

National Environmental Health
Impact Assessment Guidelines
For Development Projects

(May 2002)



Prepared by:

Nepal Health Research Council

This document has been prepared by a taskforce comprising following members:

Mr. Chandra Shekhar Yadav, **Team Leader**

Mr. Sharad Aryal, **Environmental Health Specialist**

Prof. H. B. Jha, **Socio-Economist**

© Nepal Health Research Council, 2002

Financial assistance for the preparation of this document was provided by WHO.

Foreword

The ultimate goal of all efforts to foster economic growth is the attainment of the highest possible level of physical, mental and social well being of the people. Development projects are instrumental to Nepal's economic growth. While economic growth has brought improvements on the country's general health status, we must note that development has also brought health problems much more complex than we have realized. Efforts to maintain the balance between economic development and environmental protection have been ongoing since the introduction of national environmental impact assessment guidelines 1993, environment protection act-1996 and environment protection rules 1997. However, the consequences of development projects on human health have been inadequately considered in the environmental impact assessment process.

With the intent of having a systematic process of tackling health issues related to environment brought about by development projects, Nepal Health Research Council through its Environmental Health Unit has come up with this National Environmental Health Impact Assessment Guidelines: for development projects.

In this regard, I would like to express my appreciation to all members of the task force, resource persons and other participants for their commitment and diligent work for producing such a valuable document.

It is important that our decision-makers and all other stakeholders from the national level to the community should know the implications of development projects they implement specially their impact on public health. The challenge now remains in endorsing this document by relevant authorities and working towards implementing it. NHRC hopes that Ministry of Health, Ministry of Population & Environment and other relevant Ministries will use this document as an important reference tool for undertaking environmental health impact assessment of development projects; so as to ensure protection of environment and promotion of health of the people of Nepal.

Professor Gopal Prasad Acharya
Chairman
Nepal Health Research Council

Preface

In recent years we have noted increasing trends of disease conditions and reports of disease outbreaks that can be traced directly to environmental factors brought about by industrialization, overcrowding, urbanization and man-made disasters. Inadequacies in the management of environmental hazards have continued to pose a threat to the health of Nepalese.

For the first time in recorded history, human activities are causing ecological disruption at a global level. Environmental degradation is both widespread and increasing world-wide and it is now becoming increasingly clear that development can have adverse, as well as beneficial effects on health and well-being. Development projects with obvious health benefits may also have unintentional adverse health impacts. As a result of this situation, many governments and international agencies recognize the need to further strengthen the role of environmental and health considerations in decision-making processes. Over the last couple of decades, environmental impact assessment (EIA) has evolved into an institutionalized process for identifying, assessing and mitigating the potential environmental effects of development projects and for informing decision makers in many countries. However this process is slowly developing in the context of Nepal. In the course of implementation of EIA process, the consequences of development projects on human health have been inadequately considered and integrated into the EIA process. The primary objective of this publication is to fill up this gap and institutionalize the integration of environmental health impact assessment into the existing EIA process.

This publication is divided into two parts. Part I reviews the country situation of EIA process and practice of EIA in development projects in terms of considerations of human health while assessing environmental impacts. Finally the issues that needed be taken into consideration for successful implementation of environmental health impact assessment have been discussed.

Part II describes the proposed National Environmental Health Impact Assessment Guidelines for development projects. While preparing these guidelines international experience of other countries including *Canadian Handbook on Health Impact Assessment*, *New Zealand Guide to Health*

Impact Assessment, Gothenburg Consensus Paper on Health Impact Assessment, Philippine National Framework and Guidelines for Environmental Health Impact Assessment have been shared. Guidelines are adapted to the requirement of our country. Professional views from EIA experts, public health scientists, environmental health experts, socioeconomic experts, environmental scientists have also been shared in the preparation of these guidelines.

It is realized from the experiences of other countries that it has become necessary to assess the health impact assessment of developmental/environmental policies and programs. It is important that our decision makers and all other key stakeholders from the national level to the community should know the implications, of policies and programs that they implement specifically their impact on public health. However, this document has not addressed this issue at this moment. But this issue will be incorporated in the coming years while updating the guidelines.

With these guidelines, it is hoped that the interrelationship between environmental factors and their impacts on human health will be given more emphasis in the consideration of the development projects. It is believed that these guidelines will be a major guide and reference material for environmental and health practitioners/assessors in the preparation of assessment of documents for development projects.

In this regard, I would like to express my gratitude to all the members of task force and resource persons especially Mr. **Chandra Shekhar Yadav**, Team Leader, NHRC, **Mr. Sharad Aryal**, Environmental Health Specialist, Prof. H. B. Jha, Socio-Economist for their contribution towards this work.

As environmental health impact assessment is still in developing stage in Nepal, NHRC will be grateful for comments and recommendations on the document from professionals, public or others. Lastly, with the support of the WHO which provided us with the necessary financial assistance, we have been able to come up with this document. We expect to have continued support from WHO in future to successfully implement and institutionalize these guidelines.

Dr. Anil Kumar Mishra
Member Secretary
Nepal Health Research Council

Acknowledgement

With the intent of tackling health issues related to environment, NHRC, through its Environmental Health Unit, has developed these guidelines of Environmental Health Impact Assessment for development projects.

Sincerest gratitude is expressed to **Professor G. P. Acharya**, Chairman NHRC, **Dr. Anil Kumar Mishra**, Member-Secretary NHRC and **Dr. Kamal Gyawali**, Ex-Member-Secretary NHRC for their support and encouragement in the formulation of this document.

Special thanks are also due to the WHO for providing assistance in the development of this document, specially to **Mr. Jan A. Speets**, Environmental Health Advisor for generously sharing his ideas in the conceptualization of this document.

We would also like to express our gratitude to **Professor H. B. Jha** for his untiring commitment as a consultant (socio-economist) and guiding us all through in the development of this document.

Acknowledgement also goes to **Mr. Sharad Aryal**, Environmental Health Specialist for his valuable input as a consultant and contributor in the formulation of this document.

Deep appreciation is also extended to **Mr. Salil Devkota**, Environment Expert, **Prof. Surra Man Shakya**, EIA Expert and **Mr. D. R. Shrestha**, Public Health Expert for their valuable comments and suggestions.

Chandra Shekhar Yadav
NHRC, Environmental Engineer
Team Leader

Abbreviations

ADB	Asian Development Bank
AIC	Agricultural Input Corporation
CDB	Cotton Development Board
EHIA	Environmental Health Impact Assessment
EHRA	Environmental Health Risk Assessment
EIA	Environmental Impact Assessment
EMAP	Environmental Management and Action Plan
EPA	Environment Protection Act
EPR	Environment Protection Rules
FISP	Fattepur Irrigation Sub-Project
IEE	Initial Environmental Examination
INGOs	International Non-Governmental Organizations
IUCN	The World Conservation Union
KGA	Kaligandaki A
MDS	Melamchi Diversion Scheme
MMHEP	Middle Marsyangdi Hydroelectric Project
MOPE	Ministry of Population and Environment
NEA	Nepal Electricity Authority
NEPAP	Nepal Environmental Policy and Action Plan
NGOs	Non-Governmental Organizations
PM ₁₀	Particulate Matter <10 micrometer
SMEC	Snowy Mountain Engineering Corporation
STDs	Sexually Transmitted Diseases
TOR	Terms of Reference
TSP	Total Suspended Particle
UNCED	United Nations Conference on Environment and Development
WSHEP	West Seti Hydroelectric Project

Table of Contents

Foreword	
Preface	
Acknowledgement	
Abbreviations	

Part I

Chapter 1	1
Introduction.....	1
Chapter Contents.....	1
1.1 Background.....	1
1.2 Objectives	2
1.3 Justification.....	2
1.4 Approach.....	4
Chapter 2	5
A Critical Review of Environmental Impact Assessment Process	5
Chapter Contents.....	5
2.1 Historical Background of the Emergence Of EIA	5
2.2 Existing EIA Process	6
2.3 Health Component of the Current EIA Process.....	9
Chapter 3	10
Case Studies: Review of Environmental Impact Assessment Reports of Development Activitieg.....	10
Chapter Contents.....	10
3.1 Melamchi Diversion Scheme Environmental Impact Assessment.....	10
3.1.1 Introduction.....	10
3.1.2 Current Situation of Health.....	10
3.1.3 Health Impacts.....	11
3.1.4 Health Mitigation Measures.....	12
3.1.5 Health Monitoring.. ..	13

3.2	Middle Marsyangdi Hydroelectric Project (MMHEP)	
	Environmental Impact Assessment.....	13
3.2.1	Introduction.....	13
3.2.2	Current Situation of Health.....	15
3.2.3	Health Impacts	15
3.2.4	Health Mitigation Measures.....	16
3.3	West Seti Hydroelectric Project (WSHEP) EIA - Social and	
	Land Use Studies.....	16
3.3.1	Introduction.....	16
3.3.2	Current Situation of Health.....	17
3.3.3	Health Mitigation Measures.....	17
3.4	Kaligandaki A Hydroelectric Project Environmental Impact	
	Assessment.....	18
3.4.1	Introduction.....	18
3.4.2	Current Situation of Health	18
3.4.3	Health Impacts	18
3.4.4	Health Mitigation Measures	18
3.5	Fattepur Irrigation Sub-Project (FISP) Environmental Impact	
	Assessment.....	19
3.5.1	Introduction.....	19
3.5.2	Environmental Impacts.....	19
3.6	Environmental Impact Assessment for Disposal of Obsolete	
	Pesticides.....	20
3.6.1	Introduction.....	20
3.6.2	Environmental Impacts.....	21
3.7	Environmental Impact Assessment of Copper Sulphate and	
	Copper Oxychloride Plant.....	21
3.7.1	Introduction.....	21
3.7.2	Current Situation of Health.....	22
3.8	EIA of the Feasibility study on the Construction of Kathmandu	
	Naubise Alternate Road in the Kingdom of Nepal	22
3.8.1	Introduction.....	22
3.8.2	Current Situation of Health	22
3.8.3	Health Impacts	23
3.9	Environmental Impact Assessment of Syuchatar Sanitary	
	Landfill Site.....	23
3.9.1	Introduction.....	23

3.10 Stakeholder Analysis, Social and Environmental Assessment: In the Context of the Proposed Rural Infrastructure Project in 1996.....	23
3.10.1 Introduction.....	23
3.11 Overall Shortcomings in Health Considerations.....	25
Chapter 4	26
Health Hazards and Risks from Environmental Problems	26
Chapter Contents.....	26
4.1 Health Hazards, Risks and Impacts.....	26
4.2 Water Pollution and Its Health Impact.....	28
4.3 Air Pollution and Its Health Impact.....	29
4.4 Soil Pollution and Its Health Impact.....	29
4.5 Solid Waste Pollution and Its Health Impact.....	30
4.6 Rapid Urbanization and Informal Settlement Areas	31
Chapter 5	32
Issues That Need to be Addressed to Facilitate Environmental Health	
Impact Assessment	32
Chapter Contents.....	32
5.1 Current Health Policy	32
5.2 The Need to Put Health Concerns on the Policy Agenda.....	32
5.3 Inter-sectoral Collaboration.....	33
5.4 Strengthening Existing EIA Guidelines With Respect to Health.....	34
5.5 Sources of Information.....	34
5.5.1 Government Health Statistics.....	35
5.5.2 Key Informant Interview	35
5.5.3 Literature Review	36

Part II

Chapter 6 ..:	37
Environmental Health Impact Assessment Process.....	37
Chapter Contents.....	37
6.1 General Guidelines for EHIA Preparation and Implementation.....	37
6.1.1 Establishment of Baseline Health Status.....	38

6.1.2	Identification of Hazards and Evaluation of Potential Health Impact.....	38
6.1.3	Identification and Assessment of Community Exposure.....	38
6.1.4	Identification of Risk Groups.....	39
6.1.5	Prediction of Health Consequences and Outcomes ...	39
6.1.6	Assessment of Indirect Health Determinants.....	39
6.1.7	Control Measures	40
6.1.8	Mitigation Measures	40
6.1.9	Monitoring and Auditing Plan	40
6.2	EHIA Coverage of Proposed Development Projects	40
6.3	Techniques for Conducting EHIA	42
6.3.1	Screening.....	42
6.3.2	Scoping and Profiling.....	43
	6.3.2.1 Environmental Health Hazard Listing	45
	6.3.2.2 Identification of Vulnerable Populations and Other Significant Stakeholders	45
	6.3.2.3 Identification of Important Environmental Factors.....	45
	6.3.2.4 Evaluation of the Capabilities of Project Proponent, Local and National Government Agencies, the Community, NGOs and the Private Sector.....	46
6.4	Environmental Health Risk Assessment Process	46
6.4.1	Health Consequence Rating	47
6.4.2	Incident Potential Rating.....	48
6.4.3	Exposure Rating.....	49
6.4.4	Risk to Health matrix	50
6.5	Contents of the Environmental Health Impact Assessment Report.....	51
6.5.1	Baseline Health information	51
	6.5.1.1 Demographic Profile.....	51
	6.5.1.2 Vital Statistics	52
	6.5.1.3 Local Health Resources.....	52
6.5.2	Environmental Health and Sanitation Profile	52
	6.5.2.1 Water Supply	52
	6.5.2.2 Human Excreta Management.....	52
	6.5.2.3 Waste Management and Disposal Systems..	52
	6.5.2.4 Food Hygiene.....	53

6.5.3 Environmental Health Impact and Risk Assessment Component.....	53
6.5.3.1 Identification and Description of Environmental Health Sensitive Activities and Processes During the Various Phases of the Project Life Cycle	53
6.5.3.2 Identification of Health Hazards Present During the Various Project Activities.....	53
6.5.3.3 Identification of Impact Population or Receptors.....	54
6.5.3.4 Description of the Health Consequences.....	54
6.5.3.5 Health Consequence Rating	54
6.5.3.6 Priority Rating.....	54
6.5.3.6.1 Exposure Rating and Health Consequence Rating Matrix	55
6.5.3.6.2 Incident Potential Rating and Health Consequence Rating Matrix.....	55
6.5.4 Control and Mitigating Measures	55
6.5.4.1 Management Control Measures	55
6.5.4.2 Health Hazards Control Program	55
6.5.4.3 Consequence Recovery or Mitigating Measures.....	56
6.5.4.4 Health Surveillance, Evaluation and Monitoring Plans.....	56
6.6 Health and Safety Management Plan for Projects-Not Required to Prepare an EHIA.....	56
6.6.1 Components of the Health and Safety Management Plan	56
References	58
Annex I.....	61
Annex II.....	62
Annex III.....	80

Part I

(Situation and Practice of EIA Process)

- Chapter 1 Introduction
- Chapter 2 A Critical Review Environmental Impact Assessment Process
- Chapter 3 Review of Environmental Impact Assessment Reports of Development Activities
- Chapter 4 Health Hazards and Risks from Environmental Problems
- Chapter 5 Issues That Need to be Addressed to Facilitate Environmental Health Impact Assessment

Chapter 1

Introduction

Chapter Contents

This chapter gives the background information about the development of these guidelines. It goes on to discuss briefly why environmental health impact assessment (EHIA) of development projects is needed.

