

CHALMERS



Comparative Analysis of the EIA system of Developed and Developing Countries: Cases of Hydroelectric Power Plants

Master of Science Thesis in the Programme Applied Environmental Measurement Techniques

NIZAMI ABDUL-SATTAR

Environmental System Analysis

Energy and Environment

CHALMERS UNIVERSITY OF TECHNOLOGY

Göteborg, Sweden, 2007

Report: 2007:8

ISSN: 1404-8167

MASTER OF SCIENCE THESIS

**COMPARATIVE ANALYSIS OF THE EIA SYSTEM OF DEVELOPED
AND DEVELOPING COUNTRIES: CASES OF HYDROELECTRIC
POWER PLANTS**

NIZAMI ABDUL-SATTAR

Environmental System Analysis
CHALMERS UNIVERSITY OF TECHNOLOGY
Göteborg, Sweden, 2007

Report: 2007:8
ISSN: 1404-8167

COMPARATIVE ANALYSIS OF THE EIA SYSTEM OF DEVELOPED AND DEVELOPING COUNTRIES: CASES OF HYDROELECTRIC POWER PLANTS

©NIZAMI ABDUL-SATTAR., 2007

Report: 2007:8
ISSN: 1404-8167

Environmental System Analysis
Energy & Environment
CHALMERS UNIVERSITY OF TECHNOLOGY
SE-412 96, Göteborg, Sweden, 2007

Telephone +46(0) 31 77210 00
<http://www.chalmers.se>

Chalmers Reproservice
Göteborg, Sweden 2007

When a proposed action threatens the physical, biological, social, or economic environment, a thorough assessment is done and measures are identified to prevent and offset the adverse environmental impacts. This practice is called an Environmental Impact Assessment (EIA).....
David P. Lawrence, (2003).

EIA is one of the successful policy innovations of the 20th century that is existed and practiced in more than 100 countries of the world. It is applicable to any development activity, which is likely to have significant environmental impacts but its form varies globally due to different economic, social, political and environmental circumstances.....
Christopher Wood, (2003).

ABSTRACT

Escalation of interest in sustainable development of land and its valuable resources has accompanied development and environment together. EIA (Environmental Impact Assessment) is an important legislative and scientific tool that lends quality assistance to decision-making for sustainable development. The incorporation of environmental considerations into the decision making process varies from developed countries to developing countries because of diverse set of cultural, economic, social and political patterns.

At the beginning the practice of EIA was primarily confined to developed countries but it became increasingly familiar to people in the developing regions due to the active role of national and international organizations and media. Sweden adopted EIA in 1985 and initiated it on a regular basis in 1988 after the Environmental Government Bill, while in Pakistan the EIA studies for any development project became obligatory after the enactment of the Environmental Protection Act in 1997.

The EIA system of developing countries is not efficient in terms of application and review. Also the appraisal of issues, decision making process and evaluation through post-monitoring is not well-performed. The stages of the project cycle are not fully integrated in processes of environmental assessment and decision making. The findings of the conducted EIA studies are also not thoroughly considered. The key reason of this shortcoming is the wrong perception of EIA because at the start intensive attention is given to the EIA content that eventually begins to lose at the time of implementation. This results in unexpected and unrequired consequences under different sets of conditions.

The aim of this research is;

- 1) To review the status of the EIA system in developing and developed countries by going through the developmental and evolutionary history of the EIA system in the world,
- 2) To provide a gap analysis of the procedural differences at the time of implementation and the consequences of differences after accomplishment of one hydroelectric power plant in each of the countries of Sweden, Pakistan and Norway,
- 3) To find out the reasons of failures of the EIA system in the developing countries with possible solutions and choices to remove its inadequacies in developing countries in general and Pakistan in particular.

Keywords: Environmental Impact Assessment, sustainable development, decision making process, implementation, monitoring.

ACKNOWLEDGMENTS

I would like to manifest my warmest gratitude to all people that in one way or another have helped me in the completion of this thesis. The most and above all, I missed my family while living far from them but they always motivated and fervently encouraged me to ensue my work.

I am very thankful to my supervisor Prof Sverker Molander who gave me an opportunity to carry out this research in the area of my interest. His kind and patience attitude leads me to work in a total freedom of mind and heart. He guided me throughout my research and supported me with his advices to rectify the troubles every time I faced.

Last but not least, I am obliged to my friends who make me cheer and laugh with their jokes and supported me during my stay. I am thankful to you guys, who never made me feel alone.

5th March, 2007
Nizami Abdul-Sattar
Göteborg, Sweden.

ACRONYMS

ANZECC	Australian and New Zealand Environment and Conservation Council
EAAC	Environmental Assessment Advisory Committee
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
EU	European Union
GBTI	Ghazi Brotha Taraqiati Idara
GWH	Gigawatt Hour
IEA	International Energy Agency
IEE	Initial Environmental Examination
IUCN	International Union for the Conservation of Nature and Natural Resources
MENA	Middle East and North Africa
MW	Mega Watt
NEPA	National Environmental Protection Act
NEQS	National Environmental Quality Standards
NWFP	North-West Frontier Province (Pakistan)
OECD	Organization for Economic Cooperation and Development
PAHO	Pan-American Health Organization
PEPA	Pakistan Environmental Protection Agency
PEPO	Pakistan Environmental Protection Ordinance
SEPA	Swedish Environmental Protection Agency
SER	State Environmental Review
UNCEE	United Nations Economic Commission for Europe
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
WAPDA	Water and Power Development Authority
WCD	World Commission on Dams

Table of Contents

1. INTRODUCTION	1
1.1 Objectives/Aims of the Study.....	1
1.2 Hypotheses	2
1.3 Approach and Methodology.....	2
1.3.1 Approach	2
1.3.2 Methodology	2
1.3.3 Secondary Data Collection	3
1.3.4 Primary Data Collection.....	3
1.4 Limitation.....	3
1.5 Structure of the Thesis.....	3
2. DEVELOPMENT AND EVOLUTION OF ENVIRONMENTAL IMPACT ASSESSMENT	5
2.1 EIA in Africa.....	8
2.2 EIA in Asia.....	9
2.3 EIA in Latin America	10
2.4 EIA in North America.....	11
2.5 EIA in Australia	12
2.6 IA in Europe	12
2.7 EIA of the Development Banks and Aid Agencies.....	13
3. COMPARATIVE ANALYSIS OF THE EIA SYSTEM.....	15
3.1 Comparative Review of the EIA System in Developed and Developing Countries.....	18
3.1.1 Consideration of Alternatives.....	19
3.1.2 Screening.....	19
3.1.3 Scoping.....	19
3.1.4 EIA Report Preparation	19
3.1.5 EIA Report Review.....	20
3.1.6 Monitoring and Post Auditing	20
3.1.7 Decision Making Process.....	20
3.1.8 Public Participation	20
3.1.9 Effectiveness of the EIA System.....	20
3.1.10 Monitoring of the EIA System	21
4. COMPARATIVE ANALYSIS OF THE EIA SYSTEM OF SWEDEN AND PAKISTAN.....	23
4.1 Application of Evaluative Criteria to Sweden and Pakistan	24
4.2 EIA Legislation.....	24
4.2.1 In Sweden;.....	24
4.2.2 In Pakistan;.....	26
4.3 EIA Administration	28
4.3.1 Actors and Accountability in the EIA Process.....	28
4.3.2 Consultation	29
4.4 EIA Practice	30
4.4.1 Screening.....	30
4.4.2 Scoping.....	30
4.4.3 Public Participation	31
4.4.3 Review	31
4.4.4 Appeal	31
4.4.5 Monitoring.....	32
4.5 Guidance on EIA	32
4.6 Time Factor in the Assessment Process	32

5. CASE STUDIES	34
5.1 Case Studies without EIA	34
5.1.1 THE TARBELLA HYDROELECTRIC POWER PLANT	34
5.1.2 THE SUORVA HYDROELECTRIC POWER PLANT	36
5.2 Case Studies with EIA	37
5.2.1 GHAZI BROTHA HYDROELECTRIC POWER PLANT	38
5.2.2 AURLAND HYDROELECTRIC POWER PLANT	39
6. ANALYSIS	40
6.1 Analysis of the EIA System in Paper	40
6.2 Analysis of the EIA System in Practice	42
7. COMPARATIVE DISCUSSION OF THE EIA SYSTEM IN DEVELOPING COUNTRIES....	47
7.1 Perception of the Concept of the EIA System.....	47
7.2 Failures of the EIA System.....	47
7.3 Role of Development Assistance Agencies in the EIA System.....	48
8. FINAL CONCLUSION AND RECOMMENDATION	49
9. REFERENCES.....	52

List of Tables

Table 2.1 Evolution of the EIA Process.....	6
Table 2.2 Evolution of EIA in Africa.....	9
Table 2.3 Evolution of EIA in Asia.....	10
Table 2.4 Evolution of EIA in Latin America	11
Table 2.5 Evolution of EIA in Central and Eastern Europe.....	13
Table 2.6 Evolution of EIA in Development Banks and Aid Agencies	14
Table 3.1 Cross Country Evaluation of EIA.....	16
Table 3.2 Criterion to See the Performance of the EIA System of Developing Countries.....	18
Table 3.3 Comparative Review of the EIA System of Developing and Developed Countries	21
Table 4.1 EIA Evaluation Criteria: Systemic and Foundation Measures.....	23
Table 4.2 Comparative Analysis of EIA Legislation	28
Table 4.3 Actors and Accountability in the EIA Process.....	29
Table 4.4 Comparative Analysis of EIA Administration	29
Table 4.5 Comparative Analysis of EIA Practice	33
Table 4.6 Comparative Analysis of Foundation Measures.....	33
Table 5.1 Comparative Analysis of Tarbella and Suorva Power Plants	37
Table 5.2 Comparative Analysis of Ghazi Brotha and Aurland Power Plants	39
Table 6.1 Results of Criteria for Sweden and Pakistan	40
Table 6.2 Weighted Score Scheme for the EIA system in Paper.....	41
Table 6.3 Results of Criteria for Tarbella and Suorva Power Plants	42
Table 6.4 Results of Criteria for Aurland and Ghazi Brotha Power Plants	43
Table 6.5 Weighted Score Scheme for the EIA System in Practice	44
Table 6.6 Total Score for Sweden, Norway and Pakistan	46
Table 6.7 Characteristics of the EIA system of Sweden, Pakistan and Norway.....	46
Table 8.1 Existing Problems of the Developing Countries with Recommendations.....	50

List of Figures

Figure 2.1 Status of the EIA System Worldwide.....	8
Figure 4.1 EIA Procedural Flow in Sweden.....	25
Figure 4.2 EIA Procedural Flow in Pakistan.....	27
Figure 6.1 Comparison of the EIA system in Paper in Sweden and Pakistan.....	42
Figure 6.2 Comparison of Tarbella and Suorva Power Plants	43
Figure 6.3 Comparison of Aurland and Ghazi Brotha Power Plants.....	44
Figure 6.4 Comparative Analysis of the 'EIA system in paper' and the 'EIA system in practice' of Sweden and Pakistan	45
Figure 6.5 Comparative Analysis of the 'EIA system in paper' and the 'EIA system in practice' in Norway and Pakistan	45

1. INTRODUCTION

Development and environment are not two separate concepts anymore due to the continued rise of interest in sustainable development of land and its valuable resources. This thought was brought first time in the Brundtland report by the World Commission on Environment and Development. In the report efforts were made to integrate the environmental aspects with the developmental issues (cf. Reid 1995 cited in Bruhn and Eklund, 2002), so to bring environment and development together new legislative and technical tools were introduced at national and international levels such as EIA (Environmental Impact Assessment), ERA (Ecological Risk Assessment) and LCA (Life Cycle Assessment).

Environmental Impact Assessment (EIA) provides assistance to make the decisions for sustainable development. In this approach information about environmental impacts of a proposed project is assessed or operational activity is gleaned and considered by the decision makers to determine whether the project should proceed or not. The environmental impacts are seen in a very systematic way of different steps such as screening, scoping, consideration of alternatives, description of environmental baselines, identification, prediction and evaluation of impacts, public consultation, mitigation and monitoring of impacts, presentation, documentation and review and decision-making. This scientific tool is used to predict, assess and describe the outcomes or consequences on the environment by considering the physical and living environment (SLU, 2006; Glasson et al., 1999 and Morris et al., 2001).

EIA was introduced first time in USA in 1969 and the process of implementation of EIA was hastened in EU member states in 1985 after the European community directive. To carry out EIA, once primarily confined to western nations, became increasingly familiar to people in the developing countries. Due to distinctive cultures and political patterns the unification of environmental considerations into the decision making process varies between developed countries and developing countries (El-Fadel and El-Fadl, 2004). The widespread use of EIA in developing countries is delayed due to lack of suitable methodologies for their social, economic and institutional conditions. The major problem created there was how to carry out EIA under limited cost, time and available expertise (Biswas and Geping, 1987).

That's the basic assumption explaining why western style EIA did not brought the anticipated outcomes and proved to be inappropriate and unworkable as it was enforced in the developed countries (Holling, 1978 and Wandesforde-Smith et al., 1985a). El-Fadel and El-Fadl (2004) presented the reasons for this failure, which in general are not associated with the developed countries. The key reason is a wrong perception of EIA because at beginning intensive attention is awarded to the EIA content, which eventually starts to lose at the time of implementation. Efforts are made just to amass the information but not to analyze, interpret or examine the outcomes after the project accomplishment. This took place due to lack of efficient and effective monitoring and evaluation system, so El-Fadel and El-Fadl (2004) and Wandesforde-Smith et al. (1985b) are in a favor that the developing countries should reform their constitutional and procedural practices that suit their infrastructure, resources and the institutional, technical and financial constraints.

1.1 Objectives/Aims of the Study

This research has three objectives.

First, it describes the status of the EIA system in developed and developing countries. The status of the EIA system is explained by its developmental and evolutionary history in the world and by comparative analysis in the developed and developing countries. The major focus was on different steps involved in the EIA process such as screening, scoping, public participation and review.

Second, it presents detailed analysis of implementation outcomes (EIA system in paper) and performance outcomes (EIA system in practice) or the constitutional differences at the time of implementation and outcomes differences after accomplishment of the hydroelectric power plants in Sweden, Pakistan and Norway.

Third, it discusses the different reasons of the EIA system's failures in developing countries with possible solutions and suggestions to remove its inadequacies for the developing countries in general and Pakistan in particular.

The overall aim of the study is to provide gap analysis of various steps (screening, scoping, public participation and review) of the EIA system in the light of case studies of hydroelectric power plants and recommendations for current problems of the EIA system of developing countries, so they can meet the national and international requirements of sustainable development.

1.2 Hypotheses

The following three hypotheses were made to meet the objectives and aims of the study:

- The legal and regulatory framework of the EIA system is not in harmony with the institutional and socio-economic conditions of the developing countries.
- The priority for participation of various stakeholders such as regulatory, regional bodies and public in the development of hydroelectric power plants in Sweden, Pakistan and Norway was depending on the economic needs of the respective country.
- Sweden and Pakistan have differences in the effectiveness of implementation and monitoring facilities, which result in different environmental issues at public and official levels.

1.3 Approach and Methodology

1.3.1 Approach

The information for this thesis was acquired as collection of primary and a secondary data. The secondary data were gathered first. It comprised of analysis method of documents and literature review from published works and books. Selected reports and relevant journal article in printed and electronic format were utilized. After examining and reviewing the secondary data, the further information need was specified and based on that analysis the methodology for primary data collection was developed.

1.3.2 Methodology

During primary and secondary data gathering following tools or methods were used.

1. Document analysis/literature review
2. Electronic media i.e. emails and telephone contacts

These two methods were used to understand comprehensive synthesis of the research problem, establish the hypotheses and to reach the eventual aims and objectives of the study. These were prioritized in the order as mentioned above due to the time and budgetary constraints.

1.3.3 Secondary Data Collection

In the collection of secondary data the published books and papers, selected comprehensive reports, relevant journal's articles in printed and electronic resources were consulted. This approach supported the alignment of predefined objectives and to make the hypotheses and was further used to back and expand evidences from others sources. This methodology also remained helpful to corroborate claims and clear creative ideas about the investigation and created the reason to develop further contacts through telephone and Internet.

To establish the first hypothesis the information about evolutionary history of the EIA system in different regions of the world at different times was collected. Second hypothesis is confirmed by having the data about the EIA studies, environmental impacts, mitigation measures and the unsolved issues of the hydroelectric power plants carried out in Sweden, Pakistan and Norway. The information about the Tarbella and Suorva hydroelectric power plants in Pakistan and Sweden was gathered from already conducted case studies of the World Commission on Dams (WCD). The data about the Aurland and Ghazi Brotha hydroelectric power plants in Norway and Pakistan was collected from the International Energy Agency (IEA) and Water and Power Development Authority (WAPDA) of Pakistan.

To validate the third hypothesis the documentation and publication of PEPA (Pakistan Environmental Protection Agency) in different years such as 1997, 2000 and 2005, and SEPA (Swedish Environmental Protection Agency) were consulted. The handy information about the EIA system of Sweden was acquired from the Nordregio publications on the Nordic EIA system.

1.3.4 Primary Data Collection

During primary data collection the information and data that were missing and absent after the secondary data collection was composed. The exercise of this stage was limited in this research because most of the needed data was obtained during the secondary data collection. Few interviews were conducted to get the necessary evidences about the case studies from Pakistan. The interviews were of an open-ended nature because they provide additional views of the respondent besides the facts that one can ask.

1.4 Limitation

The financial constraints forced to stay in Sweden rather than to carry out an on-the spot research particularly for the case studies of Pakistan.

A quantitative approach to make comparison more comprehensive and clear is used in chapter 6 in the mood of different weighted score schemes and their graphical illustrations. The possibility of uncertainties and errors is expected in the obtained results.

1.5 Structure of the Thesis

The thesis is divided into three principal segments according to the objectives and hypotheses.

In the first part the progress and evolution of EIA is discussed in chapter 2. The comparative analysis of developed and developing countries based on various steps is discussed in chapter 3, so chapters 2 and 3 validate the first hypothesis and achieve the first objective of the study.

The second part is consisted of detailed study of the EIA system of Sweden and Pakistan. To confirm the second hypothesis and to get the second objective of the research the EIA system is further splitted into two main sections. The first is the 'EIA system in paper' and the second is the 'EIA system in practice'. The description with the obtained results from the comparison is given in chapters 4 and 5.

The third hypothesis and objective are proved and achieved by comparative discussion of the EIA system of developing countries with widespread perception and failures of the EIA system and the role of international development agencies in this perspective. This discussion is conferred in chapter 6 and 7.

