

# Environmental Audit Study of Environmental Impact Assessment (EIA) Implementation of different Projects with Special Emphasis on Forest Resources

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(CASE STUDIES OF EIAs IN THREE DIFFERENT PROJECTS: CHILIME HYDROELECTRIC PROJECT IN RASUWA AND NUWAKOT DISTRICTS, EAST RAPTI IRRIGATION PROJECT IN CHITWAN DISTRICT AND ANNAPURNA QUARRY PRIVATE LIMITED IN DHADING DISTRICT)

**Dissertation submitted in partial fulfillment of the requirements for  
The Degree of Master of Science in Environmental Management**

*Submitted By*  
**Rabindra Roy**

*Submitted to*  
Department of Environmental Management



**School of Environmental Management and Sustainable Development  
(SchEMS)**  
*Pokhara University*

**Kathmandu, Nepal**  
*September 2002*

## DECLARATION

I hereby declare that the dissertation entitled “**Environmental Audit Study of Environmental Impact Assessment (EIA) Implementation of different Projects with Special Emphasis on Forest Resources** (*Case Studies of EIAs in three different Projects: Chilime Hydroelectric Project in Rasuwa and Nuwakot districts, East Rapti Irrigation Project in Chitwan district and Annapurna Quarry Private Limited in Dhading district*)” submitted towards the partial fulfillment of the Degree of Master of Science in Environmental Management is based on the investigation carried out by me under the guidance of Prof. Dr. Ram Bahadur Khadka. The dissertation/ part thereof have not been submitted for the award of any degree of any other University or Institution.

.....  
(Rabindra Roy)  
September 2002

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*Approved by*

Internal Supervisor: \_\_\_\_\_

External Supervisor: \_\_\_\_\_

Head of Department: \_\_\_\_\_

Date: \_\_\_\_\_

## CERTIFICATE

This is to certify that the dissertation entitled “**Environmental Audit Study of Environmental Impact Assessment (EIA) Implementation of different Projects with Special Emphasis on Forest Resources** (*Case Studies of EIAs in three different Projects: Chilime Hydroelectric Project in Rasuwa and Nuwakot district, East Rapti Irrigation Project in Chitwan district and Annapurna Quarry Private Limited in Dhading district*)” submitted by Rabindra Roy towards partial fulfillment of Degree of Master of Science in Environmental Management is based on the investigation carried out by him under the guidance of Prof. Dr. Ram Bahadur Khadka. The dissertation/ Part thereof has not been submitted for the award of any Degree of any other University or Institution.

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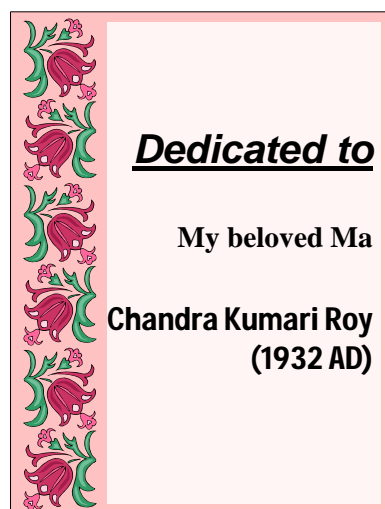
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Date:



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## **Abstract**

The study was carried out in three selected development project sites i.e. Chilime Hydroelectric Project in Rasuwa and Nuwakot districts, East Rapti Irrigation Project in Chitwan district and Annapurna Quarry Private Limited in Dhading district. All of them lie in the Central Development Region of Nepal.

The study focuses on carrying out comprehensive environmental audit of forest resources of selected three development projects and on assessing effectiveness of mitigation measures adopted, which are prescribed in EIA reports for improving social, economic and environmental conditions of the communities with reference to forests resources.

It was observed during the field visits that the development projects have somehow negative impact on the forest resources during the project implementation phase. The account of these negative impacts on forest resources is must to restore the in-situ conservation. The documentation has been carried out yet, it is insufficient to clearly carry out mitigation and compensatory measures in future.

Besides, it was observed that the proponents do not follow periodic reporting of mitigation measures prescribed in the EIA reports to the concerned government authorities i.e. District Forest Office, District Soil Conservation Office and National Parks. In addition, these government offices have also been less than serious in this regard. Consequently, the restoration of forest resources remains in dilemma. Every activity rendering the restoration of forest resources must be documented properly during the project implementation phase at field level. This will help environmental auditing more efficient and simple. In addition, available documents are also not properly organized. Therefore, the available documents need to be properly recorded for future consultation. Moreover, there is no regular coordination and communication between/among the concerned stakeholders of the project.

Although compensatory plantations comply with the prescription of mitigation measures, it does fail at implementation stage. This could happen in other development projects as well. Therefore, before compensatory plantation, there should be proper technical assessment on where, how, and when the compensatory plantation to be carried out and what needs to be given the preference as per the site condition and local people's demand and/or desire. In this matter, concerned DFO should take initiation with healthy consultation with Proponent and local people. In addition, the proponent should not ignore the DFO.

Any development project open up the market for employment opportunities. The three projects studied, employed the local people as per their knowledge and skills. This certainly enhances the socio-economic condition of the local people. It also helps to conserve the forest resources because; they are well aware of their local environment

and forest resources. It is easy to convince them for conserving the local forest resources. Hence, the proponent should encourage employing the local people for the sake of conserving forest resources.

Although this study does not aim at this topic, I realized that there is lack of professionalism in the EIA practices. Anyone, without proper academic background, has been doing EIA as a consultant. This will not be useful for conserving local as well as national environment in the long run. As I perceive, this would be serious dilemma in days to come. It is recommended that the professional code of conduct for EIA should be developed for developing professionalism in this subject.

## **Acronyms**

AQPL	Annapurna Quarry Pvt. Ltd.
BZ	Buffer Zone
CBA	Cost Benefit Analysis
CF	Community Forest
CFUG	Community Forest User Group
CHEP	Chilime Hydroelectric Project
DAO	District Administration Office
DDC	District Development Committee
DFO	District Forest Office
DIO	District Irrigation Office
DoF	Department of Forests
DSCO	District Soil Conservation Office
EIA	Environmental Impact Assessment
EPA, 96	Environmental Protection Act, 1996
EPR, 97	Environmental Protection Regulations, 1997
ERCD	Environmental and Resource Conservation Division
ERIP	East Rapti Irrigation Project
FMIS	Farmer Managed Irrigation Scheme
FUG	Forest Users Group
HMG/N	His Majesty Government of Nepal
IEE	Initial Environmental Examination
IFO	Ilaka Forests Office
IUCN	The World Conservation Union
LNP	Langtang National Parks
MFSC	Ministry of Forests and Soil Conservation
MOPE	Ministry of Population and Environment
NEA	Nepal Electricity Authority
NEPA	National Environmental Policy Act
NPC	National Planning Commission
NTFP	Non Timber Forest Products
RCNP	Royal Chitwan National Park
RP	Range Post
SchEMS	School of Environmental Management and Sustainable Development
TOR	Terms of Reference
VDC	Village Development Committee
WUG	Water Users Group

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## ***Chapter One***

### **1.0 Introduction**

#### ***1.1 Origin of EIA***

During the 1960s, it became clear to many in US Congress that pollution and other environmental problems were both complex and interrelated. It was clear that a comprehensive approach to the environment was needed (Glasson et. al., 1994). People argued that the environmental consequences of development projects were not being taken with responsibility by the government planners who used only traditional criteria in terms of economic efficiency in making decisions (Ortolano, 1984). As a result, the National Environmental Policy Act (NEPA) was established in 1969 and was enacted in January 1970 (Harvey, 1995). The aim of NEPA (1969) was to force all agencies of the Federal Government to integrate environmental concerns into their planning and decision-making process. Section 120 (2) of the NEPA (1969) requires agencies prepare a detailed statement of environmental impacts for Federal actions significantly affecting the human environment. In this way the US environmental policy Act, 1969 was introduced as the first legislation to require EIAs to be carried out.

