	H M I
Avg Water Depth (meters)	>2 5	1 25 2 50	<1 25	H M I
Maxumum Water Depth (in meters)	>4 75	2 50 4 75	<2 50	H M I
Period Reservoir Almost Dry (in Months)	0	0 3	>6	H M I
Sufficiency of Water for Irrigation/other uses	Ample	Just enough	Inadequate	H M L
Type of Water use (Based on Water Quality)	Drinking Cooking	Tourism Fishery etc	Only washing Irrigation No use	H M I
Complaints about Water Quality	None	Saline Hard	Suspected to be Disease Causing/ Unusual/Taste Odour/Acidi	H M I

GROUND WATER ACCESSIBILITY

Ground Water Aquifer (Specific Tests are required for Quantitative Assessment)				
Major type of soil at surface of site	Rocky/ Gravelly	Clayey	Sandy/ Silty	I M H
Major Soil characteristic beneath the top layer of 300 millimeters	permeable	Moderate	Permeable	I M H
Annual Rainfall (mm)	>2000	1000 2000	<1000	H M I
Yala Rainfall (mm) (Apr Sep)	>2000	1000 2000	<1000	H M I
Maha Rainfall (mm) (Oct March)	>2000	1000 2000	<1000	H M I
Depth to Ground water from well observations at close proximity (average depth at site in meters)	0 4 5	4 5 13 0	>13 0	H M L
Site in relation to other land	High	Similar	Low	L M H
Present Land Use	Forest/Plantation Scrub/Grassland	Settlements Urban/ Village	Paddy Fields Wetlands	M I H
Type of ground water use (Water Quality)	Drinking Cooking	Industry etc	Washing/ Irrigation/ No use	H M I
Complaints about ground water quality	None	Saline Hard	Suspected to be Disease Causing/ Unusual Taste/ Odour/Acidic	H M L

Present Ground Water use in the 2 km radius from site	High	Medium	Low	L M H	

Steepest slope (rise in meters for a 100 meters distance)	>10	5 10	<5	L M H	
Average slope (rise in meters for a 100 meters distance)	>10	5 10	<5	L M H	
Major type of soil at surface	Rocky/ gravelly	Clayey	Sandy/Silty	H M I	
Indications of soil erosion	High	Noticeable	None	L M H	
Potential of erosion if land cover is removed	High	Moderate	Low	I M H	
Angle of cut on a slope which may stand on its own without collapsing	$>60^0$	30^0 60^0	<30	H M I	
Topography of site	Flat	Rolling	Hilly	H M L	

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Steepest Slope (rise in meters in 100 meters)	>10	5 10	<5	H M L
Average Slope (rise in meters for a 100 meter distance)	>10	5 10	<5	H M L
Position of site related to other lands (elevation)	High	Similar	Low	H M L
Topography of site	Flat	Rolling	Hilly	L M H

SURFACE WATER BODIES WITHIN 10KM FROM SITE				
Rivers/Stream No (Add a sheet for each River, Stream or Canal) Name of River or Stream				
Closest Distance from site (in meters)	< 1000	1000 5000	>5000	HMI
At the reach of (closest) observation during the period of flow				
Flow characteristics	Peranial	Perinial but significant difference between season	Seasonal (Almost non existent in one season)	HML
Average width (in meters)	>6 0	3 0 6 0	<3 0	HMI
Average depth of flow in a across section of the river (in feet)	>1	0 6 1 0	<0 6	HMI
Average speed of flow	fast	Moderate	Slow	HMI
Downstream Uses (relative to flow) Domestic(drinking washing bathing) Fishery/wildlife Drinking water supply Ag (anmeut reservoir pumping livestock) Industries	 Large Large Large Large Large	 Medium Medium Medium Medium Medium	 Small Small Small Small Small Add	 HMI HMI HMI HMI HMI
Type of Water Use	Irrigation and/or washing or no use at all	Tourism and/or Fishery and any other uses (except drinking and cooking)	Drinking and Cooking and any other uses	HMI
Complaints	Suspected to be Disease Causing/ Unusual Taste/ Ordour/Acidic	Saline/hard	Non	HMI

Name of the Tank or Lake				
Distance from site (in meters)	<1000	1000 5000	>5000	HML
Water spread area in hectares	>75	25 75	<25	HMI
Average water depth at centre of bund (in m)	>2 5	1 25 2 5	<1 25	HMI
Maximum water depth at centre of bund (in m)	>4 75	2 5 4 75	<2 5	HML
Period of time when the reservoir is almost dry (in months)	0	0 3	>6	HML
Sufficency of water for Irrigation/other uses	Ample	Just enough	Inade quate	I MII
Type of Water Use	Irrigation and/or washing or no use at all	Tourism and/or Fishery and any other uses (except drinking and cooking)	Drinking and Cooking and any other use	HMI
Complaints	Suspected to be Disease Causing/ Unusual Taste/ Ordour/Acidic	Saline/hard	None	HML
Source 1 Source 2 Source 3 Source 4 Source 5				HMI HMI HML HMI HML

3

Characteristics of land in the district (District Secretaries District)				
Characteristics of soil (general)	Impermeal	Moderate Laterite	Permeable Sand/Gravel	HML
Depth to ground water (in meters)	>5	1-5	<2	HML
Land use	No significant	Non Agric /non Food Use	Agriculture/ Food/High density groundwater use (urbanized)	HML
Utilizable Land area in the district (ha)	>160	40 160	<40	HML
Availability of Regional Solid Waste Disposal Facility	Yes	Partially	No	HML
Flooding potential	Low	Medium	High	HML

SITE EXPANDABILITY

(Add Weightage factor specified in brackets)				
Extent of site (in ha)	>40	14 40	< 14	HML
If less than 14 ha, provide additional 5L to the score				
Ownership	State/semi state/developer owned	State or semi state but encroached	Private/protected	HML
Equivalent value of land	Rural	Suburb	Town	HML
Current use of Land	Vacant	Partial use	Fully used/ Reserved area	HML
Availability of zoning/land use plan for the region	Yes	In preparation	No	HML
Existing/Planned land use of surrounding area	Not identified	Planned to be developed	Already developed/presence of sensitive systems	HML (3)
Terrain	Flat	Undulating	Hill/valley/flood plain	HML
Presence of minerals in significant quantity within 1 km of site	None	Moderate	Large	HML
			ADD	