2. DEVELOPMENT AND EVOLUTION OF ENVIRONMENTAL IMPACT ASSESSMENT

At the beginning of the 1960s various conferences were held and worldwide media gave special attention to the environmental issues like water pollution. These efforts were enhanced when the book “Silent Spring” written by Rachel Carson was published in 1962 that described the degradation of the environment due to usage of pesticides, so the latter half of the 1960s is called the period of environmental awakening. During the year 1970 people initially started to give responses and took gradual actions against these environmental problems. As a sequel the Earth Day was held on 22 April, 1970 (Thompson and Ross, 2001). In this period many countries passed legislation to control such harms (Modak and Biswas, 1999). California was the first American state that implemented National Environmental Protection Act (NEPA) in 1970 (Wood, 1995).

The immediate requirement to have the means of environmental management like EIA to protect humans and the physical environment was realized when the fatal accidents such as the Ixtoc ‘blow out’, the sinking of Amoco Cadiz, Bhopal and Chernobyl accidents happened. Peoples became more concerned and cautious of these sorts of tragedies nearby in the region or other parts of the world (Htun, 1990).

EIA is considered as one of the oldest and most mature tools in environmental management, which is comprised of environmental indicators, reporting and audits. It also initialized work with ecological management, life cycle assessment and product and technology assessment (Thompson and Ross, 2001). The 33 years evolutionary age of EIA has now broadened in the context that this is not only the process to identify potential affects but in addition it enable the merger of environment and development concerns. With the recent development of democratic system and economies in the form of open-market the EIA system further went to change in different regions of the world (Htun, 1990).

There exists more than 100 EIA systems (Wood, 2003b) which are practiced in more than 100 countries (Sadler, 1996). The key principles and objectives are the same in any part of the world and the systems share many common problems. It is applicable to any developmental activity that is likely to have significant environmental impacts but its form varies globally because of different economic, social, political, environmental circumstances (George, 2000) and due to jurisdiction that improves its effectiveness (Wood, 2003b).

The significant expansion in the scope of environmental assessment took place in the mid of 1980s when all the developed economies had their own EIA procedures (Lee and George, 2000). According to Glasson et al. (1999) the process of implementation of EIA in EU member states was completed during this period because of an European Community Directive. The complete legislation based on the principles of sustainability was seen in New Zealand when the Resource Management Act was enacted in 1990 (Modak and Biswas, 1999). Below is a table 2.1 that depicts the evolution of EIA process in different time periods.

Table 2.1 Evolution of the EIA Process

Time periods	Examples of development
Pre-1970 Initial development	<ul style="list-style-type: none"> ▪ project review based on technical/engineering and economic analysis ▪ limited consideration given to environmental consequences
Early/mid-1970s Methodological development	<ul style="list-style-type: none"> ▪ EIA introduced (NEPA, 1970) ▪ basic principles; guidelines; procedures; including public participation ▪ standard methodologies for impact analysis developed (e.g., matrix, checklists, networks) ▪ several other countries adopted NEPA-based approach (e.g., Canada, Australia, New Zealand) ▪ major public inquiries (rather than court litigation) help shape their process development
Later 1970s to early 1980s Increasing scope (Social dimensions included)	<ul style="list-style-type: none"> ▪ use of EIA by developing countries (e.g., Brazil, Philippines, China, Indonesia) ▪ SIA (strategic Environmental Assessment) and risk analysis included in EIA processes ▪ greater emphasis on ecological modelling, prediction and evaluation methods ▪ programme EISs prepared in US ▪ environmental inquiries in several countries encompass policy review aspects ▪ informational (non-hearing) provisions for public involvement ▪ coordination of EIA with land use planning processes (e.g., New South Wales, Victoria)
Mid-1980s to end of decade Process strengthening and policy integration	<ul style="list-style-type: none"> ▪ EC Directive on EIA establishes basic principles and procedural requirements for all member states ▪ increasing efforts to address cumulative effects ▪ development of follow-up mechanisms (e.g., compliances and effects monitoring) ▪ ecosystem and landscape level approaches applied (e.g., to assess wetland losses) ▪ World Bank and other international lending and aid agencies establish EIA requirements ▪ increasing number of developing countries carry out EIAs (e.g., Asia)
1990s Towards sustainability	<ul style="list-style-type: none"> ▪ requirement to consider transponder effects under Espoo Convention ▪ EIA identified as implementing mechanism for UN conventions on climate change and biological diversity ▪ SEA system established by increasing number of countries ▪ mediation incorporate into EIA requirements (still limited) ▪ sustainability principles and global issues receive increased attention (some EIA guidance but still limited) ▪ increasing use of GIS and other information technologies ▪ application of EIA to international development activities more widespread ▪ greater corporate use of EIA, including screening investment and loan decisions and undertaking site and property assessment to establish liabilities ▪ rapid growth in EIA training, networking and cooperation activities ▪ enactment of EIA legislation by many developing countries
From 2000 till now	<ul style="list-style-type: none"> ▪ Strategic Environmental Assessment (SEA) evolved and further developed from EIA to overcome the problems associated with it ▪ new approaches are given to EIA and SEA such as Analytical Strategic Environmental Assessment (ANSEA) and Environmental Impact Description (EID) ▪ Principles of sustainability are now fully incorporated into any step or stage involved in the EIA system

Source: Sadler (1996); Modak and Biswas (1999); Sankoh (1996); Dalkmann et al. (2004) and Alshuwaikhat (2005).

The adoption of formal EIA principles and regular practices took much time in developed countries even after the launch of EIAs in their lands. For example, in 1988 EIA became mandatory in UK. The European Council of Ministers approved a directive on EIA in 1985. Same with USA, Luxembourg, Ireland and France, which realized its need during various activities such as engineering highway, dams, mining and industries (Sankoh, 1996).

During 1970s and 1980s the legislation about the environmental safety was brought up on a broad spectrum and the immediate demand for action was felt at a national and international level. The United Nations conference on human environment held in Stockholm in 1972 showed a breakthrough in the life of EIA. This conference boosted the need to have a framework for the absolute concern of problems of the human environment (Modak and Biswas, 1999). According to Lim (1985) EIA accepted and appeared as a legal directive in developed and developing countries after this conference. The Organization for Economic Cooperation and Development (OECD) recommended that the EIA procedure and method should be adopted in the member states of EU (OECD, 1992). Now the EIA is a “major tool for environmentally-sound management practices and for the consistent attainment of sustainable development goals” in developed countries (Ebisemiju, 1993).

The outspread of concern and recognition to consider the environmental issues in developing countries also started during 1970s and 1980s. However, the implementation of mandatory EIA procedure started in the developing countries a decade later especially after the Rio Earth Summit in 1992. Before this the regular practice of EIA was more concentrated in the developed countries. Some developing countries introduced EIA rather earlier. For example, Colombia started to use it in 1974 and Philippines in 1978 (Lee and George, 2000).

Thompson and Ross (2001) have the opinion that the practice of EIA in developing countries is the result of EIA provisions to the country and the execution of the requirements from the development aid agencies. This view is further supported by Wood (2003a); Lee (1983); Alshuwaikhat (2005); Ebisemiju (1993) and Briffett (1999a). The EIA has been introduced in some of the developing countries even earlier than most of the developed countries as mentioned. But the formal legislation for EIA was enacted late and is less entrenched into the development process (Lee and George, 2000). There are enormous differences existed in the EIA system within developing countries. Central and Eastern Europe, Latin America, South East Asia and African countries have the EIA system varying from their origin and way towards its effectiveness (Wood, 2003b).

To see development and evolution of the EIA system throughout the world the continents of the land such as Asia, Africa, Europe, Australia, Latin America and North America are used. A short description about the status of the EIA system is reflected in the Figure 2.1. This figure represents different forms of the EIA legislation such as EIA's regulation, partial regulations, guidelines and draft regulations in different parts of the world.

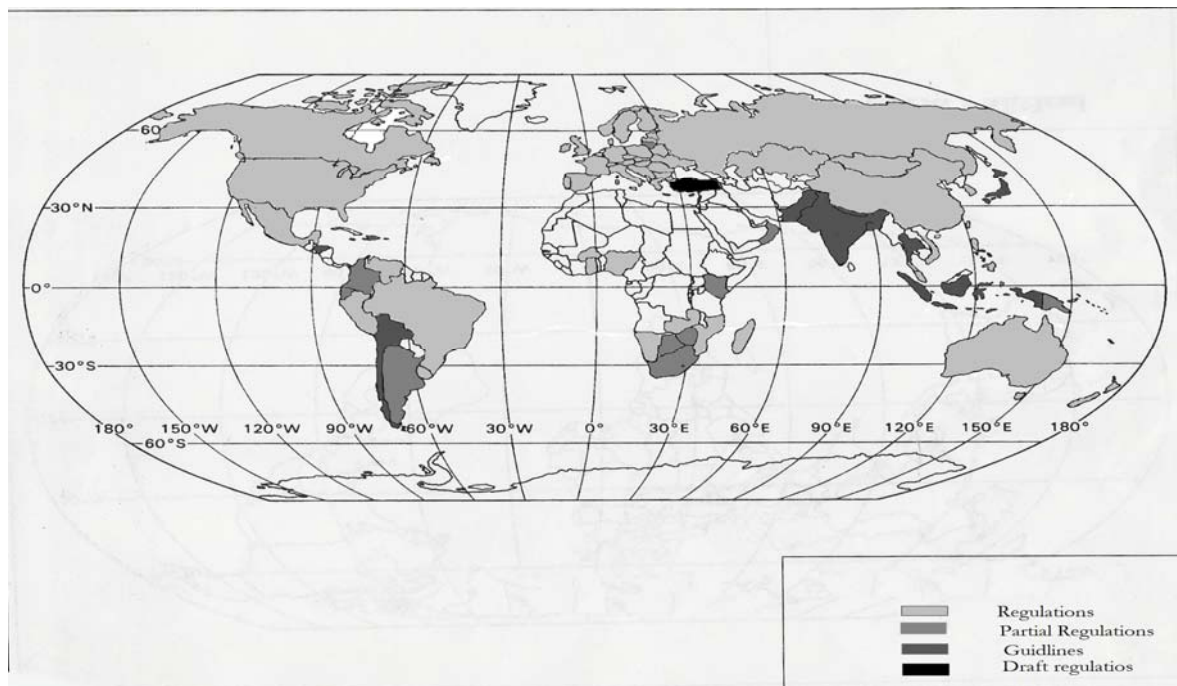


Figure 2.1 Status of the EIA System Worldwide.

Source: Glasson et al. (1999).

2.1 EIA in Africa

The bilateral donors and multilateral agencies prepared EIAs in Africa during 1970s and 1980s. These agencies were from Britain, Norway, Denmark, USA, France and also the African Development Bank and the World Bank (George, 2000). The amalgamation of environmental concerns into the development process was first considered by the state of South Africa in 1982 when they formed a committee to develop a strategy for ensuring such integration. Later South Africa developed an EIA that is called Integrated Environmental Management (IEM) (Kakonge, 1999). In Ghana and Tanzania there are some institutions that have their own EIA procedures. For example, the mining sector of Ghana and the National Parks Authority (TANAPA) and the Electricity Supply Organization of Tanzania (George, 2000).

The African Ministerial Conference on the Environment (AMCEN) and the regional preparatory conference of the United Nations on the Environment and Development (UNCED) held in Cairo in 1985 and in 1991 made specific recommendations for the use of EIA in the African states. These meetings and agreements lead to the integration of EIA into the development process. Later Egypt developed its environmental policy that covers EIA. Nigeria enacted its EIA decree in 1992 that necessitates detailed analysis of 19 categories of major development projects (Kakonge, 1999).

After the Earth Summit many African countries appeared to formalize environmental legislation or policy as shown in table 2.1. But still many of them have to pass environmental legislation. The ministerial meeting held in Durban focused the necessity of EIA in Africa. This meeting issued several suggestions for the enactment of environmental legislation and demands for the enhancement of public position in the use of EIA (Kakonge, 1999).

Table 2.2 Evolution of EIA in Africa

Country	Legal requirements for EIA	Local and sectoral provisions for EIA
Egypt	Law 4, 1994, on protection of the environment	Coordination with sectoral ministries and local governorates
Ghana	Environmental Protection Agency Act 490/1994, EIA Procedures 1995	Guidelines issued by EPA for mining sector 1995
Malawi	National Environmental Policy 1996 and draft Environmental Management Act 1996	None
Mauritius	Environmental Protection Act 1991 as amended on 6.4.93	Local and sectoral provision
Nigeria	Environmental Impact Assessment Decree 86/1992, Urban and Regional Planning Decree 1992, EIA Procedure 1994.	Provisions of planning decree
South Africa	Environmental Conservation Act 1989 EIA Regulations 1997	Provincial government procedures
Swaziland	Enabled by Swaziland Environment Authority Act 1992, Environmental Audit, Assessment and Review Regulations 1996	None
Tanzania	No general national requirements. Tanzania National Parks Authority Guidelines 1993, Procedures 1995	Tanzania national parks, Tanzania electric supply company
Tunisia	Law 88-91, 1988. EIA decree 91-362, 1991	None
Zambia	Environmental Protection and Pollution Control Act 1990, Regulations 1997	None

Source: George (2000).

2.2 EIA in Asia

The enactment of the EIA legislation is variable in Asian countries. The practice of EIA started during 1990s and today in the planning process EIA has become established firmly in most of the Asian countries (Alshuwaikhat, 2005). The East Asian countries such as Thailand and Philippines enacted EIA legislation in 1970s even earlier than many European countries. Some countries like Hong Kong and Japan have recently introduced formal legislation, while Malaysia and Indonesia have developed sectoral guidelines. Brunei and Laos are following the guidelines of World Bank and Asian Development Bank. Singapore, Vietnam and Cambodia have no mandatory EIA legislation. Many of the countries follow the requirements of EIA to receive loans from the multinational finance agencies (Briffett, 1999b).

In South Asian countries such as India and Pakistan have established EIA earlier than other countries of the region (George, 2000 and Biswas and Agarwala, 1992). The EIA is still not so mature in this region because of social, cultural and economic aspects, which are given little careful consideration in the assessment process of impacts on the physical and natural environment (Htun, 1990).

In Middle East countries Oman, Tunisia and Turkey are included in the list of countries who have established the EIA system. Many other countries are at enabling stage and if EIA is present somewhere in the region then it is in draft form. Mostly the EIA is conditioned by donor agencies and is a requirement for project development (George, 2000). The following table shows the evolution of EIA in Asia.

Table 2.3 Evolution of EIA in Asia

Country	Legal requirements for EIA	Local and sectoral provisions for EIA
Bangladesh	Enabled Environmental Protection Act 1995. Draft procedures prepared	EIA guidelines for flood action plan
Bhutan	Enabled National Environmental Protection Act, EIA guidelines 1993	None
China	Environmental Protection Law 1979, 1989	Provincial, county and city environmental protection boards, with responsibilities to national environmental protection agency and local government.
India	Enabled Environment (Protection) Act 1986, Mandatory under EIA Notification 1994	Limited delegation to state pollution control boards
Indonesia	Government regulation No.29, 1986 Regulation No. 51 of October 1993, Regulations 1996	Sectoral agencies and provincial government procedures
Jordan	Enabled by Environmental Protection Act 1995	Aqaba region directive 1995 (draft)
Malaysia	Environmental Quality (Amendment) Act 1985 Environmental Quality (Prescribed Activities) Order 1987	EIA process decentralized to DOE state (regional) offices
Morocco	Enabled by Decree 2-93-809 1994. Environmental Protection Act 1996	None
Nepal	Environmental Protection Law 1996, EP Rules 1997	Sectoral guidelines
Oman	Environment Protection and Pollution Control Act 1982, amended 1985, 1993	None
Pakistan	1983 Ordinance No. 37, Environmental Protection Ordinance No.27 1997-enabling legislation	Implemented through provincial government
Philippines	Presidential Decree No. 1586 of 1978, Order DA021 1992, Proclamations 1981, 1996, Procedures 1997	Regional offices of environment board
Sri Lanka	National Environmental Act No. 47 of 1980 amended 1988, Regulation No. 772/22 1993, Ministerial order 1995	North western province statute, powers delegated to sectoral ministries
South Korea	Environment Preservation Act 1977, EIA Act 1993 (amended 1997), EA Regulation 1993	Local government regulations
Syria	None Decree due to come into force 1999	None
Taiwan	EIA law 1994 implementation rules 1995	Provincial environmental protection departments
Turkey	Environmental Law 1983, EIA Regulations 1993, 1997	None
Vietnam	Environmental Protection Law 1994, Government Decree 175/CP 1994, guidelines 1994-1997	Delegation to provincial government

Source: George (2000).

2.3 EIA in Latin America

Latin American countries have different geographical, political and cultural circumstances due to different origin of their colonists and immigrants, which had significantly influenced the development of the EIA system (Moreira, 1990). Like East Asia this region also experienced rapid industrialization. Some countries are in upper-middle income group while some are in the lower-middle income group. Besides forestry, the coastal and water resources development and oil and mineral extraction are important sectors in the region, so the development of EIA in the region shows the same patterns of development as seen in East Asia (George, 2000).

Initially EIA was required by the development aid agencies. However, the regular start occurred during the mid-1970s when preventive regulations started to include in the legal and institutional organization of

many countries. For example, in 1972 the first environmental assessment was performed in Brazil when an international consultant documented the significant impacts of a hydroelectric power plant in response of a request to the World Bank (Brito and Verocai, 1999). The recent establishment of environmental policies and laws and the mobilization of community environmental interest has triggered because of financial and technical support from the United Nations Environment Programme (UNEP) and the Pan-American Health Organization (PAHO) (Moreira, 1990).

Brazil, Mexico and Venezuela are the countries with developed EIA system. The under developed countries of the region like Belize, Bolivia and the Costa Rica has also enabled the EIA legislation, while some countries are at preparing levels and some are following the EIA requirements due to pressure of funding agencies (George, 2000). The report of the world commission on environment and development “our common future” in 1987, which later included in the United Nations (UN) conference on environment and development in 1992 have purposely created awareness about the sustainable development and spurred the efforts to obtain support from development aid agencies and international environmental organizations. The political stability, economic recovery and the opening of internal markets have obtained trust of international banks to offer loan for project development (Brito and Verocai, 1999). The following table depicts the evolution of EIA in Latin America.

Table 2.4 Evolution of EIA in Latin America

Country	Legal requirements for EIA	Local and sectoral provisions for EIA
Belize	Environmental Protection Act 1992 Regulations 1995	No
Bolivia	Law on Environment 1992, Regulations 1995, 1996	Coordination with local and sectoral government
Brazil	Rio de Janeiro permit system, 1977 National Environmental Law 1981, Executive Decree 88, 351 1983 (issued 1986), EIA Regulations 1986	Yes, in many states
Chile	Framework Environmental Law 1994, Regulations 1997	Regional environmental commissions
Mexico	Law of Public Works 1980 Federal Law on Environmental Protection 1982, Regulation on EIA 1988 and amendments Environment and Natural Resources Code 1990	State laws and municipal regulations required to be established to support the federal law
Peru	Environment and Natural Resources Code 1990	Sectoral ministries and municipality of lima have issued own regulations
Uruguay	Law of Environmental Impact Assessment 1994	Sectoral ministries responsible for evaluating projects
Venezuela	Organic Law of Environment 1976 Regulation on EIS, Decree 2213, 23/4/92	Detailed requirements set by sectoral ministries.