EIA enactment is defined as an effective tool of a proposed action on the environment including all aspects of the natural and human environment. It seeks to compare the various alternatives that are available for any project or program as well as attempting to weigh environmental effects on a common basis with economic costs and benefits in the overall project evaluation. Different definitions have been given for the term Environmental Impact Assessment (EIA). EIA is a “process” that examines the environmental consequences of an action, in advance (Glasson et al., 1994). It aims to improve the quality of a decision by giving the decision-maker a clear picture of alternatives, and the environmental changes that were predicted, and trade-off advantages and disadvantages of each alternative.

#### ***1.2 Initial Development of EIA in Nepal***

In developing countries such as Nepal, there is an increasing realization that if economic benefit from the development is to be sustainable, environmental aspects must be considered at the initial phase of project planning. The correct choices of technology in implementing the development activity can minimize the adverse environmental impacts of development, enhance the quality of the human and natural environment and will help to bring sustain overall benefits (NPC/HMG/IUCN, 1993.).

EIA system in Nepal has been formulated in order to integrate environmental considerations into development planning and implementation in the country. His Majesty’s Government of Nepal introduced an environmental policy for the first time in

its Sixth Five Year Plan (1980-1985) and this was elaborated in its Seventh Five Year Plan (1985-1990) (HMG, 1985). During the period of the Seventh Five Year Plan, the government endorsed a National Conservation Strategy (NCS), within which the development of an EIA system for Nepal was a major component. Its implementation then started in 1989 and was later supported by the Eighth Five Year Plan (1992-1997) which enunciated a separate policy on Environment and Resource Conservation as a part of national policy (HMG 1992, 1997a).

Although, the implementation of the National Conservation Strategy formalized EIA application through the involvement of government agencies, the concept of EIA was not entirely new to Nepal at that time. A few projects carried out EIA in the late 1970s but all of those were commissioned primarily in response to donor conditionality. In the case of the NCS, the integration of environmental consideration into the formation of central and local development projects was the main objectives (Khadka and Uprety 2000).

The development of EIA guidelines for different sectors was given priority and fully supported by the Eighth Five Year Plan. The Plan set a target to develop EIA guidelines for such large-scale development projects as road construction, hydropower, irrigation, housing, drinking water supply and sewerage projects. Accordingly, HMG launched a separate EIA program in collaboration with IUCN (The World Conservation Union). This program has been a vehicle for creating awareness of the need for environmental assessment and for developing an EIA system in Nepal. The program was designed, using a learning-by-doing approach, and trained a number of government officials, NGO members and individuals from private sector agencies, using EIA training manuals developed for this purpose (Khadka and Tuladhar 1996; Khadka et al. 1996; Khadka 1997).

The Eighth Five Year Plan has been important in developing and institutionalizing EIA system in Nepal's development planning and administration. The government developed and approved umbrella national EIA guidelines in 1993 (HMG, 1993). Separate guidelines for the forestry and industry sectors were developed and endorsed by the government in 1995 (HMG, 1995a, b). Other sector specific guidelines have been developed and are being officially endorsed and others are being prepared.

All of these guidelines were developed using a participatory approach. They were drafted in workshops involving EIA stakeholders such as government officials, representatives from NGOs and Private sector organizations, corporate bodies, environmental consultancies and individual professionals. The guidelines were tested to validate their applicability in field conditions and were tailored to suit local conditions. The use of the participatory process in developing EIA guidelines promoted wider stakeholder participation, and fostered a multi-disciplinary approach (Khadka and Tuladhar, 1996).

### ***1.3 Internalization of the EIA System in Nepal***

The sector specific EIA guidelines were developed under the broad framework of National EIA guidelines, 1993. Further, the application of EIA guidelines has been made effective through the enforcement of environmental legislation. Prior to the legal regime on EIA, all large sized projects had to be submitted to the Environmental and Resource Conservation Division (ERCD) of the National Planning Commission for authorization. ERDC also had the responsibility to examine the project on whether or not it had undergone an EIA according to the national and sector-specific EIA guidelines. In this way, even in the absence of an umbrella legislation, all large sized proposed development projects from the public sector, and proposed projects from the private sector which required authorization from the concerned government agency, have undergone an EIA utilizing the national and sector specific EIA guidelines (Khadka and Uprety, 2000).

After four years of successful implementation of the EIA guidelines, and the experience gained, the government has introduced several provisions to legally internalize EIA in the decision making process. EIA has now been made mandatory for prescribed projects and activities through the provision of the Environmental Protection Act, 1996 and Environmental Protection Regulation, 1997 (see fig 1.3a).

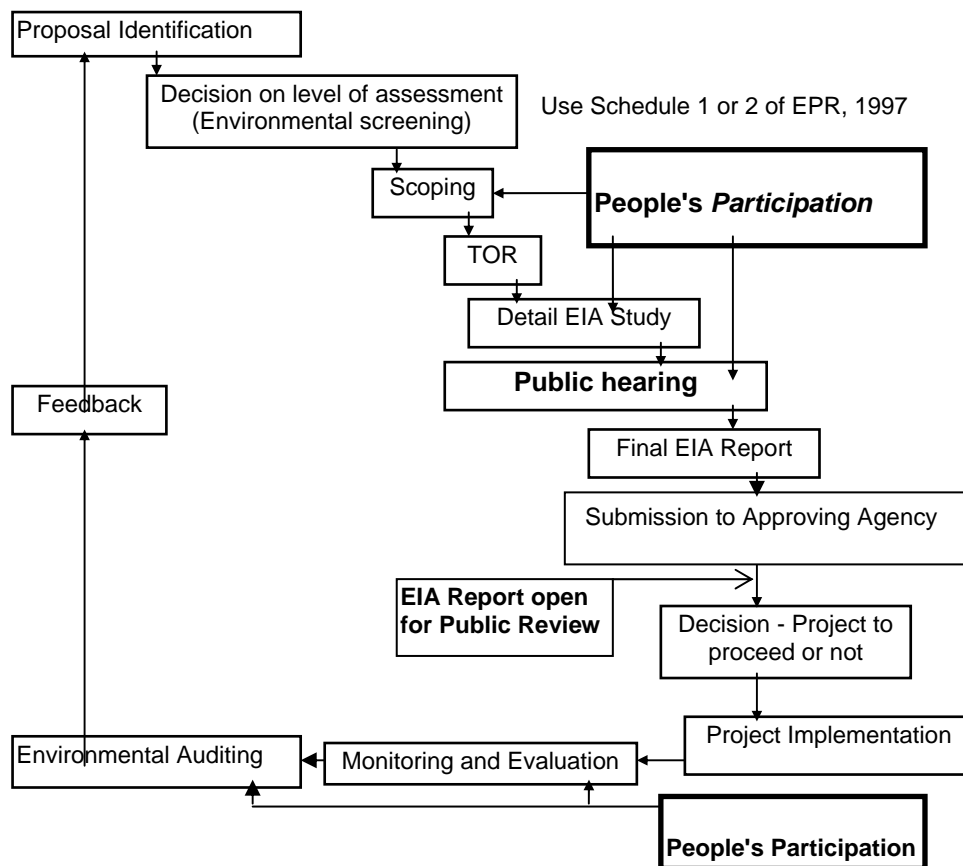


Figure 1.3a: Environmental Assessment Process and Public Participation in Nepal

### ***1.4 Environmental Legislation in Nepal***

Nepal's Environmental Protection Act, 1996 obliges the proponent to carry out either an Initial Environmental Examination (IEE) or an Environmental Impact Assessment (EIA) for the major development projects and programs EPR,97 (amendment, 1999) in its schedule (1) and (2) consist the list of proposal requiring IEE and EIA respectively (see figure 1.4a and 1.4b). For example, IEE is required for the establishment and/or expansion of protected areas, construction of 1 to 5 MW of electricity project, construction of district roads etc. Similarly, EIA is required for a forest management plan, national highway, and electricity-generating project exceeding five MW etc. According to the Act, the proponent is obliged to submit a proposal requiring an IEE for approval by the concerned agencies, or to the Ministry of Population and Environment (MOPE) in the case of EIA. Before, the approval of the Project, MOPE must publish a notice relating to the availability of the EIA report for public comment and review. It may also form a technical committee to review the EIA report (HMG, 1996).