1.1 Background

In June 1992, the United Nations Conference on Environment and Development (UNCED) was held in Rio de Janeiro. The outputs of the conference included a Declaration of Principles on environment and Development and an agenda for change during the 21st century, referred to as *Agenda 21*. The Declaration of Principles states:

"Nations shall enact effective environmental laws and develop national law regarding liability for the victims of pollution and other environmental damage. Where they have authority, nations shall assess the environmental impact of proposed activities that are likely to have a significant adverse impact. "

Agenda 21 acknowledges the dependence of human health on a healthy environment. It requires all countries to have programs to identify environmental health hazards and to reduce the risks. Principle 1 of the Rio Declaration clearly stated the case: "Human beings are at the center of concerns for sustainable development. They are entitled to have a healthy and productive life in harmony with nature."

Agenda 21 has been used as a priority-setting tool for the policies of many international agencies and countries. In response to *Agenda 21*, His Majesty's Government of Nepal has also prepared the Nepal Environmental Policy and Action Plan (NEPAP)-1993: The NEPAP has tried to address issues raised in *Agenda 21* that are of particular relevance to Nepal; it identifies major environmental problems facing the country,

briefly reviews the causes and consequences of these problems, and recommends practical policy guidelines and actions to address them.

HMG/ Nepal introduced National Environmental Impact Assessment (EIA) guidelines before Environment Protection Act came into existence. It has been eight years since the National Environmental Impact Assessment Guidelines, 1993 was introduced in Nepal. These guidelines were endorsed by His Majesty's Government of Nepal on 27 September 1992 and gazetted on 19 July 1993 in Volume 43, Number 5. These guidelines require all concerned authorities to prepare an EIA for any development project or activity that significantly affects the quality of the environment. Essentially, the EIA study examines the biophysical, geophysical and socioeconomic impacts of a project or activity and recommends measures to mitigate such impacts.

This document is an initiative of WHO-Nepal/NHRC for the development of Guidelines of Environmental Health Impact Assessment of development projects in Nepal. Environmental health impact assessments can be carried out for policies as well as for development projects and they can be done prospectively or retrospectively. This publication is principally concerned with the prospective assessment of development projects.

1.2 Objectives

The principal objectives of this study were:

- . To review the EIA process established in the kingdom of Nepal in relation to health risk assessment.
- . To review the EIA reports of development projects with respect to consideration of health.
- . To recommend guidelines for application of EHIA process in development projects/activities.

1.3 Justification

Government and international agencies invest large sums in development projects. The projects fall into a wide range of sectors, such as energy, agriculture and industry. Development projects have both positive and negative impacts. These range far beyond their immediate objectives.

They can affect the environment, social structure and demography of local communities. They can also affect public health.

The sustainability of development can be ensured only if the full range of potential impacts are assessed at an early stage and corrective action is taken in light of the assessment. Surprisingly, in spite of the fact that concern for health usually underlies discussions about the environment, health itself is not often specifically considered and is seldom given a high priority in development plans (WHO, 1992).

As the World Commission on Environment and Development (1987) pointed out: "A development path that combines growth with reduced vulnerability is more sustainable than one that does not".

Most development projects, from whatever sector, are expected to have a beneficial effect on human health. However, sometimes the indirect impacts include unexpected negative effects on health. Many of these can be avoided by careful planning. Adverse health impacts are most likely to affect the most vulnerable social groups; this may serve to amplify the overall adverse effect. Such impacts reduce the social and economic benefits expected from the development and transfer hidden costs to the health sector.

Environmental health impact assessment is a procedure for identifying health hazards, interpreting the health hazards as health risks, and suggesting risk management strategies. Often only minor actions may be required to safeguard health. The actions may vary from ensuring that the health authorities are informed of development plans, to specific requests for major planning changes, such as settlement siting.

In summary, development, human health and the health of the environment are mutually interdependent. If the health of the people is safeguarded, then ultimately the ecosystem itself will be safe. The need for environmental health impact assessment cannot be overemphasized as the turn of the century witnesses the rapid change in technology leading to disastrous impact on health, environment and socioeconomic development. The proposed EHIA Guidelines aim to ensure the use of environmental health impact assessment as a tool, of environmental policy and a planning tool for sustainable development.

1.4 Approach

In order to achieve the objectives and obtain the major outcomes of the study, primarily the secondary source materials were used for data collection. In the process of collecting secondary source materials, all available literature on the subject matter of the study was gathered from different sources including visits to libraries, NGOs, INGOs and UN Agencies as well as browsing the Internet. The EIA process established in our country as well as the EIA studies of development projects of different sectors were reviewed. Additionally Environmental Health Impact Assessment Guidelines of some other countries were reviewed. Finally a guidelines on Environmental Health Impact Assessment has been proposed within the context of our country set-up.

Chapter 2

A Critical Review of Environmental Impact Assessment Process

Chapter Contents

This chapter reviews the Environmental Impact Assessment process that has been adopted in our country. It starts by giving some background on the emergence of EIA. It then reviews the inclusion of health component on the current EIA process.

2.1 Historical Background of the Emergence of EIA

It was for the first time in the Sixth Five-Year Plan (1980-85) that the environmental problem was recognized as a national issue in our country. Environment was regarded as an integral part of development in the Seventh Five-Year Plan (1985-90). Following the political change in 1990, the Constitution of the Kingdom of Nepal (1991) recognized environment protection as an issue of national priority. Thereafter, Nepalese government formulated the environmental policy (EPC, 1993) whose basic objectives were:

- To manage efficiently and sustainably natural and physical resources;
- To balance development efforts and environmental conservation for sustainable fulfillment of the basic needs of the people;
- To safeguard national heritage;
- To mitigate the adverse environmental impacts of development projects and human actions; and
- To integrate environment and development through appropriate institutions, adequate legislation and economic incentives, and sufficient public resources;

- . Realizing the increasing importance of environmental problems in the country, Nepal passed a law in 1993, requiring sponsors of all development projects affecting the quality of the environment to prepare an EIA in order to evaluate the potential impact of a project on the general environment. This provision is embodied in Environment Protection Act-1 996 and its implementing Environment Protection Rules-1997 and subsequent amendment 1999. EIA aims to make development projects sustainable.

Separate EIA guidelines for forest and industry sector have also been formulated and implemented. Independent environment sections have been formed in some concerned ministries related to physical development, and the planning sections have been directed to work on environmental issues where there is no environment section. Though there are various provisions to protect environment and control pollution in the EP A, no effort has been made to institutionalize the process and the system in the sector agencies. Likewise, necessary knowledge and skill have not been disseminated to change working capacity and mentality of the people. The acts and regulations related with environment have not been effective due to the lack of integrated environmental policy, lack of co-ordination among various agencies, lack of adoption of holistic approach, and lack of awareness among general people on policy and guidelines.

2.2 Existing EIA Process

The EIA process looks at the possible effects of a proposed project on the environment. In particular, it evaluates the impacts of a project's construction including associated infrastructure, operations and decommissioning on the physical, biological and socioeconomic condition of the community where the project will be introduced. It identifies beneficial and adverse environmental impacts; examines the significance of the environmental implications; assess whether adverse impacts can be mitigated; recommends preventive and mitigation measures that will lead to the reduction of the negative effect to an acceptable level. The output from the EIA process presents decision

makers with the information necessary to determine whether or not a project should be implemented.

Under EPR-1997, projects are categorized as 'Proposals requiring Initial Environmental Examination (IEE)' and 'Proposals requiring EIA'. No person or entity is allowed to undertake or operate such projects without first securing an approval from the Ministry of Population and Environment (MoPE) or the 'concerned body'. More than 200 types of developmental activities must follow the environmental assessment process. MoPE reserves the right to accept or reject the EIA report of the prescribed proposal whereas the concerned ministries could approve the IEE report. Following is a brief description of the EIA process. A graphical representation of the EIA process is presented in the Annex I.

If the project is determined to come under Schedule-2 of EPR-1997, an EIA has to be carried out. After completing the work for project screening, scoping is undertaken with the aim of discovering the alternatives to the proposed activities of the project identified as having potentially significant impacts on the environment, selecting appropriate alternatives, and determining the issues to be considered during the environmental impact assessment. The scoping process is initiated and organized by the project proponent in coordination with the concerned agencies of HMG. It is the most critical step in the EIA process since this is where the key issues and concerns regarding the socioeconomic, environmental and other impacts of the project on the community are discussed and agreed upon by the various stakeholders. The terms of reference (TOR) for EIA is prepared on the basis of scoping exercise (Refer Annex II: Schedule-4, EPR-1997) and it needs to get an approval by MoPE. MoPE reserves the right to make minor changes or revision in such TOR as required citing the nature of the proposal.

After the scoping activity, the project proponent proceeds to prepare and submit an EIA report that conforms to the terms of references prepared on the basis of the scoping exercise. The EIA working team usually begins with the collection of secondary data from different sources and may supplement with primary data. The team then synthesizes the data, evaluates them, identifies impacts and proposes mitigation measures for

negative impacts. Based on the identified impacts and the proposed mitigation measures, an environmental management plan and monitoring plan is prepared. The EIA document prepared is placed for public review and the suggestions and opinions received from public are incorporated in the report.

The EIA review process is a critical activity upon which the decision to grant or deny the approval to a particular project is determined. In reviewing the EIA report, the MoPE conducts a series of meeting (usually three) involving members from the concerned ministry, the MoPE and experts from different disciplines. If the nature of the report is of direct relevance to public health (e.g. establishment of medical waste treatment facility), experts from public health are also invited in the meeting whereas in other cases public health specialists are not invited in reviewing the report. If the reviewing committee deems necessary for some changes in the report, the proponent has to make necessary changes and submit the revised report in the next meeting of the reviewing committee. In general, the MoPE grants approval within 60 days from the date of receipt of the proposal. The MoPE reserves the right to reject or approve the EIA report.

If the project is determined to be in Schedule-I of EPR-1997, an IEE process is required. The proponent prepares a work schedule in the format as indicated in Schedule 3 of EPR-1997 (Refer Annex II) for a report relating to such proposal and an approval is required from the 'concerned ministry'. Since the IEE is not a full-scale assessment, the data and information needed may come primarily from secondary sources like reports, studies and documentation of consultations with stakeholders. Based on the relevant information gathered, the identification of impacts and mitigation measures for adverse impacts are carried out. A simplified environmental management plan is prepared incorporating proposed mitigation measures and matters to be monitored while implementing the project.

Review of the IEE report is carried out by the 'concerned ministry' and an approval is given within 21 days if the investigations by the reviewing

† Based on interview with Mr. Bhai Raja Manandhar, MoPE.

committee finds no substantial negative impact on the environment on the implementation of the proposal. However, if the 'concerned body' finds it necessary to carry out an EIA, the IEE report is forwarded to MoPE. The proponent then has to fulfill all the formalities laid down by EPR-1997 for the preparation of the report of EIA.

2.3 Health Component of the Current EIA Process

Environmental Act, Rules and Guidelines issued in relation to the Nepalese EIA process identify the direct and indirect human health impact as one of the components in assessing the effect of development projects. However a careful review of the present EIA process reveals a marked absence of clear and definite human health indicators in the evaluation of the impact of projects on the community. In fact, a review of most EIA documents (Refer Chapter 3) has shown that the potential effect of the project on human health is inadequately tackled or in some cases completely not included. At most, the information usually available in this portion has contained a description of general health status data obtained from District Health Offices or Department of Health Services.

Furthermore, EIA review process has not stressed the importance of acquiring the information on the general health status of the community. This only serves to highlight the need to establish a reliable set of baseline data describing the health condition of a community prior to the start of a project. It is worth noting that while the EIA review committee includes experts from diverse fields such as forestry, road, water, etc.; it hardly includes medical and public health practitioners or environmental health experts (unless the project is of health sector) who may be able to provide the necessary expertise in evaluating the possible impact of development projects on human health.

Without giving high value to the human health, none of the development activity will become sustainable. For this, it is important that human health impact should be considered in each step of the EIA process. Proposed EHIA guidelines in Chapter 6 outlines how health can be integrated into the existing EIA process to fulfill the inadequacies in the health component of the current EIA process.

Chapter 3

Case Studies: Review of Environmental Impact Assessment Reports of Development Activities

Chapter Contents

This chapter provides a critical review of a range of EIA studies of development activities carried out in the kingdom of Nepal. The main focus was to review the health considerations undertaken in the EIA studies. The EIA reports from different sectors were collected and reviewed.

3.1 Melamchi Diversion Scheme Environmental Impact Assessment

3.1.1 Introduction

Melamchi Water Supply Project that aims to divert 510 million liters of water daily from Melamchi, Yangri and Larke rivers in Sindhupalchowk district, via a 28-km long tunnel, to Kathmandu. The first of the three phase project, which expects to be completed within next three to four years will divert 170 million liters of water daily. This EIA study was prepared in accordance with EP A-1996 and lending institutions regulations.

3.1.2 Current Situation of Health

A considerable investment was made in the collection and analysis of the baseline health conditions. A general overview of the current health situation of the project impact zone was given. Preventive, promotional and curative health care services available in the project affected area were listed. It was mentioned that many of the problems, limitation and

challenges described in the health sector were not specific to the project impact zone. On the contrary, they were typical for the situation in many parts of Nepal. Information about vital statistics including mortality/morbidity, major diseases, STDs, reproductive health, child health, nutritional status, local health resources, water and sanitation profile was provided.

3.1.3 Health Impacts

Positive as well as negative health impacts were analyzed. The report highlighted that the health benefits of a clean, plentiful supply of water to Kathmandu were many. In the local context in and around the construction sites in Melamchi valley - new job opportunities and an increased cash flow in the local economy and improved socio-economic conditions was implied as an improved public health status.

The negative health impacts identified were related to three different mechanisms:

- .Changes in the social environment brought about by the project generated population influx to the area
- Changes in the physical environment brought about by the construction activities
- Increased exposure to hazards in connection with construction activities and engineering processes

- ..The study reported that the majority of the potential negative health impacts associated with the project were likely to occur as a consequence of the first of these mechanisms i.e. population growth. Mainly the 'boom town' phenomenon due to the rapid growth of population in the project area could cause a sudden increase in demands and needs for almost all kind of services, including promotional, preventive and clinical health services. It was identified that due to the limited resources and the capabilities of the local government organizations, the external assistance was necessary to deal with these matters.