[To be marked Yes (present)/No (not present)]					
Infrastructure/distance from the proposed estate (Add weightage specified in brackets)					
Power (from high tension line) (3)	<2 km	2 5 km	10 20 km >5	HML (3)	
Telecommunication	<5 km	5-10 km	>10	HML (1)	
Pipe Borne Water Supply (2)	<2 km	2 5 km	>5 km	HML (2)	
Surface Drainage (1)	<5 km	5 10 km	>10 km	HML (1)	
Sewerage (1)	<1 km	1-2 km	>2	HML (1)	
	x Weightage and Add	_____ _____			

(System\distance from the proposed estate)				
Forest reservation (in km)	> 5	1 5 km	<1 km	HMI
Prime agriculture/Fertile land	>5	1 5 km	<1 km	HML
Upper catchment/recharge area	>5	1 5 km	<1 km	HMI
Urban centre (town/city)	>5	1-5 km	<1 km	HML
Archeological sites	>5	1 5 km	<1 km	HML
Cultural/religious sites	>5	1 5 km	<1 km	HML
Coastal Zone as defined by CCD (including lagoons/estuaries)	>10	5 10 km	<1 km	HML
National parks/sanctuaries/botanical gardens	>5	1-5 km	<1 km	HMI
Rivers/lakes/reservoirs	>5	1-5 km	<1 km	HMI
Marsh/swamp/wetland (of significance)	>5	1 5 km	<1 km	HMI
Tourist Resorts	>5	1 5 km	<1 km	HML

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Transport facility/distance from the proposed estate (weightage)				
Roads (Main (A&B or marked red on Topo sheet) (3) (Secondary (Marked yellow on Topo sheet)	<5 km	5 10 km	>10	HML (3)
Railway line (2)	<5 km	5 10 km	>10	HML (?)
Airport (1)	<10	10 50	>50	HML
Port/Harbour (1)	<10	5 10 km 10 50	10 20 km >50	HML
		x Weightage and ADD		
Bus Depots (3)	<5	5 10	>10	
Status of access roads (5)	good	moderate	poor	

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Service/distance from the proposed estate (weightage)				
Schools (2) (Up to A/L ((Up to O/L ((Up to Grade 5	<20 km <5 km <2 km	20 30 km 10 20 km 5 10 km	>30 km >20 km >10 km	HMI (2) H
Hospital Base District Rural	20	20 30	>30	(3)
	<5 <2	5 10 2 5	>10 >5	
Community Settlements (residential facilities) (2)	<5 km	5 10 km	> 10 km	HML (2)
Banks (3)	< 5 km	5 10 km	>10 km	HML (3)
Police Stations (3)	<5 km	5 10 km	>10 km	HML (2)
Fire Stations (2)	<10 km	5 10 km 10 20	>10 km >20	HMI (2)
Oil/Gas Storage facilities (2)	<5 km	5 10 km	>10 km	HML (2)
Hotels/Eating houses (2)	<1	1 3 km	>3 km	HML (2)
Recreational Facilities	<5	5 10	>10 x Weightage and ADD	(2) _____
Post Office	<2	2 5 >5	(2)	
Communication Facilities (IDD, Fax, Photocopies)	<5	5 10 >10	(3)	

SKILLED
LOCAL LABOUR AVAILABILITY

(L-S) LOCAL SKILLED LABOUR AVAILABILITY in the D/S division				
Daily wage (Rs)	<350	150 50	<150	I MH
Main occupational sector at present	Agric	Industry/ Craft	self	LMH
Unemployed Population in the age group of (16-55)	<1000	1000 2500	>2500	LMH
Unemployed Male/Female Ratio	0 9	0 9 1	<1	LMH
Level of Education Technical School University Post Graduate	 < 100 < 5 < 2	 10 500 5 10 2 5	 >50 >10 > 5	 LMH LMH LMH
Unemployment Condition	>12% High	120% Medium	<12% Low	HMI
Apprentice training centre (within 20km)	<2	4	>4	LMH

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LOCAL UNSKILLED LABOUR AVAILABILITY

LOCAL LABOUR AVAILABILITY in D/S division					
Daily wage (Rs)	<100	100 200	>200	LMH	
Main occupation at present	Agricul ture	Industry craft	self	LMH	
Male/female ratio of unemployment	0 0 75 0 9	1 0 75 0 9 1 0	>1 >1 0	LMH	
Population in the age group of (16 55)	<1000	1000 2500	>2500	1 MH	
Level of education Primary Secondary	<1000 <700	1000 2500 700 1500	>2500 >1500	LMH 1 MH	
Unemployment Condition	High >12%	Medium 12%	Low <12%	LMH	

ASSIMILATIVE CAPACITY OF AIR SHED

(AQ) AIR QUALITY				
Geographical location	Hilly/Coastal	Flat	Valley	LMH
Cloud cover at night	Clear sky	Slightly cloudy	Cloudy	LMH
Wind speed	Strong	Moderate	Normal	LMH
Wind direction (during most of the year)	Uni directional	change direction	No clear direction	LMH
Rainfall (mm)	Low <1000	Medium 1000 2000	High >2000	LMH
Average annual temperature (^{0}C)	<30	50 30	>25	LMH
Land use of the surrounding area Within radius of 1km	Forest	Open	Built up	LMH
Number of Smoke emission sources within 1 km	>2	2 3	<3	LMH
Position of site with respect to surroundings (elevation)	High	Similar	Low	LMH

NOISE ASSIMILATION CAPACITY

Judicial Inst

NOISE (Within 0 5 km)				
Religion Cultural/Schools	0	1	>1	HMI
School/Hospital	0	1	>1	HMI
Land use of the surrounding area	Veget	Open	Residential	HMI
Highways / roads	Major	Minor	Tracks	HMI
Vegetation	Sparse	Bush	Thick	LMH
Geographical features surrounding the sites	Valley	Flat	Hill	LMH
Other noise generating activities	>3	1 3	0	HML