Any proponent, who implements a prescribed project without the approval of its IEE/EIA, or without compliance with any condition imposed during proposal approval, shall be fined up to NRs one million. The designated officer from MOPE may also

issue an order stopping project construction activities immediately. The Act empowers the environmental inspector to oversee and review project implementation and examine whether or not the proponent is complying with the conditions approved in the process of project authorization. If the project proponent is not satisfied with the decision made by the designated officer or environmental inspector, he/she has the right to appeal to the Appellate Court within 35 days from the date of the decision made or order issued (HMG, 1996).

The Environmental Protection Regulation, 1997 elaborates the provisions for the application of IEE/EIA. The proponent wishing to operate a 'prescribed project' in any given area is obliged to issue a public notice as a first step of scoping, describing the nature of the proposed project to be implemented in the area concerned. The proponent shall invite any expression of concern, within 15 days as per EPR, 1997 (amendment 1999), from people in the area where the project is planned to be implemented. The project proponent shall collect and compile these responses within a scoping report, which is to be submitted to the concerned government agency for approval. The development of the Terms of Reference (TOR) for further EIA studies should be based on the approved scoping report. The scoping report and the Terms of Reference form the basis for developing the IEE/EIA Report for the particular project in question. This is submitted to the concerned Ministry (in the case of the IEE) and to MOPE (in the case of the EIA) for approval.

Before submitting the IEE/EIA report to the concerned Ministry or MOPE the proponent has to make it available to the Village Development Committee (VDC) and the District Development Committee (DDC) and in schools and public places where the project is likely to be implemented, for public review. A public hearing should be made in the project area to collect suggestions (HMG, 1998). All the comments and suggestions provided by the concerned public should be compiled and incorporated into the final report on IEE/EIA (HMG, 1997b).

According to legal provision, the concerned Ministry should approved the final IEE report within 30 days after its submission, and the Ministry of Population and Environment should approve the EIA report within 90 days following submission. However, in the case of EIA, MOPE should make the final report available to the public for review and the time-period given for public review in this case is 30 days. MOPE may also form an EIA Review Committee of experts, which may also include representation from the communities likely to be affected by the project.

Implementation of the mitigation measures prescribed in the IEE/EIA and recommended by the project authorizing agencies, and other conditions imposed by the approving agencies, are the responsibility of the project proponent. However, EPR, 1997 also empowers the concerned Ministry to monitor the implementation of the compliance requirement by the government agencies. MOPE is also responsible for environmental auditing after the completion of the project (HMG, 1997b).

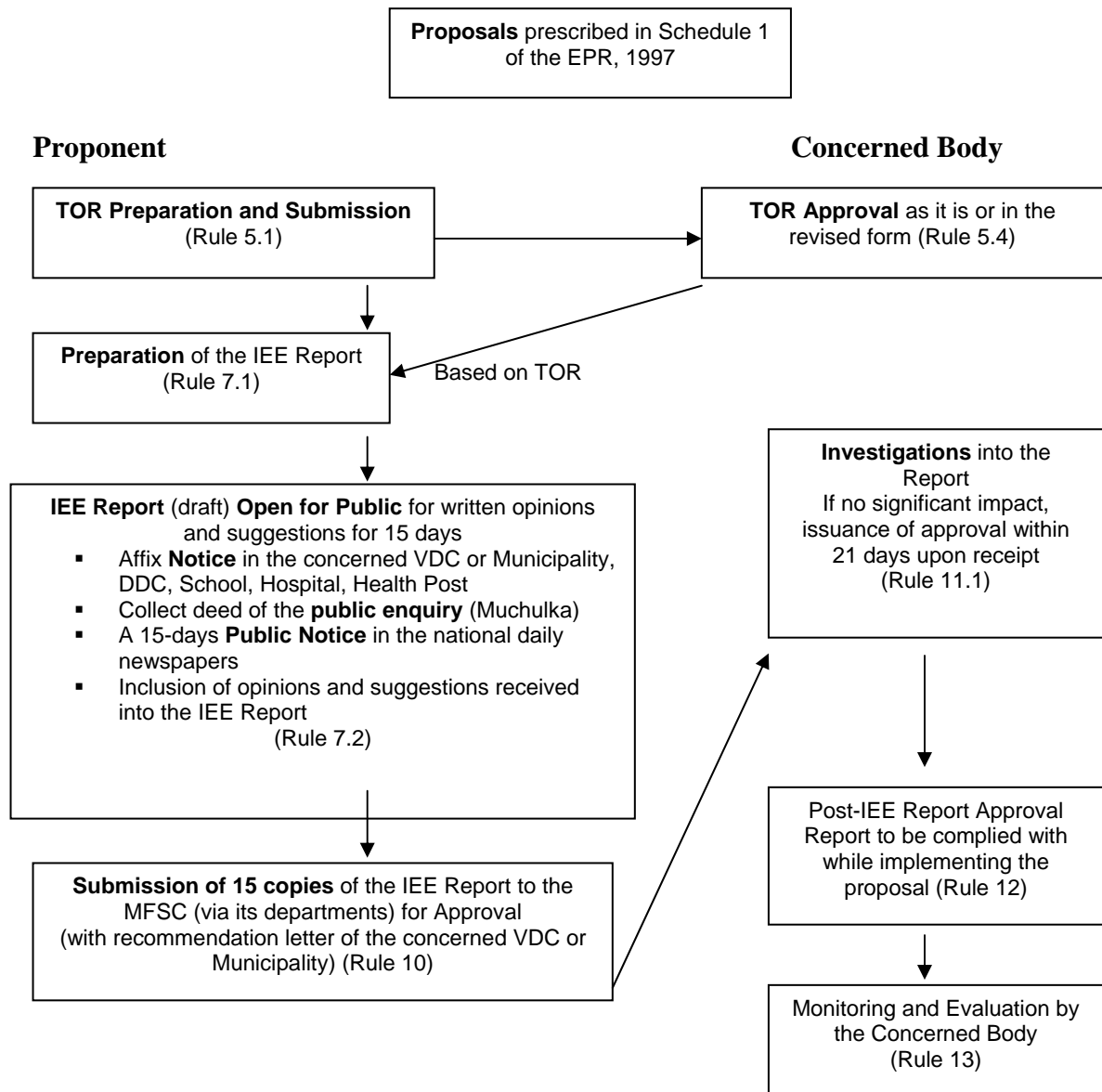


Figure 1.4a: Approval Process for Initial Environmental Examination Report of the Forestry Sector (Pursuant to Section 5 and 6 of EPA, 1996 and Rules 7, 10 and 11 of the EPR, 1997)