Magnitudes of the health impacts were illustrated in separate sections giving a high value for human health. The topics covered were Vehicle-borne Infections, STDs, HIV/AIDS, Vector-borne Infections, Malnutrition, Alcohol and Drug Abuse, Occupational Health Injuries and Disease (Injuries, Noise, Motor Vehicle Accidents and Trauma, Overburdening of Existing Health Care Services). The health impacts were rated as medium to high negative without the implementation of mitigation measures. Risk groups of the health impacts were identified and they were personnel to be employed by the MDS and the general population in the project impact zone.

3.1.4 Health Mitigation Measures

Most of the recommended mitigation actions were concerned with supplementary and complementary activities to the construction of the project and the manner in which the construction process was managed. The objectives of the proposed mitigation measures were:

- Avoid an increase in the rate of transmission of vehicle borne infections
- Avoid an increase in the rate of transmission of STDs, including HIV/ AIDS
- Avoid an increase in the rate of transmission of vector-borne infections
- Avoid an increase in the occurrence of malnutrition
- Avoid an increase in the occurrence of health problems related to alcohol and drug abuse
- Limit the occurrence of occupational injuries and diseases Limit the occurrence of motor vehicle accidents and trauma
- Avoid a reduction in the availability and quality of medical care

Specific mitigation measures focussing on community health and occupational health and safety were recommended. Establishment of a community health project in consultation with the local authorities was recommended to focus on various health issues arising due to the

development of Melamchi Diversion Scheme. It was proposed that an occupational health and safety program be established for all project related construction and operational activities. In order to limit the population influx to the area, it was recommended that workers be recruited locally as far as possible.

3.1.5 Health Monitoring

It was recommended that the continued monitoring of project impact on human health conditions be made as it is an essential element of the health impact assessment. It was also recommended that while the project is operating, it would be very important to monitor the impacts on local communities' health and simultaneously improve the mitigation measures if the negative impacts become visible.

Even though in this study human health considerations were discussed in detail, environmental health risk assessment was not carried out.

3.2 Middle Marsyangdi Hydroelectric Project (MMHEP) Environmental Impact Assessment

3.2.1 Introduction

MMHEP is a run off river type, to be constructed in the midhills of Lamjung district of Nepal. To examine the environmental issues of Middle Marsyangdi hydropower development, NEA had already accomplished IEE study at the Project feasibility stage in 1994 and an EIA in 1997 at the upgrading phase of the feasibility study. These studies concluded that the project was environmentally feasible and needed stringent mitigation plan implementation and effective monitoring of the project during its construction and operational periods. This EIA study was conducted during the tender design stage of project development that differed with the previous one due to change in project sitting and its features.

The NEA, as it is concerned to the financial arrangement and execution of construction works of MMHEP components and subsequent management and operation, is the project proponent. As stipulated in EPR, chapter-2, Rule-4 NEA thus bears the responsibility and has prepared this EIA report of the MMHEP in accordance with Rule- 7 and schedule-6 of the EPR for its approval from Electricity Development Department, Ministry of Water Resources and MoPE. This EIA study was limited to explore environmental consequences of the implementation of different components of MMHEP in the prevailing biophysical and social environment.

The report basically described the characteristics of the project and environmental situation. Physical, biological, social and socio-economic situations of the project affected areas were described. Field studies especially with regard to socio-economic database of the directly affected people and families identified were undertaken.

Baseline information included description of forest, vegetation and wildlife including fish species, the physical aspects, geology, drainage as well as river system and the climate of the project area. Environment survey on biological aspects relating to fisheries, wild life and terrestrial fauna, forest types and watershed management was carried out. Information on existing land use pattern of the project area, water supply system, road networks and traffic volume, energy source and consumption pattern, social infrastructure facilities (school, health posts, financing institutions), industrial and commercial establishments and operation, religious and cultural sites, gender balance and sensitivity, recreational facilities etc were collected and analyzed. Baseline monitoring data for air, water, noise and vibration were established at suitable locations within the project site.

Some service institutions at the district level were listed. The likely environmental impacts of project implementation. were analyzed for biophysical, social and cultural aspects in detail. The significant positive and negative environmental impacts associated' with the project components were identified. The mitigation and monitoring measures were proposed for identified negative impacts.

The Environmental Management and Action Plan (EMAP) was prepared with the objective of evaluating the effectiveness of the mitigation and monitoring measures adopted to minimize the environmental impacts and to enhance overall environmental conditions within the project affected areas.

3.2.2 Current Situation of Health

A very limited information regarding current health status of project impact zone was given. The general health status in the project affected area was mentioned 'not satisfactory'. The main health problems were reported to be ARI, diarrhea, dysentery, eye and ear related problems, asthma, typhoid, bronchitis, vitamin A deficiency, anemia and a few cases of malaria. Some health services available in the project area were listed. Health status in terms of households having sick family members were given. As per the report, very limited information regarding STDs, HIV and AIDS were obtained from health departments.

3.2.3 Health Impacts

No positive health impacts were mentioned in the report. On the contrary, some negative health impacts due to air, water and noise pollution of construction phase activity were identified. But the impacts mentioned were very general in nature. The increased level of dust in the adjoining areas of construction was identified as health hazard. It was assessed that this would have potential to degrade the general respiratory health of the communities close to the construction sites. Activities of the construction related workforce in the community wastes, springs and water supply intake, open defecation, haphazard dispose of waters were identified as potential health hazards to cause outbreaks of diarrhoea, amoebic dysentery, para-typhoid, hepatitis (A, E), food poisoning and cholera etc. Noise levels due to increased traffic to the area, ventilator and optional diesel plants located in the sites were identified as health hazards and risk to the roadside and adjoining communities. The other health concern raised in the report was the influx of population and emergence/ enhancement of STDs in the project area. Gen_ral occupational

accidental risks due to the nature of this project were mentioned. But occupational risks due to different components of the work were not identified. Risk of health due to malaria by the formation of reservoir was identified as very low.

3.2.4 Health Mitigation Measures

To minimize health related problem due to increased dust, noise and water pollution, some measures were recommended for strict implementation and monitoring. To check and minimize the health impacts related with the influx of the construction workers, some specific measures were recommended. A health and sanitation program was also recommended. Monitoring of health was not mentioned specifically.

The following deficiencies were noted in terms of environmental health considerations in the study:

- *The health aspects of environment were not addressed properly.*
- *The mitigation measures proposed were very general in nature which do not correspond to the impact identified*
- *No health impact was properly predicted and there were certain difficulties in justifying their occurrences.*
- *Monitoring and auditing plan was not proposed for the health impacts identified.*
- *Environmental health risk assessment was not carried out.*
- *A thorough identification of risk groups was lacking.*

3.3 West Seti Hydroelectric Project (WSHEP) EIA - Social and Land Use Studies

3.3.1 Introduction

This report on community health in the WSHEP was prepared to provide a baseline description of the existing situation and to predict likely impacts on health from the construction and operation' of the project. It was identified that the overall community health in the project area would be affected by the construction and operation of the project.

3.3.2 Current Situation of Health

The general level of community health in the project area was very low due to a combination of factors, inadequate medical facilities, a low literacy rate, poor hygiene and poor water quality. Health facilities present in the project area districts were listed. Incidence of common diseases, water related diseases, STDs and other infectious diseases and the main cause factors for the spread of such diseases were identified. Poor environmental sanitation, high rate of malnutrition, large family size, poor health facility were identified as some of the factors responsible for health problems in the area.

3.3.3 Health Mitigation Measures

Potential health impacts were identified and discussed in separate sections such as health impacts due to influx of workers, health impacts associated with water supply and sanitation, health impacts associated with the reservoir and health impacts associated with reduced river flows.

Specific mitigation measures were proposed for each potential health impacts identified. Mitigation measures proposed were highly practicable. A sanitation programme was proposed to improve sanitary conditions and public health of the community at large. Monitoring of health risks was proposed.

Though the report outlined various conditions of health in the community, the following deficiencies were noted in the environmental health aspect:

- *Environmental health risk assessment was not carried out.*
- *A thorough identification of risk groups was lacking.*
- *Monitoring and auditing plan was not proposed for the health impacts identified*

3.4 Kaligandaki. A Hydroelectric Project Environmental Impact Assessment

3.4.1 Introduction

The KG A project was 144 MW modified run-off river type hydroelectric project located on the Kali Gandaki river near the confluence with the Andhi Khola. This report was prepared in accordance with HMG's regulations and lending institution' (ADB) regulations.

3.4.2 Current Situation of Health

A general situation about the existing health conditions was described. It was identified that the sanitation facilities in the project affected area were very poor. Some common water related diseases present in the area were listed. Prevalence of malnutrition was identified in the project area.

3.4.3 Health Impacts

Some positive and negative health impacts were discussed. Standing water in construction areas was identified as potential health hazard since this could encourage the breeding of mosquitoes and increase the potential for malaria. The large number of workers could increase the potential for epidemics (infectious and communicable). On site education of workers regarding health and hygiene, focusing especially on preventive measures for many local diseases, would have indirect positive effects on the local population. The construction of water supply systems and subsequent monitoring of these systems for contamination, etc. would reduce the instances of waterborne diseases in the area. This would benefit both the project workers and local residents.

3.4.4 Health Mitigation Measures

Some mitigation measures for identified health and sanitation impacts were recommended.

Though mitigation management and monitoring Plan for identified environmental impacts were proposed, environmental health risk assessment was not carried out.

²KGA has proposed four basic documents to address environment, health, social and safety issues. Health issues were addressed in contractor's tender document. According to it, contractor was entitled to submit health and safety plan along with other environmental and social documents. At the implementation aspects, they had hospitals, doctors, medicine facilities, good quality of water and food being supplied to workers. However, during the EIA, much emphasis were not given for health aspects. So the project lacks baseline data. Because of lack of assessment of awareness, even project had cholera outbreak in earlier phase. This example of KGA necessitates the urgency of implementing EHIA for development projects in Nepal.

3.5 Fattepur Irrigation Sub-Project (FISP) Environmental Impact Assessment

3.5.1 Introduction

The FISP is located at Fattepur Village Development Committee in Banke District. The project started in January 1998 and is expected to be completed by December 2002. This scheme would provide irrigation facilities to about 2,078 ha of gross command area, equivalent to 1,800 net cultivable command area. As the proposed project exceeded 2000 ha, this EIA study was carried out as per Schedule 2 of the EPR-1997. The main objective of this EIA study was to assess the potential impacts of the project on the local environment and examine the significance of the environmental impacts.

3.5.2 Environmental Impacts

Existing environmental conditions of the command area were described. The study had identified both positive and negative environmental impacts during the construction and operational phases. The study had identified more positive impacts than negative impacts. In terms of negative impacts- clearance of 32 ha of forest seemed to be a major

²Source: Discussion with environmental engineer of KG A, Mr. Salil Devkota

impact. A brief outline on impact of social services including health and sanitation due to increase of construction workers were identified in the report. Health services available as well as prevalence of most common diseases in the project were listed. Health and sanitation facilities available in the area were identified as very poor.

This report has following deficiencies in terms of considering environmental health aspect of the workers and community:

- *Baseline health status of the project command area was not discussed*
- *Direct and indirect environmental health hazards were not properly identified*
- *Evaluation of potential health impact was lacking. Identification of risk groups and community exposures as well as prediction of health consequences were lacking.*
- *Environmental health risk assessment was not carried out.*

3.6 Environmental Impact Assessment for Disposal of Obsolete Pesticides

3.6.1 Introduction

This EIA report was prepared to analyze environmental impacts of disposal of obsolete pesticides. The specific objective of this proposal was to dispose less hazardous obsolete pesticides stocked in AC and CDB godowns. Obsolete pesticides are stocked pesticides that can no longer be used for their intended purpose and therefore require safe disposal. This report was prepared in accordance with the obligatory legal provision of EPA-1996 and EPR-1997. It identified that the possible sources of adverse environmental impacts were- handling of pesticides, transportation of pesticides containers, disposal and post disposal periods of pesticides. Environmental impacts on air quality, water quality, soil quality, local flora and fauna, labor force and local community were identified to some extent.

3.6.2 Environmental Impacts

Geology and biodiversity of the proposed disposal site were discussed. Degradation of air, water and soil quality within the periphery of the disposal site were identified as negative impacts. The overall significance of the effects on health was identified as low as local communities were relatively far from the disposal site.

It was mentioned that different mitigation measures should be adopted to reduce the environmental impacts. It was proposed that the environmental monitoring and auditing should be carried *out* after disposal of pesticides.

The following deficiencies in terms of environmental health considerations were noted in the report:

- *Baseline health status of the project command area was not discussed*
- *Identification of the direct and indirect environmental health hazards were not carried out.*
- *Identification of risk groups and community exposures as well as prediction of health consequences was lacking.*
- *Environmental health risk assessment was not carried out.*

3.7 Environmental Impact Assessment of Copper Sulphate and Copper Oxychloride Plant

3.7.1 Introduction

Pasupati Agrochem Nepal (P) Ltd. was a joint venture industry which planned to produce 6 different products including Copper sulphate and Copper oxychloride which fall under the definition of pesticides. The EIA was completed in accordance with the obligatory legal provision of Environmental Protection Act 1996 and Environment Protection Rules 1997. EPR demands *for* environmental studies and assessments for any establishment that produces pesticides irrespective of the production capacity. The main objective of this study was to identify and analyze the

significant environmental impacts. In general, some negative environmental impacts identified were air, solid waste and noise pollution.

3.7.2 Current Situation of Health

A very brief description about the current health and sanitation situation of the project site district was given. No impact on human health due to the implementation of the project was considered. Hence no mitigation measures on health impacts were proposed.

The study lacked a comprehensive view on environmental health impacts due to the implementation of the project.

3.8 EIA of the Feasibility study on the Construction of Kathmandu-Naubise Alternate Road in the Kingdom of Nepal

3.8.1 Introduction

The proponent prepared this EIA report in accordance with Schedule 2 of the Environment Protection Rules, 1997 (amendment 1999). This report was based on the Scoping Report and the TOR approved by the MoPE on June 13, 2000. Some physical, biological, bio-physical and socio-cultural impacts were identified. The magnitudes of the impacts were also evaluated.

3.8.2 Current Situation of Health

A very general situation about health and sanitation of the project-affected area was given. Deterioration of health or sanitary conditions due to the population influx were identified. It was mentioned that adequate and good health care services were lacking. There was no detail discussion about existing situation of health.

3.8.3 Health Impacts

Influx of workers during construction and lack of improved latrines in the area was identified to cause environmental sanitation problems.