Source: George (2000).

2.4 EIA in North America

EIA as a part of project planning and decision making process was made first time in the world by USA after the National Environmental Policy Act of 1969. Through a cabinet directive Canada formed an environmental assessment review process in 1973 and later developed it in 1984. This process was legalized through an order of council that legislated and promulgated when the Canadian Environmental Assessment Act was passed in 1995. The history of legislation of environmental protection is also long in Mexico. In 1917 the conservation of the natural resources was granted by Mexico’s constitution. The general law of ecological balance and environmental protection provides EIA legislation of Mexico. EIA is further flourished and gradually improved in this region due to joint efforts among these three countries in the form of North American agreement of environmental cooperation (Clark and Richards, 1999).

2.5 EIA in Australia

In commonwealth of Australia the environment protection act that is called Impact of Proposals was enacted in 1974, 14 years before the enforcement of European commission's directive on EIA. This act has the federal activities independent of existing procedures by the state or local government. To extend the scope of EIA the procedures were reformed due to Australian and New Zealand Environment and Conservation Council (ANZECC) in 1991. The EIA system has gone through various reviews, amendments and reposition within a new commonwealth environment protection agency (Wood, 1995).

2.6 EIA in Europe

The development of EIA in this region is impelled by the political, economic and planning system of the region (George, 2000). The continent Europe is divided into several regions with different economies and infrastructure. For example, the Eastern Europe comes under the category of low or lower-middle income groups while the countries that fall in Northern and Western Europe have developed economies.

The evolution of EIA in Central and Eastern Europe dates from late 1970s to early 1980s. The development of EIA as a management tool issued first time in the Polish law of water that required it for intended use of water in 1974. In Croatia the regulation of EIA was introduced in 1984. The EIA system varies much due to the constitutional, administrative, economical, political and cultural circumstances. In Poland, the Czech Republic, Estonia, Latvia, Ukraine and Romania the new and revised EIA is being prepared, for example, the second version of EIA legislation of Poland. The EIA legislation currently enforceable in these countries originated due to common influence of the centrally planned economy, decision-making and the environmental legislation of the former USSR, the State Environmental Review (SER), Assessment of Environmental Impacts (OVOS) and the western style EIA. So, the state of the environment and environmental awareness is persuaded largely at the end of the social era (Rzeszot, 1999 and Starzewska, 1990).

In 1993 a supranational and intergovernmental union of different European countries came into existence by the treaty on European Union. So far there are 25 member states mostly from North and South Western parts of the Europe (EUROPA, 2007). The draft directive of EIA first published in 1980 and the European community agreed on text in 1985. The national perceptions of priorities and the political relationship were considered well in this directive. The excessive delays happened due to domestic provisions of each member state, which were improved, invalidated or even revoked. 21 versions of EIA were published during the commissioning of a research project on EIA before the final directive 85/337/EEC (Bond and Wathern, 1999 and Wathern, 1990). The table 2.5 shows an evolution of EIA in Central and Eastern Europe.

Table 2.5 Evolution of EIA in Central and Eastern Europe

Country	Legal requirements for EIA	Local and sector provisions for EIA
Bulgaria	Environmental Protection Act 1991, Regulation 1992, 1995	Some delegation to regional and municipal authorities
Croatia	Law on Physical Planning 1980, EIS Regulations 1984, Law on Environmental Protection 1994, Decree on EIA 1997.	Delegation to local government enabled but not implemented
Estonia	Government Regulation No. 314 1992, Ministry of Environment Regulation No. 8 1994	Delegation to local government
Latvia	Law on State Ecological Expertise 1990. Law on EIA 1998	None
Poland	Environmental Protection Act 1990, Land use Planning Act 1994, MoE Orders 1995	Delegation to local government if not of national importance
Russia	Environmental Protection Act 1991, Ecological Expertise Act 1995, OVOS Regulations Order No. 222 1994	Delegation to local authorities
Slovakia	Federal Act 17 1992, Act No. 127/1994 on EIA	Participation of municipal government
Ukraine	Law on Environmental Protection 1991, Law on Environmental Expertise 1995	Sectoral OVOS instructions, local government committees

Source: George (2000).

2.7 EIA of the Development Banks and Aid Agencies

The World Bank, African Development Bank, Asian Development Bank, Caribbean Development Bank, Europe Bank for Reconstruction and Development, Inter American Development Bank, Islamic Development Bank and Development Bank of Southern Africa operate globally in their respective regions for development activities. These banks grant loan at preferential interest rates for environmental assessment and development activities. Many countries having developed economies receive funds from their own development aid agencies. For example, the several directorates general of the European commission joint with member states of the European Union provide funds for development activities (George, 2000).

Major projects during the 1970s and 1980s financed by these banks and aid agencies did not succeed to obtain the necessary and anticipated results on varied environmental grounds. They had to face considerable criticism from public and within the countries that provided the funds, so as a result many of them developed gradually their own environmental assessment procedures. These EIA procedures are based on governmental policies or national legislation in the donor countries or the international agency's policies. Many of the international bodies such as UNEP, UNDP, UNCEE and IUCN have played an important role to strengthen the EIA in South Asian and rest of the Asian region (George, 2000). The evolution of EIA in Development Banks and Aid Agencies is described in table 2.6.

Table 2.6 Evolution of EIA in Development Banks and Aid Agencies

Agency	Procedural requirement	Application to policies and plans
World Bank	Operational Policy, Procedural and Practice Guide 1999	Guidance for sectoral and regional loans
African Development Bank	EA guidelines 1992	
Asian Development Bank	EA Procedures 1993	
European Bank for Reconstruction and development	Environmental Procedures 1996	
Inter-American Development Bank	Procedures 1990	
Australia (AUSAID)	Guidelines 1996	
Canada (CIDA)	Procedural guide 1995	
Denmark (DANIDA)	Procedures 1994	Procedures for sector programme support
European Commission DG 1A/1B/8	DG1B 1997 DGB 1993	
Finland (FINNIDA)	Guidelines 1989	
Germany (GTZ and KFW)	Guidelines 1995	
Japan (JICA)	Environmental Guidelines 1990-1994	
Netherlands (DGIDC)	Procedures 1993	Includes policies and programmes
Norway (NORAD)	Guidelines 1990-96	
United Kingdom (DFID)	Procedures 1996	
USA (USAID)	Procedures 1980	Applies to plans and programmes

Source: George (2000).

3. COMPARATIVE ANALYSIS OF THE EIA SYSTEM

Lundquist (1978 cited in Wood, 1995) stated that “comparative studies of national approaches to solve environmental problems have often led to valuable and practical suggestions to improve the effectiveness of the national processes examined”. Each country having an EIA system is a reflection and product of the legal, administrative and political circumstances of that country. Step-by-step comparative analysis commits us to understand the nature and effectiveness of the EIA system and to understand the factors that can play a significant role in the success of a country’s EIA process.

Hence the evaluative framework is designed by choosing some analytic criteria to compare the EIA system of different countries. This framework can be based on principles of the EIA system or the provisions set by NEPA or the requirements given by European EIA directive. The comparative analysis may also be based on the steps involved in the EIA process or the rules to assess the authorities and proponents. However, in any case the basis to select the criteria is “to find the reason that why the EIA process of one country is working more efficiently than other and their possible solutions” (Wood, 2003a).

Fookes (1987 cited in Wood, 2003a) chose United Nations environmental programme goals and principles to evaluate the EIA system of South Australia. Gibson's (1993 cited in Wood, 2003a) evaluated the EIA system of Canada by selecting the eight principles that were necessary for efficient EIA system. Wood (1995, 2003a) diversified the path of choosing criteria for comparative analysis of different countries. He applied criteria that comprised the formal requirements of EIA and elements of its practice to compare Egypt and Turkey. He also evaluated the EIA system of US, California, UK, Netherlands, Canada, commonwealth of Australasia, Western Australia and New Zealand based on the aims and the steps involved in the EIA process. Legislation, procedure, evaluation, professionalism, public/relevant agency, administration, judicial follow up and international systemic measures and features were the criteria used by Leu et al. (1997) to see effectiveness of the EIA system of Taiwan, Malaysia, Indonesia. Ahmed and Wood (2002) compared the EIA system of Egypt, Turkey and Tunisia on the base of formal requirements for EIA and elements of its practice. El-Fadl and El-Fadel (2004) compared the Middle East and North African (MENA) countries and used the same criteria that were used by Ahmed and Wood (2002). The table 3.1 shows a cross-country evaluation in different parts of the world based on different criteria.

Table 3.1 Cross Country Evaluation of EIA

Continent/ region	Criteria	Countries evaluated	Title of article/ book	Source
East Asia and Latin America	1. Institutional process i.e. responsible agency, action proponent, preparer and reviewing, rule-setting and licensing agency. 2. EIA implementation i.e. national development planning and environmental goals, institutional structure. 3. performance evaluation	Philippines, Korea, Brazil	Theory and Practice of EIA Implementation: a Comparative Study of Three Developing Countries	Lim Gill-chin (1985)
East Asia	Nine quality control mechanisms use in EIA process i.e. legislation, procedure, evaluation, professionalism, public/ relevant agency, administration, judicial follow up and international systemic measures and features	Taiwan, Malaysia, Indonesia	Evaluation of Environmental Impact Assessment in Three Southeast Asian Nations	Leu et al. (1997)
European Union (EU)	Consideration of Alternatives, screening, scoping, preparation of EIA report and its review, monitoring, mitigation, public participation	Australia, Belgium, Denmark, Finland, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom (UK)	Environmental Impact Assessment in the European Union	Bond and Wathern (1999)
East Asia	1. EIA legislation i.e. administrative approaches, legislation and ad hoc. 2. EIA practice i.e. cumulative impact assessment, environmental management plan, mitigation, monitoring, public participation, scoping and screening	Brunei/ Darussalam, Cambodia, China, Hong Kong, Indonesia, Japan, Korea (South), Laos, Malaysia, Myanmar (Burma)	Environmental Impact Assessment in East Asia	Briffett (1999b)
South and Central America	Screening, scoping, public participation and administrative time table.	Argentina, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Guyana, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, Venezuela	Environmental Impact Assessment in South and Central America	Brito and Verocai (1999)
North America	Screening, scoping, alternatives, impact analysis, mitigation, public participation and monitoring	USA, Canada, Mexico	Environmental Impact Assessment in North America	Clark and Richards (1999)
Africa	1. EIA legislation i.e. administrative approaches, legislation and ad hoc 2. EIA practice i.e. cumulative impact assessment, environmental management plan, mitigation, monitoring, public participation, scoping and screening	Algeria, Botswana, Congo, Comoro, Djibouti, Egypt, Eritrea, Ethiopia, Ghana, Lesotho, Kenya, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Nigeria, Rwanda, Seychelles, south Africa, Sudan, Swaziland, Tanzania, Tunisia, Uganda, Zambia, Zimbabwe	Environmental Impact Assessment in Africa	Kakonge (1999)

Continued;

Continent/ region	Criteria	Countries evaluated	Title of article/ book	Source
Central and Eastern Europe and the former USSR	Screening, scoping, licensing of consultants, preparation of EIS, public participation, quality control, role of EIA in decision making, monitoring and post-auditing	Albania, Armenia, Belarus, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Moldova, Poland, Romania, Russia, Slovakia, Slovenia, Ukraine	Environmental Impact Assessment in Central and Eastern Europe	Rzseszot (1999)
Comparison between selected countries	The aims of EIA process and different steps used in it.	USA, California, UK, Netherlands, Canada, Australia, West Australia, New Zealand	Comparative Evaluation of Environmental Impact Assessment System	Wood (1999)
Almost all continents	Legal requirements for EIA, local and sectoral provisions for EIA, implementation, application to policies and plans, screening, scoping, competent authority for environmental acceptability, public participation, monitoring and expertise for conducting EIA	Developing and transitional countries	Environmental Impact Assessment in Developing and Transitional Countries.	Lee and George (2000)
Western Asia	Legislative, institutional and financial aspects of EIA i.e. screening, scoping, impact analysis, mitigation, role of EIA in decisions making process and post project monitoring	Egypt, Lebanon, Saudi Arabia, Yemen	A study on the Evaluation of Environmental Impact Assessment in Selected ESCWA Countries	ESCWA (2001)
Middle East and North Africa	Formal requirements for EIA and elements of its practice i.e. screening, scoping, impact analysis, mitigation, role of EIA in decisions making process and post project monitoring	Egypt, Tunisia, Turkey	A comparative Evaluation of the EIA System in Egypt, Turkey and Tunisia	Ahmad and Wood (2002)
METAP Countries	1. Legal and institutional framework of EIA i.e. administrative body, competent authority and review body 2. EIA procedural framework i.e. screening, scoping, contents of EIA report, review, public participation and decision making	Lebanon, Morocco, Syria, Palestine, Tunisia, Turkey	Working Together to Strengthen the Environment: Strengthening EIA System in the Mediterranean Region	CITET (2003)
Middle East and North Africa	Criteria same as devised by Ahmed and Wood (2002).	Oman, Israel, Algeria, Turkey, Tunisia, Kuwait, UAE, Egypt, Iran, Yemen, Jordan, Iraq, Palestine, Qatar, Lebanon, Morocco, Syria, Saudi Arabia	Comparative Assessment of EIA System in MENA Countries: Challenges and Prospects	El-Fadl and El-Fadel (2004)

3.1 Comparative Review of the EIA System in Developed and Developing Countries

There are vast differences in the EIA system of developed and developing countries and within the developing countries. For example, Central and Eastern Europe, the Latin America and South East Asia and African countries have the EIA system varying from their origin and way towards its effectiveness (Wood, 2003b). It is also surprising that in the countries within the same continent have different requirements for the EIA system. For instance, in Somalia EIA is considered insignificant while in Ghana it is becoming significant (Appiah, 2001). Many authors and researchers articulated the reasons of such variations of the EIA system in developed and developing countries and between them. Briffett (1999a) identified these differences at a minor scale as “there are considerable variations in the EIA system used particularly in relation to the scope (public or private), scale (national, local) and content (physical, biological and social parameters)” and George (2000) identified them on a broader scale as “...resources and administrative systems, social and cultural systems, and the level and nature of economic development”.

The cross-country evaluation of EIA as summarized in table 3.1 made it clear that researchers and authors are now more focused towards the developing and low income countries. To make a generalized comparative review of the EIA system in developed and developing countries a criterion based on 14 different questions is used as grouped in table 3.2. Wood (2003b) used this criterion to see the performance of the EIA system of developing countries. Different aspects of the EIA system such as consideration of alternatives, screening, scoping, EIA report preparation and its review, decision making process, monitoring and post auditing, mitigation, public participation, effectiveness and monitoring of the EIA system are used for this comparison. The obtained results are summarized in table 3.3.

Table 3.2 Criterion to See the Performance of the EIA System of Developing Countries

	Criterion
1	Is the EIA system based on clear and specific legal provisions?
2	The relevant environmental impacts of all significant actions must be assessed?
3	Must the evidence of the consideration, by the proponent, of the environmental impacts of reasonable alternative actions be demonstrated in the EIA process?
4	Should the screening of actions for environmental significance take place?
5	Should the scoping of the environmental impacts of actions take place and specific guidelines be produced?
6	Must EIA reports meet prescribed content requirements and do checks to prevent the release of inadequate EIA reports exist?
7	Should the EIA reports be publicly reviewed and the proponent respond to the points rose?
8	Must the findings of the EIA report and the review be a central determinant of the decision on the action?
9	Must the monitoring of action impacts be undertaken and is it linked to the earlier stages of the EIA process?
10	The mitigation of action impacts must be considered at the various stages of the EIA process?
11	The consultation and participation must take place prior to, and following, the EIA report publication?
12	The EIA system should be monitored and, if necessary, be amended to incorporate feedback from experience?
13	Are the financial costs and time requirements of the EIA system acceptable to those involved and are they believed to be outweighed by discernible environmental benefits?
14	Does the EIA system apply to significant programmes, plans and policies, as well as to projects?

Source: Wood (2003b).

3.1.1 Consideration of Alternatives

This stage includes a range of alternatives and approaches such as different locations, scales and designs for proposed activity. In developing countries the consideration of alternatives is often weak due to different priorities of the governments. The central focus of mostly governments is the reduction of poverty. So no-action alternative is considered often (wood, 2003b). According to Bisset (1992) the choice of alternative is rarely achieved at earlier stage of the development project. The minimization of environmental damage after the project completion is mainly carried out in developing countries by the selection of preferences.

3.1.2 Screening

This stage is performed to know whether the proposed project needs an EIA or not. If the project falls in the category for which EIA is necessary then the screening process gives the degree of required assessment. In developing countries the screening process is rather weak because environmental agencies have little power, so often it is undertaken unsatisfactory. The requirement of screening process is accepted properly when funding from the development agencies is involved (Wood, 2000).

3.1.3 Scoping

In this stage those key issues and impacts are specified that are significant for additional investigation. With the utility of scoping process the boundary and limit of the investigation is also determined. This process is given same importance in developing countries as in the developed countries (Ahmad and Sammy, 1985; Bisset, 1992; OECD, 1992 and Jones, 1999). But often it is missing at the time of public consultation. It is performed properly as a result of requirements of the development assistance agencies such as World Bank (World Bank, 1999).

3.1.4 EIA Report Preparation

The EIA report that includes results of the carried EIA studies is presented to the decision making body and other interesting parties. The EIA reports are not available to the public e.g. Egypt (Ahmad and wood, 2002) and often considered confidential in developing countries (Bisset, 1992). According to Lee (2000b) these reports are weak on scoping, prediction and alternatives. The EIA reports are not properly communicated to the everyday people because they are often written in English language rather than in the endemic language (wood, 2003b).

3.1.5 EIA Report Review

The adequacy and effectiveness of the EIA report is examined in review process. The information necessary for decision making process is also provided by this process. Due to differences in administrative and consultative procedures review of the EIA reports varies widely in developing countries (George, 2000). According to Ahmad and Wood (2002) the EIA review stage is either poorly begun or missing and its independent review is of lower standard in developing countries (Lee, 2000b) compared with developed countries.

3.1.6 Monitoring and Post Auditing

Environmental auditing is undertaken to see the performance and to examine and assess the potential environmental impacts due to development project. This is executed after the partial or complete implementation of the project. In developing countries monitoring and auditing of impacts is a missed or not conducted step in EIA compared with developed world. The shortfall of attention and commitment and sometimes the non-existent nature of monitoring system cause it harder to achieve the goals of sustainability. Ahmad and Wood (2002) described this situation in Egypt, Turkey and Tunisia. Lohani et al. (1997) indicated this shortcoming in Asian countries.