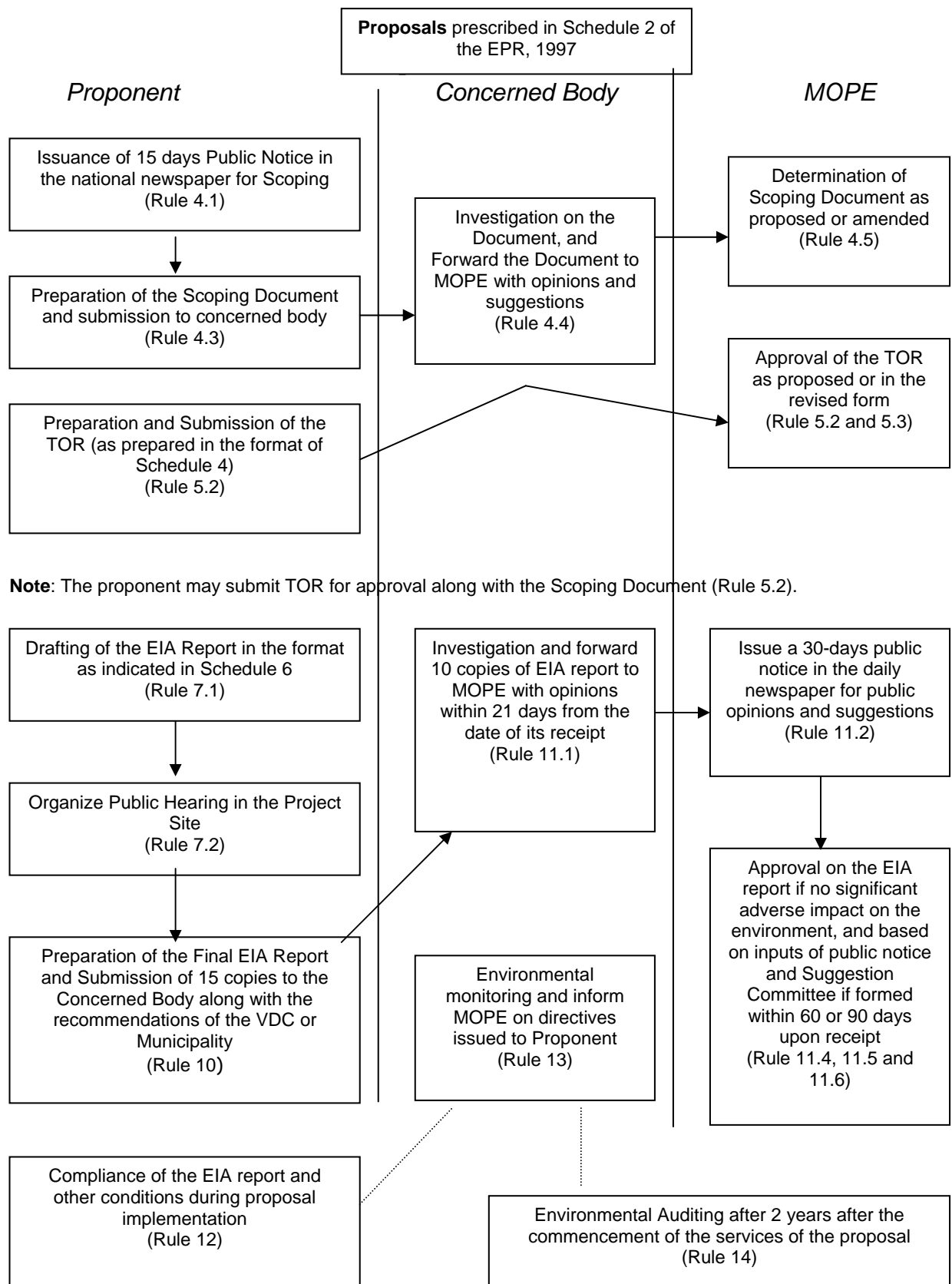


Figure 1.4b: Approval Process for Environmental Impact Assessment Report of the Forestry Sector  
(Pursuant to Section 5 and 6 of EPA, 1996 and Rules 4-7 and 10-14 of the EPR, 1997)

### ***1.5 Environment Impact Assessment and Environmental Audit***

How does environmental audit relate to environmental impact assessment (EIA)? Clearly, it depends on the type of environmental audit referred to, and the definition adopted. The various types of environmental planning audits are means to improve the overall public policy, regulatory and administrative framework for environmental management, including EIA. Therefore, it can be said that these type of environmental audits are extensions of EIA.

Corporate environmental audits are intended to ensure that the corporations concerned are complying with that framework, including requirement plans. Corporate environmental audits are an extension of environmental compliance commitments or requirements, but not EIA as such. Even so, there are many links between EIA and corporate environmental audit. Corporate environmental audits are generally concerned with addressing potential future impacts and audits are generally carried out on operating facilities, whereas EIA is generally carried out before a project commences.

Both EIA and corporate environmental audit, however, commonly describe the status of defined environmental parameters at a given site; EIA as a baseline, audit as a benchmark (Roy, 2002). Some audits are conducted as part of an approval process, either by environmental regulatory agencies for operating licenses or insurances; or by corporate regulatory agencies for corporate prospectuses, mergers, and acquisitions.

Similarly, corporate environmental audits generally involve some form of objective verification, usually to a third party; and EIA documents are subject to external cutting by government agencies and the public. It should be noted that many individuals and firms who do not generally conduct EIA like environmental law and accounting firms in particular also carry out environmental audits.

### ***1.6 A need of Environmental Audit***

The terms “audit” is usually associated with the finance and accounting. Environmental audit is a new tool, although it has been used for a long time in the past with different names in the developed countries. The use of this type of tool has been proven to be very beneficial in order to examine the complexities of environmental management system particularly in the context of increased introduction of environmental laws, standards, equipments and new technologies. Environmental audit basically, enables us to check back and examine how well these environmental instruments have worked and enabled to assess the actual environmental impacts, accuracy of prediction, effectiveness of environmental mitigation measures adopted and functioning of monitoring mechanism. In Nepal, The National EIA Guidelines (1993) and Environment Protection regulation (1997) specify that an Environmental Audit is

required after the project operation for two years, and that other types of environmental auditing are optional as to be decided by HMG/N.

### ***1.7 Rationale of the study***

The proponents are preparing the EIA report to get the environmental clearance from the MOPE and other government line agencies. However, after getting the approval, whether the mitigation measures prescribed in the EIA reports are properly implemented at the field level or not. This will be a first attempt of its kind, to document the implementation of EIA recommendations and/or to measure the effectiveness of mitigation measures prescribed in the EIA reports as environmental audit, which have direct impact on forest resources.

This is the rationale of the study.

### ***1.8 Objectives***

The general objective of the study is to review and analyze the EIA reports of Chilime Hydroelectric Projects (CHEP) in Rasuwa and Nuwakot districts, East Rapti Irrigation Project (ERIP) in Chitwan district and Annapurna Quarry Private Limited (AQPL) in Dhading district (see appendix: one). During the review, the biological environment (especially forest resources) in the EIA reports have been taken due consideration for the environmental audit. Moreover, the study takes the account of socio-economic environment with reference to forest resources as well.

During the study period, CHEP was under construction phase whereas ERIP and AQPL were in the operational phase.

The objectives of the study are:

- to carry out the environmental audit of forest resources of selected three development projects;
- to assess effectiveness of mitigation measures prescribed by EIA reports in improving social, economic and environmental condition of the communities with reference to forests resources; and
- to explore the difficulties while conducting environment auditing at field and to make recommendations for them. to natural resources.

### ***1.9 Constraints of the study***

This study was conducted for the partial fulfillment of the M. Sc. Degree in Environmental Management of the School of Environmental Management and Sustainable Development, Kathmandu of Pokhara University in Nepal. The study was carried out under different constraints. Primarily, limited time was available. It is very important that any study should have ample time. As it could be realized, time could play a vital role for a study of this nature.

In addition, '*a state of emergency nation-wide due to Maoists rebels in Nepal*' and '*night curfew in several districts in Nepal*' since November 26, 2001 have affected the study mainly for field study due to the security problems. If this situation were not prevailing, the researcher could have done in-depth study in the field with worm's eye view. Rendering this problem, this study relied on the qualitative information with little quantitative information.

Adding together, the scheduled field visits did postpone for three times. Further, local residents of the study area were scared to interact with researcher due to the present situation of Nepal. Nevertheless, within the available time the researcher has done his best to come to this result.

## ***Chapter Two***

### **2.0 Methodology**

The methodology is based on review of the EIA reports of CHEP, ERIP and AQPL. The study also reviewed the EPA-1996, EPR-1997 (as amended 1999) and National Environmental Impact Assessment Guidelines-1993, EIA guidelines for the industrial sector-1995 and EIA guidelines for the Forestry sector-1995.