This shows that no comprehensive study was carried out to identify the health impacts and recommend measures for identified health impacts.

3.9 Environmental Impact Assessment of Syuchatar Sanitary Landfill Site

3.9.1 Introduction

This EIA study was carried out to satisfy the provision of Environment Protection Act 1996 and Environment Protection Rules 1997. This report was about the Scoping Exercise carried out to analyze the possible impacts of the proposed Syuchatar Sanitary Landfill Site. Some possible impacts that may affect on physical, biological, environmental and socioeconomic were identified. Potential health hazards were not identified. The current situation of the health of the population was not studied. It is generally accepted that if the impact on human health is not considered in the Scoping Exercise, it is less likely that it will be considered in the later stages of the EIA process.

Thus, this study failed to identify health impacts in the Scoping Exercise. So the environmental health impact assessment guidelines is needed to guide the assessors to take an account of health impacts in the environmental assessment.

3.10 Stakeholder Analysis, Social and Environmental Assessment: In the Context of the Proposed Rural Infrastructure Project in 1996

3.10.1 Introduction

The proposed rural infrastructure project under the World Bank was to be implemented in eight districts of Nepal. The project aimed at strengthening relevant agencies and help achieve sustainability of the rural infrastructure particularly the rural roads. The, study analyzed

different stakeholders involved in the rural road development process in Nepal taking into consideration particularly of the social and environmental aspects. This was not an EIA study. However, as this study presented an assessment on social and environmental aspect of the proposed rural infrastructure project, this review was done to see how environmental health impact considerations were taken in this project.

One of the specific objectives of the study was to carry out an environmental analysis which would identify likely impacts of the project, proposing criteria to identify project sub-components with potentially significant impacts and corresponding prevention, mitigation and cooperation measures.

Potential environmental impacts identified were Soil Erosion/Conservation; Slope Destabilization/Stabilization; Soil and Construction Waste Disposal; Soil Borrow Areas/Pits; Quarry Areas; Water Flow Modification; Soil and Water Contamination; Vegetation Deterioration/Improvement; Deforestation/ Afforestation; Settlement Growth; Dust Pollution; Household or Structures Displacement. All the environmental impacts were identified from the point of harm to the environment without taking consideration of impacts on human health. Some mitigation measures were proposed for identified environmental impacts.

It appears that the study did not try to carry out full-scale environmental impact assessment of the proposed project citing reasons that the objectives of the project were not to construct any new roads but to support in maintenance and rehabilitation of the existing roads. Consequently this study completely did not assess the impact on human health due to the implementation of the project.

This shows that a need of environmental health impact assessment is necessary for the protection of human health.

3.11 Overall Shortcomings in Health Considerations

Though some of the studies have thoroughly considered about health impacts due to the project implementation, some common deficiencies were noted in most of the reports. Baseline health status was not established in many studies. Direct and indirect environmental and occupational health hazards in construction, operation and decommissioning of the project were not identified in detail. Risk-groups identification was lacking in most of the studies. Predictions of health consequences were not carried out. Indirect health determinants were not assessed. Comprehensive control and mitigation measures for health were not proposed. Monitoring and auditing plan for health was not included. Most of the studies did not carry out environmental health risk assessment. Provision for identification of environmental health hazards after the decommissioning of the projects was not included.

To overcome this shortcomings an EHIA guidelines has been proposed in the Part II of this document which will guide the proponents, environmental assessors and others in this field to consider the health impact assessment component of current EIA process.

Chapter 4

Health Hazards and Risks from Environmental Problems

Chapter Contents

This chapter reviews linkages between environmental problems of Nepal and their associated health hazards and risks. This chapter serves both as a 'justification' for EHIA, by giving concrete relevant examples, and as an 'information source' to refer to for background on typical environmental problems associated with development projects, their health hazards and communities at risk. The objectives of this chapter are to identify a range of typical environmental problems associated with development activities, give common examples of health hazards and health risks resulting from these environmental problems in general.

4.1 Health Hazards, Risks and Impacts

A *health hazard* has a potential to cause ill-health. A *health risk* indicates the extent to which the potential is realized. A *health impact* is any change in health risk that is reasonably attributable to a project, program or policy. Some health hazards have an acute and rapid onset and may result in relatively sudden death. These include malaria, diarrhoea, acute poisoning and traumatic injury. Other health hazards have a latent period, or require long-term exposure/deprivation before becoming evident. These include dust induced lung disease, some forms of schistosomiasis, AIDS, cancer and sensory impairment (World Bank, 1997).

Identification of health hazards needs to be systematic and comprehensive. Matrix 1 gives an overview of some health hazards associated with sectoral activities. The matrix, should help the proponents/assessors decide whether: a) a project may result in health hazards and b) the risks are sufficient to warrant a detailed health impact assessment (World Bank, 1997).

Matrix 1. Indication of some potentially positive or negative health impacts by sector

	SECTOR																						
	Agriculture and rural development	Irrigation schemes	Integrated pest management	Forestry & agro-forestry	Industry and Energy	Oil and gas	Hydropower construction	Mining/smelting	Manufacturing & processing	Infrastructure	Water dam construction	Roads or rail constructions/rehabilitation	Ports and harbors	Airports	Water treatment/supply	Wastewater treatment and disposal	Solid waste management	Housing construction or rehabilitation	Air pollution controls indoor & outdoor	Temporary construction (all sectors)	Construction camps, townsite	Temporary facilities & cover-crowding	
Communicable diseases																							
Associated with human behavior																							
STDs and HIV							+	+			+	+	+									+	+
Hepatitis B & C											+	+	+									+	+
Associated with unsanitary conditions																							
Diarrhoeal Diseases		+					+		*						●	●	●	●				+	+
Intestinal nematode infections								+	*						●	●	●	●				+	+
Tuberculosis								+										●	●			+	+
Other respiratory infections								+										●	●				
Vector borne diseases																							
Malaria		+		+							+				*			●					
Schistosomiasis				+							+				●								
Leishmaniasis		*		+											●		●	●				+	+
Dengue fever				●											●	●	●	●				+	+
Filaria													+		●		●	●				+	+
Japanese Encephalitis		+					+				+											+	+
Childhood diseases*																							
Non-communicable conditions																							
Exposure to chemicals (Pesticides, acids, etc.)		+	+	+		+		+	+						●	*	*						
Respiratory diseases								+	+										●			+	+
Injury: Unintentional																							
Traffic related injuries								+				+	+	+								+	
Occupational (falls, fires, other)				+		+	+	+	+		+	+	+					+				+	+
Communal violence																		+				+	+
KEY	+ Project may potentially increase risks of disease or condition													● Project may potentially decrease risks of disease or condition					* Potential health impacts of project may be positive or negative.				
* Note: Childhood diseases within this category include pertussis, poliomyelitis, diphtheria, measles, and tetanus.																							

4.2 Water Pollution and Its Health Impact

Water pollution is considered a serious environmental problem especially in the urban areas of Nepal. Two kinds of water pollution exist viz. surface and ground water pollution. The main sources of pollution in the main rivers, crossing the urban as well as the rural part, are considered to be domestic, industrial wastewater and agricultural wastes such as pesticide and fertilizer residues. Domestic wastewater results from the large population of the main city and its main peri-urban area. Industrial wastewater comes from various industries. These industries release their effluents to surface waters without any treatment. The pollution problem intensifies in the dry season when the flow of the rivers decreases. Heavy metal pollution is also a serious problem in surface water.

The main health hazards resulting from pollution of surface waters are:

- Communicable diseases such as parasite infections, hepatitis, summer diarrhoea and typhoid.
- Non-communicable diseases such as heavy metal toxicity.

The health risk associated with these hazards can evolve when the untreated surface waters of these rivers are used for irrigation or when the polluted waters reach the ground water and that is used for drinking. Similarly, the use of such water for bathing and other recreational activities.

The main sources of ground water pollution are industrial wastewater, domestic wastewater and agricultural wastes. Groundwater is the main source of drinking water in the Terai region of Nepal.

The principal health hazard of ground water pollution are communicable diseases such as typhoid, summer diarrhoea and parasite infection; and non-communicable diseases which may arise from the high levels of nitrate or phosphate or pesticides in the ground water. Again, the risk evolves when using polluted waters for drinking or for irrigation. Non-communicable diseases such as heavy metal toxicity may also occur.

4.3 Air Pollution and Its Health Impact

Air pollution is considered a major environmental problem in urban areas. The main causes of air pollution are (SAEHN, 2002):

- Transport, which is responsible for >50 % of air pollution.
- Poor conditions of the roads.
- Industries such as brick factories, cement factories and fabric industries.

Biomass burning especially in the rural areas as well as tobacco smoking cause indoor air pollution. The health hazards resulting from such pollutants vary according to the type of pollutant, its concentration in the air and the mode, time and frequency of exposure. Respiratory diseases, eczema, ophthalmic diseases and cancers are all examples of health hazards, which results from different types of air pollution.

The communities at risk are those living in highly polluted areas, inhabitants of informal residential areas and those, such as transport workers, street vendors and traffic police, whose occupations may result in their high exposure to air pollutants. Especially vulnerable community groups are children, elderly people and those suffering from respiratory, allergic or cardiac problems.

4.4 Soil Pollution and Its Health Impact

Soil pollution in agricultural land is an emerging environmental problem in the context of our country. Dumping of solid wastes, uncontrolled use of pesticides/fertilizers and industrial effluents are some common sources of soil pollution. Soil pollution can be hazardous to health if plants intended for human consumption are grown in contaminated soils or when soil pollutants such as fertilizers, pesticides and heavy metals percolate to ground water which is used for irrigation and drinking purposes. Health risks-from soil pollution depend on the type of pollutants, their concentrations in the soil and their bio-availability. However, there is little or no information on measurements of soil

pollution in our country. This makes it rather difficult to assess the health risks resulting from it.

Health risks are posed to the community who consume vegetables grown in contaminated soils or who uses water that has percolated through contaminated soil.

4.5 Solid Waste Pollution and Its Health Impact

Solid wastes consist of domestic, hospital and industrial wastes. These can pose several health hazards because of the following factors:

The mode of disposal of solid wastes: Most solid wastes are disposed in landfills, most of which are located on the outskirts of cities. Heaps of garbage are dumped alongside the street, riverbanks and other public places. These exposed waste disposal areas have the potential to cause serious health risks such as infantile diarrhoea and dysentery because they provide a feeding and breeding site for flies and rats. Most of hospital and industrial wastes are mixed with municipal wastes and taken for disposal. Hospital waste can be highly hazardous for health because it may contain toxic chemicals, contaminated syringes and other medical wastes that can result in serious health risks such as HIV or hepatitis infection.

Scavengers or waste pickers: Scavengers search the rubbish tips for disposed cans, plastic containers, bones, bread and food left-overs. Many of the waste pickers are children. Health hazards to those waste pickers may include hand and leg injuries, intestinal and respiratory infections, eye infections and exposure to hazardous waste. They can get infection of HIV, Hepatitis and tetanus by injury. Additionally, some of the recycling processes can be hazardous such as the re-use of collected bread and food as an input in human food; collected plastic containers for preserving food and drinks; and collected egg cartons to hold sweets and food can result in serious health risks to the consumer.'

4.6 Rapid Urbanization and Informal Settlement Areas

Rapid urbanization is a growing phenomenon in most cities. Cities are growing fast because of increased migration from rural areas. This phenomenon is putting more and more pressure on the limited infrastructure and services in urban centers. Many of the migrants have settled in the outskirts of the cities. These informal residential areas have grown rapidly and are now home to a substantial proportion of the population of cities.

The housing in these areas lacks basic healthy conditions. The air quality is poor both indoors and outdoors. Proper sewerage systems and potable water distribution systems are absent. This situation of poor living conditions and lack of basic services can lead to the outbreak of various diseases such as acute respiratory infections, tuberculosis, pneumonia, influenza, meningitis and intestinal infections. Some studies indicated that waterborne diseases such as cholera, typhoid and diarrhoea exist predominately in informal settlement areas.

Chapter 5

Issues That Need to be Addressed to Facilitate Environmental Health Impact Assessment

Chapter Contents

This chapter reviews some of the factors that need to be taken into consideration to enable EHIA process, specifically in relation to policy adjustment, institutional framework and arrangements, the planning process for development projects, and the guidelines for environmental impact assessment. This chapter also points out sources of information that can help with EHIA implementation.

5.1 Current Health Policy

Although the current health policies and legislation and goodwill may be sufficient for action, a fresh policy statement committing the Ministry of Health and Ministry of Population and Environment to EHIA of development projects would facilitate carrying out relevant activities. Ideally, proposing a definitive, precise and clear EHIA policy statement backed with appropriate legislation should be aimed at a near future goal.

5.2 The Need to Put Health Concerns on the Policy Agenda

Policies are the decisions about courses of action adopted by a government or other bodies for the achievement of certain objectives. They form the framework within which particular programmes and projects are designed. However, policies can be modified or changed, either because of new scientific findings or because of a changing political or economic climate. It is sometimes the duty of experts to try to educate politicians about the need for a policy change.

Policies designed to improve the economic conditions and living standards of communities often have unintended effects on health. In most cases, the health sector must assume responsibility for the treatment and control of the negative health consequences which arise largely from circumstances or policies beyond its control. Thus, health policy is not a matter solely for the health sector, and it is now increasingly accepted that there should be health objectives in all development projects.

Numerous obstacles, however, hinder the prediction and measurement of health risks arising from development projects. Planning officials, whether from the health or other sectors, are rarely adequately trained in assessing effects on health. The process of assessment is hampered by poor background data on the population affected, by time restrictions, and by limited financial resources.

Often, even when health consequences are considered, the project modifications required to prevent ill-health may not be undertaken. Sufficient resources may not be available to support the health services needed to treat or control the anticipated health problems. Even with adequate resources, inter-sectoral co-operation in development planning is difficult to achieve. It is especially difficult to change broad national development strategies that have negative health consequences.

Policy adjustment is required in order to confront the health hazards associated with development projects. Action without consultation by different sectors is identified as the main factor engendering disregard and neglect of human health. A policy of integrated project development is required, with carefully planned support for health maintenance in and around development projects.

5.3 Inter-sectoral Collaboration

Inter-sectoral collaboration is a pre-requisite for successful EHIA of development projects. Co-ordinated multi-sectoral effort involving health and environment as well as development planning and implementation sectors is essential for a sustainable EHIA. This is probably one of the most complex issues that needs to be tackled. Though all sorts of inter

sectoral co-ordination committees exist but their proper functioning will depend on political will and individual commitment of personnel involved more than on anything else. Therefore advocacy, awareness raising, sensitization and orientation of decision makers at all levels is necessary.