3.1.7 Decision Making Process

The rejection and approval or additional change in the project is decided in a decision making process. In developing countries the decision making approaches are closed to external scrutiny. Lee (2000a) said “degree of success is integrating assessment findings into decision making in the planning and project cycle”. The decisions are negatively affected by the corruption, social and economic factors (Boyle, 1998 and Wood, 2003b). Often the EIA process is considered after the planning and design process in developing countries, where it provides the mitigation measures that are too ineffective and insignificant to consider and difficult to implement (Briffett, 1999a and Ebisemiju, 1993).

According to Bisset (1992) EIA is used to justify a before taken decision and to concern with remedial measures. Briffett (1999b) and Boyle (1998) described this situation in Thailand, Indonesia and Malaysia where the economic development agencies seem to be more powerful than environmental agencies. Brito and Verocai (1999) conferred that due to political instability that depends on the economic growth the influence of EIA on decision-making process is limited in South America, while no project has been canceled so far in Africa due to EIA (Kakonge, 1999).

3.1.8 Public Participation

The consideration about consultation and participation of public is different in developed and developing countries. In developed world this step is performed to take more environmental and social benefits and to avoid conflicts (wood, 2003a). While this is not the case in many developing countries according to Lee (2000a) where the public is often excluded or refused in decision making process. For example, in Egypt (Ahmad and wood, 2002), South East Asia (Boyle, 1998), Philippines (Lohani et al., 1997), South America (Brito and Verocai, 1999) and in African countries (Kakonge, 1999) the public opinion is neglected.

3.1.9 Effectiveness of the EIA System

The perception about the benefits and costs of the EIA system varies from one country to another country and even from stakeholder to stakeholder in developing countries. Wood (2003b) mentioned that in South Africa all stakeholders believe that the substantial benefits of the EIA system is more than the costs related to it. But for some stakeholders EIA is a mean of delaying and improving projects. For consultants EIA is a worthwhile process. The overall perception regarding EIA is that the environmental quality and acceptability of decision is improved due to EIA. The problems such as delays, financial resources, lack of expertise, lack of data and confidentially were the same in the developed countries at

the time of application of the EIA system, which the developing countries are facing nowadays (Wood, 2003b).

3.1.10 Monitoring of the EIA System

Weak and little EIA system monitoring in developing countries is a principal hurdle to get the forecasted benefits of the conducted EIA studies. According to Wood (2003b) the tendency to keep record of copies and documents of the EIA reports is weak e.g. South Africa. Not only is the absence of information existed but also the lack of interest in reviewing the operating system. In some developing countries the environmental agencies monitor different aspects of the EIA as a result of experience from former conducted studies (Ahmad and wood, 2002).

Table 3.3 Comparative Review of the EIA System of Developing and Developed Countries

	Criteria	Developed countries	Developing countries
1	Legal provision	Comprehensible and specific legal provisions are present to define EIA clearly.	Clearly defined EIA process is rarely found in legislation that is mostly incorporated into other decision making procedures.
2	Assessment of Environmental impacts	Yes, the assessment of environmental impacts is carried out properly.	This is mostly considered in significant projects. The cumulative and direct environmental impacts are not enclosed.
3	Alternative actions	EIA process demonstrates the consideration of alternative actions by the proponents.	Alternatives like “no-actions” and the environmentally friendly alternatives are often not considered.
4	Screening	Screening for actions for environmental significance is carried out completely.	There are lists of activities, thresholds and criteria for screening process.
5	Scoping	Specific guidelines are produced for scoping and public participated is ensured.	In the scoping process the participation of public is rare.
6	EIA reports content	The prescribed content requirements are present in the EIA reports and how to check the release of inadequate EIA reports is exist in the EIA reports.	According to the requirements of development assistance agencies the EIA reports are planned.
7	Public participation	The EIA reports are reviewed publicly and the proponents reply to the raised questions.	Public often not involved. The proponents rarely respond to the points raised to improve and review the EIA report
8	Review	To make a decision on the action, the findings of the EIA reports and the reviews are considered practically.	The influence of EIA is just theoretical not the practical.
9	Monitoring	Monitoring of the impacts of actions is considered and they are also linked to the earlier stages of the EIA process.	Monitoring is meeting with few specific requirements, so the practise of monitoring is rare.

10	Mitigation	Mitigation of impacts is considered at the various stages of the EIA process in real practise.	Mitigation is considered fully but the implementation practice is inadequate.
11	Consultation	Consultation and public participation are taken before the publication of EIA reports.	In scoping and review process the formal requirements for consultation and public participation are almost absent.
12	EIA system monitoring	The EIS system is monitored and amended to include observations from experiences.	The monitoring of the EIA system is absent but development assistance agencies and the gained experience cause modification in the procedures of EIA.
13	Finance and time requirements	The financial and time costs are accepted.	Financial and time costs are not accepted
14	SEA (strategic environmental assessment)	EIS system is applied well to the programmes, plans and policies and to the projects.	Development assistance agencies caused the practice of SEA in some countries.

Sources: Wood (2003b); Lee and George (2000) and OECC (2000).

4. COMPARATIVE ANALYSIS OF THE EIA SYSTEM OF SWEDEN AND PAKISTAN

Sweden and Pakistan's EIA system are reviewed and analyzed based on the criteria devised by Ahmed and Wood (2002). Same criteria also used by El-Fadel and El-Fadel (2004) to understand the efficiency of the EIA system in MENA countries. Ahmed and Wood's (2002) criteria evolved by the work of many researchers such as Ortolano et al. (1987); Fuller (1999) and Wood (1999). Fuller (1999) grouped this criterion, as shown in the table 4.1. The systemic and foundation measures used as criteria in this research are the same as described by Fuller (1999) and used by Ahmed and wood (2002) and El-Fadel and El-Fadel (2004). The framework is consisted of constitutional and regulatory aspects of the EIA system such as screening, scoping, EIA report review, mitigation etc and on the appropriate measures undertaken to enhance the effectiveness of a country's EIA system. This framework facilitates the comparison of the legal procedures, application arrangements and implementation practices. In this way the identification of the legislative and practice differences between Sweden and Pakistan before, and after the implementation of the EIA procedure is carried out.

Table 4.1 EIA Evaluation Criteria: Systemic and Foundation Measures

Systemic measures	EIA legislation	1.1 legal provisions for EIA 1.2 Provisions for appeal by the developer or the public against decisions 1.3 Legal or procedural specification of time limits 1.4 Formal provisions for Strategic Environmental Assessment (SEA)
	EIA administration	2.1 Competent authority for EIA and determination of environmental acceptability 2.2 Review body for EIA 2.3 Specification of sectoral authorities' responsibilities in the EIA process 2.3 Level of coordination with other planning and pollution control bodies
	EIA process	3.1 Specifies screening categories 3.2 Systematic screening approach 3.3 Systematic scoping approach 3.4 Requirement to consider alternatives 3.5 Specified EIA report content 3.6 Systematic EIA report review approach 3.7 Public participation in EIA process 3.8 systematic decision-making approaches 3.9 Requirement for environmental management plans 3.10 Requirement for mitigation of impacts 3.11 Requirement for impact monitoring 3.12 Experiences in SEA
Foundation measures	4. Existence of general and/ or specific guidelines including any sectoral authority procedures 5. EIA system implementation monitoring 6. Expertise in conducting EIA (national universities, institutes, consultancies with EIA technical expertise) 7. Training and capacity building	

Source: Fuller (1999); Ahmed and Wood (2002) and El-Fadel and El-Fadel (2004).

4.1 Application of Evaluative Criteria to Sweden and Pakistan

To make critical analysis of the 'EIA system in paper' a detailed review of the official documents and reports are made, which describe the EIA legislation, EIA administration and EIA practice of both countries. For Swedish EIA system the Nordregio publications on the Nordic EIA system (Bjarnadottir, 2001 and Hilden et al., 1998) and the Swedish Environmental Code (Regeringskansliet, 2002) are consulted. While the official documents and reports made by Pakistan Environmental Protection Agency (EPA, (1997a; 1997b; 2000; 2005a and 2005b)) were the key sources of information for the Pakistani EIA system. During reproducing the text material the legislative terminology is used as such to avoid any change in the original scriptures of law.

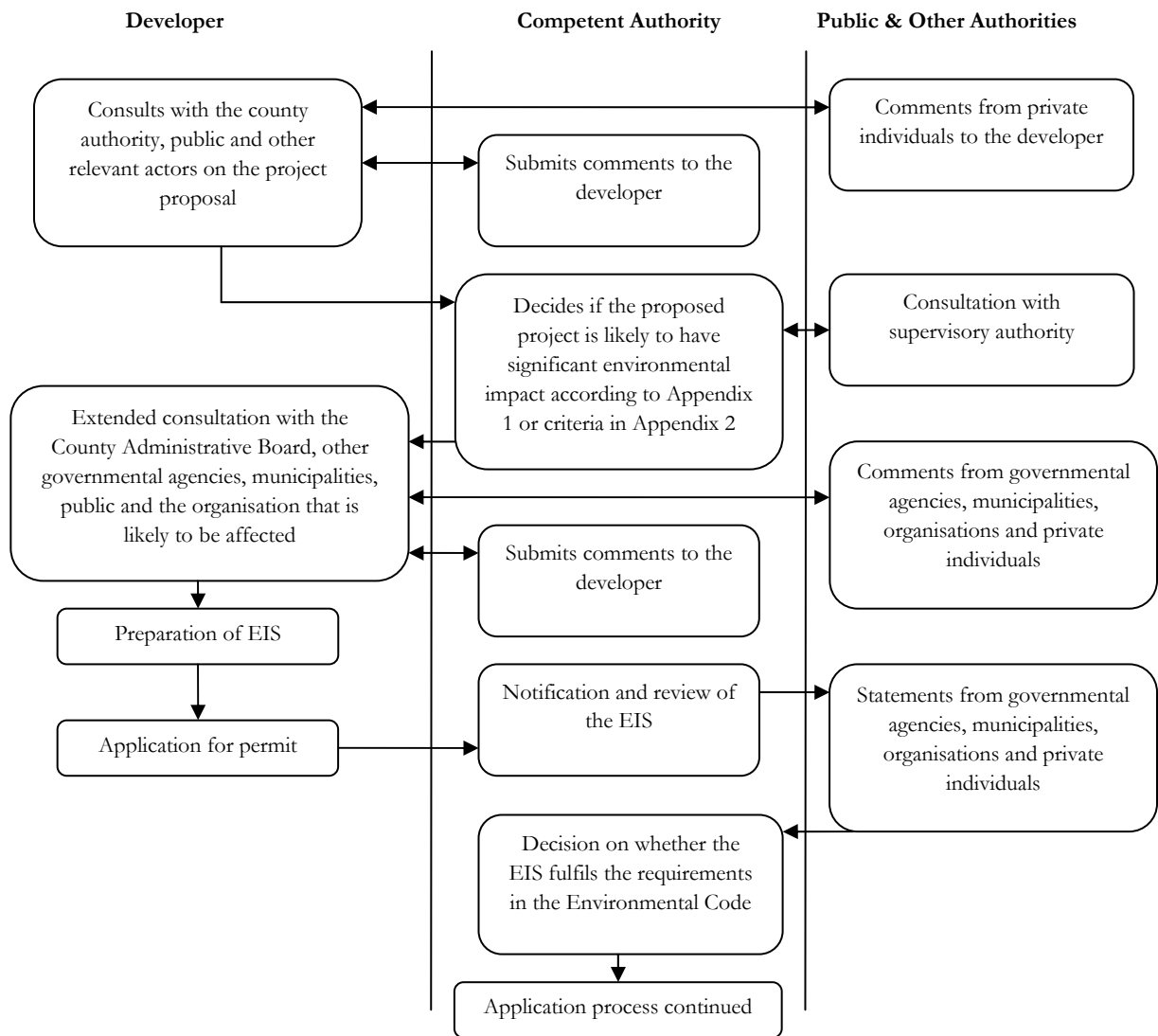
4.2 EIA Legislation

A brief history of the EIA legislation of both countries is described. The procedural flows of EIA used nowadays in both countries are shown in figure 4.1 and figure 4.2 to understand the differences in constitutional framework of both countries.

4.2.1 In Sweden;

- EIA introduced when the Swedish EPA described the requirements for EIA that became the part of the Environmental Protection Act in 1981 (Modak and Biswas, 1999).
- EIA legislation enabled in 1987 after the enactment of Road Act (Bjarnadottir, 2001) and Management of Natural Resources Act (Bruhn and Eklund, 2002).
- EIA started on regular basis in 1988 when the Government Bill was passed. At that time the aim of EIA was just to gather information about the impacts before start of decision making process and the aspects were limited to pollution and health, while the resource management issues were rarely considered (Englund and Styrke, 2001).
- EIA broadened in its scope when the Environmental Assessment Ordinance came into force in 1991. The contents of the EIS (Environmental Impact Statement) were described in the new guidelines set by Swedish EPA in 1995. These guidelines also meet the demands of the people to speak about the potential effects of the project before giving permission, so the environmental features started to incorporate into the decision making process (Bruhn and Eklund, 2002).
- EIA's significance and potentiality improved due to exchange of experiences and comparisons of EIA research in a transponder context in early 1990s when the Nordic council made an ad hoc group (Lerman, 2004).
- EIA as a compulsory process for projects became the part of Swedish law in 1994 when the European Economic Space (EES) agreement was signed (Englund and Styrke, 2001).
- EIA in its present context is handled by the new Environmental Code that came into force in Sweden on 1st January 1999 (Bjarnadottir, 2001) after the incorporation of EC's legislation into the Swedish legislation in 1998 (Bruhn and Eklund, 2002).

Figure 4.1 EIA Procedural Flow in Sweden

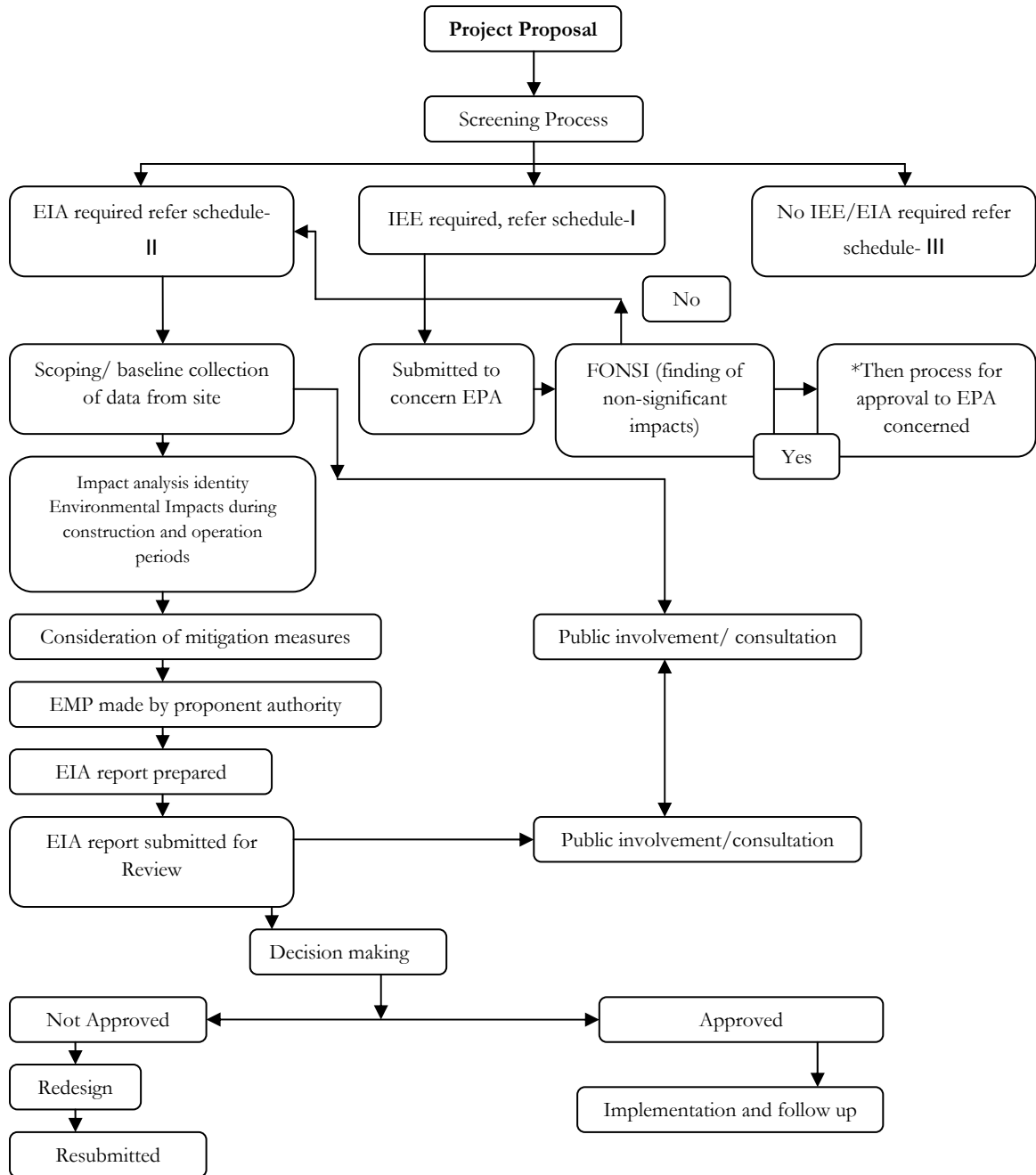


Source: Bjarnadottir, (2001).

4.2.2 In Pakistan;

- EIA was introduced first time through Pakistan Environmental Protection Ordinance (PEPO) in 1983, when it stated that EIA is required at the time of planning of the project. PEPO also motivated the EPAs to enact the EIA process in the country.
- EIA became mandatory for public and private projects on 1st July 1994 when Pak-EPA described the general guidelines for the EIA process.
- EIA legislation in the form of environmental assessment guidelines package enabled in the country when the Pakistan Environmental Protection Act (PEPA), 1997 repealed the PEPO of 1983. The purpose of this act was to prevent and control the population and to promote the sustainable development by protecting, conserving, rehabilitating and improving the environment.
- EIA succeeded to get a firm legal state in 2000 when the Pak-EPA notified the EIA/IEE regulations. The sectoral guidelines of the EIA process were set besides the general guidelines in these regulations.
- EIA became the invariable part of the project clearance process after the decision of Executive Committee of the National Economic Council (ECNEC) that EIA report must submit along with the project documents on 27th July 2004.
- EIA implementation at project level to integrate the environment into development planning and promotion of Strategic Environmental Assessment (SEA) to integrate environment into decision making process was described by the National Environmental Policy in 2005.

Figure 4.2 EIA Procedural Flow in Pakistan



Source: Aslam (2006).