CULTURAL AND RELIGIOUS RESOURCES

CULTURAL & RELIGIOUS RESOURCES					
Religious sites (national importance) W/5 km	>1	1	1	H M H	
Cultural sites (national importance) W/M 5 km	>1	1	1	H M H	
Religious sites (local importance) 1 km	>3	2 3	<2	L M H	
Cultural sites (local importance) 1 km	>3	2 3	<2	H M H	
Any of the above in the perimeter				Yes/ No	
Any of the above within a site				Yes/ No	

EVALUATION SHEET

Workshop on Improving Methods for Environmental Impact Assessment

July 2, 1997

Galadari Hotel, Colombo 1

1 Was this workshop useful to your work? (Please circle the appropriate response)

A = Very Useful B = Useful C = Marginally Useful D = Not Useful

2 Should we have further programs of this kind YES ____ NO ____

3 What specific benefits have you gained by participating in this workshop

4 (a) Please comment on the sections you found most useful

(b) What additional subject areas do you think would be useful in future programs and for whom?

5 How do you plan to apply the knowledge gained from this workshop in your job ?

5 What additional training would you recommend ?

6 Any other comments

(Please use reverse side if you require additional space)

THANK YOU FOR YOUR COOPERATION IN COMPLETING THIS FORM

4 REVIEW OF METHODS USED FOR ENVIRONMENTAL IMPACT ASSESSMENT

Nilanthi Bandara

HISTORICAL DEVELOPMENT

Environmental Impact Assessment (EIA) was first introduced in the United States of America in 1969 through the National Environmental Protection Act (NEPA) Since then several methodologies have been designed to conduct such assessments In the early years most of the assessments were done on an adhoc basis They have evolved into more methodical scientific technologies with time These methods were devised on a project by project basis mostly in developed countries

Environmental Impact Assessment process consists of several steps that range from scoping to comparison of project alternatives The accomplishment of these individual steps requires a specific method This chapter discusses briefly -

- methods used in the key steps of the EIA process
- methods employed for EIAs conducted and published in Sri Lanka and
- an analysis of the methods used in three selected EIAs in Sri Lanka

METHODS APPLICABLE

The EIA methods used vary widely depending on the type scale and location of the project The resources available including time information funds and trained personnel also play a role in the selection of a suitable methodology A systematic approach must be adopted since the process involves a number of steps Methods available to accomplish the tasks involved are briefly discussed below

Scoping

Scoping the first step in Environmental Impact Assessment involves the identification of significant impacts that require detailed study Though scoping is usually focused on the preparation of the Terms of Reference of the EIA it should ideally be continued throughout the assessment process Scoping requires examination of EIA reports of former projects of a similar nature study of similar projects carried out earlier and records of discussions among experts Expert knowledge is collected by holding two to three seminars when several specialists are participating and many meetings if the number involved is small A main concern in using this method is the lack of participation of all members in discussions Delphi Technique can be used to overcome this constraint

As the first step of the Delphi Technique preliminary discussion is held amongst all members Then individual members are allowed to work independently or in small groups to prepare separate lists of impacts prioritized in order of significance These lists are then sent to the coordinator who evaluates them and prepares a common list by re arranging the impacts according to the frequencies of individual responses This list is sent back to members for re evaluation The process can be reiterated till a consensus is arrived The use of the Delphi Technique will ensure that all the experts can participate freely in the assessment

Identification of the primary impacts can be done effectively through the checklist approach Checklists are of two types simple and descriptive The former provides only a list of environmental indicators while the latter supplies information on methodologies of impact measurement impact prediction and assessment of each environmental factor These are generally prepared for specific project categories

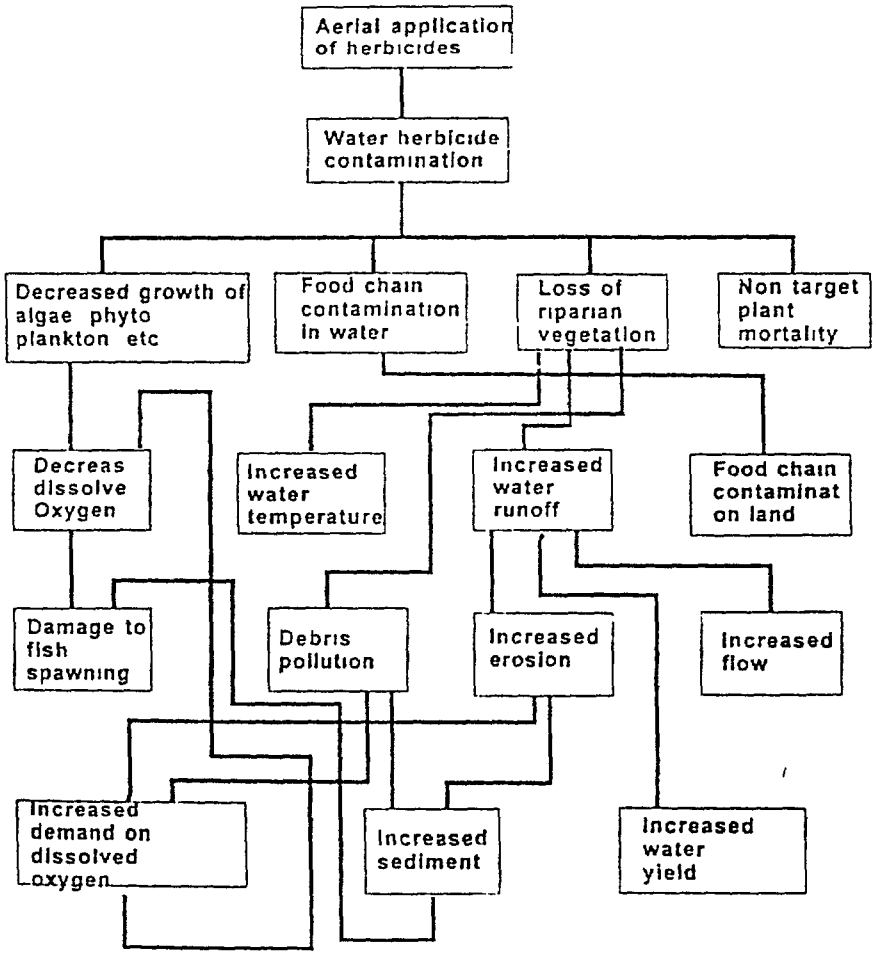
Several checklists are available for various development projects The ADB Checklist for water resources development projects developed by the ADB Bank is a good example of this (ADB 1987) Questionnaire type checklists which are generally used to assess impacts are also widely available Although a convenient method to use checklists have limited application The evaluators might stick only to the issues shown in the checklist Another major drawback of the checklist method is that it identifies only the direct impacts Secondary impacts or indirect effects of the project may easily be omitted