5.4 Strengthening Existing EIA Guidelines With Respect to Health

EIA is undertaken in response to environmental laws that have been enacted. The current definition of EIA fail to refer to human health. The reason for this is probably that the health issues of interest are limited. Particular concerns are prevention and control of air, water and soil pollution to limit hazardous effects on people's health. However, there are many other health concerns and these include malnutrition, injury and psycho-social disorder as well as the more traditional communicable diseases. These other health concerns are often far more important than pollution impacts in the context of our country. The first step in strengthening EIA guidelines is then simply to include an explicit reference to human health. Furthermore, the responsibility of the EIA/Environment Unit in MoPE and in other ministries should be in controlling all activities with actual or potential impacts on the environment *and human health*. Also, the EIA unit needs to be staffed with experts specialized in relevant disciplines including a *public health specialist*.

5.5 Sources of Information

EHIA must always include the collection of information, knowledge and data about a project in order to reach an informed conclusion about health impacts. The available information is often incomplete, biased or uncertain. It ranges in certainty from the scientifically tested, through probable to speculative. It ranges in the degree to which it can be quantified from numerical, through ranking, to purely qualitative. All this evidence is valid provided that the assessment is explicit about the assumptions and uncertainties that are included. Sources of information usually available are discussed below.

5.5.1 Government Health Statistics

Government compiles medical statistics based on the records of people seeking medical care from hospitals and health centers such as primary health care centers, health posts, sub-health posts. Quality of data is very poor because of under-reporting and poor record keeping. Not all diseases are reportable. However, the data should suggest which diseases are most common in a district, region or village and enable them to be ranked. In most regions, the most common causes of illness will be listed as water-borne disease and respiratory disease.

5.5.2 Key Informant Interview

The assessment will often be based on a series of interviews with key informants. A careful record should be kept about who was interviewed, when and where. These informants will include experts associated with the project and institutions that have a duty to protect human health. Examples may include transport officials, departments/ministries responsible for labor, public works, irrigation, the environment, agriculture and industry.

There are many different departments and divisions within the Ministry of Health including public health. Every district in Nepal has one District Public Health Office. As the Ministry of Health is usually under-funded, it diverts most of its funds into curative medicine. Consequently, public health offices have not received much attention so that their value as sources of information may be far lower than expected.

Academic institutions often contain specialists with a detailed knowledge of some aspects of the problem. For example, parasitologists may have conducted special surveys of the project community to determine the prevalence rate of particular infections such as intestinal nematodes. These individuals may provide a relatively independent and unbiased view that can be compared to that of official statistics. In any case, all the interviews should aim at triangulation. This is the process of obtaining more than one set of information to support, corroborate or reject conclusions and opinions of others.

5.5.3 Literature Review

The best predictor of what will happen on a new project is the example of what has happened on similar projects in the same country or overseas. Information of this sort is often compiled by scientists and published in journals and books. It may also have been compiled in reports but not published. Unpublished reports are a valuable source of information but difficult to obtain. They are often stored in the libraries of consultancy companies, donor agencies, non-governmental organizations and UN institutions.

Part II

(EHIA Process/Guidelines)

Chapter 6

Environmental Health Impact Assessment Process

Chapter 6

Environmental Health Impact Assessment Process

Nepal is a developing country and many development activities are carried to uplift the economic status of the country. However, the country is faced with the concern of balancing the interrelationship, first, between economic activities and its impact on the environment, and second, between environmental degradation and its impact on human health. To date, project proponents, decision-makers, planning and regulatory agencies do not seem to acknowledge that these two interrelationships must be taken together in assessing the impacts of development projects rather they have put more emphasis on the first.

Since the introduction of the EIA in Nepal, policies and guidelines for assessing the impacts of development projects have always given greater emphasis on the effects to the environment. In this regard, it seems necessary to expand the current EIA to integrate a more definite and comprehensive procedure for assessing the impact of development projects on the health condition of the people in the community and in the workplace.

Chapter Contents

The chapter recommends the general guidelines for EHIA preparation and implementation. The techniques for conducting EHIA have also been suggested.

6.1 General Guidelines Implementation for EHIA Preparation and Implementation

The following general guidelines are intended to facilitate the preparation and implementation of environmental health impact assessment. These

guidelines are generic in nature and can be applied to any development projects. These guidelines may be used by project proponents, decision makers and implementing agencies engaged in reviewing EIA documents. In the preparation of the EIA documents, it is important that environment and health impacts are considered together. In fact, EIA and EHIA must be approached in an integrated manner in all steps of the EIA process from screening and scoping to compliance monitoring and evaluation.

The scope of EHIA covers the health impact assessment of the development projects (includes new project and project for expansion in terms of operations or area or modification of processes).

6.1.1 Establishment of Baseline Health Status

The EHIA shall include appropriate primary and secondary health data about related activities/projects for purposes of establishing the baseline health status of the 'affected' community. This will help evaluators determine possible correlation between the construction, operation and decommissioning of projects and the changes in the health status of the people within the community associated with environmental changes brought about by the project.

6.1.2 Identification of Hazards and Evaluation of Potential Health Impact

The EHIA shall be able to identify and evaluate the potential environmental health impact, whether adverse or beneficial to affected communities. Identify potential health hazards posed by the introduction of project into a particular area will provide project proponents with the opportunity to adopt necessary changes or measures to mitigate, if not to totally eliminate possible adverse effects to the community.

6.1.3 Identification and Assessment of Community Exposure

The EHIA shall be able to identify the possible routes of exposure of the project affected community. Should projects prove to be damaging to the

environment and particularly to human health, the determination of potential routes of exposure will be important in preventing or controlling the adverse impact of these projects. Providing information on the sources of potential hazards will facilitate the identification of potential routes of exposure for the community and the workers.

6.1.4 Identification of Risk Groups

The EHIA shall be able to identify risk groups who have a higher probability either of exposure or developing the adverse health effect. This will be facilitated by the knowledge of the demographic profile of the affected communities, the expected movement of people due to immigration and the geographical location of the project in relation to where these communities are situated. The identification of the risk groups will be very significant in identifying means of protection and cure for those who will be affected.

6.1.5 Prediction of Health Consequences and Outcomes

The EHIA shall be able to predict health consequences and outcomes, whether these are direct or indirect effects of the development project or whether they result with or without the project. Among the direct effects are acute and chronic poisoning, respiratory diseases, skin diseases, cancer and injuries while among the indirect effects are sexually transmitted diseases (STDs), psycho-social dysfunction, alcohol and substance abuse, malnutrition and violence. The EHIA shall also include a discussion on the perceived or expected health trends should the project be allowed or disallowed to operate.

6.1.6 Assessment of Indirect Health Determinants

The EHIA shall include a discussion and assessment of the indirect health determinants of the community residents like water supply and sanitation, access roads, increased income, electricity and public health services. These factors have significant impact on the health of the people because they determine accessibility to factors that have direct impact on the general health condition of the people.

6.1.7 Control Measures

The EHIA shall include a discussion on the control measures that must be undertaken to prevent or minimize environmental health impact to communities and workers where projects are introduced. This will ensure that the proponents in the construction, operation and decommissioning phases of their projects pro actively consider the health and welfare of the community and the workers.

6.1.8 Mitigation Measures

The EHIA shall have a thorough discussion on the mitigating measures that must be put in place to minimize the adverse health consequence should the control measure fail and the environmental health hazard is released. Other mitigating measures may include community livelihood programs, environmental management program, occupation health and safety program, and health emergency preparedness plan.

6.1.9 Monitoring and Auditing Plan

The EHIA shall include a monitoring strategy and auditing design to keep track of the changes in the health situation of the affected community throughout the construction, operation and decommissioning of the development project.

6.2 EHIA Coverage of Proposed Development Projects

In parallel to the existing EIA guidelines and practice as' implemented by MoPE, EHIA shall be conducted on all projects under Schedule-2 of EPR-1997. The existing EIA review committee in the MoPE shall review the EHIA component of the EIA report. However, a public health and/or environmental health expert must be included in the reviewing committee. Projects that fall outside Schedule-2 of EPR-1997 shall prepare a Health and Safety Management Plan (Refer section 6.6) instead of a full blown EHIA. The concerned ministry shall review the Health and Safety Management Plan. .

Fig. 1: Flow of Activities in EIA and EHIA Processes

EIA Flow Chart

<p>Project Requiring EIA</p> <p>Preparation of Scoping and TOR Approval of TOR by MoPE</p> <p>Preparation of EIA Report by proponent and submission</p> <p>EIA Report Review by MoPE</p> <p>Approved, not approved or resubmission</p> <p>Monitoring by MoPE</p>	<p><u>Screening</u></p> <p><u>Scoping</u></p> <p><u>EIA Preparation</u></p> <p><u>Document Review</u></p> <p><u>Approval</u></p> <p><u>Monitoring and Evaluation</u></p>	<p>Project Requiring EIDA</p> <p>Health Hazard listing Identification of Risk groups Identification of important environmental factors Evaluation of capabilities of stakeholders, etc.</p> <p>Preparation of EHIA and submission</p> <p>Evaluation of EIDA</p> <p>Approved, not approved or resubmission</p> <p>Monitoring</p>
--	--	---

The Fig. 1 shows the EHIA process in comparison to EIA process. The EHIA process and flow of activities are designed in a way so that it is easy to integrate into the existing EIA process. It is not the intention of this document to have a separate EHIA report. The EHIA process data should be contained in a separate chapter on Health in the EIA report submitted for review to the Ministry of Population and Environment.

6.3 Techniques for Conducting EHIA

This section provides a detailed explanation of the stages and components for carrying out an EHIA. The EHIA process and flow of activities are designed in a way so that it's easy to integrate into the existing EIA process.

6.3.1 Screening

The purpose of screening is to identify which projects are likely to have environmental health impacts. Screening for projects must consider the following:

- The environmental and occupational health hazards that will be generated during project construction, operation and decommissioning to which workers and impact communities may be exposed. This includes screening for hazardous and hazard generating project operations and materials i.e. operation or production processes, raw materials, intermediate products, by-products, finished products and waste products. Occupational and environmental health hazards generated by development projects may be classified into either direct or indirect health hazards. Direct health hazards can be further sub-classified into 1) physical, 2) chemical, 3) biological and 4) ergonomic health hazard.
- Physical hazards may include noise, vibration, radiation or extremes of pressure or temperature. Workers involved in the various phases of a project life cycle are the most exposed risk groups to physical hazards.
- Chemical hazards come in a variety of forms (solid, liquid and gas) which have the potential to cause adverse health effects to both workers and the community.
- Biological hazards are encountered in development projects which release microbes and biologically contaminated 'waste materials or if the project is located in areas endemic for certain diseases such as malaria and schistosomiasis.

- Ergonomic hazards are predominantly found in the workplace. Outcomes of these hazards may include poor productivity and adverse health conditions e.g. RSI (repetitive strain injury), low back pain etc.
- Indirect health hazards to the community may include economic dislocation, inadequacy or disruption of social services, and community disintegration as a consequence of development. *For example 'boom towns' effect due to in-migration of workers which may result in increasing crime rate, prostitution, drugs, STDs alcohol etc.*
- The exacerbation or reduction of the magnitude of existing endemic diseases such as malaria, filariasis etc. and other diseases (if present) brought about by the construction or operation of the project should be considered.
- Pre-existing communities near the project site where high-risk groups vulnerable to the adverse effects of the project may be located. This includes indigenous cultural communities, communities with significantly high proportion of children and elderly, communities with significantly high incidence or prevalence of communicable or non-communicable diseases and with limited access to medical and health services.

6.3.2 Scoping and Profiling

The purpose of the scoping is to identify the health effects that should be addressed in the EHIA. The types of health effects during scoping will vary enormously depending on the size and nature of the project, the health of the potentially affected communities and the social, economic and cultural context. Aspects of health that shall be taken into consideration are shown in Table 6.1.

Feature	Characteristics
Hazardous agents	Microbiological virus-bacteria Chemical - heavy metals and organic chemicals Physical- noise, dust, radiation, vibration
Environmental factors	Changes in the quality or availability of water, food, air, land and soil Waste management practices Physical safety and security Disease vectors
Exposure conditions	Human exposure pathways- food, air, water, etc. Occupational exposure Identification of risk groups
Effects on physical health	Mortality Morbidity- communicable and non-communicable diseases, acute and chronic effects Injuries and accidents Effects on future generations Effects on high-risk groups Exacerbation of existing health conditions e.g. asthma Cumulative effects
Effects on health care services	Incremental health care needs Displacement of traditional health care services
Other effects	Effects on income, socio-economic status and employment Effects on municipal revenues and local industries Migration and re-settlement Effects on social and community health including effects on culture and way of life Effects on services e.g. education, social support networks etc. Effects on psychological well being e.g. Stress, anxiety, nuisance, discomfort Beneficial effects on health

(Source: Health Canada, 2000)

6.3.2.1 *Environmental Health Hazard Listing*

Review of the location and process flows of the development projects will enable the proponent in the initial examination to come up with a hazard listing. This can be classified into physical, chemical, biological, ergonomics and indirect health hazards for ease of the analysis. The list should be comprehensive enough to cover the significant health hazards and receptor groups.

6.3.2.2 *Identification of Vulnerable Populations and Other Significant Stakeholders*

Everybody affected in any way by a project under consideration is called a stakeholder. There are usually many different communities affected by each project and each community will be vulnerable to different combinations of health hazards. The process of identification may include the listing of vulnerable sectors in the impact community (children, elderly, sick, unemployed etc.) and other stakeholders such as NGOs, media, government agencies, which may be affected either directly or indirectly by the project. No project can be considered sustainable if it fails to determine the fears and concerns of the affected communities and to act upon them.

6.3.2.3 *Identification of Important Environmental Factors*

It is necessary to review important environmental characteristics of the proposed project location, which can increase/decrease the adverse health impact of the project to its workers and the community.

Examples of

important environmental factors that need to be reviewed are: i) inadequacy of transportation and communication facilities in the area, ii) low literacy rate of the general population iii) inadequacy of health and other social services, iv) limited local government's capability and resources.

6.3.2.4 *Evaluation of the Capabilities of Project Proponent, Local and National Government Agencies, the Community, NGOs and the Private Sector*

The capabilities of different sectors should be evaluated vis-a-vis their ability to assist in the prevention, control and mitigation of identified health hazards either through provision of direct services, dissemination of information and conduct of training, monitoring and surveillance etc.

6.4 Environmental Health Risk Assessment Process

Environmental health risk assessment (EHRA) is a tool to identify, evaluate and control environmental health hazards. Outputs of the environmental health risk assessment process are useful in the prioritization of health hazards as well as in the design of prevention and control systems by the project proponent. The main objective of an EHRA is the protection and promotion of the health of workers and communities affected by development projects. The cornerstone of an . EHRA is the identification of environmental health hazards, assessment of risk to health of workers and impact communities and the design of control and mitigating measures to reduce the risk to as low as reasonably practicable.