Table 4.2 Comparative Analysis of EIA Legislation

	Sweden	Pakistan
Initial EIA legislation	Environmental Protection Act 1981	1983 Ordinance No. 37
Enabling EIA legislation	Road Act 1987 (1971:948) Ordinance on EIS 1991 (1991:738)	Environmental Protection Act 1997
Current legislation	Environmental Code (1998:808), Chapter 6.	National Environmental Policy 2005
Decree/ Regulation/ Order	Ordinance on Environmental Impact Statements (1998:905)	EIA/IEE Regulations 2000
Other legislation that include additional requirements on EIA	Planning and Building Act (1987:10), Chapter 5, article 18.	No information available
Status of EIA regulations	Legislated	Legislated
Provisions for appeal	Yes	Yes
Specification of time limits	Yes	Yes

4.3 EIA Administration

Actors and accountability in the EIA process and consultation are the main stages involved in EIA administration. Different actors and their influence on the EIA process and the requirements for consultation in both countries are discussed following.

4.3.1 Actors and Accountability in the EIA Process

In Sweden the County Administrative Board takes the decision about the screening process. The developer is responsible for completing scoping process through consulting with the board. The preparation of the EIS and EIA is also the responsibility of the developer. During these processes developer consults with the individuals that are likely to be affected. Consultation with the municipality, other authorities and organizations is certain if the operational activity or measure is likely to have environmental impacts. The competent authority considers EIS as a part of the development application. There is a combined fee for the license procedure and inspection according to the Environmental Code. This is contemplated to review the EIS. The parties carrying the operations have to pay fee for the EIS and the EIA procedure.

In Pakistan the federal and provincial EPAs are responsible for the IEE of private and EIA for both private and public projects. The federal jurisdiction applies to the projects that are on the federal land such as military projects involving trans-country and trans-province impacts. The provincial EPAs are responsible at the provincial and regional level. Planning and development departments are the second most important actors that are responsible for public projects at the federal and provincial levels. Consultants provide expertise in the preparation of EIA/IEE but they are not regularized and licensed by any governmental authority. The decisions regarding EIA are made at federal or provincial levels. The responsibility of municipalities is negligible because they are not given adequate power to take decisions. Nowadays numbers of NGOs are operating in the country and their active position is encouraging to safeguard the environment. The proponent has to pay a nonrefundable review fee to the responsible authority at the time of submission of an IEE/EIA. The following table 4.3 pointed out the variations in the EIA process of both countries based on the different steps involved in it.

Table 4.3 Actors and Accountability in the EIA Process

	Sweden	Pakistan
Screening	The County Administrative Board.	Federal and Provincial EPAs
Scoping	The developer ensures consultation with the County Administrative Board and other authorities.	The proponent consults with private consultants
Preparation of the EIS	The developer	The proponent
Notification (making the EIS official and available for comment)	The County Administrative Boards	Federal and Provincial EPAs
Review	The County Administrative Boards	Federal and Provincial EPAs
Decision making	The County Administrative Boards	Federal and Provincial EPAs
Appeal regarding screening	No possibility for appeal	Yes
Decision on development	The environmental court, the superior environmental court and the supreme	Federal and Provincial EPAs
Implementation of individual parts of the EIA procedure	No information available	No information available
Monitoring	The developer	The proponent

4.3.2 Consultation

In Sweden the developer consults with the County Administrative Board and private individuals anticipated to be affected during the screening phase. The consultation involves location, extent and design of the project as well as its environmental impacts. Prior to the screening decision the County Administrative Board is asked to discuss with the supervising authority. The results of consultations are submitted with the EIS. The developer has to consult again with the County Administrative Board, regulatory authorities, municipalities, citizens and the organizations that are likely to be affected during the scoping process. For environmentally hazardous activity the EIS will be notified publicly with the application of the action. While if any activity is likely to have significant environmental impacts then the existence of EIS shall be announced publicly along with the application if any available. There are no requirements for external consultation on the content of EIS. Whether the EIS satisfies the conditions of the Environmental Code or not is decided by the responsible authority in a particular decision or in conjunction with handling the matter.

In Pakistan the proponent consults with the appropriate federal or provincial agencies to obtain the required information such as base data that ease him in the preparation of environmental report. The proponent further has to consult with the affected communities and relevant NGOs and consider their views and comments. The following table 4.4 shows the differences of the different steps involved in the EIA administration of Sweden and Pakistan.

Table 4.4 Comparative Analysis of EIA Administration

	Sweden	Pakistan
Competent authority for EIA and environmental acceptability	Yes	Yes
Review Body for EIA	Yes	Yes
Specification of sectoral authorities' responsibilities in the EIA process	Yes	Yes
Level of coordination with other planning and pollution control bodies	No information available	No information available

4.4 EIA Practice

Different steps are involved in the EIA practice such as screening, scoping, public participation, review and appeal and monitoring. Some other important steps such as guidance on EIA, time factors in the assessment process are also discussed in EIA practice.

4.4.1 Screening

The County Administrative Board in Sweden and federal and provincial EPAs of Pakistan are the authorities to make screening decisions. Developer/proponent shall consult with the responsible authorities to take permission of development in both countries. There are listings specified for those projects for which EIA studies are necessary to perform. In Sweden the projects are listed in appendix.1 of the ordinance on EIS (1998:905). For those projects that are considered dangerous for their characteristics, location and characteristics of potential effects as described in annex III of 97/11/EC, board may request to carry out EIAs. Annex II of 97/11/EC is not adopted in Sweden because many of the projects of annex II is present in annex I. In some acts like Road Act the provisions of EIA/EIS are described in Environmental Code, while in some ordinance like the Ordinance of 1998:1252 on Area Protection the competent authority may request an EIA if it is deliberated necessary in any individual case. In Pakistan the proponent of a project that falls in any category listed in schedule 1 of the IEE/EIA Regulations, 2000 has to file an IEE to the federal agency and if the project falls in schedule II then file of an EIA is registered to the federal or provincial EPAs.

4.4.2 Scoping

Scoping process is not considered a separate process in flowchart of the EIA system but a requirement in the preparation of EIS in Sweden. It includes the account of possible alternatives sites and designs with reasoning of their selection. It also contains the description of consequences of the alternatives. The SEPA is preparing general guidelines of the EIA that will also elaborate the contents of EIS. The developer is responsible for consulting with County Administrative Board, regulatory agencies, the municipalities, citizens and organizations on the scope of the EIS because they are likely to be affected. After consultation the authorities present suitable plans and relevant documents to the developer. The County Administrative Board has the authority to conduct any study, programme or plan the document relevant to land and water management in the country passed by the governmental agencies. The County Administrative Board can further provide planning documents to the municipalities and authorities and anyone that is involved in preparation of EIS on request.

In Pakistan the scoping process is consisted of checklists of the likely impacts and mitigation measures. These checklists are derived from the sectoral guidelines of IEE/EIA set in 2000. The consideration of proposal and its location and the physical and cultural environment are the key elements in the scoping process, so the proponents and reviewers are cautioned to adopt a mechanistic approach. There is no preset description of concerns in the scoping process to be examined for any particular assessment but to determine the critical issues for each particular proposal is a necessary part of the scoping. Consideration is given to the potential severity, temporal or spatial extent and secondary or cumulative impacts. These impacts are analyzed to know either they are continuous or intermittent, temporary or permanent and reversible or irreversible during prioritization of the issues. The proponent is responsible for scoping process. He has to consider the alternatives and issues of concern that are boosted by those who are likely to be affected. The responsible authority helps the proponent in providing guidelines, backing the categories of the projects and checking whether the environmental report fulfills the legislative requirements or not. In the scoping process the affected communities, national and sometimes international NGOs and interest groups also provide useful information and values to the proponent on the environmental issues.

4.4.3 Public Participation

In Sweden developer is responsible for carrying out consultation at early stages with the individuals that are probable to be affected. To fulfill the requirements of the County Administrative Board the developer carries a thorough consultation with public and organizations. The announcement about the EIS is issued by the board. The EIS and its application will be made available to public that can give comment before dealing of case or matter.

In Pakistan the proponent consults with the responsible authority during drafting of EIA to make certain that it is acceptable to show the public. When the EIA is finalized after satisfying the requirements put by the responsible authority the proponent makes a public notice in English or Urdu national newspaper and in the local newspaper describing the type of project, its exact location, the name and address of the proponent through a paid advertisement. A definite date, time and place for public are also given and it should not be earlier than 30 days from the date of notice. The federal agency distributes the EIA to the concerned government agencies and seeks their comments thereon. Comments from public and government are gathered and put into tables. These are duly considered by responsible agency before decisions on the EIA are made. The federal agency makes it easy for the proponent by issuing guidelines indicating the basic techniques and measures for public participation.

4.4.3 Review

The criterion for making review of the EIA report is about same in both countries. The competent authority in Sweden and federal agency in Pakistan examine the application to review EIA. In Sweden during review process the consultation and the received opinions are examined. The decision whether the EIA satisfies the legal requirements or not is made by processing authority separately or in connection with the decision on the case or matter. In Pakistan the base of review is qualitative and quantitative assessment of the documents, data furnished by the proponent and comments from the public and governmental agencies. It is completed in three steps. First, the deficiencies in the environmental report are identified. Second, the critical shortcomings are analyzed and finally the remedial actions are pursued that include recommendations for the acceptability of the proposals by changing the mitigation measures and monitoring requirements.

4.4.4 Appeal

In Sweden the decision about the EIS made by the competent authority cannot be appealed separately. However, the decision on the case or matter can be appealed. Those who have the right to appeal involve the subject of a judgment or decision against him, local or central association as well nonprofit organizations that have been active for at least 3 years and have at least 2000 members. Environmental courts are meant for appealing against the County Administrative Boards. To appeal against the decisions of the environmental court there are superior and then Supreme Court, so a combination of administrative and civil laws in the procedure of appeal is present.

In Pakistan the proponent and the public has the right to appeal against any decision taken by the responsible authority. The decisions on environmental approvals and the requirements imposed by the responsible authority can be appealed in the environmental tribunals.

4.4.5 Monitoring

In Sweden there are no requirements for monitoring in the Environmental Code but in others ordinances such as supervision, inspection and enforcement according to the Environmental Code (förordning {1998:900} om tillsyn enligt miljöbalken) and in the ordinance on the operator's self-monitoring (förordning {1998:901} om verksamhetsutövares egenkontroll) there are requirements for monitoring. The validity of permit and the possibilities to revise it are regulated in Chapter 24 of the Environmental Code. For example a permit can be reconsidered about permitted quantity of production. Under certain circumstances conditions can be changed or revoked. For example, if new techniques are developed or when the developer has neglected the conditions of the permit.

In Pakistan the inspection, checking and implementation, conditions of approval and decisions on them are taken by the responsible authorities. The proponent and his consultant are responsible for monitoring of the actual effects, implementation of the remedial measures and verification of the precision of prognoses. The responsible authority and its delegate can come for inspection of the site or premises before, during, or after the commencement of operations relating to the activity. The position of regulatory authorities i.e. Environmental Protection Agencies is the examination of compliance with National Environmental Quality Standards (NEQS) and verification of the mitigation measures. Public can further participate in solution of the arisen problems by providing practical suggestions. They highlight the inadequacies in the monitoring programmes but their involvement is sometimes formal and sometimes informal.

4.5 Guidance on EIA

The Swedish Environmental Protection Agency (SEPA) can issue legally binding regulations on the application of the EIS ordinance after consultation with other governmental bodies. The SEPA has chosen to develop general guidelines. These guidelines are considered in decision-making and in addition serve as a checklist for authorities and developers. Some other authorities have published regulations regarding EIA in other interrelated areas such as road transport, national rail administration, Swedish national board for housing and planning and the national Swedish board of handbooks on aspects of EIA.

In Pakistan the advisory body i.e. Environmental Assessment Advisory Committee (EAAC) appointed by the director general of the federal EPA provides guidance in developing all the aspects of environmental assessment and advising the federal EPA in deciding and approving draft guidelines.

4.6 Time Factor in the Assessment Process

In Sweden there are no formal time requirements for the EIA procedure. According to the estimations the time period for taking comments on scoping process is at least one month. The time for public hearing during review process is at least three weeks. The time acquired by the authority from reviewing to final decision holds approximately eight weeks but it can be prolonged. The developer is granted three week to make appeal.

In Pakistan the time for public comments is thirty days. After receiving the documents the assessment process is executed within ninety days. The responsible authority takes decision after public hearing and reaching further data from the proponent within thirty days thereafter. The time for the final decision is four months. Efforts are made to reduce this time span. In matter of unusual projects the director general of the responsible authority can extend this time.

Table 4.5 Comparative Analysis of EIA Practice

	Sweden	Pakistan
Specified screening categories	2	2
Systematic scoping approach	Threshold list	Threshold list
Systematic scoping approach	Developer	Proponent
Requirement to consider alternatives	Yes	Yes
Specified EIA report content	Yes	Yes
Systematic EIA report review approach	Yes	Yes
Public participation in EIA process	Yes	Yes
Systematic decision making approach	Yes	Yes
Requirement for mitigation of impacts	Yes	Yes
Requirement for impact monitoring	Yes	Yes

Following table 4.6 tells whether sector authorities have specific guidelines or not and the presence of monitoring system in both countries.

Table 4.6 Comparative Analysis of Foundation Measures

	Sweden	Pakistan
Existence of general and/ or specific guidelines including any sectoral authority procedures	Including	Including
EIA system implementation monitoring	Yes	Yes

5. CASE STUDIES

To make easiness in correlation, for better understanding of the likeness and differences and to validate the hypotheses of the study; case studies of hydroelectric power plants are discussed in two different scenarios. In first scenario two case studies of hydroelectric power plants from Sweden and Pakistan are analyzed for which no EIA study was performed. In second scenario two case studies of hydroelectric power plants from Norway and Pakistan are analyzed for which the EIA studies were carried out, so these are the case studies without and with EIA.

5.1 Case Studies without EIA

To know the effectiveness of large dams scattered in different regions of the world a World Commission on Dams (WCD) was established in 1998 sponsored by 20 different organizations. This commission has conducted detailed studies of different large dams in the world. The methodology that was exercised to draw conclusion about these dams were case studies, cross-check survey of 150 dams, thematic reviews and inputs from various stakeholders, interest groups and individuals that form the commission's work programme. Efforts were made to review the environmental, technological, economical and social aspects in these case studies. The convergent and divergent views were gathered. The Tarbella and Suorva hydroelectric power plants in Pakistan and Sweden were also considered by this commission. The presented case studies of the Tarbella hydroelectric power plant (AADI, 2000) and Suorva hydroelectric power plant (Hammar and Ljungqvist, 2000) of first scenario without EIA are adopted from the WCD case studies. The critical analyses of the case studies are made on the groundwork of environmental and ecological impacts without EIA and with special consideration of the effectees.

5.1.1 THE TARBELLA HYDROELECTRIC POWER PLANT

Introduction

Tarbella being the world's largest earth fill dam is a national aspiration of Pakistan. The dam is located in the North-West Frontier Province (NWFP) and 65 km North West of Islamabad. The development of dam is the sequel of Indus water treaty with India in 1960 to solve the dispute with India on the distribution of different river waters. The dam is built in Indus river system which catchment area is 944,600 km². The construction works started in 1968. The first storage of water released in 1975 and power generation commenced in April 1977. Today the dam is actively producing 3478 MW electricity that is 22% of the national power system and 35% of the Water and Power Development Authority (WAPDA) system. The dam is 485 ft high, having 2 spillways and 4 tunnels. The project goals were to meet the immediate needs of continued energy of the country and to bolster the irrigation system for agriculture. The total cost of the project was Rs. 18.5 billion. This cost was covered by bilateral loan agreements with developed countries while the local costs were fulfilled by government of Pakistan.

EIA Studies

At the time of implementation and construction of the project the constitutional requirements of the EIA system were not enforceable in the country, so no EIA study was conducted for this project. After technical and economical scrutiny coordinated by the World Bank the development of the dam was approved in 1996 under the first phase of Indus Special Study (ISS) with the title "Report on a Dam on the Indus at Tarbella". During the second phase of study sectoral planning of water and power resources of West Pakistan was completed in 1967.

Environmental Impacts

During planning and construction of the dam there was no survey or assessment of ecological impacts. It is thus difficult to analyze the ecological or environmental impacts according to the baseline conditions. Changing flood volume and timing, increase in canal irrigation withdrawals for agricultural production, coastal currents, storms and industrial pollution are different sources that had caused various primary and secondary ecological problems. The primary effects include the deduction of inflows during flood periods, reduction of fresh water nutrients silt and the changes in dry season flows and water quality. These impacts resulted in intrusion of salt water, changes in geomorphology of the delta and turmoil of nutrient balance of the ecosystem and habitat.

The consequences of these factors are the shifts in composition of vegetation in different barrage zones. The flora and fauna are seriously affected. Woods species like *Acacia nilotica* have suffered and restricted in low-lying areas. The indigenous poplar variety *Populus euphratica* also ceased to grow. Among fauna the *Hilshaw ilshaw* and the fresh water dolphin *Platanista indi* are important for conservation point of view. *Hilshaw ilshaw* is a unique fish species, which was available in plenty before the development of the dam but now disappeared in the downstream. The Indus dolphin is restricted in some stretches of the river and is considered now among the threatened species. Hog deer (stag) *Axis porcinus* is restricted and resettled to densely vegetated sites and included in endangered species. The partridges and other bird species have shown dipped trends. The dam did not affect the species of fish only but also the lines of fishermen because they were unable to migrate freely up and down the river.

Mitigation Measures

Due to development of Tarbella dam 81048 acres (32800 hectares) area of the land comprising 135 villages is affected. 96000 people had to displace and 120 villages were submerged. The main occupation of these displaced peoples was agriculture. The communities surrounding the project were considered for compensation. The Government of Punjab and Sindh allocated 59000 acres (24000 ha) in their provinces for the displaced peoples. WAPDA developed new townships for the displaced communities to relocate them. To reduce the siltation watershed management and forestation in the catchment areas had been carried out.

Benefits vs. Costs

The ratio of education and job opportunity during the construction was heightened in indigenous communities. In downstream areas the correspondence of inter-marriages and incomes were raised. Several large-scale engineering institutions have been built in vicinity of the Tarbella dam including Ghulam Ishaq Khan (GIK) institute of engineering sciences and technology; one of the finest educational institutes of engineering in the country. The dam created a 240 km² water body for aquaculture. The site of the dam attracts more than 100,000 national visitors each year.

The water logging and drainage have affected severely the production of yield in certain districts of Sindh. The effectees were dispersed owing to refusal of Sindh government to give them promised 19,333 acres (7800 ha) land. 1283 plots were planned originally at one of the new established town Kala Dhaka but only 311 plots were provided to the affected.

Issues still remain to be solved

The land was allocated unjustly and the announcements of suspension in judicial cases have created acrimonious issues that resulted in resentment among locals. The towns that were built are poor conditioned. The maintenance and repair work are the responsibility of WAPDA and the Department of local government and rural development but both of them put claim the responsibility on each other.