SchEMS organized the brainstorming session with the officials of the Ministry of Forests and Soil Conservation and its related Department for the study of "Review of IEE/EIA of Forestry Sector". The outcome of it has been adopted as the methodology for this study purpose.

#### ***2.1.0 Desk Study***

The Environmental Impact Assessment (EIA) Reports of the selected projects i.e. CHEP, ERIP and AQPL were thoroughly reviewed. For the study purpose, EIA reports were collected and reviewed and prepared the checklist of environmental audit. Which was finalized through a brainstorming session with Supervisor of this study and with the government officials, concerned proponents and professionals those involved in preparing the EIA reports. This helped to assess the triangulation of the primary and secondary information.

A thorough review of EIAs of selected three projects was undertaken. The review was focused on the biophysical and socio-economic environment of the projects and as a result a three separate environmental auditing checklists were prepared (see appendix one).

#### **2.1.1 Review of EIA Reports**

The following EIA reports have been reviewed;

- EIA of Chilime Hydroelectric Project (CHEP), Rasuwa and Nuwakot districts;
- EIA of East Rapti Irrigation Project (ERIP), Chitwan district and
- EIA of Annapurna Quarry Private Limited (AQPL), Dhading district.

### **2.1.2 Preparation of Environmental auditing checklists**

During review, environmental auditing parameters and indicators were developed carefully that will address the above-mentioned aspects of environmental audit. The environmental audit checklists were thus developed incorporating followings:

- identification and development of environmental audit parameters;
- development of environmental audit Indicators to verify the predicted impacts and prescribed mitigation measures;
- sources of information at field level; and
- methodology for collecting information.

#### ***2.1.1 Field Study***

Field study of the selected projects were carried out during April and May 2002. The following tools and techniques have been used to acquire the primary information for the study.

- field investigation and observation;
- informal discussion with concerned stakeholders such as project officials/proponents, labor forces, local communities, government line agencies i.e. DFO, DSCO, DIO, DDC, VDC;
- rapid Rural Appraisal (RRA);
- interview with key informants;
- focus group discussions; and
- audio recording.

#### ***2.1.2 Secondary Information***

Secondary information necessary for the study were collected from concerned agencies and/or offices, both at field and central office. In addition, other relevant secondary information were collected from different resource centers. These information were incorporated to analyze and interpret the research findings and preparation of this dissertation.

## ***Chapter: Three***

### **3.0 Result and Discussion**

#### ***3.1.0 Chilime Hydroelectric Project (CHEP)***

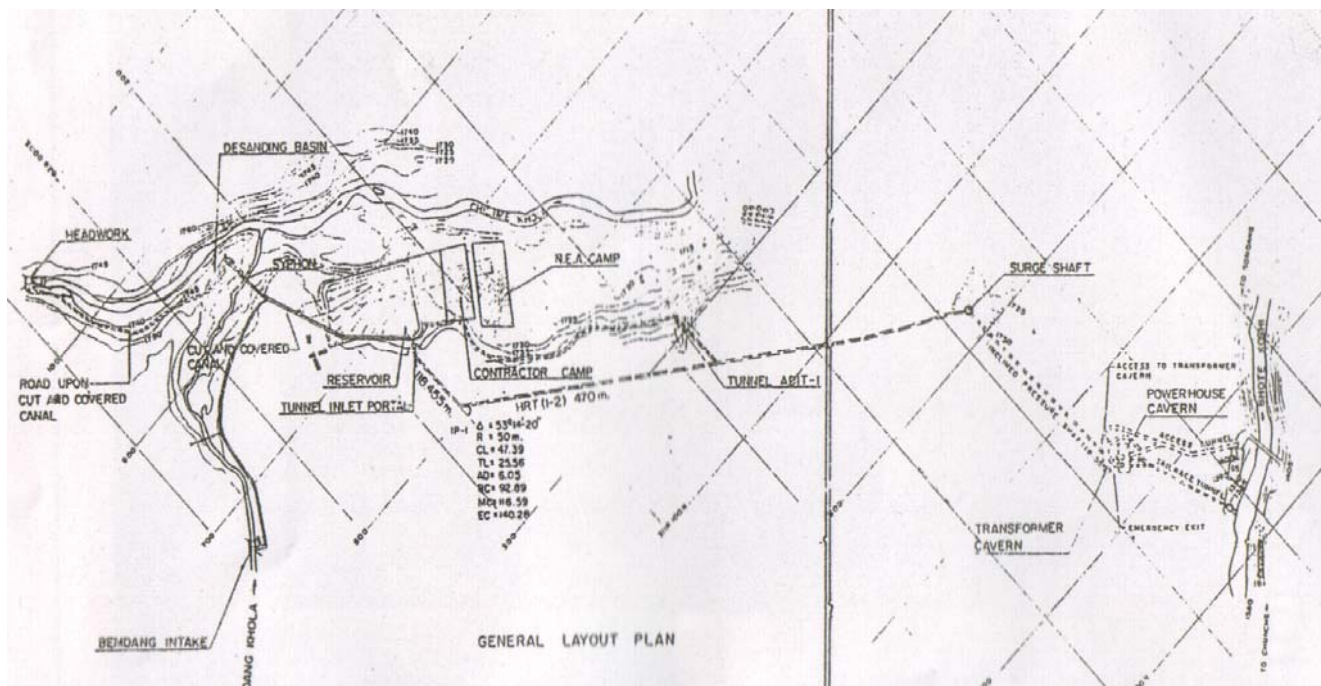
##### **3.1.1 Project Description**

Chilime Hydroelectric Project, with capacity of 20 Megawatts, is constructed in the 15 Kilometer north of Dhunche, a district headquarter of Rasuwa district. The project that is in vicinity of Goljung, Chilime and Syafrubeshi VDC is fully underground except the one-kilometer power canal that is visible above the surface. Headrace tunnel, painstake, powerhouse, and transformer room are built in underground tunnel. It has seven Kilometer of access road. It is run of river type of hydroelectric project and it comes from Chilime and Bemdang river, one of the major tributaries of Bhote Khoshi River. The rivers have dependent flow from the snow fed watershed area.

All technicians, working for this project, are Nepalese and they are employed under the Nepal Electricity Authority (NEA). There is not any foreign assistance in financial and technical except the reviewed of project designed were approved by the Canadian experts before implementing the project. A public company named 'Chilime Hydroelectric Company Limited' has been registered to operate the project in future. This company will have 51 percent of shares of NEA, 25 percent of shares of NEA employees and 24 percent of shares of public.

More than 80% of civil construction work has been completed during the field visit on April 2002.

## Chilime Hydroelectric Project



### **3.1.2 Environmental Audit of Biophysical Environment**

The access road connects Trishuli-Somdang road with the site of headwork of the CHEP. Around 1.65 ha of forestland, mainly consisting pine forest was disturbed by the access road construction. The forest area comes under the Goljung Community Forest. Slope stabilization activities were not carried out along the road. The area is prone to land slide and soil erosion.

District Forest Office had distributed 6500 (*Pinus roxburghii*=4000, *Melia azedarach*=400 and *Alnus nepalensis*=2100) seedlings to the project at free of cost. Roadside plantation had been carried out at access road nearby Goljung. Nevertheless, the survival rate of the plantation is minimal due to lack of proper technical assessment during plantation. In addition, there was an incident of soil erosion and landslides at the plantation site in the subsequent years. Plantation was carried out with the help of local community forests user groups. It covers three hectares. There was no regular working coordination among and/or between line agencies such as District Forest Office staff and the project staff.

To comment, this is not a good indicator for the conservation of forest resources though it had been carried out with the help of local people. Therefore, the proper technical assessment such as site selection, seedling species selection, time schedule for seedling plantation and others have to be carried out before the seedling plantation. If the site was not suitable for the seedling plantation, other alternative measures such as grass plantation could have been adopted for the in-situ conservation and/or rehabilitation of the affected area. This further would have helped to minimize further landslide and soil erosion.