Risk to health from environmental health hazards can be estimated using qualitative and quantitative strategies. Qualitative health risk assessment as a prioritization tool is used in situations where there is difficulty in obtaining accurate data and records on the factors that determine health risks. Experience in developing countries indicates the usefulness of qualitative techniques in environmental health risk assessment.

Qualitative health risk assessment involves the following steps:

a) Identification of adverse health consequences on the human receptors and rating them based on the severity of ill-health (health consequence rating);

- b) estimation of the probability of occurrence of the exposure incident. This can be estimated using the exposure rating technique or the incident potential rating technique.
- c) integration of the adverse health consequence rating with either the exposure rating or the incident potential rating to come up with a health risk prioritization matrix that becomes the basis for planning and prioritization of control and preventive measures.

The health consequence rating, incident potential rating and exposure rating as well as the health risk assessment matrix are explained in the following sections. These have been adopted from *Environmental Health Service*, 1997.

6.4.1 Health Consequence Rating

The severity of potential ill health is based on the hazardous properties of the agent and the adverse health impacts on the workers and community residents (receptors). A health consequence rating is given to adverse situations during the construction, operation or decommissioning of the development projects, which lead to the release of the environmental health hazards and the exposure of vulnerable receptors. This is usually done using worst scenario assumptions.

I

Health Consequence Rating

Consequence Rating	Definition (in terms of potential to cause harm to people)
1	Slight Injury/Illness: Not affecting work performance or activities of daily living, nor cause disabilities or morbidities to members of the community. -Agents not hazardous to health
2	Minor Injury/Illness: Affecting work performance (restricted work case) or activities of daily living (schooling, cooking, washing clothes) or a need to take a few days off to fully recover the activities of daily living. -Agents with limited health effects which are reversible e.g. skin irritations, food poisoning bacteria)
3	Major Injury/Illness: Resulting in a permanent partial disability or affecting work performance or activities of daily living of vulnerable members of the community in the long term. -Agents capable of irreversible damage without serious disability (e.2. noise, ergonomic hazards)
4	Permanent total disability or fatality (small exposed population) -Agents capable of irreversible damage with serious disability or death both to workers and vulnerable members of the community (e.g. acids, and alkalis in the laboratory, chemicals with known human carcinogen released to the environment)
5	Multiple fatalities (large exposed population): -Agents with potential to cause multiple fatalities (e.g. chemicals with toxic effects and known human carcinogens especially if released into the air, soil and water media, like H2S gas, heavy metals, pesticides).

6.4.2 Incident Potential Rating

Incident potential rating involves the review of historical incidence or occurrence of events leading to environmental health hazard exposure of workers or impact communities or to the release of the hazard into the environment. This strategy relies heavily on available records and information of past events in the country where the development project

is being constructed or somewhere else in the world where a similar project is already in-place and operational.

Incident Potential Rating

Incident Potential Rating	Definition
Very Low (A)	Unlikely to happen
Low (B)	Theoretically possible to happen but no report of its occurrence is available locally or abroad.
Medium (C)	Has happened once in Nepal or abroad in an industry or development quite similar to the project being proposed
High (D)	Has happened more than once in Nepal or abroad in an industry or development quite similar to the project being proposed
Very High (E)	Has happened during the operation of similar development owned and operated by the project proponent in other parts of Nepal or abroad

6.4.3 Exposure Rating

Exposure rating estimates the chance of over-exposure from environmental health hazards of the worker of the impact community through the evaluation of existing development facilities and control measures. This strategy is very useful for risk assessment of expanding development projects where the development is already existing and in-place.

Exposure Rating

Exposure Rating	Definition
Very low (A)	Exposures are negligible.
Low (B)	Exposures are controlled and likely to remain so in accordance with ideal preventive measure criteria.
Medium (C)	Exposures are currently controlled and meet control measure standards, but control cannot be assured.
High (D)	Exposures are not adequately controlled to meet standards and continuously or regularly exceed occupation and / or community limits.
Very High (E)	Exposures are excessive and will almost certainly result in health damage to workers or community residents exposed.

6.4.4 Risk to Health matrix

The risk to health matrix shown below is an integration of the health consequence rating with the incident potential rating or exposure rating. This is an effective tool in the prioritization of environmental health hazards for future courses of action.

Health Risk Matrix

Consequence Rating	Harm to People	Exposure rating or Incident potential rating				
		Very Low (A)	Low (B)	Medium (C)	High (D)	Very High (E)
1	Slight injury/illness	9	8	7	6	5
2	Minor injury/illness	8	7	6	5	4
3	Major injury/illness	7	6	5	4	3
4	Permanent total disability/fatality	6	5	4	3	2
5	Multiple fatalities	5	4	3	2	1

For both exposure rating and incident potential rating matrices, the environmental health hazards identified and evaluated can be given a priority score that can assist in determining not only the magnitude of the risk involved but the need to prioritize control and mitigating measures.

6.5 Contents of the Environmental Health Impact Assessment Report

In response to the need for a more extensive environmental health impact assessment component in the current EIA process, the project proponent should provide the following data. These data should be contained in a **separate chapter on Health** in the EIA report submitted for review.

6.5.1 Baseline Health information

-Baseline health information is useful in determining changes in the original health profile of workers and communities within the project affected area through time. Baseline information can be obtained from secondary data sources available in the district and zonal health offices. However, in our country health data obtained through the public health system are often incomplete and with a wide range of variability and limited accuracy. Despite these limitations, available data can still

provide a general estimate of the state of health impact of communities.

Secondary data may be sufficient for projects with lower health risk to the impact communities.

Primary data may be collected through surveys of impact communities in cases where secondary data are insufficient to provide an accurate health profile of affected communities. Primary data collection through survey may be required in cases where development projects have higher health risk.

6.5.1.1 Demographic Profile

Data on demographic profile of workers and impact communities should be provided in terms of the following: a) age and *sex* distribution of

residents b) occupation profile and source of household income c) education profile of household members and d) household composition.

6.5.1.2 *Vital Statistics*

Information on the vital health statistics of the affected community should be provided such as: a) morbidity and mortality rates; b) infant mortality rate; and c) notifiable diseases including endemic diseases in the area. Ideally a five-year history should be obtained to enable the proponent to establish gross trends in the health statistics.

6.5.1.3 *Local Health Resources*

The proponent should provide information on available health resources and services in the area. Health resources may include health facilities such as government and private hospitals, medical and dental clinics, rural health units and services provided by NGOs.

6.5.2 Environmental Health and Sanitation Profile

6.5.2.1 *Water Supply*

Data on water supply should include the percentage of households with access to potable water supply system and the percentage of households with contaminated water sources in the affected communities.

6.5.2.2 *Human Excreta Management*

The percentage of households with sanitary and non-sanitary toilets and those without toilet should be included in the baseline data.

6.5.2.3 *Waste Management and Disposal Systems*

Information on waste management may include strategies the community are using to dispose of garbage and other domestic and community wastes. It is also important to include the percentage of households being

served by the city garbage collection system as well as the percentage of households served by the city sewerage system.

6.5.2.4 Food Hygiene

Information on food sanitation and safety may include a review of the sources of food and the food establishments operating in the impact communities with the view of estimating whether the development project can cause a deterioration in the quality of food supply available and their preparation.

Other baseline data like air pollutant levels, quality of existing bodies of water, soil quality and other parameters of environmental quality may also be included. Data on environment, health and sanitation may be obtained from the local/zonal health office.

6.5.3 Environmental Health Impact and Risk Assessment Component

6.5.3.1 Identification and Description of Environmental Health Sensitive Activities and Processes During the Various Phases of the Project Life Cycle

Not all activities in the various phases of the development project are critical for environmental health. In this section of the report, activities and sub-activities that are health sensitive or critical for environmental health are listed and described in detail. Environmental health critical activities are defined as work procedures or processes with potential adverse health impact on the workers or the community.

6.5.3.2 Identification of Health Hazards Present During the Various Project Activities

This section should contain the various significant environmental health hazards that can be observed in the development project. The hazards should be classified into physical, chemical, biological, ergonomics and indirect health hazards.

6.5.3.3 Identification of Impact Population or Receptors

The impact population or human receptors of the hazards should be identified. These receptors include a) workers b) community members and c) transients in the workplace or the community. The most vulnerable groups who have higher probability either of exposure or developing the adverse health effect among these receptors should also be identified.

6.5.3.4 Description of the Health Consequences

Adverse direct or indirect health consequences to the receptors due to hazard exposure should be described including severity and magnitude of illness (acute, sub-acute, chronic, or short term long term, or mild, moderate, severe). Consequences are estimated based on the worst possible scenario and rated from no effect or no consequence to very severe effect or consequence.

A prediction of the health trends should the project be allowed or not allowed to operate should be included in the report. The indirect health and health related consequences to the workers and the community residents should be discussed. This includes water supply and other public utilities and services, infrastructures, health services, increased income, food safety and security, and other factors that may bring improvement or deterioration of the public health.

6.5.3.5 Health Consequence Rating

A score is given per hazard identified at each stage of the project's life cycle based on the severity of the health consequence.

6.5.3.6 Priority Rating

The hazards identified should be prioritized based, on the health risk matrix.

6.5.3.6.1 *Exposure Rating and Health Consequence Rating Matrix*

This matrix is used for project already in existence where experience, observation or studies on hazard exposure have been documented. This matrix is very useful for assessment of hazards for development projects being proposed for expansion.

6.5.3.6.2 *Incident Potential Rating and Health Consequence Rating Matrix*

This matrix is used when the project is still in the planning stage where no definite designs and procedures are in-place to control possible health hazards. This is based on the historical records of the occurrence of exposure situations where there is a release of the identified hazards and exposure of receptors in the past either locally or in other countries.

6.5.4 Control and Mitigating Measures

The document should contain the proposed actions and strategies to be established and implemented by the project proponent to reduce or eliminate identified environmental health hazards to as low as reasonably practicable.

6.5.4.1 *Management Control Measures*

The proponent should be able to submit a coherent and comprehensive environmental health policy that reflects senior management commitment to the prevention and control of environmental health hazards.

6.5.4.2 *Health Hazards Control Program*

The document should contain the individual environmental health hazard control strategies and program the proponent is going to implement. Control program may fall into any of the following;

- a) engineering controls
- b) administrative controls
- c) personal protective equipment to be used by workers

d) community strategies and intervention to be implemented by the proponent to ensure that the health of the affected communities is maintained or even improved with the implementation of the development project.

6.5.4.3 Consequence Recovery or Mitigating Measures

This section should contain strategies designed by the project proponent in cases where preventive measures fail and the environmental health hazard are released and pose a significant health risk to workers and community residents.

- a) first aid programs
- b) medical emergency response strategies
- c) community emergency and disaster plans
- d) communication and warning strategies in place during environmental health emergencies
- e) options for community rehabilitation and relocation after the occurrence of the disaster

6.5.4.4 Health Surveillance, Evaluation and Monitoring Plans

This section should cover the health surveillance, program evaluation and monitoring systems that will be established by the proponent to ensure that environmental health hazards remain under acceptable control.

6.6 Health and Safety Management Plan for Projects Not Required to Prepare an EHIA

This section briefly outlines the guide for the preparation of Health and Safety Management Plan for proponents not required to conduct a detailed EHIA on their proposed projects.

6.6.1 Components of the Health and Safety Management Plan

The Health and Safety Management Plan will include the following components:

- 1) Project description, including process flows, raw materials, finished products, by products and waste products.
- 2) Listing of health and safety hazards present in the work site as well as those with potential impact to the health of the community.
- 3) Identification of important environmental factors.
- 4) Evaluation of capabilities of stakeholders.
- 5) Identification of vulnerable communities and stakeholders.
- 6) Statement of proposed strategies to prevent and control health and safety hazards identified, including recovery and emergency health and safety measures in case of accidents and injuries

Preventive and control strategies may include the following:

- i) workplace health and safety policy
- ii) engineering controls
- iii) administrative controls
- iv) use of personal protective equipment
- v) workplace medical emergency response plans
- vi) community response plans

- 7) Proposal for the proper management, evaluation, monitoring and audit of the Health and Safety Management Plan.

References

- Birley, M. H., 1995, *The Health Impact Assessment of Development Projects*, HMSO Publications, London.
- Department of Agriculture, 1999, *Environmental Impact Assessment for Disposal of Obsolete Pesticides*, Institutional Reforms in Agriculture Sector ADB/ Ministry of Agriculture HMG/ ANZDEC-New Zealand.
- Department of Irrigation, 2000, *Fattepur Irrigation Sub-Project Environmental Impact Assessment*, Irrigation Development Project Mid Western Development Region.
- Department of Roads, 2001, *The Feasibility Study on the Construction of Kathmandu- Naubise Alternate Road in Kingdom of Nepal: Environmental Impact Assessment*, Department of Roads Kathmandu- Naubise Alternate Road Feasibility Study Project.
- ECHP, 1999, *Health Impact Assessment: Main Concepts and Suggested Approach-Gothenburg Consensus Paper*, European Center for Health Policy, Brussels.
- Environmental Health Service, 1997, *Philippine National Framework and Guidelines for Environmental Health Impact Assessment*, Department of Health, Manila, Philippines.
- EPC, 1993, *Nepal Environmental Policy and Action Plan: Integrating Environment and Development*, HMG-Environment Protection Council, Kathmandu.
- Health Canada, 2000, *The Canadian Handbook on Health Impact Assessment: Decision Making in Environmental Health Impact Assessment (Vol. 2)*, Available Online [<http://www.hc-sc.gc.ca/ehp/ehd/oehalhia/voI2.htm>] (September 2001).

Helvetas Nepal, 1998, *Stakeholder Analysis-Social and Environmental Assessment: In the Context of the Proposed Rural Infrastructure Project: Draft*, Helvetas Nepal.

IUCN, 1999, *Melamchi Diversion Scheme Environmental Impact Assessment*, mCN/ METCON.

Khadka, R. B., Gorzula, S. and Malla, S. K., 2000, *Environmental Impact Assessment Process for Hydropower Project in Nepal: Results of One-Day SWOT Analysis*, MoWS/USAID/IRG/NEIAA, Kathmandu.

Ministry of Health-New Zealand, *A Guide to Health Impact Assessment*, Available Online [<http://www.moh.govt.nz/>] September 2001.

Ministry of Local Development, 1999, *Environmental Impact Assessment Syuchatar Sanitary Landfill Site*.

MoPE, 2000, *State of the Environment Nepal*, HMG-Ministry of Population and Environment, Kathmandu.