5.1.2 THE SUORVA HYDROELECTRIC POWER PLANT

Introduction

The dam is present at the upper parts of the Stora Luleälv River in Northern part of Sweden. It consisted of 15 power plants that include 29 turbines whose generating capacity are 14,065 GWH. The significant contribution in this total capacity is of the Porsj station at upstream that along with 6 power plants and 13 turbines generate 7,600 GWH. The reservoir of Suorva dam is the second largest artificial reservoir in Sweden meant for hydropower production. The area of the reservoir is consisted of 574.2 km² of surface water covered by 589 lakes. The annual flow of water is 4,600 million m³ that drains eastward side of the country. The first impoundment of dam was completed in 1919 by the proposal of the State Power Board. In 1920 the dam started to electrify the surrounding village, a radio station and the local airlines. The dam required additional impoundments that were completed in different times i.e. 1927, 1939, 1963 and 1966 referred as phases I, II, III and IV respectively. The last impoundment doubled the surface area from the first impoundment and proposed a new dam construction. Three new tunnels and two underground power stations Ritsem and Vietas were built with the fourth impoundment. The area waited living of Saami herdsmen for many centuries because it was a primary source of seasonal grazing and salmonid fish for them.

EIA Studies

At the time of development of dam in early 1919 the EIA regulations were not implemented in the country, so project was started without the EIA studies. The water law was not followed properly because it was the national interest to build a dam. The decisions were taken without appropriate in line legal procedure. In April 1921 there was a minor survey of the flora, fauna and archaeology of the surrounding area due to opposition of Swedish Society for Nature Conservation. After this there were several more detailed surveys on fish, birds, mammals and the ethnography of the Saami people. These studied were spread in different times i.e. 1924, 1928-29 and 1936, and were focused towards the reduction of *Gammarus lacustris* and brown trout. Before the fourth extension of the dam a pre-impact survey was conducted. To describe the state of general pollution of dam a botanical inspection was made in 1961. This survey was later continued in different periods of the year in 1968-69, 1974-77, 1979, 1983 and 1995.

Environmental Impacts

The terrestrial and aquatic environment disturbed due to repeated impoundments. The significant impacts to the flora and fauna were due to demolition of the original lake and shoreline habitat that resulted in the additional loss of original biodiversity. The major loss was the downfall of the biomass of Salmonid fish with both arctic char and brown trout. The riparian vegetation that was once known to be rich in wildlife is now changed to barren desert. The importance of Suorva valley and the national park have affected because of impoundment for both the residents and tourists.

Benefits vs. Costs

The hydropower was used in mines, railways and factories all over the Sweden. Due to raise of new road the tourists and Saami took easier access to the National Park and access to the marketplace for handicraft and the reindeer products respectively. Due to increased supply of electricity the financial growth and employment opportunities raised in Sweden.

The much sufferers of this development were the Saami. They suffered the loss in the forms of fisheries and reindeer herding. They suffered due to the disruption of migration routes, loss of good calving land and old pastures, while the new pasture land had less biological productivity and were at higher altitude. Their reindeer herding and fishing in open lake became difficult for them as there was no protection from the wind. The submerged vegetation got entangled in the nets and the fishing became precluded for them.

The reindeer herding Saami were settled first time with real financial settlement after 45 years. Jokkmokk was the local communities that had to face the additional loss of financial capacity and population after the construction phase. The local population became unable to afford the costs of electric wires because of fiscal losses, disturbed winter roads and migration routes. That's the cause why the local population had to await 60 years for arrival of electricity in their houses.

Issues still remain to be solved

The ideology of Social Darwinism by the end of the 19th century was the main hurdle to compensate Saami because they were considered a lower order, which are not equal with non-Saami in their legal status. The Saami suffered because of unclear laws considering the right of the land. But now the situation about the Saami's rights is progressed and improved. Following table 5.1 presents the comparative analysis of these two case studies without EIA. Different parameters such as EIA studies, unsolved issues, losses to the human and environment, successfulness of Mitigation measures and administrative time table are used to compare both power plants.

Table 5.1 Comparative Analysis of Tarbella and Suorva Power Plants

		Sweden	Pakistan
EIA studies	Screening	No	No
	Scoping	No	No
	Public participation	No	No
Unsolved issues	Social problems	Yes	Yes
	Economic problems	Yes	Yes
	Environmental problems	Yes	Yes
Losses to the human and environment	Human being	Yes	Yes
	Flora	Yes	Yes
	Fauna	Yes	Yes
Successfulness of mitigation measures	Peoples	No	No
	Flora	Yes	No
	Fauna	No	No
Administrative time table	Delays	Yes	Yes

5.2 Case Studies with EIA

In second scenario two case studies; the Ghazi Brotha hydropower plant (WAPDA, 2000; ADB, 2005 and eSpots, 2007) in Pakistan and Aurland hydropower plant (IEA, 2005) in Norway are analyzed on the base of taken mitigation and compensatory measures. The International Energy Agency (IEA) is an energy policy adviser working in 26 member countries. It established a task force led by Japan with presently working group of nine countries such as Canada, China, Finland, France, Japan, Norway, Spain, Sweden and the United Kingdom to document such hydropower projects in which all possible mitigation measures are taken successfully during design and operational phases. The presented case study of Aurland hydropower plant here is one of the conducted case studies of IEA.

5.2.1 GHAZI BROTHA HYDROELECTRIC POWER PLANT

The Ghazi Brotha power plant is located on the Indus River and is 100 km from Islamabad in North West of Pakistan. It is a major run-of-the river project that utilizes the head of about 76 m in the Indus River. The power generating capacity of Ghazi Brotha is 1450 MW with average annual energy output of 6,600 GWH that accounts for 10% of current Pakistan energy capacity. The finance of the project is arranged by Asian Development Bank (ADB) and Islamic Development Bank (IDB). The planning and design studies and the documentation for tender were completed in 1990-1994. The dam was completed in 2003. The definite purpose to build this dam was to meet the acute shortage of electric power that can be further dispersed in the country through existing network of WAPDA. The project consisted of three segments; barrage, power channel and power complex. The barrage is 7 km downstream of Tarbella dam, power channel is 52 km long and power house has total generating capacity of 1450 MW. The guidelines and regulations for the development were set by the World Bank, which were similar to the ADB.

Due to enactment of Environmental Protection Act it is now mandatory to lead EIA studies. The environmental and social aspects were given much weight in this project. The pre-evaluation and assessment surveys added the scoping session, socio-economic survey, ecological survey, study on bird migration through Indus flyway, archaeological survey and detailed surveys of corridors were carried out. A detailed and comprehensive resettlement action plan was further developed for the affected and displaced peoples.

Several prospective steps have been taken to minimize the significant impacts of the extra-high-voltage-transmission lines on the physical, biological and human resources of the project region. 54 villages were affected falling in three districts i.e. Swabi and Haripur in NWFP and Attock in Punjab. Total land of 4,770 hectares holding 20,000 household were affected. A broad range of precautionary and mitigating development programmes were conducted to reduce the environmental and socio-economic impacts. Ghazi Brotha Taraqati Idara (GBTI) an NGO was established to control resettlement and compensatory activities for the affected. To eliminate poverty and to promote participatory sustainable development an inspiring plan named Integrated Regional Development Plan (IRDP) was made by GBTI.

According to the ADB project completion report the power plant is ultimately reaching its goals successfully to meet the demands of electric power with least cost in environmentally sustainable and socially acceptable way. The unexpected delays due to finance problems, labour disputes and contractor payments had occurred throughout the completion of project.

A detailed resettlement plan was carried out but its implementation suspended owing to land acquisition price and agreement problems. The compensatory efforts were disturbed due to lack of transparency of payment to the sufferers, so the resettlement plan's expectations fell short. But it was resolved soon by WAPDA and World Bank through another feasibility study that leads to the Resettlement Action Plan (RAP). It was meant to deal with the land compensatory resettlement issues. Eventually the state took it seriously after the threatening of World Bank to withdraw its fund if the affected were not resettled properly. On request of the chairman of WAPDA the National Accountability Bureau (NAB) investigated and caught an organized financial crime during the execution of the project. This fraud was the loss of Rs.4 billion to national exchequer and due to this the compensatory rates were raised unethically and exorbitantly (NAB, 2006).

5.2.2 AURLAND HYDROELECTRIC POWER PLANT

The project lies in the Aurland valley in Western part of Norway. This valley is famous internationally for its fascinating scenery and beauty. The dam planning was prepared during 1960-1969 and the application and construction of the dam continued from 1969 to 1984. The plant was finally completed and commenced operation in 1984. The Aurland hydropower consisted of 5 power plants. The current capacity of the project is 840 MW. It covered 30% electric power consumption of Oslo in 1992. Now with the additional installation of a 3rd unit the total capacity of the dam has increased to 1100MW. The municipal owned company “Oslo Lysverker” accomplished this project. The development of the project was the result to manage Oslo self-supported on reliable energy.

To reach the approval of construction there were extensive requirements involving the EIA studies and considering all the prospective aspects of mitigation measures. The procedure of accepting agreement for the application lasted from 1965 to 1969 due to thorough evaluation of environmental issues lifted by people. The environmental issues were considered from start of the project even at higher costs.

Impacts of the hydropower plant on aquatic and marine ecosystem, fish stocks, ice conditions of the surrounding area and cultural heritage were considered. The negative effects of construction on the flora and fauna of the waterway system were further investigated. The consequences of road construction before and after the project, handling of quarries and rock deposits after extraction from deposits and the artificial lakes and shorelines in regulating area of reservoirs were the main considerations of the project.

The taken protective measures incorporated the re-vegetation of the disposal sites and quarries, use of tunnel in construction of roads and built of small weir dams to create natural landscape. The works i.e. tunnelling and underground construction discounted the environmental impacts to a creative extent. The major development was tunnels through the mountain and underground power facilities. Weir dams were constructed to create more natural scenery and to enlighten the visual impression. They act as shelter and breeding houses for fish in the river. Rock deposits were re-vegetated. The local groups worked actively to develop infrastructure, improve the road connection and to make access to reliable electric power. The table 5.2 shows the comparative analysis of these two case studies with EIA. The factors to make comparison are the same as used in table 5.1.

Table 5.2 Comparative Analysis of Ghazi Brotha and Aurland Power Plants

		Norway	Pakistan
EIA studies	Screening	Yes	Yes
	Scoping	Yes	Yes
	Public participation	Yes	Yes
Unsolved issues	Social problems	No	Yes
	Economic problems	No	Yes
	Environmental problems	No	No
Losses to the human and environment	Human being	No	Yes
	Flora	No	No
	Fauna	No	No
Successfulness of mitigation measures	Peoples	Yes	No
	Flora	Yes	Yes
	Fauna	Yes	Yes
Administrative time table	Delays	No	Yes

6. ANALYSIS

A quantitative approach to make comparison more attractive, clear and understandable in the form of different weighted score schemes and their graphical illustrations is used. The comparative analysis is based on the qualitative approaches as presented in chapter 5. It was harder to justify the results in a quantitative way because the available information and data does not fulfil its requirements, so the possibility of uncertainties and errors is expected in the obtained results.

6.1 Analysis of the EIA System in Paper

The EIA system that is asked for this comparison is restricted in the form of available official reports and documents, so this EIA system is called the ‘EIA system in paper’. In this system different scores are applied against each criterion of regulatory requirement specified in the legal document with corresponding systemic and foundation measures as discussed in detail in chapter 4. The weighted score scheme range from 0 to 5 in an ascending order. The detail of this weighted score scheme is given in table 6.2. Zero and one point is used when there is no third choice. Zero is assigned when the criterion is absent or did not perform and one is granted when it is implemented and performed.

Table 6.1 Results of Criteria for Sweden and Pakistan

Criteria	Sweden	Pakistan
Legal provisions	5	5
Appeal on screening decision	0	1
Time limits	1	1
Competent authority	1	1
Review body	1	1
Sectoral authorities	1	1
Coordination	No information available	No information available
Screening categories	2	2
Screening approach	1	1
Scoping approach	1	1
Alternatives	1	1
Report content	1	1
Report review	1	1
Public participation	1	1
Decision-making	1	1
EMPs	No information available	No information available
Mitigation	1	1
Monitoring requirements	1	1
Total	20	21

The description of each criterion for Sweden and Pakistan is given in chapter 4. Both countries are given 5 scores in legal provisions because they have empowered EIA legislation and have executive regulations for the EIA system. For appeal on the screening decisions Sweden is given 0 point because decision about the Environmental Impact Statement (EIS) made by the competent authority cannot be appealed separately. No relevant information was available for coordination and EMPs in the legal and administrative documents. For screening method 2 categories are available in both countries, so each of them is given 2 points. There are no monitoring requirements in the Swedish Environmental Code but in other ordinances such as ordinance on supervision, inspection, enforcement and self-monitoring there are provisioning for monitoring. Besides this, the specifications of all other criteria are fulfilled by Sweden and Pakistan.

Table 6.2 Weighted Score Scheme for the EIA system in Paper

Measure	Response	Weight	Justification
EIA legislation	Enabling legislation and executive regulations/decree	5	There are five categories with each referring to the current status of the legislation. Thus one point is awarded at each level
	Enabling legislation and draft executive regulations/ decree	4	
	Enabling legislation	3	
	Draft legislation and regulations /decree	2	
	Draft regulation/ decree	1	
Level of coordination with other planning and pollution control bodies	High	3	Since there are three levels of coordination, one point is given to each higher level
	Moderate	2	
	Weak	1	
	None	0	
Screening categories	Three categories	3	The weights awarded respond to the number of screening categories specified
	Two categories	2	
	One category	1	
	No categories or not performed	0	
Screening approach	Threshold/ lists or application for license	1	One point is awarded for appropriate screening methods
Scoping approach	Discretionary or not performed	0	The responsible authority is postulated to provide a more consistent scope based on formal requirements than proponents
	Responsible authority or with its approval	2	
	Proponent	1	
	No systematic approach or not performed	0	
Remaining measures	Yes	1	
	No	0	

Source: El-Fadl and El-Fadel (2004).

A graphical illustration is produced that cleared the discrepancies of the EIA system between Sweden and Pakistan as reflected in figure 6.1. The only difference existed in both countries is the appeal on the screening decisions, which is only allowed in Pakistan. The figure 6.1 shows that the 'EIA system in paper' is nearly the same in both countries. The total obtained score contains the difference of only 1 point on the base of 18 different criteria. Two criteria coordination and EMPs are not considered in the graphical representation because no data was available.

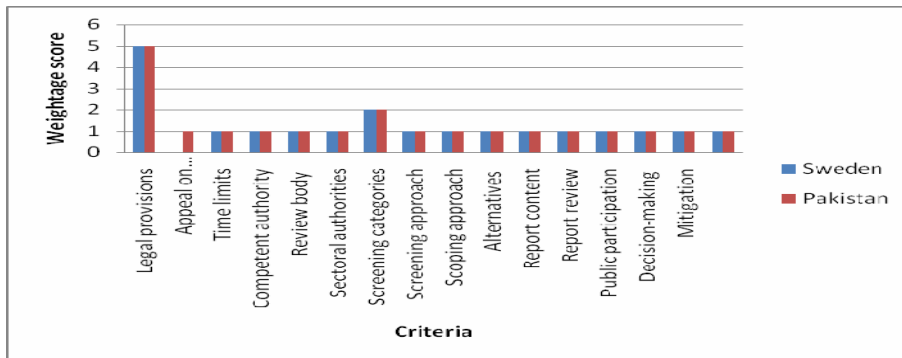


Figure 6.1 Comparison of the EIA system in Paper in Sweden and Pakistan

6.2 Analysis of the EIA System in Practice

Analysis of the ‘EIA system in practice’ was carried out on the basis of case studies with two different scenarios as discussed in chapter 4. In first scenario two case studies from Pakistan and Sweden were chosen for which no EIA was performed. In second scenario two case studies from Norway and Pakistan were chosen for which the EIA studies were conducted. A general principle for this comparison is same as it was in the ‘EIA system in paper’ but with different weighted scores and criteria as shown in table 6.5.

5 different criteria were assigned different weighted score from 0 to 3 in an ascending order. First, the Tarbella and Suorva hydroelectric power plants from Pakistan and Sweden is compared and in second case Aurland and Ghazi Brotha Power plants from Norway and Pakistan are compared. Table 6.3 shows the same results of Tarbella and Suorva power plants as can be expected from a project that is carried out without the EIA studies.

Table 6.3 Results of Criteria for Tarbella and Suorva Power Plants

Criteria	Sweden	Pakistan
EIA studies	0	0
Unsolved issues	0	0
Losses to the human and environment	0	0
Successfulness of mitigation measures	1	0
Administrative time table	0	0
Total	1	0

Both of the projects had raised the potential environmental impacts to the human being, flora and fauna and left unsolved issues of the displaced people. Only Sweden is awarded 1 point for its successful mitigation efforts for flora. While Pakistan did not reach to gain even a single point. The graphical representation of this datum is shown in figure 6.2 and according to it both of the countries failed to bring any score except one criterion for which Sweden is awarded 1 point.

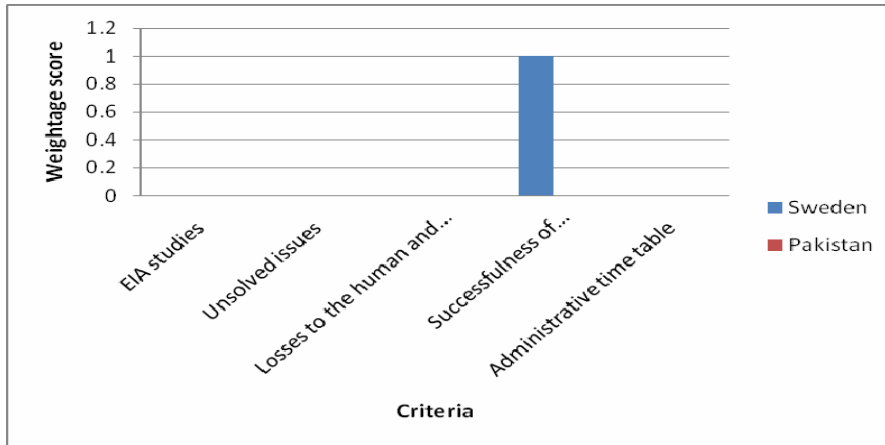


Figure 6.2 Comparison of Tarbella and Suorva Power Plants

Case studies from Norway and Pakistan are analyzed in second scenario as discussed before. Aurland and Ghazi Brotha hydroelectric power plants gained more scores than the first scenario cases. The reason is the EIA study that was performed before implementation of the projects. Norway gained 13 points and Pakistan got 8 points. The central differences were the unresolved issues and problems of the displaced peoples, which were seen even in the presence of well-planned programme for the effectees in Pakistan. Unusual delays happened from beginning to completion of Ghazi Brotha hydroelectric power plant because of financial constrains and labor disputes. From figure 6.3 it is reasoned that the human being was the prime sufferer of this project. They had to leave their homes and to face the problems of poor maintenance at new residences.