In addition, concerned District Forest Office should have taken an initiative for the technical supervision of such type of seedling plantation programs rather than providing the seedlings at free of cost. In this matter, both stakeholders i.e. DFO and CHEP could have had mutual coordination to achieve the desired objectives. Moreover, DFO should have monitored the plantation works at least for three subsequent years. Within those periods, the seedlings would have grown and would have survived. In case of death of seedlings and failure of seedling plantation, causal replacement of death seedlings and re-plantation should have been carried out in subsequent years. For this purpose, the proponent should have met the cost of the seedling re-plantation.

*Table 3.1.2a: Forestland disturbed by the CHEP*

Project component	Forest Area, ha
Access road	1.65
Headworks	0.10
Total	1.75

*Source: EIA report, CHEP, 1995*

Vegetation in the headwork site is sparse and mainly riparian vegetation. Rehabilitation and slope stabilization works should have been done (see appendix three). The civil construction work is going on.

Local contractor provided kerosene to the local labors. There was no kerosene shortage because, the local contractor stocked adequate kerosene to meet the demand. Illegal firewood cutting and collection was not noticed during the construction phase. However, some cases of fuel wood collection by the workforce in the past were reported. Nevertheless, at present this activity has been controlled by local FUGs. In addition, there is possibility of locals selling fuel wood to the workforce. It is believed that, the use of firewood for cooking gives a better taste of cooked food in firewood rather than in kerosene stove. This could be a subject for further research, which is beyond of the scope of this study.

However, labors did not have adequate time to go to the forest and there was not enough space for stocking/piling of firewood in the work camp. Hence, the direct impact on vicinity forests by the workforce had been noticed minimal during the field visits and observation.

As such, for the minimization of the consumption of fuelwood at the work camp of labor force, the proponent should have encouraged the local/petty contractor to run a common mess for the labor force rather than individual oven for cooking purpose. This would have certainly helped in consuming fuelwood for making daily meal to a large number of labor force. In addition, kerosene and LP Gas could have been used for cooking instead of fuelwood. However, air pollution from these cooking fuel should not be overlooked.

*Table 3.1.2b: Issues reported on fuelwood consumption at headworks*

Issues observed	Issues resolved
Illegal collection of fuelwood from two Community Forests were reported by workforce: Prigote Palgumbo community forest, Goljung VDC – 9, Nejakpakha community forests, Chilime VDC-2. Conflicts between construction workers and FUGs on illegal fuelwood collection.	The dispute was resolved in mediation of DFO staffs; Workers stopped entering the CF; Worker used kerosene for cooking and to some extend they were buying surplus fuelwood from adjoining CFUG.

Source: Field Survey 2002

Work camp at headwork did affect two community forests namely: Prigote Palgumbo community forest, Goljung VDC-9 and Nejapakha community forests, Chilime VDC-2. Pine, Alnus and Rhododendron are the major species of these CF and wild boar, ghoral thar and ratuwa are the major wild animals found in these community forests. Further, timur and chiraito are the major non-timber forest product found in these CFs but there are no any illegal trading of these NTFP. Local businesspersons do trade the chiraito after payment of government royalty. Initially, there were conflict between construction workers and community forests on illegal firewood collection from CF. The District Forest Office helped to resolve this dispute. After that, construction worker started to purchase surplus firewood during the silvicultural operation of the CFs. This is a good practice for preserving the forest resources.

The powerhouse is constructed underground and no impact on vegetation and wildlife (see appendix three). The EIA report had recommended establishment of temporary check post of the Langtang National Park (LNP) to control poaching and illegal hunting. During discussion with the officials of LNP, it was learnt that the CHEP has been providing rent for two rooms at Syafrubesi for the check post. The project contributes Rs 1500 per month for rent of park staff at Syafrubesi check post. They also confirmed with us that no cases of illegal hunting or poaching took place in the project area and/or in LNP. This was followed as per the recommendation in the EIA report.

The transmission line passes through Langtang National Park. Illegal poaching/hunting was not observed during the construction phase of the Transmission Line Pillar. Nevertheless, the fragmentations of the wildlife habitat did affect the movement of the wild animals.

The logs/ timbers from the T/L are still not auctioned. 4417.219 ft<sup>3</sup> including log and sawn timber of Pine, Alnus and others and 48 Chatta (5\*5\*20 ft<sup>3</sup>) of firewood have been stacking at the park office (see appendix three). This is resulting in the lost of calorific value of fuel wood.

To discuss, these timber and fuelwood should have been brought by the concerned proponent i.e. CHEP as per the rate of government royalty. This should have been carried out during the felling process of the trees when the installation of transmission lines took place.

*Table 3.1.2c: Timber extracted from Langtang National Parks*

Volume	Major tree species	Remarks
4417.219 ft <sup>3</sup> (log and sawn timber) 48 Chatta (5*5*20 ft <sup>3</sup> ) of firewood	Pine, Alnus and others	LNP had called auction for two times and which were not responded. The timbers are still stacking at the parks office and degrading their timber value.

*Source: Langtang National Park*

To conclude, the project has made minimum disturbance to the forest and biodiversity during the construction phase. It has also taken an initiation to form the local environmental committee to preserve the existing environment. The committee constituted three VDCs that were affected by the project. Likewise, it also constituted other environmental committee named, Environmental Monitoring Committee that included the representatives from District Forest Office, Langtang National Parks, Environmental Unit of NEA and Project Staff. The project deputed an administrative officer to coordinate this committee. However, he had less knowledge on environmental conservation, forest and biodiversity conservation as well. Therefore, there is a need to depute the professional forester in such assignments

### **3.1.3 Environmental Audit of Socio-economic Environment**

Around 200 to 500 labors worked at peak hours during the construction phase. Among them, 50% represented the local workers and remaining from outside. Except this employment generation through the project, other socio-economic changes have not been accounted during the field investigation.

### 3.1.4 Environmental Audit Matrix

*Table 3.1.4a: Environmental Audit Matrix of CHEP*

Parameters			
Impacts predicted	Mitigation measures	Indicators	Findings
<b>Activity:</b> Access road from Dhunche - Somdang to head work			
Forest degradation Illegal cutting of trees; About 1.65 ha forest changed; and Goljhung FUG directly affected	Job opportunity for locals & discourage Illegal felling; Afforestation; Alternative fuels at reasonable cost; and Cash compensation to FUGs.	Demand/ Origin of fuelwood; Availability of alternative fuel; Local employment at Project; Condition of forest; Number & condition of plantation; Volume/Species of trees; and Area of forest lost Trees extracted from CF Goljhung.	Slope stabilization activities have not been performed satisfactorily along the road. Several land slides were observed during field visit; The project has provided cash compensation (Rs. 20,000) for the compensatory plantation and their maintenance for 3 years to Goljung CFUG; Plantation along the roadside was done by the users. <i>Pinus roxburghii</i> were the major species planted; and The plantation was not successful due to soil erosion, landslides and lack of proper technical guidance during plantation.

<b>Activity:</b> Head work and powerhouse constructions			
<p>Illegal hunting of birds; and Damage of reptile habitats. Forest degradation due to Illegal cutting of trees.</p>	<p>Temporary check post of LNP at Syafrubesi.</p>	<p>Establishment of check post; and Cases of violation of Forest legislation (illegal hunting, cutting)</p>	<p>Ground vegetation at the headwork site is sparse and mainly riparian vegetation; Rehabilitation and slope stabilization works have to be done with civil structure. The civil construction work is on progress; Local contractors are reported of managing their kerosene requirement by themselves; In past, some issues of fuel wood collection by the workforce were reported. Nevertheless, at present this activity has been controlled by concerned FUGs. However, there is possibility of locals trading fuelwood to the workforce; and CHEP has rented 2 rooms for LNP personnel at Syafrubensi, for the check post.</p>
<b>Activity:</b> Transmission line			
<p>Loss of vegetation and Wildlife habitat disturbance inside and outside the LNP.</p>	<p>Minimize tree felling.</p>		<p>The transmission line passes through Langtang National Park; Illegal hunting of wildlife was not reported during construction of the transmission line; The estimated volume of tree felling is higher than estimated one. The logs/ timbers from the T/L are still not auctioned.</p>

### **3.2.0 East Rapti Irrigation Project (ERIP)**

#### **3.2.1 Project Description**

In November 1987, East Rapti Irrigation Project (ERIP) was proposed to be built in Chitwan District, Rapti River catchment to enhance agricultural productivity, to increase rural income and to accelerate rural development. The following components were proposed for the ERIP: a diversion weir across Rapti River of 400m in length to divert a maximum flow of 14.3 m<sup>3</sup>/sec, an under sluice gate, guide banks, 3.7 m wide fish ladder, a self flushing de-sander, 21.9 km of canal networks, and 24.6 Km drainage network. Proposed command area of ERIP was 9,500 ha.