The Network approach provides a very effective and scientific method to impact identification Networks are ecosystem flow charts showing the inter relations between various environmental parameters and their functions This method easily identifies the manner in which the impact on one environmental component results in affecting several other environmental components or functions A cross section of a sample network is given in Figure 1

Simple matrices can be drawn between project activities and environmental parameters to illustrate how individual activities affect various components of the environment Matrices are essentially two dimensional charts incorporating a list of project activities on one axis and a checklist of environmental characteristics affected on the other Such matrices allow the identification of cause-effect relationships in the cells of the matrix Identification of impacts would require the use of only a simple interaction matrix

Activities are assessed individually for their impacts on specific environmental parameters Impacts on any component of the environment are noted by placing crosses in the corresponding intersecting cells This procedure is based essentially on expert judgement It is also a very effective way of identifying both impacts and the project activities likely to cause adverse impacts which require mitigation

Figure 1 - Section of an Impact Network



Source Thor et al (1978)

Figure 2
Leopold Matrix

Instructions

1. Identify all actions (located across the top of the matrix) that are part of the proposed project
2. Under each of the proposed actions place a slash at the intersection with each item of the side of the matrix if an impact is possible
3. Having completed the matrix in the upper left hand corner of each box with a slash place a number from 1 to 10 which indicates the MAGNITUDE of the possible impact 10 represents the greatest magnitude of impact and 1 the least (no zeros) Before each number place + (if the impact would be beneficial) In the lower right hand corner of the box place a number from 1 to 10 which indicates the IMPORTANCE of the possible impact (e g regional vs local) 10 represents the greatest importance and 1 the least (no zeros)
4. The text which accompanies the matrix should be a discussion of the significant impacts those columns and rows with large numbers of boxes marked and individual boxes with the larger numbers

	a	b	c	d	e
a		2/1			8/5
b		7/2	5/3	5/1	7/7

			A Modification of regime													B Land transformation and construction																C Resource extraction						
		Proposed Actions	a Exotic flora or fauna introduction	b Biological controls	c Modification of habitat	d Alteration of ground cover	e Alteration of ground water hydrology	f Alteration of drainage	g River control and flow modification	h Canalization	i Irrigation	j Weather modification	k Burning	l Surface or paving	m Noise and vibration	a Urbanization	b Industrial sites and buildings	c Airports	d Highways and bridges	e Roads and trails	f Railroads	g Cables and lifts	h Transmission lines pipelines and corridors	l Canals	m Dams and impoundments	n Piers seawalls marines and sea terminals	o Offshore structures	p Recreational Structures	q Blasting and drilling	r Cut and fill	s Tunnels and underground structures	a Blasting and drilling	b Surface excavation	c Subsurface excavation and retorting	d Well drilling and fluid removal	e Dredging	f Clear cutting and other lumbering	g Commercial fishing and hunting
CHEMICAL CHARACTERISTICS	1 Earth	a Mineral resources																																				
		b Construction material																																				
		c Soils																																				
		d Land form																																				
		e Force fields and background radiation																																				
		f Unique physical features																																				
	2 Water	a Surface																																				
		b Ocean																																				
		c Underground																																				
		d Quality																																				
		e Temperature																																				
		f Recharge																																				
		g Snow ice and permafrost																																				

Table 1 Methodologies Used in Selected EIAs in Sri Lanka

Environmental Impact Assessments	Methods Applied					
	Checklists			Matrices		Networks
	Simple	Questionnaire	Scaling	Simple	Graded	
1 Rajawella Golf & Hotel Project - Sept 1993	+	–	–	–	–	–
2 Kukule Hydro Power Project - Mar 1993	+	–	+	+	+	–
3 Colombo- Katunayake Expressway Project - March 1992	+	–	–	+	–	–
4 Sapugaskande BOO Power Station Project - Dec 1993	*	–	–	+	–	–
5 Kerawalapitiya Reclamation project - Dec 1993	+	–	–	+	–	+
6 200 bed room Hotel Project at Seeduwa - April 1994	+	–	–	–	–	–
7 Aqua Pearl Villa - Hotel Project at Bolgoda - 1996	+	–	–	–	–	–
8 Clay Extraction and Blanketing of Samanalawewa Reservoir for leakage mitigation - July 1994	+	–	–	+	+	–

9 Upper Kotmale Hydro Power Project - Sept 1994	+	_	+	_	_	_
10 Sanitary Landfill at Mahara & Transfer Station at Madampitiya -	+	_	_	_	_	_
11 Wirawila Walk Inn -	+	_	_	_	_	_
12 250 roomed Hotel at Pothupitiya/Kuda - Waskaduwa - August 1995	*	_	_	+	+	_
13 Integrated Petroleum Refinery & Power Plant at Hambantota - Jan 1996	*	_	_	+	+	_
14 Sapugaskanda Power Station - Extension II - April 1996	+	_	_	_	_	_
15 LPG Import Terminal at Kerawalapitiya - July 1996	+	_	_	*	_	_
16 Relocation and Modernization of Tanneries industrial estate Bataatta - June 1996	+	_	_	+	+	_