Table 6.4 Results of Criteria for Aurland and Ghazi Brotha Power Plants

Criteria	Norway	Pakistan
EIA studies	3	3
Unsolved issues	3	1
Losses to the human and environment	3	2
Successfulness of mitigation measures	3	2
Administrative time table	1	0
Total	13	8

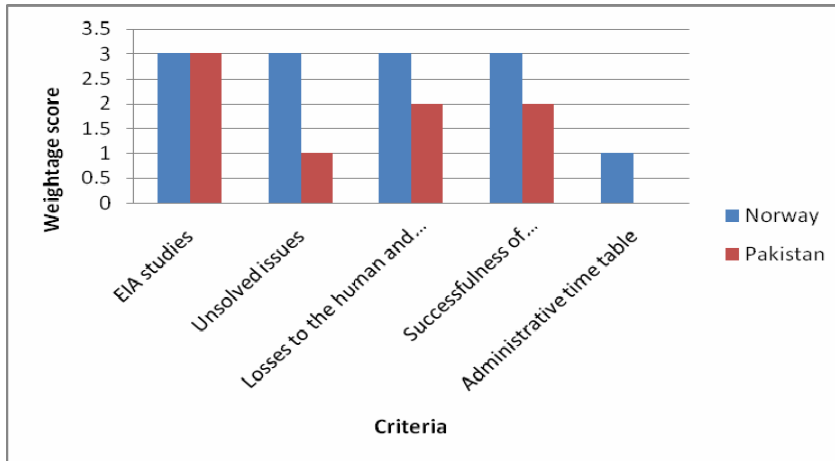


Figure. 6.3 Comparison of Aurland and Ghazi Brotha Power Plants

Table 6.5 Weighted Score Scheme for the EIA System in Practice

Measure	Steps involved in measure	Weight	Justification
EIA studies	Screening	0-3	Depends how many steps are covered in the development project. If the project completed all the three steps it will be awarded 3 point and in case of no step 0 point will be given and vice versa.
	Scoping		
	Public participation		
Unsolved issues	Social problems	0-3	
	Economic problems		
	Environmental problems		
Losses to the human and environment	Human being	0-3	
	Flora		
	Fauna		
Successfulness of mitigation measures	Displaced people	0-3	
	Flora		
	Fauna		
Administrative time table	Delays	0-1	Here is only two options Yes or No. If delay happened then 0 point and in case of no delay 1 point will be awarded.

To present integrated results the aggregate score of the ‘EIA system in paper’ and the ‘EIA system in practice’ are added. In first phase the criteria for Sweden and Pakistan are weighed and in second phase criteria for Norway and Pakistan. As Norway is not analyzed in its ‘EIA system in paper’, so the points of the Swedish EIA system in paper is supposed to be the same for Norway due to same origin of the EIA system instituted by the European Union directive and due to similar socio-economic and socio-political infrastructure. The ‘EIA system in paper’ and the ‘EIA system in practice’ showed obvious differences when the total score of Sweden, Norway and Pakistan is applied against each criterion as shown in figure 6.4 and 6.5.

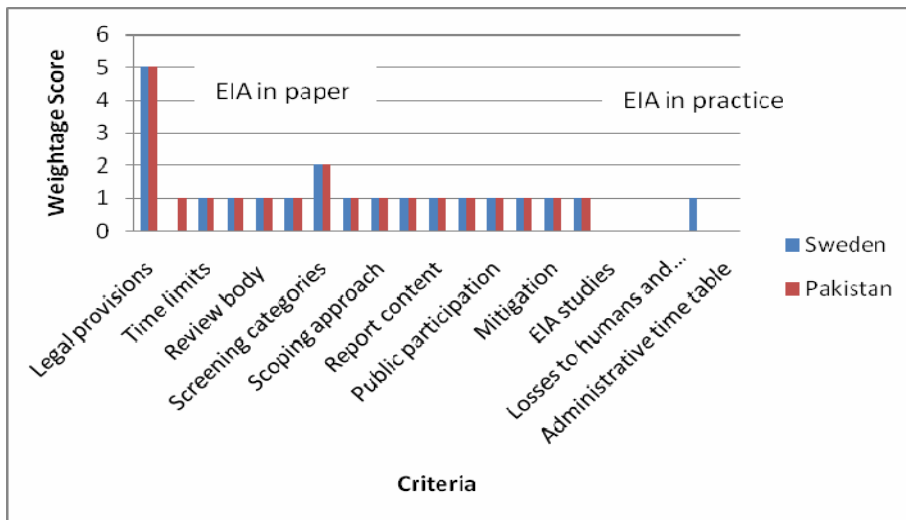


Figure 6.4 Comparative Analysis of the ‘EIA system in paper’ and the ‘EIA system in practice’ of Sweden and Pakistan

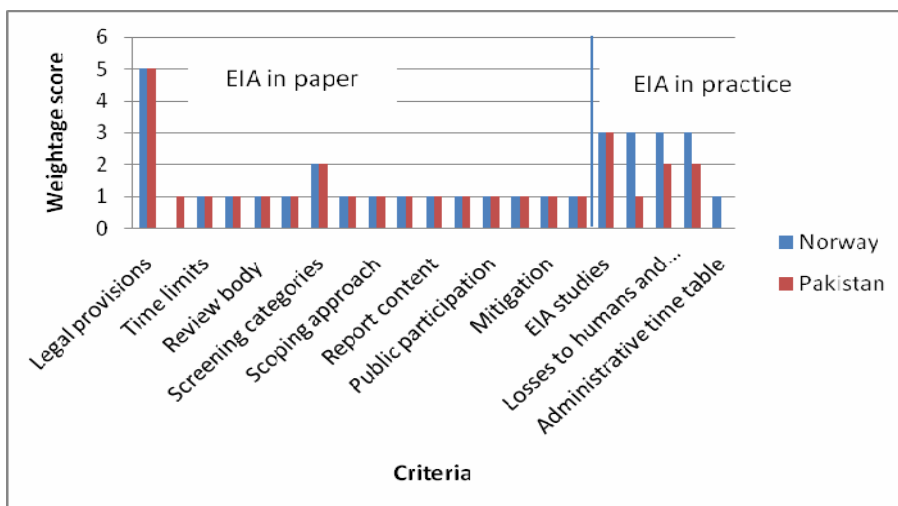


Figure 6.5 Comparative Analysis of the ‘EIA system in paper’ and the ‘EIA system in practice’ in Norway and Pakistan

Among four case studies two were from Pakistan and one from Sweden and one from Norway. To overcome this distribution gap of case studies with EIA and without EIA the score of the Swedish case study without EIA is supposed same for Norway and Norway’s points of case study with EIA are awarded to Sweden. The total score is 34 for Sweden and Norway and 29 for Pakistan as shown in table 6.6. The aggregate score of the Norway’s ‘EIA system in paper’ and ‘EIA system in practice’ is given in table 6.1 and 6.4 respectively.

Table 6.6 Total Score for Sweden, Norway and Pakistan

Country	EIA system in paper	EIA system in practice		Total Score
		Without EIA	With EIA	
Sweden	20	1	13	34
Pakistan	21	0	8	29
Norway	20	1	13	34

The interesting fact is the ‘EIA system in practice’ that fell from expected fruitful effects to negative effects even in the presence of adequate EIA legislation as shown in figure 6.4 and figure 6.5. The comparative summary of the merged results of the table 6.6, figure 6.4 and 6.5 is presented in table 6.7. Table 6.7 shows that the three countries have satisfactory constitutional requirements for the EIA system. Major deficiencies had reportedly occurred when there were no legal requirements for EIA and projects were carried out in their absence. This unsatisfactory situation is shifted to satisfactory when the EIA starts to conduct in all three countries. In Sweden and Norway after the implementation of EIA requirements the case studies showed no deficiency as losses to the living and the physical environment. Although Pakistan has a satisfactory ‘EIA system in paper’ this system is caught up in administrative nature of problems. The sufferers of this problem were the people as described in chapter 5. They had to bear economical and social losses.

Table 6.7 Characteristics of the EIA system of Sweden, Pakistan and Norway

Country	Legal requirements	Major deficiencies		
		Legislative	Implementation	
			Without EIA	With EIA
Sweden	satisfactory	No	Yes	–
Pakistan	satisfactory	No	Yes	Moderate
Norway	satisfactory	No	–	No

7. COMPARATIVE DISCUSSION OF THE EIA SYSTEM IN DEVELOPING COUNTRIES

7.1 Perception of the Concept of the EIA System

It is difficult to understand about the perception of EIA in such countries where the literacy rate is too much low, where mostly peoples even do not know what the benefits they will take if proper EIA will be conducted. They are also unfamiliar about their rights to participate in the EIA procedure and fear to talk against the proponent that thought as a wealthier and unapproachable person and others officials authorities.

The fundamental reason of unsatisfactory performance of the EIA system in developing countries is the wrong perception of EIA because at beginning intensive attention is given to EIA content that starts to lose at the time of implementation and fails to provide the required or expected outcomes under different set of conditions. Efforts are made just to collect the information and not to analyze, interpret and examine the consequences after accomplishment of the project and this took place due to lack of efficient and effective monitoring and evaluative system. For example, the case study of Ghazi Brotha power plant reflects that even in the existence of the EIA system the mitigation for effectees did not bring the expected results as discussed in detail in chapter 4.

It is perceived and conceived that EIA will provide justification to the decision makers on their already taken decisions on environment compared to social and economic concerns. Both the politicians and the decision makers have mixed attitude towards EIA. The contestant of them argues about the obstructing needs of developments, too much money and too many delays. They are even unwilling to accept this because it obliges them to consult and allow the public to participate in the planning process (Briffett, 1999a). The political choices to process the EIA is sometimes complex and unnatural in developing countries (Wandesforde-Smith et al., 1985a).

This is also a general dilemma that the EIA system in developing countries can't stop the deterioration of environment from hasty expanding developmental activities and can't bring success to safeguard the natural environment. This is true to some extent if the problems of the developing countries are seen in the global context of the EIA system as discussed in chapter 2.

7.2 Failures of the EIA System

There are many reasons of failures of the EIA system, which are understood and pointed out by many authors and researchers. A widespread thought of this failure is the use of western derived models or the flaws in the ground realities i.e. lack of political will or weak implementation (Briffett, 1999a; Sankoh, 1996; Wandesforde-Smith et al., 1985a and Wood, 2003b). Comparing with western states the EIA legislation of developing states is imposing and classy processes but unfortunately this is true on paper but not in practice as the examples of discussed case studies reflected in chapter 6.

Baseline studies, predicting significant impacts and review of the quality of work are the fundamental elements addressed in the EIA system but to bring them out there is need of expertise and fiscal resources, which are mostly lacking in developing countries (Briffett, 1999a). Unfamiliarity with the EIA concept, methodologies, techniques and shortage of baseline studies and appropriate technology are common in most of the developing countries (Ebisemiju, 1993).

The social and cultural needs and sensitivities are often ignored by the developers and regulatory agencies. For example, in Bali and Chiang Mai in Indonesia and Thailand the spiritual and religious values were altogether ignored during the development of Tanah Lot. There is inappropriate establishment of administrative competency in developing countries. Some countries like Indonesia and Malaysia are trying to establish jointly but the resources are lacking for adhering and implementing the EIA system (Briffett, 1999a).

In some countries check and balance is not proper and they are stiff to enforce because penalties are too low and corruption is much high. The power is not transferred to the regional and lower agencies. This results in problematic delays and insufficient integration between central and sectoral authorities (Briffett, 1999a). Wood (2003b) drew this situation of the EIA system in South Africa. George et al. (2001 cited in Wood, 2003b) focused the same problems in Mediterranean countries and Ahmad and Wood (2002) pointed out this situation in Egypt, Tunisia and Turkey.

So, the current status of the EIA system in terms of implementation and regular practice is not sufficient in developing countries as shown in table 3.3. But according to Glasson et al. (1999) there are vast differences between developing countries. This situation necessitates an increase of the workforce capacity of evaluation and undertaking of EIAs in developing countries. This is also noticed by Ahmad and Sammy (1985); Biswas, (1992); Briffett, (1999b) and Clark, (1999). Lohani et al. (1997) brought up an example of this situation that “the number of skilled EIA professional in Asia is severely limited and human resource development is the top priority”. Comparing with the developed countries where courses are multidisciplinary, more practical and having operational aspects of EIA, the developing countries cover more theoretical aspects of the EIA (Biswas, 1992).

7.3 Role of Development Assistance Agencies in the EIA System

The active role of international agencies in the exposure and implementation of the EIA system in developing countries is appreciable. Ortolano (1993 cited Wood, 2003b) and Horberry (1985) discussed their importance in the way that “development aid agencies control has great potential for bringing about effective EIA in developing countries, particularly those without national EIA requirements. However, this potential has not yet been fully realized because aid agencies have been slow to impose EIA requirements on recipients and even slower to enforce consistently nontrivial compliance with their own requirements. Under these circumstances project proponents receiving development aid have often been able to get by with token compliance with the EIA requirements of donors”. But sometime the requirements of these offices cause chaos and do not match with national EIA requirements. As the direct coordination between the different donor agencies is less, so sometimes the EIAs, social impact assessment and costs benefit analysis result in ineffective development process that causes a cumbersome situation.

8. FINAL CONCLUSION AND RECOMMENDATION

In developing countries the EIA system is not efficient in terms of implementation, review, appraisal of issues, decision making process and evaluation through post-monitoring. The steps of the project cycle are not fully integrated in environmental assessment process and at the time of decision making process the findings of the conducted EIA studies are not thoroughly considered.

The priorities of the developing countries are focused more towards the economic growth, controlling population growth and to meet the ever-increasing energy demands. In this path the environmental concerns fail to get high rank in the governmental agenda. For example, like many other developing countries Pakistan introduced environmental laws in 1980's but its long-term commitment with environmental protection is yet not able to back up because the environmental issues are not given greater emphasis. EIA is not much mature in most of the developing countries due to limited capabilities and capacities.

Different authors and scientists presented different solutions to the prevailing problems of the developing countries. Glasson et al. (1999) described that "...emerging EIA systems are developing rapidly, learning from exiting systems and adapting EIA techniques to their own needs". Sankoh (1996) and Briffett (1999a) have the views that EIA should be simplified and flexible in developing countries. Wood (2003b) pointed out four critical factors certain for the effectiveness of the EIA system in developing countries. They are the training capacity building in EIA, diffusion of EIA experience, appropriate donor EIA policy and integration of requirements and political will. El-Fdel and El-Fadl (2004) and Wandesforde-Smith et al. (1985b) are in a preference that the developing countries should reform their constitutional and procedural practices, which suit their infrastructure and resources and consider the institutional, technical and financial constraints.

In developing countries the goals of sustainability cannot achieve unless the improvements are not made in some other sectors or areas such as enacting legislation, public participation, awareness, environmental controls and data systems. These areas or factors influence the effectiveness of the EIA system directly or indirectly, so these are the limiting factors that clinch the success or failure of the EIA system. The existing problems of the EIA system nowadays are grouped in table 8.1 with recommendations, so they can be solved, minimized or eliminated from the developing countries.

Though some recommendations have been specified in table 8.1 relevant to the hypothesis and aims of the study but they are more linked or relevant to the policy or decision maker. Besides, it is also required to have some more research or investigation to make the EIA system easily acceptable and applicable to the policy maker according to their national or global needs. This research could be carried out on the development of qualitative analysis towards quantitative analysis for having clear view of the problem itself. This analysis can be done through graphical illustration of the certain problems based on different weighted score schemes as tried in chapter 6 for the comparative analysis of the EIA system in Sweden, Norway and Pakistan.

Table 8.1 Existing Problems of the Developing Countries with Recommendations

Existing problems	Recommendations	Suggestions
Lack or no monitoring requirements during and after the implementation of project	Environmental monitoring committee	<ul style="list-style-type: none"> ▪ These committees should consist of representatives of responsible authority, the proponent, key governmental agencies, relevant authority and NGOs. ▪ The success of such committees depends on their periodic meetings and further public consultation and having the authority to proponent and director general of the responsible authority, so they can give suitable mitigation measures.
Lack of effective environmental auditing system	Monitoring and Management plan for risks and hazards identification	<ul style="list-style-type: none"> ▪ It is carried out by having checklists, questionnaires or rating systems. ▪ Time series data should be gathered by monitoring information with the help of which graphs can be analyzed. This graphical illustration will provide statistical significance of variations and rates and directions of change. ▪ For monitoring sufficient funds should be released so that in identification and rectification of environmental impacts, immediate costs can be saved at early stage in the project. ▪ The design of the monitoring programme should be based on careful thoughts of the necessity of such programme for how long and how the results will be used in practice.
Weak public participation and weak public hearing system	<ul style="list-style-type: none"> ▪ Awareness ▪ Training ▪ Networking ▪ Education 	<ul style="list-style-type: none"> ▪ Public hearing system should be strengthened through promotion of volunteerism. ▪ To make effective and objective involvement in the EIA process, the increase of capacity building of various sectors is necessary such as media, NGOs, academic institutions. ▪ A judicial activism is also necessary to develop for environment. ▪ Training and networking of media persons and NGOs. Making institutions and studying the sustainability and environmental related subjects in the running institutions.
Lack of effectiveness of EIA system	<ul style="list-style-type: none"> ▪ Compatibility of EIA with the ground realities ▪ Training 	<ul style="list-style-type: none"> ▪ The process steps involved in EIA should be compatible with the likely impacts, scale of development, site sensitivity and community concerns. ▪ Efforts should be done to have preliminary findings at the time of process preparation, so the alternatives can be chosen from an environmental view point. ▪ Training is necessary to create awareness and understanding.
Less trained human resource and building capacity	<ul style="list-style-type: none"> ▪ Training ▪ Infrastructure ▪ Consultancy services 	<ul style="list-style-type: none"> ▪ Check and balance is necessary with a compensatory system for them. ▪ Their needs trained human resource, equipment and physical resources to support the monitoring capabilities. ▪ The consultants should be called on the basis of transparent criteria. Their registration should be renewed annually by the environmental authorities and ministries. A quality assurance system should be assessed