ERIP lies in Chitwan District. It is bounded by East Rapti in the South, Khageri River in West, Foothills of Mahabharat Range in North and Lothar River in East. And, it covers 12 VDCs, namely; Piple, Bhandara, Kathar, Kumroj, Bachhuli, Chainpur, Ratnanagar, Khairhani, Birendranagar, Pithuwa, Jutpani, and Panchkanya.

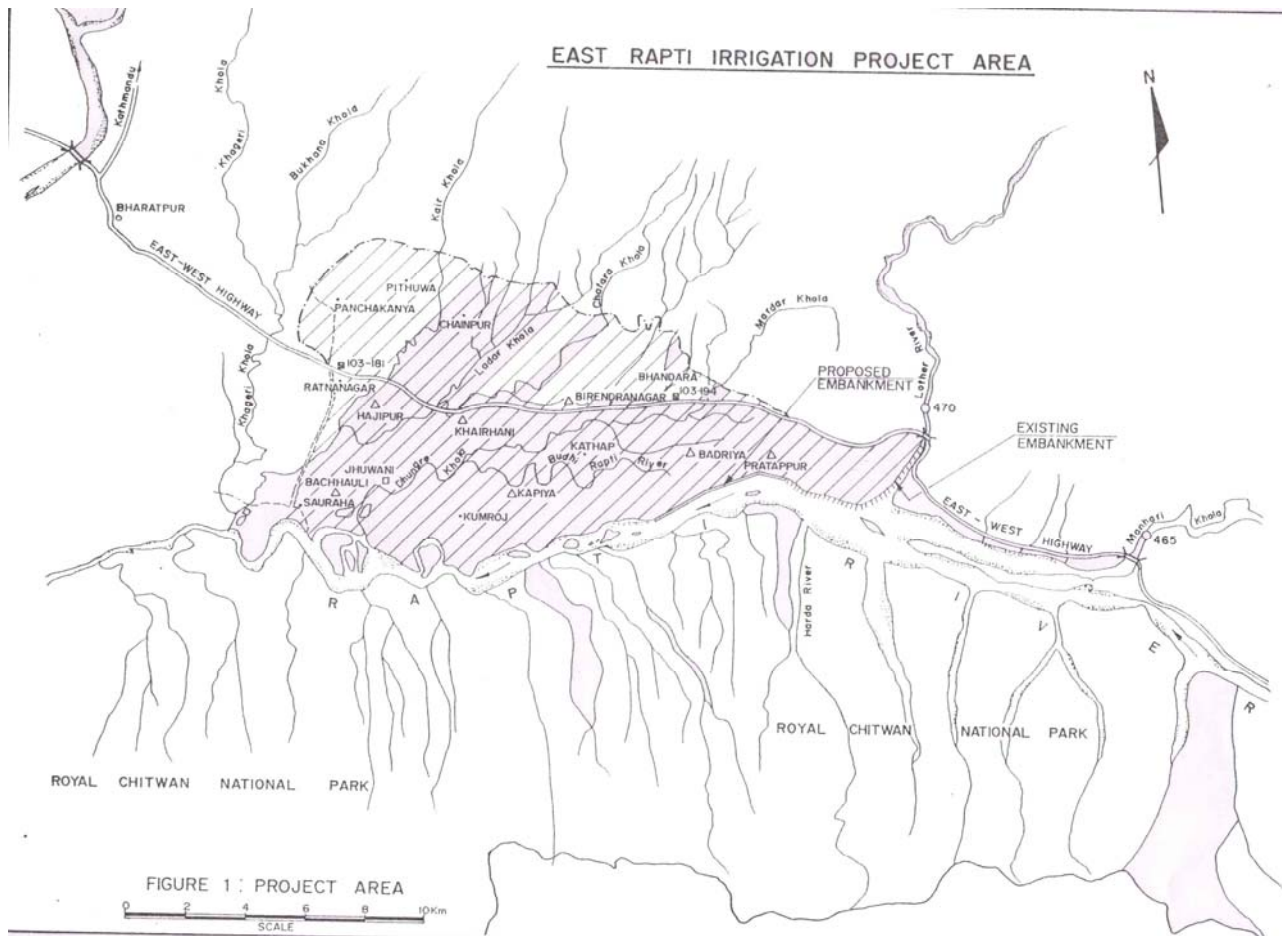
No consideration of EIA was made in the project feasibility stage for ERIP. After the completion of project feasibility, RCNP authority raised questions about the impact of the project in RCNP, as Rapti River is the major source of water for the wildlife habitat of the park. It was then decided to undertake EIA, which identified possible impacts to RCNP and concluded that ERIP should not be implemented. The Special Loan Administration Mission (November 1989) from ADB supported the results of EIA.

The project is now in operational phase. As per the EIA report of the ERIP, which strongly opposed construction of dam across East Rapti River, the ERIP was reformulated. Hence, the implementation of ERIP was carried out focusing on the rehabilitation and improvement of 85 existing Farmer Managed Irrigation Schemes (FMIS) rather than expanding or constructing new irrigation schemes. Command area of ERIP was thus scaled down from 9,500 to 5,200 ha. Construction of 18 Km long flood embankment on the right bank of East Rapti River, in Pratappur was added to the project considering 1993 flood devastation. At present, The Irrigation Management System of ERIP is coordinated by the “East Rapti Irrigation Water Users Coordination Organization”, which initially incorporated 85 Water User Groups (WUGs) of respective FMISs. These days, total of 93 WUGs are under this organization. The eight irrigation schemes have intake in the East Rapti River, which are shown in Table 3.2.1a.

*Table 3.2.1a: Irrigation schemes in East Rapti River*

Irrigation scheme	Command area	Irrigation scheme	Command area
Pratappur Mahu Kulo Piple	364 ha	Mudabhar Kulo Bhandara	130 ha
Mahadev Kulo Piple	90 ha	Janakalyan 'ga' Kulo Bhandara Kathar	100 ha
Sisabas Parsaune Kulo Piple Bhandara	101 ha	Janakalyan 'ka' Kulo Kathar	255 ha
- 24 -			
Padariya Kulo Bhandara	120 ha	Janakalyan 'kha' Kulo Kathar	118 ha

*Source: East Rapti Irrigation Water Users Coordination Organization (2002)*



### **3.2.2 Environmental Audit of Biophysical Environment**

Considering the 1993 flood devastation in the East Rapti River, the ERIP has incorporated an 18 Km long flood embankment on the right bank of East Rapti river in Pratappur (see appendix three). Along the side of embankment, the project has done plantation, which has provided biological benefits; and they are:

- embankment along the Rapti river helps to control the flood into the settlement area and agricultural land during the rainy season;
- decrease on flood hazard due to the diversational canals of the irrigation project, decrease on the speed and velocity of river run off;
- irrigation project benefits to increase the agricultural production and to enhance the greenery of the forest area (see appendix three);
- plantation along the embankment are handed over to the FUGs to manage them as a community forest;
- availability of leaf litter, fodder and other forest products to local people;
- local residents and the member of the community forests have become active after formation of the community forest for income generating activities;
- recreational space and seasonal migration for the RCNP wildlife enhanced and acted as the wildlife corridor.