MoPE, 2001, *State of the Environment Nepal (Agriculture and Forests)*, HMG-Ministry of Population and Environment, Kathmandu.

NEA, 2001, *Environmental Impact Assessment Study of Middle Marsyangdi Hydroelectric Project*, Nepal Electricity Authority Middle Marsyangdi Hydroelectric Project.

NEA, *Environmental Impact Assessment of Kali Gandaki A Hydroelectric Project*, Nepal Electricity Authority Kali Gandaki A Hydroelectric Project.

NPC, *National Environmental Impact Assessment ,Guidelines 1993*,
HMG-National Conservation Strategy Implementation Project,
Kathmandu.

Pasupati Agrochem Nepal, *Environmental Impact Assessment of Copper Sulphate and Copper Oxychloride*, Akchat Consultants/Society for Environmental and Development.

SAEHN, 2002 (*Situation Analysis Environmental Health in Nepal*), Center for Economic and Technical Studies & Creative Consultants, Prepared for Nepal, Health Research Council/WHO, Kathmandu.

SMEC, *West Seti Hydroelectric Project Environmental Impact Assessment: Social and Land Use Studies*, Vol. 6, SMEC West Seti Hydroelectric Corporation Limited.

UNEP, *State of the Environment Nepal 2001*, United Nations Environment Programme, Kathmandu.

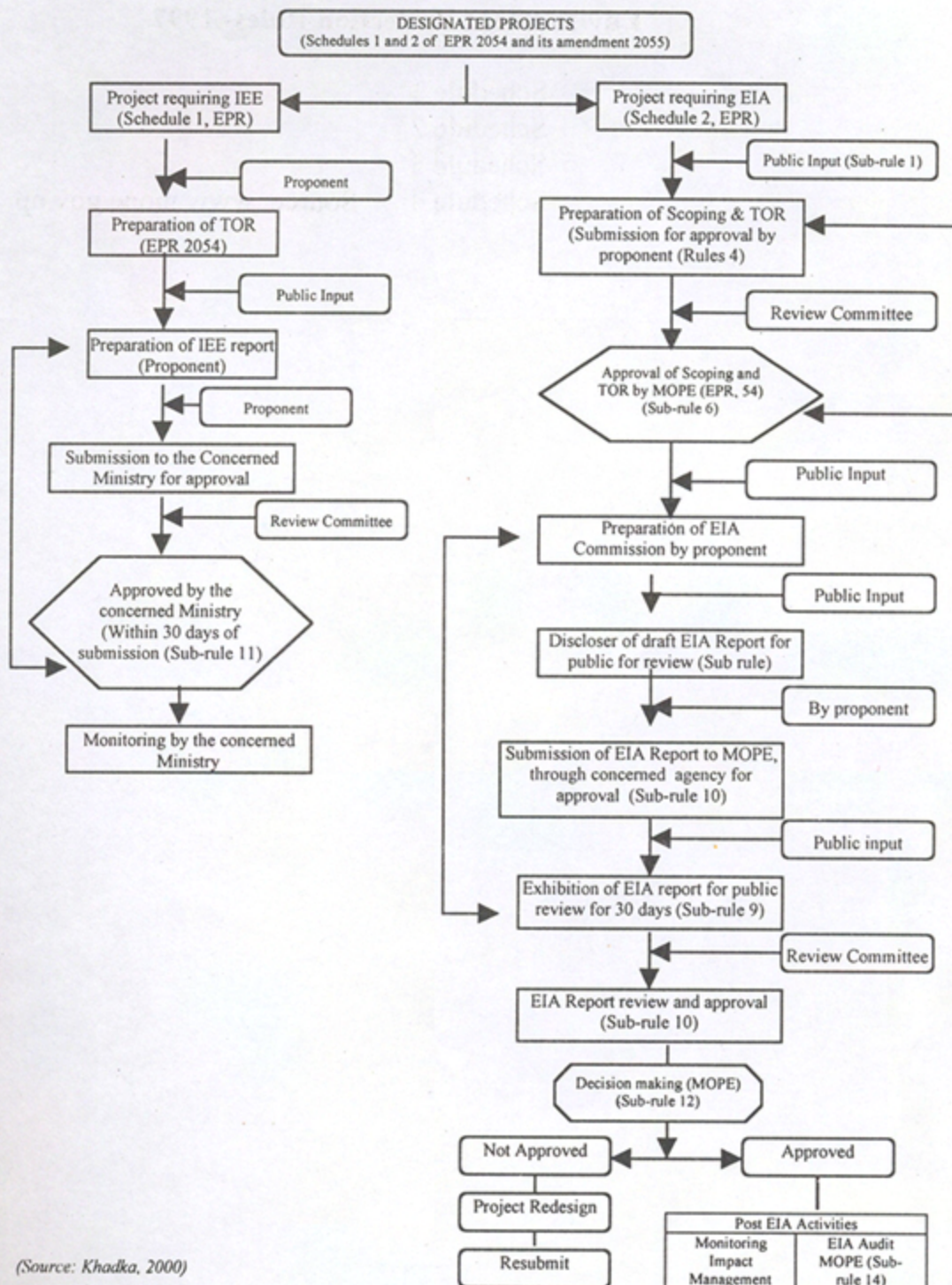
WHO, 1992, *Our Planet Our Health*, Report of the WHO Commission on Health and Environment, Geneva.

World Bank, 1997, *Health Aspects of Environmental Assessment*, Environmental Assessment Sourcebook Update, No. 18.

World Commission on Environment and Development, 1987, *Our Common Future*, Oxford University Press.

Annex I

Flow Chart of EIA Process



Annex II

Environment Protection Rules- 1997

Schedule 1

Schedule 2

Schedule 3

Schedule 4 Source: www.mope.gov.np

Environment Protection Rules 1997

Schedule - 1

(Pertaining to Rule 3)

Proposals Requiring Initial Environmental Examination

A. Forest Sector

1. Plantation of indigenous plants of a single species on a single block of 50 to 100 hectares in the Terai and 25 to 50 hectares in the hills.
2. Plantation of such imported species of plants as are deemed suitable for that purpose following their test in the concerned place, on a single block of 10 to 50 hectares in the Terai and 5 to 25 hectares in the hills.
3. Handover of forests with an area ranging between 25 to 100 hectares in the Terai and 5 to 25 hectares in the hills as leasehold forests.
4. Clear felling or rehabilitation of national forests with an area of not more than 5 hectares.
5. Establishment of saw-mills processing 5,000 to 50,000 cubic feet of timber per year.
6. Collection of 5 to 50 tons of forest products other than timber per year.
7. Establishment or expansion of national parks, wildlife sanctuaries and conservation areas, or environmental conservation zones.
8. Extraction of the roots of trees which have been felled, removal of leaves (in such a manner as to turn trees into stumps), extraction of seeds of lichens or orchids from trees, and collection of Sal (*Shorea robusta*) seeds.
9. Formulation of watershed management plans. .
10. Construction of new botanical gardens or zoos outside forest areas in the public or private sector.
11. Resettlement of imported wild animals of different species.
12. Preparation of management plans of national parks, wild life sanctuaries, conservation areas, and their ,buffer zones, or launching of development and construction activities specified in such plans.

13. Establishment of medicinal herbs centers for the commercial production of medicinal herbs and aromatic plants in public scrublands.
14. Commercial collection or industrial processing of non-polluting medicinal herbs and aromatic plants.
15. Construction of forest paths up to 5 kilometer long, and of fire protection lines up to 10 kilometer long.
16. Collection of boulders, gravel and sand and extraction of coal and other minerals ITom forest areas.

B. Industrial Sector:

1. Production of alcohol by the process of blending and establishment of distilleries equipped with boiling and fermentation facilities, with a production capacity of 5,00,000/liters per day.
2. Establishment of breweries and wineries equipped with fermentation facilities with a production capacity of 500,000/liters per day.
3. Establishment of acid, alkali, and primary chemical industries with a production capacity of 100 metric ton per day.
4. Processing of hides not more than 5000 sq. ft. per day.
5. Establishment of Electroplating and Galvanizing industries.
6. Establishment of cooking, natural gas refilling, filling, production and distribution industries.
7. Establishment of boulder crushing industries.
8. Establishment of paints industries.
9. Establishment of dairy processing industries.
10. Establishment of industries producing lubricant by the process of blending reprocessing or reclamation.
11. Establishment of industries manufacturing foam.
12. Establishment of industries manufacturing dry or wet cell (battery).
13. Establishment of crude sugar or sugar ...industries with a production capacity of 3000 metric tons per day.
14. Establishment of thread and cloths dyeing, printing and laundry industries (including carpets) except traditional cottage industries.

15. Establishment of pulp and paper industries, except traditional cottage industries, with a production capacity of 100 metric tons per day.
16. Establishment of bricks and tiles industries with a production capacity of 10 million units per year.
17. Establishment of cement industries with a production capacity of 30 metric tons per hour based on lime-stone and with a production capacity of 50 metric tons per hour based on clinker.
18. Establishment of quick! slaked lime industry producing 50 metric tons per day.
19. Establishment of pharmaceutical industries. 20. Establishment of industries manufacturing chemical fertilizers (blending) and pesticides (blending).
21. Establishment of plastic industries (bases on waste plastic as raw materials).
22. Establishment of matches industries. 23. Establishment of industries relating to auto workshop (except 2 wheelers).
24. Establishment of industries producing and processing coke and briquette from coal."

a. Establishment of the following industries having investment of total fixed capital exceeding Rs. 1 million.

1. Plastic processing (except processing waste materials).
2. Processing and production of tyres, tubes and rubber.
3. Soap (including detergents and clearing shampoos).
4. Photo processing.
5. Foundry.
6. Production of cigarettes, bidi (tobacco rolled in leaf) tobacco, betel nuts.
7. Slaughter house.
8. Glass (plane glass)
9. Food processing.
10. Relating to metal (including remelting, rerolling, and fabrication) .
11. Bitumen and bitumen emulsion.
12. Cold storage.
13. Threading.

14. Vegetable ghee, oil.
15. Herbal processing.
16. Production of different items from bone, horn and foot root
17. Rosin turpentine, veneer and catechu.
18. Fish and meat processing.
19. Production of packaging materials
20. Poultry feeds.
21. Machine shop.

b. Mining Sector:

Excavation of mines through relocation and resettlement of permanent residence of not more than 100 people.

1. Relating to Open Mine and Under Ground Mine:

1. Excavation of metallic minerals in small scale.
2. Excavation of the other industrial minerals in small scale except precious stones semiprecious stones and abrasive minerals from among the classified industrial minerals for the industrial purpose.
3. Excavation of non-metallic minerals in small scale.
4. Excavation of industrial precious and semiprecious stones and abrasive minerals with a production capacity of 50 to 100 grams per day.
5. Establishment of coal mines in small scale.
6. Excavation of construction oriented mineral materials in small scale.
7. Excavation of highly precious, precious, valuable stone and semi-valuable stone minerals with a production capacity of 50 to 100 grams per day.
8. Production of natural gases in very small and small scale.

2. Relating to other Mines:

- a. Extraction of 10 to 50 cubic meter of sand, gravel and soil from river beds per day.
- b. Extraction of 50 to 100 grams of precious, valuable and semi-valuable stone minerals per day through placer or dredging techniques.

C. Road Sector:

1. Construction of the following roads:
 - a. District roads
 - b. Urban roads
 - c. Rural roads
 - d. Small feeder roads
2. Construction of 1 to 5 kilometers long ropeways.
3. Construction of 1 to 5 kilometers long cable car routes.
4. Construction of major bridges.
5. Construction of tunnels.
6. Improvement of the standard, rehabilitation and reconstruction of national highways and feeder roads.

D. Water Resources and Energy Sector:

1. Supply of electricity through the installation of transmission lines of not more than from 33 kv to 66 kv capacity.
2. Operation of rural electrification projects of 1 to 6 mva.
3. Operation of electricity generation projects of 1 to 5 mw capacity.
4. Under the new systems of irrigation :
 - a. Those irrigating 25 to 2000 hectares in the Terai,
 - b. Those irrigating 15 to 500 hectares in the hill valleys,
 - c. Those irrigating 10 to 200 hectares in the hill and mountain areas with a steep gradient.

5. Under the rehabilitated systems of irrigation:

- a. Those irrigating more than 500 hectares in the Terai.
- b. Those irrigating more than 200 hectares in the hill valleys.
- c. Those irrigating more than 100 hectares in the hill and mountain areas with a steep gradient.
- d. Any water resources development activity which displaces not more than ITom 25 persons to 100 persons with permanent residence.
6. Control of floods through dams in the Terai.
7. Control of rivers over an area of more than one kilometer.

Note: Any rehabilitation project which includes additional irrigated areas, new sources of water, watershed management or changed channel lines shall be considered to be a new System.

E. Tourism Sector:

1. Establishment and operation of hotels with 50 to 100 beds.
2. Extension of the areas of the existing airports.
3. Opening of new areas for the promotion of tourism.
4. Operation of rafting activities on any river having fish or other aquatic life.
5. Operation of new golf courses and organized water sports.
6. Promotion of tourism in a number exceeding 10,000 per year at an altitude above 5000 meters.
7. Disposal and management of waste emitted from trekking points.

F. Drinking Water:

1. Collection of rain-water in an area of not more than 200 hectares, and use of water sources (springs and wet-lands) located within the same area.
2. Surface water sources with not more than 1 cubic ft. safe yield, and supply of not more than 50 percent of the water during the dry season.
3. Processing of water at the rate of 10 to 25 liters per second.
4. Recharging up to 50 percent of the total aquifer for the development of underground water sources.
5. Construction of not more than one kilometer long tunnels for carrying water.
6. Displacement of not more than 100 persons for operating a water supply scheme.
7. Settlement of not more than 500 persons on the upper reaches of water sources.
8. Supply of drinking water to a population ranging between 2,000 and 20,000.
9. Supply of drinking water to a population ranging between 10,000 and 100,000, and connection of new sources.
10. Installation of more than 20 kilometers long electricity transmission lines for pumping or processing water, and consumption of more than one mw of electricity.
11. River training and diversion activities over an area of more than one kilometer.

G. Waste Management:

1. Waste management activities to be undertaken with the objective of providing services to a population ranging between 2,000 and 10,000.

2. Following activities relating to waste emitted from houses and residential areas:

- a. Filling of land with 100 to 1000 tons of waste a year.
- b. Activities relating to transfer stations and resource recovery areas spread over not more than 3 hectares.
- c. Selecting, picking, disposing, and recycling waste through chemical, mechanical or biological techniques in an area of not more than 2 hectares.
- d. Activities relating to compost plants in an area ranging between 1 and 5 hectares.
- e. Operation of sewerage schemes.