+ method applied

_ method not applied

* not distinct

Source Published Environmental Impact Assessment Reports, Central Environmental Authority, Sri Lanka

not been done properly except in such cases such as the EIA of the Upper Kotmale Hydro Power Project

Encouragingly however some reports contain matrices showing the impacts of selected project activities on specific components of the environment But even these can hardly be called comprehensive Only a few authors have attempted to compare project alternatives based on total impact scores given to individual alternatives The Network approach for impact identification has been used only in the assessment of the Kerawalapitiya Reclamation project

The lack of a methodical approach in most of these assessments has made project evaluation difficult The systematic conduct of EIA allows justifiable recommendations on the mitigatory measures and on the selection of a suitable alternative The manner of their presentation makes it almost impossible to arrive at a judgement on the significance of the impacts described in the assessment reports

APPLICATION OF METHODS IN SELECTED EIAs

This section analyses the methods used in environmental impact assessments of three selected development projects in Sri Lanka

Upper-Kotmale Hydro Power Project

The Upper Kotmale Hydro Power Project aims at generating sufficient power to meet the growing demand for the early 2000 s The site is located on the western slope of the Nuwara Eliya mountain range The area extends over an altitude of 700-1200 m on the upstream of the Kotmale oya one of the largest tributanes of the Mahaweli Ganga The project comprises of a 34m dam a regulation pond of 0 8 MCM capacity 12 8 km long Headrace tunnel 796 m long underground type penstock an underground type power house with 2 units of 77MW turbine/ generator and 6 tributary diversion facilities

Significant impacts that can arise from the project are identified at the initial stages of the study The method used was originally developed by the US Corps of Engineers/ Batelle in 1972 for the large scale Colombia River Water Resources Development Project This method has been recommended by the Asia Development Bank (ADB)

An Initial Environmental Assessment (or Screening) had been conducted to identify the significant impacts For this purpose hydro power projects in Sri Lanka and elsewhere in the past had been studied and significant impacts from these identified Then a significance level was assigned for each impact with relevance to the present project The levels were ranked as not significant minor moderate possibly moderate major possibly major and critical A detailed study and description of the identified impacts then follows

The initial identification of impacts is done comprehensively However the checklist used is not provided as part of the EIA report this makes it difficult to judge how extensive the screening process was Modification of an available checklist (such as the ADB checklist prepared specifically for water resource development projects) to suit local conditions allows identification of the impacts of diverse issues

Comparison of alternatives is not done quantitatively A graded matrix would have shown the effects of different alternatives explicitly and allowed identification of project activities that cause significant impacts This would have made it easier to design measures to mitigate the negative impacts

Though the assessment starts off systematically it fails to compare the alternatives and present the results of assessment in a useful manner since it is not done methodically

Clay Extraction and Blanketing of Samanalawewa Reservoir for Leakage Mitigation

Samanalawewa Hydro Electric Project is located on the south of the Central massif of Sri Lanka 105 km east of Colombo and 35 km south of Nuwara Eliya Construction of the dam and related structures commenced in 1987 and impounding commenced in March 1992 A major leakage occurred in October 1992 and since November 1992 it has remained constant between 2 and 3 cumecs However due to economic reasons and to negate the local populations fear that the dam and reservoir are unsafe leakage mitigation was identified as a requirement The EIA looks at alternative leakage mitigation measures and their impacts

The significant issues of the project were identified from data gathered from documented information site visits and meetings with individuals A checklist of environmental characteristics of the project area was prepared by reviewing the information

so collected A list of potential impacts from water resources development projects is also presented

Once the data was collected and the lists prepared the magnitudes of the impacts of the different project activities on these selected parameters were quantified through matrix analysis Four main project activities had been selected for this analysis Matrix analysis is also done to show the potential impacts of the project on various aspects of aquatic life in the reservoir and down stream However in this report the impacts have only been identified but no attempt has been made to quantify them

The analysis of socio- economic aspects has been done fairly comprehensively to show the impacts that arise from clay extraction from borrow areas Eight different activities of this process which are likely to cause impacts are listed The other axis lists seven socio- economic aspects Matrix analysis is done to identify and grade the impacts of these different activities on each of the selected parameters Impacts are classified as beneficial or detrimental (+ or) and are graded on a scale ranging from one to four indicating mild considerable high or very high impacts Temporary impacts are denoted by a t while permanent ones are marked with a p

Even in this EIA the identification of impacts and issues is done rather haphazardly Even though a matrix analysis has been conducted it is not very effective since it is restricted to certain issues namely socio economic issues and effects on aquatic life

Although the study has identified seven alternatives their comparison is done in a rather descriptive manner which makes it difficult to compare the specific impacts of each of the alternatives The environmental consequences of each alternative are not demonstrated in the report in an effective manner making it difficult for the reviewers to select the best alternative

Matrix analysis has been utilized in this assessment to a certain extent It could however have been done in a more comprehensive manner What has been done does not provide much assistance in deciding which alternative to approve

Integrated Petroleum Refinery and Power Plant at Hambantota

This project aims at establishing a modern petroleum refinery to process crude oil and a power plant to supplement internal electricity demand The project is to be located on 1000 acres of land in the Hambantota district Southern Province

The initial screening conducted in the previous two EIAs is missing in this one The report provides an extensive description of impacts on several environmental parameters The impacts are categorized as those occurring during the construction phase and the operational phase of the project Under each environmental parameter a description of activities that cause adverse impacts and the extent of the damage anticipated is provided

The report also discusses impacts arising from seven different project activities It includes a table that provides an inventory of project activities with their impacts along with corresponding mitigatory measures prescribed in two columns Though not an actual matrix this is a very useful format for the evaluators in making decisions It could be further improved by including the project activities and impacts in two separate columns Such an arrangement would ensure addressing all impacts from a particular project activity

The basis of the selection of the best alternative site is explained in the EIA report The functional needs of the project and the environmental factors with respect to each of the alternative sites were displayed to select the most suitable field site The site alternative with the most number of positive attributes has been selected over the others It is however difficult to ascertain the basis for these estimations from the details presented in the report Matrix analysis indicating significance of impacts would have been a better way to present the selection criteria