<p>Effective implementation and enforcement mechanisms is missing or unsatisfactory</p>	<ul style="list-style-type: none"> ▪ Strong political will ▪ Necessary infrastructure ▪ Participation of local government ▪ Effective monitoring and evaluation process 	<ul style="list-style-type: none"> ▪ For effective implementation and enforcement mechanisms there is need to have strong political will and wish at all level ▪ To make the EIA system effective there is need to develop the necessary infrastructure ▪ The participation of local governments and departments at lower level should be made sure. ▪ The effective implementation of the EIA system is not possible unless there is transparent and fair monitoring and evaluation of the EIA system programmes. ▪ Sectoral guidelines are necessary to make proper and effective implementation of EIA. For example, the dairy form, poultry form, petrol pump and CNG stations. ▪ The implementation capacity can be increased by undertaking the provisions for necessary monitoring equipment, trained man power, logistics and transport. ▪ EIA reports should be reviewed in taking into consideration the environmental costs and long-term social benefits and economics
<p>Non availability of reliable baseline data</p>	<ul style="list-style-type: none"> ▪ Development of online data bank. ▪ Coordination and cooperation among environmental departments 	<ul style="list-style-type: none"> ▪ Reliable and systematic database of ecological and socio-economic environment is necessary. ▪ There are needs of coordination of universities, departments of related disciplines. ▪ There is also necessary to develop a district wise data base. The availability can be made easy by making on-line data bank.
<p>Lack of institutional mechanisms for the coordination of governmental and public EIA projects</p>		<ul style="list-style-type: none"> ▪ There are needs of mechanisms of coordination between different departments for environmental screening process. ▪ A staff consisting of skilled professional who are familiar with EIAs is necessary.
<p>Lack of financial resources</p>	<ul style="list-style-type: none"> ▪ Environment at top level priorities. ▪ Role of international funding bodies 	<ul style="list-style-type: none"> ▪ Governments should release sufficient funds for the review process and to monitoring of environmental regulations at the local level. ▪ The international donor agencies should participate actively in developing countries in their financial constrains

9. REFERENCES

- AADI: Asianics Agro-Dev. International. 2000. Tarbella Dam and related aspects of the Indus River Basin. Pakistan. A WCD Case Study prepared as an input to the World Commission on Dams. Cape Town. Available from: <http://www.dams.org/docs/kbase/studies/cspanx.pdf> [Accessed 5 February 2007].
- ADB: Asian Development Bank. 2005. Ghazi Brotha Hydropower Project (Loan 1424-Pak) in Pakistan. Project Completion Report. Available from: <http://www.adb.org/Documents/PCRs/PAK/pcr-pak-26409.pdf> [Accessed 5 February 2007].
- Ahmad, B. and Sammy, G.K. (1985). Guidelines to Environmental Impact Assessment in Developing Countries. London. Hodder and Stoughton.
- Ahmad, B. and Wood, C. 2002. A Comparative Evaluation of the EIA Systems in Egypt, Turkey and Tunisia. *Environmental Impact Assessment Review* 22:213-234.
- Alshuwaikhat, H. M. 2005. Strategic Environmental Assessment Can Help Solve Environmental Impact Assessment Failures In Developing Countries. *Environmental Impact Assessment Review* 25: 307-317.
- Appiah-Opoku, S. 2001. EIA Procedure. *Environmental Impact Assessment in Developing Countries: The Case of Ghana*. *Environmental Impact Assessment Review* 21:59-71.
- Aslam, F. 2006. Environmental Impact Assessment in Pakistan-Overview, Implementation and Effectiveness. Thesis (Master). Department of Architecture and Built Environment. KTH University. Sweden. ISSN 1651-064X. LWR-EX-EX-06-24.
- Bisset, R. 1992. 'Devising an Effective Environmental Assessment System for a Developing Country: The Case of the Turks and Caicos Islands', in Biswas, A. K. and Agarwala, S. B. C. (Eds). *Environmental Impact Assessment for Developing Countries*. Oxford: Butterworth-Heinemann.
- Biswas, A. K. 1992. 'Summary and recommendations', in Biswas, A. K. and Agarwala (eds.) *Environmental Impact Assessment for Developing Countries*. Oxford: Butterworth-Heinemann.
- Biswas, A. K. and Geping, Qu. 1987. *Environmental Impact Assessment for Developing Countries*. London: Tycooly International, cop.
- Biswas, A. K. and Agarwala, S. B. C. 1992. *Environmental Impact Assessment for Developing Countries*. Oxford: Butterworth-Heinemann.
- Bjarnadottir, H. 2001. A Comparative Study of Nordic EIA Systems, Similarities and Differences in National Implementation. Nordregio. Sweden.
- Bond, A. and Wathern. 1999. 'Environmental Impact Assessment in the European Union', in Petts, J. (Eds). *Environmental Impact Assessment in Practice: Impact and Limitations*. Volume 2. Handbook of Environmental Impact Assessment. Blackwell Science Ltd. UK.
- Boyle, J. 1998. Cultural Influences on Implementing Environmental Impact Assessment: Insights from Thailand, Indonesia and Malaysia. *Environmental Impact Assessment Review* 18:95-132.
- Briffett, C. 1999a. Environmental Impact Assessment in Southeast Asia: Fact and Fiction? *Geo Journal*; 49, 3; ABI/INFORM Global. Pg. 333.

Briffett, C. 1999b. 'Environmental Impact Assessment in East Asia', in Petts, J. (Eds). *Environmental Impact Assessment in Practice: Impact and Limitations*. Volume 2. *Handbook of Environmental Impact Assessment*. Blackwell Science Ltd. UK.

Brito, E. and Verocai, I. 1999. 'Environmental Impact Assessment in South and Central America', in Petts, J. (Eds). *Environmental Impact Assessment in Practice: Impact and Limitations*. Volume 2. *Handbook of Environmental Impact Assessment*. Blackwell Science Ltd. UK.

Bruhn-Tysk, S. and Eklund, M. 2002. *Environmental Impact Assessment-A Tool for Sustainable Development? A case study of Biofuelled Energy Plants in Sweden*. *Environmental Impact Assessment Review* 22:129-144.

CITET: Centre International des Technologies de l'Environnement de Tunis. 2003. *Working Together to Strengthen the Environment, Strengthening EIA Systems in the Mediterranean Region: Lesson Learned from METAP-EIA Institutional Strengthening Project*. Tunisia. Available from: [http://lnweb18.worldbank.org/mna/mena.nsf/Attachments/METAP+EIA+Lessons+Learnt+Report/\\$File/EIA+Report.pdf](http://lnweb18.worldbank.org/mna/mena.nsf/Attachments/METAP+EIA+Lessons+Learnt+Report/$File/EIA+Report.pdf) [Accessed 13 November 2006].

Clark, B. D. 1999. 'Capacity Building', in Petts, J. (Eds). *Environmental Impact Assessment in Practice: Impact and Limitations*. Volume 2. *Handbook of Environmental Impact Assessment*. Blackwell Science Ltd. UK.

Clark, R. and Richards, D. 1999. 'Environmental Impact Assessment in North America', in Petts, J. (Eds). *Environmental Impact Assessment in Practice: Impact and Limitations*. Volume 2. *Handbook of Environmental Impact Assessment*. Blackwell Science Ltd. UK.

Dalkmann, H., Herrera, R. J., Bongardt, D. 2004. *Analytical Strategic Environmental Assessment (ANSEA) Developing a New Approach to SEA*. *Environmental Impact Assessment Review* 24: 385-402.

Ebisemiju, F. S. 1993. *Environmental Impact Assessment: Making it Work in Developing Countries*. *Journal of Environmental Management* 38: 247-273.

El-Fadel, M. and El-Fadl, K. 2004. *Comparative Assessment of EIA Systems in MENA countries: Challenges and prospects*. *Environmental Impact Assessment Review* 24: 553-593.

Englund, M. and Styrke, S. 2001. *A comparative Study Between the EIA-Processes in Sweden and Italy*. Abstract. Thesis (Master). Department of Studies in Biology and Environmental Sciences. Umeå University, Sweden. Available from: http://www.emg.umu.se/samarbeta/Examensarbete_naturgeografi/Abstracts/Englund_Styrke_01.htm [Accessed 14 October 2006].

EPA: Environmental Protection Agency. 1997a. Pakistan Environmental Protection Act, 1997. Government of Pakistan. Ministry of Environment. Available from: <http://www.environment.gov.pk/act-rules/envprotact1997.pdf> [Accessed 5 October 2006].

EPA: Environmental Protection Agency. 1997b. Guidelines for the Preparation and Review of Environmental Reports. Government of Pakistan. Ministry of Environment. Available from: http://www.environment.gov.pk/eia_pdf/D_rev_enReprt.pdf [Accessed 5 October 2006].

EPA: Environmental Protection Agency. 2000. Review of IEE and EIA Regulations. Government of Pakistan. Ministry of Environment. Available from: <http://www.environment.gov.pk/act-rules/IEE-EIA-REG.pdf> [Accessed 5 October 2006].

EPA: Environmental Protection Agency. 2005a. National Environmental Policy 2005. Government of Pakistan. Ministry of Environment. Available from: <http://www.environment.gov.pk/NEP/Policy.pdf> [Accessed 5 October 2006].

EPA: Environmental Protection Agency. 2005b. State of Environment Report. Government of Pakistan. Ministry of Environment. Publication. Available from: <http://www.environment.gov.pk/Publications.htm> [Accessed 5 October 2006].

ESCWA: Economic and Social Commission for Western Asia. 2001. A study on the Evaluation of Environmental Impact Assessment in Selected ESCWA Countries, 01-0652. New York. United States. Available from: <http://www.escwa.org.lb/information/publications/edit/upload/enr-01-8-e.pdf> [Accessed 13 November 2006].

eSpots: Electronic Spots of the Innovative Poor. 2007. Ghazi Barotha Hydropower Project. Ghazi Barotha Hydropower Project and Ghazi Barotha Tarqiati Idara. Available from: <http://espots.sdnpc.org/stories/gbhp.htm> [Accessed 11 October 2006].

EUROPA, the European Union On-Line. 2006. Treaties and Laws. The EUA at a Glance. Available from: http://europa.eu/abc/treaties/index_en.htm [Accessed 7 February 2007].

Fuller, K. 1999. 'Quality and Quality Control in Environmental Impact Assessment', in Petts, J. (Eds). Environmental Impact Assessment in Practice: Impact and Limitations. Volume 2. Handbook of Environmental Impact Assessment. Blackwell Science Ltd. UK.

George, C. 2000. 'Comparative Review of Environmental Assessment Procedures and Practice' in Lee, N., George, C. (Eds). Environmental Assessment in Developing and Transitional Countries: Principles, Methods, and Practice. John Wiley and Sons Ltd. Chichester. England.

Glasson, J., Therivel R. and Chadwick, A. 1999. Introduction to Environmental Impact Assessment: Principles and Procedures, Process, Practice and Prospects. 2nd ed. London: UCL Press, cop.

Hammar, J. and Ljungqvist, N. 2000. The Suorva Dam: Lessons Learned from a Northern Case Study. National Union of the Saami People (SSR), Swedish Society for Nature Conservation (SNF) and World Fund for Nature (WWF), Sweden. Available from: www.dams.org/docs/kbase/submissions/ins149.pdf [Accessed 25 October 2006].

- Hilden, M., Valve, H., Jonsdottir, S., Balfors, B., Faith-Ell, C., Moen, T. P., Peuhkuri, T., Schmidtbauer, B., Swensen, I. and Tesli, A. 1998. EIA and Its Application for Policies, Plans and Programmes in Sweden, Finland, Iceland and Norway. TemaNord 567. Denmark.
- Holling, C.S. 1978. Adaptive Environmental Assessment and Management. Chichester. Wiley.
- Horberry, J. 1985. International Organization and EIA in Developing Countries. Environmental Impact Assessment Review 5:207-222.
- Htun, N. 1990. 'The EIA Process in Asia and the Pacific Region', in Wathern, P (Eds). Environmental Impact Assessment: Theory and Practice. Unwin Hyman. London.
- IEA: International Energy Agency. 2005. Landscape and Cultural Heritage–Aurland Hydropower Development, Norway. Hydropower Good Practices: Environmental Mitigation Measures and Benefits. Hydropower Implementing Agreement Annex VIII: Case Study 10-04. Available from: http://www.ieahydro.org/reports/Annex_VIII_CaseStudy1004_Aurland_Norway.pdf [Accessed 9 January 2007].
- Jones, C. E. 1999. 'Screening, Scoping and Consideration of Alternatives', in Petts, J. (Eds). Environmental Impact Assessment: Process, Methods and Potential. Volume 1. Handbook of Environmental Impact Assessment. Blackwell Science Ltd. UK.
- Kakonge, J. O. 1999. 'Environmental Impact Assessment in Africa', in Petts, J. (Eds). Environmental Impact Assessment in Practice: Impact and Limitations. Volume 2. Handbook of Environmental Impact Assessment. Blackwell Science Ltd. UK.
- Lawrence David, P. 2003. Environmental Impact Assessment: Practical Solutions to Recurrent Problems. Hoboken, N.J. Wiley-Interscience. Cop.
- Lee, N. 1983. Environmental Impact Assessment: A Review. Applied Geography 3:5-27.
- Lee, N. and George, C. 2000. Environmental Assessment in Developing and Transitional Countries: Principles, Methods, and Practice. John Wiley and Sons Ltd. Chichester. England.
- Lee, N. 2000a. 'Integrating Appraisals and Decision Making', in Lee, N. George, C. (Eds). Environmental Assessment in Developing and Transitional Countries. John Wiley and Sons Ltd. Chichester. England.
- Lee, N. 2000b. 'Reviewing the Quality of Environmental Assessment', in Lee, N. George, C. (Eds). Environmental Assessment in Developing and Transitional Countries. John Wiley and Sons Ltd. Chichester. England.
- Lerman, P. 2004. EIA Center. Sweden-EIA within the EU-EIA Newsletter 10. School of Planning and Landscape. University of Manchester. Available from: <http://www.art.man.ac.uk/EIA/publications/newsletters/newsletter10/othercountries/sweden.htm> [Accessed 10 October 2006].
- Leu, W. S., Williams W.P and Bark, A.W. 1997. Evaluation of Environmental Impact Assessment in Three Southeast Asian Nations. Proj Appraisal 12:89-100.
- Lim, Gill-Chin. 1985. Theory and Practice of EIA Implementation: A Comparative Study of Three Developing Countries. Environmental Impact Assessment Review 5:133-153.

Lohani, B., J.W. Evans, H. Ludwig, R.R. Everitt, Richard A. Carpenter and S.L.Tu. 1997. Environmental Impact Assessment for Developing Countries in Asia. Volume 1 - Overview. 356 pp. Available from: http://www.adb.org/Documents/Books/Environment_Impact/env_impact.pdf [Accessed 13 November 2006].

Modak, P. and Biswas, A. K. 1999. Conducting Environmental Impact Assessment for Developing Countries. United Nations University Press. United States of America.

Moriera, V. 1990. 'EIA in Latin America', in Wathern, P (Eds). Environmental Impact Assessment: Theory and Practice. Unwin Hyman. London.

Morris, P., Therivel, R. 2001. Methods of Environmental Impact Assessment. The Natural and Built Environment Series. 2nd ed. Spon Press. London.

NAB: National Accountability Bureau. 2006. Ghazi Brotha Hydel Power Project – A National Development Project – Falls Prey to Organized Financial Crime. Case study. Public Information Materials. Serial. No. 011.

OECD: Organization for Economic Cooperation and Development. 1992. Guidelines on Aid and Environment. No. 1. Good Practices for Environmental Impact Assessment of Development Projects OECD Development Assistance Committee (DAC). Paris. Available from: <http://www.oecd.org/dataoecd/37/25/1887592.pdf> [Accessed 14 October 2006].

Ortolano, L., Jenkins, B and Abracosa, R, P. 1987. Speculations on When and Why EIA is Effective. Viewpoint. Environmental Impact Assessment Review 7:285-292.

Regeringskansliet. Ministry of the Environment. Sweden. 2002. The Swedish Environmental Code. Article No. M2000.22. Available from: <http://www.regeringen.se/content/1/c6/02/05/49/6736cf92.pdf> [Accessed 15 October 2006].

Rzeszot, U. A. 1999. 'Environmental Impact Assessment in Central and Eastern Europe', in Petts, J. (Eds). Environmental Impact Assessment in Practice: Impact and Limitations. Volume 2. Handbook of Environmental Impact Assessment. Blackwell Science Ltd. UK.

Sadler, B. 1996. International Study of the Effectiveness of Environmental Assessment. Hull. Quebec. Canadian Environmental Assessment Agency.

Sankoh, O. A. 1996. Making Environmental Impact Assessment Convincible to Developing Countries. Journal of Environmental Management 47:185-189.

SLU: Swedish University of Agricultural Sciences. 2006. About EIA and SEA. Swedish EIA Centre. Available from: <http://mkb.slu.se/eiacentre/abouteia.asp> [Accessed 10 October 2006].

Starzewska, A. 1990. 'The Legislative Framework for EIA in Centrally Planned Economies', in Wathern, P (Eds). Environmental Impact Assessment: Theory and Practice. Unwin Hyman. London.

Thomson, D. and Ross, W. A. 2001. Environmental Impact Assessment. Encyclopaedia of Life Sciences. Johan Wiley and Sons. Ltd.

Wandesforde-Smith, G., Carpenter, R. A. and Horberry, J. 1985a. EIA in Developing Countries: An Introduction. Environmental Impact Assessment Review 5:201-206.

Wandesforde-Smith, G. and Moreira, I. V. D. 1985b. Subnational Government and EIA in the Developing World: Bureaucratic Strategy and Political Change in Rio De Janeiro, Brazil. *Environmental Impact Assessment Review*. 5: 223-238.

WAPDA: Water and Power Development Authority. 2000. Supplementary report on environmental impact assessment and resettlement action plan-2. Final Report. Ghazi Brotha Hydropower Project. E-106. Volume 8.

Wathern, P. 1990. *Environmental Impact Assessment: Theory and Practice*. Unwin Hyman. London.

Wood, C. 1995. *Environmental Impact Assessment, A Comparative Review*. Longman Group Limited. England.

Wood, C. 1999, 'Comparative Evaluation of Environmental Impact Assessment Systems', in Petts, J. (Eds). *Environmental Impact Assessment in Practice: Impact and Limitations*. Volume 2. *Handbook of Environmental Impact Assessment*. Blackwell Science Ltd. UK.

Wood, C. 2000, 'Screening and Scoping', in N. Lee and C. George (eds.) *Environmental Assessment in Developing and Transitional Countries*, Chichester, John Wiley and Sons.

Wood, C. 2003a. *Environmental Impact Assessment, A Comparative Review*. 2nd Ed. Edingburgh, Pearson.

Wood, C. 2003b. *Environmental Impact Assessment in Developing Countries: An Overview*. Conference On, *New Directions in Impact Assessment for Development: Methods and Practice*. EIA Centre. University of Manchester.M13 9PL. Available from:
<http://www.enterprise-impact.org.uk/pdf/Wood.pdf>
[Accessed 5 October 2006].

World Bank. 1999. *Environmental Assessment. Operational Policy. Bank Procedure and Good Practice 4.01*, Washington. DC. World Bank.

CHALMERS UNIVERSITY OF TECHNOLOGY
SE-412 96, Göteborg, Sweden
Phone +46(0) 31 77210 00
Web: <http://www.chalmers.se>