H. Agricultural Sector:

1. Clearing of national forests covering not more than 1 hectare in the hills and 5 hectares in the Terai, and using them for agricultural purposes.

2. Following activities relating to construction:

- a. !.....
- b. Construction of 1 to 5 kilometers long agricultural roads.
- c. Construction activities for farming 2000 to 5000 domestic fowls.
- d. Construction activities for farming big cattle numbering between 100 and 500.
- e. Construction activities for farming small cattle (sheep and goats) numbering between 1000 and 5000.
- f. Establishment of agricultural wholesale markets in urban areas.

3. Following activities relating to toxic substances (only those which are listed) :

- a. Import of 1 to 10 tons of toxic substances:
- b. Sale, supply, storage and disposal of 10_ kg. to 1 ton of toxic substances. .
- c. Use of 100 kg. to 1 ton of toxic substances in a single area.

4. Establishment of the following agro-based industries which do not dispose of polluted substances mixed with dangerous toxins:
 - a. Milk-processing industries with a capacity of not more than 26,000 liters a day.
 - b. Such agro-based industries as those producing jam, jelly, squash and juice.
 - c. Cheese industries.
 - d. Baby food industries.
 - e. !.....
 - f. !.....
5. !.....
6. Commercial fish-farming in an area of more than 1 hectare.
- I. Operation of any planning, project or programme of any development work, physical activities or change in land use except the proposals mentioned in Clause (A) to Clause (1) and those below the standards of such proposals as well as the proposals below the standards of those mentioned in Schedule-2 with a cost of Rs. 10 millions to hundred millions.

Environment Protection Rules 1997

Schedule - 2

(Pertaining to Rule 3)

Proposals Requiring Environmental Impact Assessment

A. Forest Sector:

1. Plantation of indigenous plants of a single species on a single block covering an area of more than 100 hectares in the Terai and 50 hectares in the hills.
2. Plantation of such imported species of plants as are deemed suitable for the purpose following their test in the concerned place, in an area of more than 50 hectares in the Terai and 25 hectares in the hills.
3. Handover of forests with an area of more than 100 hectares in the Terai and 25 hectares in the hills as leasehold forests.
4. Clear felling or rehabilitation of forests with an area of more than 5 hectares.
5. Establishment of saw-mills processing more than 50,000 cft. of timber per year.
6. Collection of more than 50 tons of forest products other than timber per year.
7. Formulation and implementation of forest management plans.
8. Clearing of public forests and establishment of new medicinal herbs centers for commercial production.
9. Rosin and turpentine, rubber, plywood and veneer, catechu, and timber-based matches, pulp and paper industries to be established within one kilometer inside the forest area which depend on forests for their raw materials and use processing techniques, and cardamom and medium and large tea industries which use large quantities of firewood.
10. Commercial and industrial processing of medicinal herbs and aromatic plants which emit garbage and pollution.
11. Establishment of saw-mills, bricks and tiles factories, and tobacco processing industries within 5 kilometers from the forest boundaries.
12. Establishment of resorts, hotels, safaris, educational institutions, hospitals and industries or other construction activities inside forest areas, national parks, sanctuaries,

conservation areas, buffer zones, and environment conservation zones.

B. Industrial Sector:

13. Establishment of distilleries equipped with boiling and fermentation facilities with a production capacity of more than 500,000 liters per day.
14. Establishment of breweries and wineries equipped with fermentation facilities with a production capacity of more than 500,000 liters per day.
15. Production of primary chemicals such as corrosive acid and alkali etc. (except citric tartaric, acetic, acid etc.) with a production capacity of more than 100 metric tons per day.
16. Processing of hides more than 500 sq ft per day.
17. Production of chemical fertilizers and pesticides except produced through welding process.
18. Establishment of mineral based industries with a fixed investment of more than Rs. 50 millions.
19. Production of petro chemicals and processing (diesel, kerosene, lubricants, plastics, synthetic rubbers etc.).
20. Production of ferrous and non ferrous metals (except rerolling, remelting and fabrication) by the process of primary smelting.
21. Establishment of industry producing more than 3000 metric tons of crude sugar and sugar per day.
22. Establishment of cement industries with a production capacity of more than 30 metric tons per hour based on lime stone and with a production capacity of more than 50 metric tons per hour based on clinker.
23. Establishment of lime industries with a production capacity of more than 50 metric tons per day.
24. Production of asbestos.
25. Establishment of radio active emission (nuclear and atomic processing) industries.
26. Production of primary compound (Bulk drugs) for medicines.
27. Production of extremely hazardous substances such as Isocyanite, mercury compound etc.
28. Production of ammunitions and explosives including gunpowder.

29. Establishment of industries of pulp or paper with a production capacity of more than 100 metric tons per day.
30. Establishment of brick and tiles industries with a production capacity of more than 10 million pieces per year.
31. Chemical processing of bones.

C. Mining Sector:

- a. Relocation or resettlement of permanent residence of more than 100 people for the purpose of mine excavation.
- b. Operation of all underground mining activities located at the main boundary thrust and central boundary thrust Zone.
- c. Relating to Open Mines or Underground Mines:
 1. Excavation of metallic mineral substances in medium and large scale.
 2. Excavation of non metallic mineral substances in medium and large scale.
 3. Excavation of other medium and large scale industrial minerals except precious stone, semi-precious stone, abrasive minerals from among the classified industrial minerals for industrial purposes.
 4. Excavation of medium and large scale coal mines.
 5. Excavation of construction-oriented minerals in medium and large scale.
 6. Excavation of highly precious, precious, valuable and semi-valuable minerals with a production capacity of more than 100 grams per day.
 7. Production of natural gas in medium and large scale.
 8. Excavation of radio active minerals in any scale.'
 9. Excavation of asbestos minerals in any scale.
 10. Excavation of crude oil in any scale.
 11. Excavation of industrial, precious, semi-precious stones and abrasive minerals with a production capacity of more than 100 grams per day.
- d. Relating to Other Mines:
 1. Extraction of sand, gravel and soil at the: rate of more than 50 cubic meters per day from the beds of river and revolutes.

2. Extraction of highly precious and semi -precious minerals at the rate of more than 100 grams per day through placer and dredging technique.

D. Road Sector:

1. Construction of the following roads:
 - a. National highways.
 - b. Main feeder roads.
2. Construction of more than 5 kilometers long ropeways.
3. Construction of more than 5 kilometers long cable car routes.

E. Water Resources and Energy Sector:

1. Supply of electricity through the installation of transmission lines of more than 66 kv. capacity.
2. Operation of more than 6 mva rural electrification projects.
3. Operation of electricity generation projects with a capacity of more than 5 mw.
4. Generation of more than 1 mw diesel or thermal electricity.
5. Under the new systems of irrigation:
 - a. Those irrigating more than 2000 hectares in the Terai.
 - b. Those irrigating more than 500 hectares in the hill valleys.
 - c. Those irrigation more the 200 hectares in the hill andmountain areas with a steep gradient.
6. Any water resources development activity which displaces more than 100 people with permanent residence.
7. Construction of multipurpose reservoirs.
8. Inter-basin water transfer and use.

F. Tourism Sector:

1. Establishment and operation of hotels with more than 100 beds.
2. Establishment and development of new airports.
3. Rafting arrangements for more than 2000 persons per year on a single river.
4. Dispatch of more than 2000 tourists and their assistants per year for trekking in a single area.
5. Development and construction of any infrastructure for the promotion of adventure tourism in high mountainous areas.
6. Operation of house boats on lakes. . .

G. Drinking Water:

1. Collection of rain-water in an area of more than 200 hectares and use of water sources (springs/wetlands) located within the same area.
2. Surface water sources with more than 1 cft. safe yield, and the use of its entire part during the dry season.
3. Water processing at the rate of more than 25 liters per second.
4. Recharging of more than 50 percent of the total aquifer for the development of underground water sources.
5. Construction of more than 1 kilometer long water tunnels.
6. Displacement of more than 100 persons for the operation of water supply schemes.
7. Settlement of more than 500 persons on the upper reaches of water sources.
8. Supply of drinking water to a population of more than 20,000.
9. Supply of drinking water to a population of more than 100,000, and connection of new sources.
10. Over mining of biologically or chemically polluted point and non-point sources or underground water sources that may be affected by them.
11. Operation of multi-purpose projects relating to sources of drinking water using water sources at the rate of more than 25 liters per second.

H. Waste Management:

1. Waste management activities to be undertaken with the objective of providing services to a population of more than 10,000.
2. Following activities relating to waste emitted from houses and residential areas:
 - a. Filling of land with more than 1000 tons of waste per year.
 - b. Activities relating to transfer stations and resource recovery areas spread over an area of more than 3 hectares.
- c. Selecting, picking, disposing and recycling waste through chemical, mechanical or biological techniques in an area spread over more than 2 hectares.

- d. Activities relating to compost plants spread over an area of more than 5 hectares.
 - e. Burying of waste emitted from an urban area with a population of at least 10,000.
3. Following construction activities relating to hazardous waste of the following nature in any scale:
 - a. Construction of a waste plant.
 - b. Construction of a waste recovery plant.
 - c. Construction of a site for filling, accumulating or burying waste.
 - d. Construction of a site for storing waste.
 - e. Construction of a waste treatment facility.
 4. Following activities relating to lethal waste:
 - a. Emission and management of any radio-active substance with a half age exceeding 25 years.
 - b. Emission and management of any lethal chemical with 30 lethal doses.
 - c. Final disposal management of biological lethal substances emitted from health centers, hospitals or nursing homes with at least 25 beds.
 - d. Any activity relating to one hectare or more of land and energy for the purpose of incinerating or recycling any lethal substance.

I. Agricultural Sector:

1. Clearing of forests covering more than 1 hectare in the hills and 5 hectares in the Terai and using them for agricultural purposes.
2. Following activities relating to construction:
 - a.
 - b. Construction of more than 5 kilometers long agricultural roads.
 - c. Construction activities for farming more than 5000 domestic fowls.
 - d. Construction activities for farming more than 500 big cattle.
 - e. Construction activities for farming more than 5000 small cattle. (sheep and goats).
 - f. Urbanization plan in cultivable lands.

3. Following activities relating to toxic substances (only those which are listed) :
 - a. Import of more than 10 tons of a toxic substance.
 - b. Sale, supply, storage and disposal of more than 1 ton of a toxic substance.
 - c. *Use* of more than 1 ton of a toxic substance in a single area.
 - d. Activities relating to insecticide plants or toxic substances.

J. Health:

1. Operation of hospitals or nursing homes with more than 25 beds, or medical profession (study and teaching also).

K. If any proposal is to be implemented in the following areas:

1. Historical, cultural and archeological sites.
2. Environmentally weak and wet areas.
3. National parks, wild life sanctuaries and conservation areas.
4. Semi-arid, mountainous and Himalayan regions.
5. Flood prone and other dangerous areas.
6. Residential, school and hospital areas.
7. Areas with main sources of public water supply.
8. !.....

- L. Operation of any planning, project or programme relating to any developmental work, physical activities or change in land use except the proposals mentioned in Clause (A) to Clause (K) and those below the standards of such proposals as well as the proposals below the standards of those mentioned in Schedule-1 with a cost of more than 100 millions.

ENVIRONMENT PROTECTION RULES 1997

Schedule - 3

(Pertaining to Rule 5)

Work-Schedule of Initial Environmental Examination

1. Name and address of the individual or institution preparing the report :

2. Proposal's:

a. General introduction:

b. Relevancy of the proposal:

3. Procedure to be adopted while preparing the report:

4. Policies, laws, rules and manuals to be taken into account while preparing the report :

5. Preparation of the Report :

a. Time:

b. Estimated budget:

6. !..

7. Specific impact of the implementation of the proposal on the environment:

a. Social and economic:

b. Cultural and physical:

c. Chemical:

d. Biological:

8. Alternatives for the implementation of the proposal :

a. Design

b. Project site

c. Technology, procedure of operation, time schedule, raw materials to be used.

d. Other matters.

9. Matters concerning the prevention of the impact of the implementation of the proposal on the environment.

10. Matters to be monitored while implementing the proposal.

11. Other necessary matters.

ENVIRONMENT PROTECTION RULES 1997

Schedule - 4

(Pertaining to Rule 5)

Work-Schedule Relating to Environmental Impact Assessment

- 1. Name and address of the individual or institution preparing the report :**
- 2. General introduction of the proposal:**
- 3. Data needed for the preparation of the report, and procedure of collecting them:**
- 4. Policies, laws, rules and manuals to be taken into account while preparing the report.**
- 5. Preparation of the Report :**
 - a. Time
 - b. Estimated budget
 - c. Necessary Experts
- 6. Scope determined for the preparation of the report.**
- 7. Impact on the environment of the implementation of the report :**
 - a. Social and economic
 - b. Cultural and physical
 - c. Chemical
 - d. Biological
- 8. Other alternatives for the implementation of the proposal:**
 - a. Design
 - b. Project site
 - c. Technology, procedure of operation, time-schedule and raw materials to be used.
 - d. Environment management system.
 - e. Whether or not the risks resulting from the implementation of the proposal can be accepted.
 - f. Other matters.
- 9. Measures to remove any negative impact that may be noticed while implementing the proposal.**
- 10. Particulars of the cost and returns of the proposal.**
- 11. Matters to be monitored while implementing the proposal.**
12. Relevant information, reference lists, annexes, maps, photographs, tables and charts, graphs and questionnaires to be mentioned at the time of preparing the report.,

Annex III

List of Resource Persons Contacted for Review and Comments:

Name	Designation	Institution
1. Mr. Jan A Speets	Environmental Health Advisor	WHO
2. Dr. Ram B. Khadka	Executive Director	School of Environmental Management and Sustainable Development
3. Prof. Surya Man Shakya	Director, Research and Development	School of Environmental Management and Sustainable Development
4. Dr. Mukti N. Shrestha	Secretary	MoPE
5. Mr. Janak Ral Joshi	Joint-Secretary	MoPE
6. Dr. Ananda Rai Joshi	Chief	EIA Section, MoPE
7. Dr. Udaya Raj Sharma	Under-Secretary	Ministry of Forest and Soil Conservation
8. Mr. Bal K. Upadhaya	SDE	Geo-Environmental Unit, Department of Roads
9. Mr. Bishnu B. Thapa	Joint-Secretary	Ministry of Water Resources
10. Mr. Kalyan B. Pradhan	Joint-Secretary	Ministry of Industry, Commerce and Supplies
11. Mr. Dirgha R. Shrestha	Director	Engender Health
12. Me. Salil Devkota	Consultant	NHRC
13. Mr. Bhusan Tuladhar	Director	Clean Energy Nepal
14. Chief	EIA Unit	IUCN