CONCLUDING REMARKS

Several extensive environmental impact studies have been done in Sri Lanka over the past two to three years However most of them appear to be only lengthy descriptions of the impacts caused on selected environmental aspects It is not clearly indicated as to why only these aspects were chosen for detailed study The use of sample checklists such as the ADB checklist is cost effective and simple Even if such lists are widely available they do not appear to be much used Some EIA reports nevertheless contained sytematic and comprehensive initial scoping exercises

Even in cases where a systemic approach is used for impact identification follow up assessment process does not appear to be methodical Comparison of alternatives a crucial

step in EIA can be done effectively with quantitative matrix analysis This methodology however has not been adequately used

The analysis of Environmental Impact reports conducted in Sri Lanka indicates that the quality of assessments suffer from the lack of systematic approach in spite of the availability of adequate expert knowledge in various individual disciplines Perhaps some of these methods might have been utilized at different stages of the analysis even though it is not apparent in the EIA reports Since the Terms of Reference given by the authorities do not often require the presentation of the methods used, they are not included in the report However the poor presentation makes it difficult to judge whether the analysis is methodical or not and the reviewer is doubtful as to the credibility of the assessment

The lack of prior experience may be a primary cause for the negligence to follow a methodical approach Since the preparers often refer to previous reports and tend to follow the same pattern any new techniques are slow to be adopted Often the tendency is to do the minimum that is required

The authorities involved should perhaps insist that an acceptable approach is followed hereafter in the conduct of Environmental Impact Assessments Even if the techniques used are not comprehensively described in the main report they can be attached in annexures The checklists indicating significant issues and matrices comparing the alternatives can be included in the main report

REFERENCES

Asian Development Bank *Environmental Guidelines for Selected Industrial and Power Development Projects* Manila The Philippines 1987

Canter L W & Hill L G *Handbook of Environmental Impact Assessment* Ann Arbor Science Publishers Ind Ann Arbor Michigan 1979

Leopold L B et al *A procedure for evaluating Environmental Impact* Circular 645 U S Geological Survey Washington D C 1971

APPENDIX VII

Workshop on Improving Methods for Environmental Impact Assessment

Wednesday, 2 July 1997 - 8.30 am to 4.30 pm
Galadari Hotel, Colombo 1

LIST OF PARTICIPANTS

Central Environmental Authority

Mr W A D D Wijesuriya, Director, NRM
Mr Shamen Vidanage, Environmental Officer
Mr Ajith Rodrigo, Environmental Officer
Ms Kanthi de Silva, Asst Director, NRM

Coast Conservation Dept

Mr R A D B Samaranayake, Manager (Planning)

Land Reclamation & Development Corporation

Mr Keerthi Jayawardena, Deputy General Manager, Research & Design

Mahaweli Authority of Sri Lanka

Mr P M B Ramanayake, Asst Director
Mr M M S R Perera, Deputy Manager (Environment)
Mahaweli Economic Agency

National Building Research Organization

Ms C Wettasinghe
Ms S Dias
Mr R B Samarakkody

Lanka Hydraulic Institute

Dr. R Galapatti, General Manager
Dr Nalin Wickremanayake, Snr Research Engineer
Mr Channa Fernando, Snr Research Engineer

MEIP

Ms Sharmali de Silva

University of Moratuwa

Prof (Mrs) N Ratnayake, Dept of Civil Engineering
Dr N T S Wijesekera, Dept of Civil Engineering
Dr J M S Bandara, Dept of Civil Engineering
Dr Priyan Dias, Dept of Civil Engineering
Dr S Bhuvendralingam, Dept. of Civil Engineering

University of Colombo

Dr Amaramali Jayatunga, Dept of Zoology
Mr Devaka Weerakoon, Dept of Zoology

University of Ruhuna

Dr Morley de Silva, Dean/Faculty of Science

University of Sri Jayawardenepura

Dr Hemanthi Ranasinghe, Forestry Sector

The Open University of Sri Lanka

Dr Mala Amarasinghe, Senior Lecturer

University of Kelaniya

Prof (Mrs) S Wimalasena, Dept of Chemistry
Dr Upali Amarasinghe, Dept of Zoology
Dr Ivor Fernando

ROMIN

Mr Saliya Rajakaruna, Project Manager
Ms Sharmali Seneviratne, Project Development Officer

Environmental Engineering Consultants

Mr K Suntheralingam, Managing Director

Resources Development Consultants

Ms Tania Guneratne
Mr Kithsiri Premasinghe

Central Engineering Consultancy Bureau

Mr D P W H Niriella, Civil Engineer

Engineering Consultants Ltd

Mr Mahesh Ranasoma

Road Construction and Development Co. (Pvt) Ltd

Mr S W Nanayakkara, Mechanical Engineer

Bamber & Bruce Ltd

Dr C S S de Silva

Biotech Corporation Lanka Ltd

Miss A N K Heengama
Miss W H S Chandrakanthi

CISIR

Mr H N Gunadasa, Manager/Environmental Technology
Ms Sharmini Wickremaratne, Senior Research Officer

Associated Consulting Engineers & Architects

Mr D A U Nanayakkara, Design Engineer

Ecologic Systems (Pvt) Ltd

Mr Raja Molligoda, Executive Director
Mr P Sarathchandra, Snr Chemical Engineer
Mr Dananjaya Kuruppu, Snr Chemical Engineer

EEC Project, Kurunegala

Mr Mahinda Panapitiya, Engineering Consultant

Forestry & Environment Conservation Unit, Polgolla

Dr. H M Manthritillake, Director

USAID

Mr Avanthi Jayatilleke, Environmental Specialist

NAREPP/IRG

Dr Robert Smythe, Natural Resources Management and E I A Specialist

Mr Ariyaratne Hewage, Chief of Party

Mr Sanath Ranawana, Env'l, Economic & Pollution Specialist

Ms Sherine Jayawickrama, Policy Program & Analyst

RESOURCE PERSONS

Ms Nilanthi Bandara, Faculty of Engineering Technology, The Open University of Sri Lanka

Dr S Bhuvendralingam, Dept of Civil Engineering, University of Moratuwa

Dr T L Gunaruwan, Advisor, National Planning Council of Sri Lanka

Mr Sanath Ranawana, Environmental, Economic & Pollution Specialist, NAREPP

Mr Nuwan Kodagoda, Dept of Civil Engineering, University of Moratuwa

Dr Shantha Hennayake, Deputy Coordinator, Center for Environmental Studies, University of Peradeniya

Mrs Shiranee Yasaratne, Deputy Director General, Central Environmental Authority

APPENDIX VIII

WORKSHOP ON IMPROVING METHODS FOR ENVIRONMENTAL IMPACT ASSESSMENT

Wednesday, 2 July 1997
Galadari Hotel, Colombo 1

Sponsored by
Ministry of Forestry and Environment
Central Environmental Authority
Natural Resources and Environmental Policy Project
U S Agency for International Development

AGENDA

8 30 - 9 00am	Registration
9 00 - 9 20	Opening Remarks Mr K A S Gunasekara, Secretary, Ministry of Forestry and Environment Mr Ariyaratne Hewage, Chief of Party, NAREPP
9 20 - 9 50	Current Status of EIA Process -- CEA Perspective Mrs Shiranee Yasaratne, Deputy Director General, Central Environmental Authority (CEA)
9 50 - 10 00	A Comment on EIA Objectives Dr Robert B Smythe, EIA Specialist, NAREPP
10 00 - 10 15	Tea/Coffee Break
10 15 - 11 00	Critique of EIA Methodologies Used in Sri Lanka, and Summary of Proposed Guidelines for Using EIA Methodologies Mrs Nilanthi Bandara, Senior Lecturer, Faculty of Engineering Technology, Open University of Sri Lanka
11 00 - 11 30	Special Tools for Improving EIA, Part I: Modeling Dr S Buvendralingam, Dept of Civil Engineering, University of Moratuwa
11 30 - 12 30	Plenary Discussion Identifying Issues re EIA Methodology and Options for Improving the Practice of EIA in Sri Lanka Moderator Dr Robert Smythe, NAREPP
12 30-1 30pm	Lunch Break

1 30 - 2 00	**Special Tools for Improving EIA, Part II Extended Benefit Cost Analysis** Dr T L Gunaruwan, Advisor, National Planning Council of Sri Lanka
2 00 - 2 45	**Special Tools for Improving EIA, Part III Demonstration of a Computer-based Method for Summarizing EIA Information** Mr Sanath Ranawana, Environmental Economics and Pollution Specialist, NAREPP Mr Nuwan Kodagoda, Dept of Civil Engineering, University of Moratuwa
2 45 - 3 00	Tea/Coffee Break
3 00 - 4 00	Plenary Discussion Recommendations for Improving EIA Methodology Moderator Dr Shantha Hennayake, Deputy Coordinator, Center for Environmental Studies, University of Peradeniya
4 00 -4 15	Concluding Remarks Agenda for the Future Shiranee Yasaratne Robert Smythe Ari Hewage
4 15pm	Adjourn

Appendix

NAREPP WORKSHOP REPORT

by

Dr Robert B Smythe and Dr Shantha K Hennayake

TITLE	WORKSHOP ON IMPROVING METHODS FOR ENVIRONMENTAL IMPACT ASSESSMENT
VENUE	Galadari Hotel, Colombo
DATES	July 2 1997
SPONSORS	NAREPP/IRG Sri Lanka Ministry of Forestry and Environment U S Agency for International Development
FACILITATORS	Dr Robert Smythe, NAREPP EIA Specialist Dr T L Gunaruwan, National Development Council Mrs Nilanthi Bandara, Open University of Sri Lanka
PARTICIPANTS	University Lecturers, Government Officials and representatives from Private Consulting Firms (see Annex 4, list of participants)
METHODOLOGY	Formal Presentations followed by Discussions and Demonstration of a Computer Program for site evaluations (see Annex 5, program agenda)

BACKGROUND AND OBJECTIVES

Very substantial progress has been made in the development and application of EIA in Sri Lanka in recent years The EIA process is becoming an accepted component of the government's planning and decision-making There is , however, a general consensus that improvements to the EIA process are needed to make it more timely, less costly, and more focused on providing concise, objective analysis to the Project Approving Agencies, other key decision-makers, and the public One of the major areas in EIA that needs improvement is the use of objective, scientific methods in identifying and assessing environmental impacts

The objectives of this workshop were

1 To review EIA methodologies currently used in Sri Lanka,
2 To present draft guidelines for use in EIA methodologies which are currently under consideration by the CEA and
3 To receive comments and make recommendations on ways to improve the quality and the effectiveness of the EIA process in Sri Lanka

SUMMARY OF PRESENTATIONS

Mr K A S Gunasekara, Secretary, Ministry of Forestry and Environment, opened the Workshop with general comments about the role of the EIA process as it relates to the planning and approval of development projects by the Government of Sri Lanka He stated that the EIA process was intended to allow environmental concerns to be identified and addressed early in the planning stages of development projects, so that steps could be taken to avoid or minimise adverse environmental impacts The Secretary expressed concern that the EIA process not be used simply as a means to

oppose projects He emphasized the point that in most cases the proper choice for government officials reviewing environmental documents was not simply to approve or disapprove a proposed project, but to recommend modifications that would allow the project to proceed, provided that adequate provisions to protect the environment were accepted and carried out by the project proponent

Mr Ariyaratne Hewage, Chief of Party for the Natural Resources and Environmental Policy Project (NAREPP), reviewed NAREPP's role in developing and implementing the EIA process in Sri Lanka He stated that, with NAREPP's six-year program coming to an end soon it was important to complete a handover of the process for EIA to the proper Sri Lankan institutions The proper selection and application of methods for EIA is essential if the objectives of the process are to be met and its results accepted by government decision-makers and the public Therefore, Mr Hewage emphasized, it is important for persons who have participated in the preparation and review of EIAs in Sri Lanka to help improve the process, and to make future EIA reports more useful documents He urged the workshop participants many of whom had been involved in conducting EIA studies, to contribute suggestions for improving the methodology for EIA, based on their own experience

Mrs Shiranee Yasaratne, Deputy Director General of the Central Environmental Authority summarized the current legal requirements for EIA in Sri Lanka and the major stages in the EIA process She presented a graphic summary of the status of projects processed by Project Approving Agencies (PAAs) during 1996 (see Annex 1) which indicated that a number of departments and agencies designated as PAAs did not process any IEEs or EIAs during 1996, while others, especially Forestry, were producing a much larger number of IEEs than EIAs She indicated that CEA was taking several steps to accelerate the EIA review process, one of which was that IEEs done for all new projects would not be required to undergo public review and comment If, however, a proposed action is found during the IEE process to have potentially significant environmental impacts, then it will be subjected to scoping and the other elements of the full EIA preparation and review process

Mrs Yasaratne identified some of the common problems that the CEA was having with EIA documents These included vague descriptions of the proposed action excessive descriptive information about the general environment but without the site-specific quantitative data needed to determine the potential scope of impacts, bias or other lack of objectivity in the discussion of potential environmental impacts, and the lack in some cases of any systematic methodology for assessing and comparing environmental impacts of the proposed action or reasonable alternatives
She indicated that CEA staff had in some cases spent a great deal of time with preparers of EIA documents trying to bring these reports up to an acceptable level of clarity accuracy and objectivity These weaknesses in EIA methodology and report preparation were responsible for much of the criticism that the EIA process was lengthy and responsive for delays in project approval and implementation Mrs Yasaratne urged project proponents to begin the process of EIA preparation early, and to select consultants who were familiar with the CEA's EIA Regulations She offered some points of informal advice from CEA to prospective EIA consultants (see Annex 2) in order to avoid potential conflicts of interest and to help the EIA preparation and review process to proceed more smoothly and with less conflict

Mrs Nilanthi Bandara, Senior Lecturer Faculty of Engineering Technology, Open University of Sri Lanka, presented a Summary of EIA Methodologies currently used at various stages of the EIA process (see Annex 3) These typically include questionnaires, checklists (simple and scaled), network analyses, matrices (simple and weighted) and other specialised methods such as benefit-cost analysis and computer-based quantitative models

Mrs Bandara then summarized a review she had conducted of the methodologies used in 16 recent EIA reports submitted to the CEA She found that these documents commonly relied on the use of checklists and other descriptive methods, but with a few exceptions did not make use of many of the more quantitative analytical methods In some cases no systematic application of any recognised methodology was evident The absence in many cases of tabular or matrix presentations of the potential adverse

impacts of the proposed project and alternatives made it difficult to evaluate and compare impacts either with existing conditions (the "no action" alternative) or with other alternatives

After these initial presentations, three examples of "Special Tools for Improving EIA" were presented to the workshop participants by the following experts

Dr S Buvendralingham Senior Lecturer, Department of Civil Engineering, Maratha University discussed Recent Application of Simplified Models in EIA," and gave the results of the use of a computer-based water quality model in evaluating options for improving the water quality of the Kelani River (detailed paper included in the Workshop docket)

Dr T L Gunaruwan Advisor National Planning Council of Sri Lanka, discussed the use of Extended Benefit-Cost Analysis (EBCA) as an analytical tool to bring economic considerations together with environmental values in the EIA process He summarised recent techniques for quantifying non-market values and gave examples of how ECBA could assist planners in evaluating alternatives early in the EIA process and at several conceptual levels

Mr Sanith Ranawana, Environmental Economics and Pollution Specialist NAREPP with the assistance of Mr Nuwan Kodagoda, Department of Civil Engineering Maratha University demonstrated a computer-based method for evaluating the environmental features and resource capabilities of potential development sites The model was initially developed by a team of NAREPP consultants for the Ministry of Industrial Development as a means of screening the comparative suitability of a large number of sites for development of industrial estates, This model has been revised, and the method for aggregating the ratings of 14 environmental parameters has been incorporated into a checklist and computer model that has broad general applicability to the environmental evaluation of any terrestrial site The checklist and computer package with accompanying documentation, will

shortly be released to the Ministry of Industrial Development, and will also be maintained and updated by faculty at the Department of Engineering, Maratha University for general use in evaluating potential development sites in accordance with the requirements for the EIA process

RECOMMENDATIONS

Following the above presentations a plenary session was held to invite workshop participants to make recommendations for improving the EIA process in Sri Lanka The session was moderated by Mr Avanthi Jayatilleke, Environmental Specialist, USAID/Sri Lanka The numerous comments and recommendations made by the participants are summarized below

1 The clarity and usefulness of EIAs would be improved greatly, and the cost and time spent on them could be reduced if the EIA prepares were required to state in the front of the report **what methods they are using**, including any special methods developed for this particular EIA

2 The TORs for EIA should require that the **interactions** among relevant impacts be analysed including interactions that could result in cumulative and/or long-term biological, social and economic impacts

3 TORs should be used by reviewers during the evaluation of EIAs to determine whether the terms of the TOR have been adequately followed

4 CEA and the PAAs should provide more specific guidance and oversight to assure that the public (including known stakeholders) are both informed and consulted during the EIA process

5 Analysis of alternatives should be made more useful by doing the alternatives

analysis early in the planning process for projects

6 A retrospective review of EIAs already completed should be done, and the findings used to identify preferred methods and more generally to identify ways to improve the clarity and information content of the documents

7 All EIA professional teams should include one person with the appropriate qualifications to be the report editor, who will have primary responsibility for producing a concise readable final EIA report

ANNEXES

1 Status of Projects Processed by PAAs Under EIA Regulations During 1996

2 Informal Advice from CEA to Prospective EIA Consultants

3 A Summary of EIA Methodologies by Mrs Nilanthi Bandara (from the docket)

4 List of Workshop Participants

5 Workshop Program Agenda