As per discussion with the members of Kuchkuche Community Forestry User Groups, following observation were made (see appendix three):

The Community Forest covers 108 ha of forest area and it constitutes four hundred households, as its members from Kathar VDC ward no: 6, 7, 8 and 9. It has annual budget of Rs 600,000 to 700,000 that is supported by the Royal Chitwan National Parks as the buffer zone area (as per the Buffer Zone Regulation, 2054 BS). It employs one forest watcher for the CF and he gets Rs one thousand and two hundred per month as remuneration.

The community forest covers with various species such as sissoo (*Dalbergia sissoo*), bakaino (*Melia azedarach*), teak (*Tectona grandis*), badhar (*Artocarpus lakoocha*), simal (*Bombax ceiba*), khayer (*Acacia catechu*), and so on. The wild animals such as rhino, wild boar and spotted deer seldom disturb agricultural crops but local people manage it accordingly and this is not a big problem for them, as they perceived. There are not any cases of wildlife hunting and poaching inside the buffer zone area because local people are aware of the benefit of wildlife protection and conservation as it is a part of an ecosystem and food chain.

The extraction of forest products from the community forests are done three times a year; during the last week of Baisakh to first week of Jestha (mid April to mid May), Dasain and Tihar (mid September to mid October), and last week of Poush (mid January). The cattle's grazing is the main problem of the CF and other major problem is not visible yet.

Around three to four kilometer of irrigation canal goes through the CF and that helps to recharge the ground water and maintain the ground water level (see appendix three). The negative impacts of this irrigation canals are: in the rainy season this canal accelerate the scouring of the canal bank, make roots of the trees weak causing trees damage. Three to four trees are affected annually with this problem.

In addition, this canal is used as a means of water transportation for the illegal felling of the forest products in the CF but this problem was not disclosed clearly during the discussion session. Further, the irrigation canal could be used as a means of transportation of forest products of the CF in future. This is the beneficial impact of the irrigation canal on forestry sector.

To discuss, the project has positive impact on enhancing the greenery of the area but it has a potential for using as a means of water transportation of forest products of in and/or around the CF. This identified problem would be addressed as an action research for future study, which is beyond the scope of this study.

The CF has a close relation with the KMTNC but no relation with District Irrigation Office (DIO).

To discuss, the same problems prescribed earlier, the lack of coordination and communication among and/or between the concerned stakeholders, found in this project as well.

In addition, an informal discussion with the officials of Chitwan District Irrigation Office, it was found that the authority of Royal Chitwan National Parks has not yet made any complains on dry season flow of the Rapti river as it could make problem for the wild fauna and aquatic life in the river. There is no negative environmental problems from irrigation project.

During the field visits, the meeting was held with the executive members of Bagmara Community Forestry User Group. The CF covers: 400 ha of forest area. Moreover, it constitutes 779 households as its members (ethnic composition: fifty percent Choudhari i.e. Tharu and fifty percent others i.e. mainly migrants from the mid-hill mountain). It was established on 2046 BS. As the output of the meeting, it was learnt that the East Rapti Irrigation Project made the plantation of 14 ha of area in the southern belt of Rapti River. During the phase out period of the project, this plantation area was handed-over to the community forests. This plantation area represents the Block 7 on the operational plan of the CF. Sissoo (*Dalbergia sissoo*), bakaino (*Melia azedarach*), khanyu (*Ficus semicordata*), teak (*Tectona grandis*), ipil ipil (*Leucaena leucocephala*), mashala (*Eucalyptus spp.*), bans (*Dendrocalamus spp.*), nimaro (*Ficus ariculata*) are the major tree species of the plantation.

The plantation area was maintained by the project during the project construction stage. For the long-term sustainability of the plantation, the project has also supported locals to formulate and register buffer zone community forests (see table 3.3.2a).

**Table 3.2.2a: Buffer Zone Community Forests with ERIP Plantation**

SN	Name of BZCF	Address	H/H	Area, ha	
				ERIP Plantation	Total
1	Bramhasthani BZCF	Piple VDC – 5	200	13.5	136
2	Shanti BZCF	Piple VDC – 1, 2, 3, 7 and 8	450	46	46
3	Rapti Unity BZCF	Bhandara VDC – 3, 4, 5, 6 and 7	600	37.5	252.5
4	Kuchkuche BZCF	Kathar VDC – 6, 7, 8 and 9	400	46	108
5	Shree Ram Janaki BZCF	Kumroj VDC – 6, 7, 8 and 9	437		161
6	Baghmara BZCF	Bachchauli VDC	779	14	400
7	Kumroj BZCF	Kumroj VDC	1468		1050

*Source: Field Survey, 2002*

### **3.2.3 Environmental Audit of Socio-economic Environment**

*Agricultural Production:* The mainstay of the people of the project area is agriculture. The direct benefit of ERIP to the local people is enhancement of agricultural productivity. During the field visit on May 2002, it was observed that local farmers were able to harvest paddy, twice a year. Moreover, it enhanced the socio-economic condition of the local people which is due to increased interaction within and/or between the local people and other stakeholders such as government organisation and non-governmental organisation.

*Eco-tourism:* The developed community forests have provided an additional source of income to the local people through eco-tourism. Due to the improvement the wildlife habitat inside the buffer zone area, BZCFs opened their area to the tourists for wildlife sightings, nature walks and other eco-tourism activities. As for example, Kumroj BZCF is operating a *machan* for eco-tourists. It was built with financial assistance from KMTNC (total cost: Rs 500,000 and Rs 300,000 has been paid back from the tourists). This is another source of income for local communities.

### 3.2.4 Environmental Audit Matrix

*Table 3.2.4a: Environmental Audit Matrix of ERIP*

Parameters			
Impact predicted	Mitigating Measure	Indicators	Findings
<b>Activity: Construction phase</b>			
Construction of dam across East Rapti River will lower dry season flow	The project to be reformulated excluding the construction of the dam; and Scope of the irrigation component was limited to the rehabilitation and improvement of 85 existing FMIS	Water intake structures at East Rapti River.	The reformulated project design excluded the proposed dam; Small farmer managed irrigation schemes are reinforced and streamlined; At present, total of 93 water users groups are formed under the umbrella of East Rapti Irrigation Water Users Coordination Organization; Eight channels of ERIP touch the Royal Chitwan National Park and they all lie in the buffer zone; and Despite of water abstraction between Pratappur and Sauraha, it was found the downstream flow is always greater at Sauraha than at Pratappur.
<b>Activity: Operational phase</b>			

Beneficial impact of the project is inclusion of 18 Km river embankment along the right bank of East Rapti River to prevent the flood devastation.	Considering 1993 flood devastation in East Rapti River, the project has added an 18 Km long flood embankment in the right bank of East Rapti River in Pratappur. The plantation of trees to be done along the embankment.	Incidence of floods; and Status of plantation	The flood protection embankment has significantly reduced the flood hazards (almost nil to date); The project supported following CF to be formed in the plantation area; The CFs formed under the jurisdiction of Buffer Zone Management of RCNP; Some of the major benefits of the project are: increased greenery and production of agricultural crops due to irrigation project; decreased on flood hazard; enhanced the socio-economic condition from CF to the local people – adequate supply of forest products i.e. fuelwood, fodder, leaf litter and timber, income generation from eco-tourism and increased interaction within and/or between the local people and other stakeholders; The recreational space and seasonal migration of RCNP wildlife has been supported by the plantation i.e. better management of wildlife corridor,
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### ***3.3.0 Annapurna Quarry Private Limited (AQPL)***

#### **3.3.1 Project Description**

Annapurna Quarries Pvt. Ltd, established in 2043 BS, is a private company which received a license from Department of Mines and Geology (DGM), HMG/N for the operation of the limestone quarry at Beldanda, Jogimara VDC within an area of one square mile. As per the Forest Act, 2049, Department of Forests also entered into an agreement with the lessee on 8 May 1986 for the duration of 15 years.

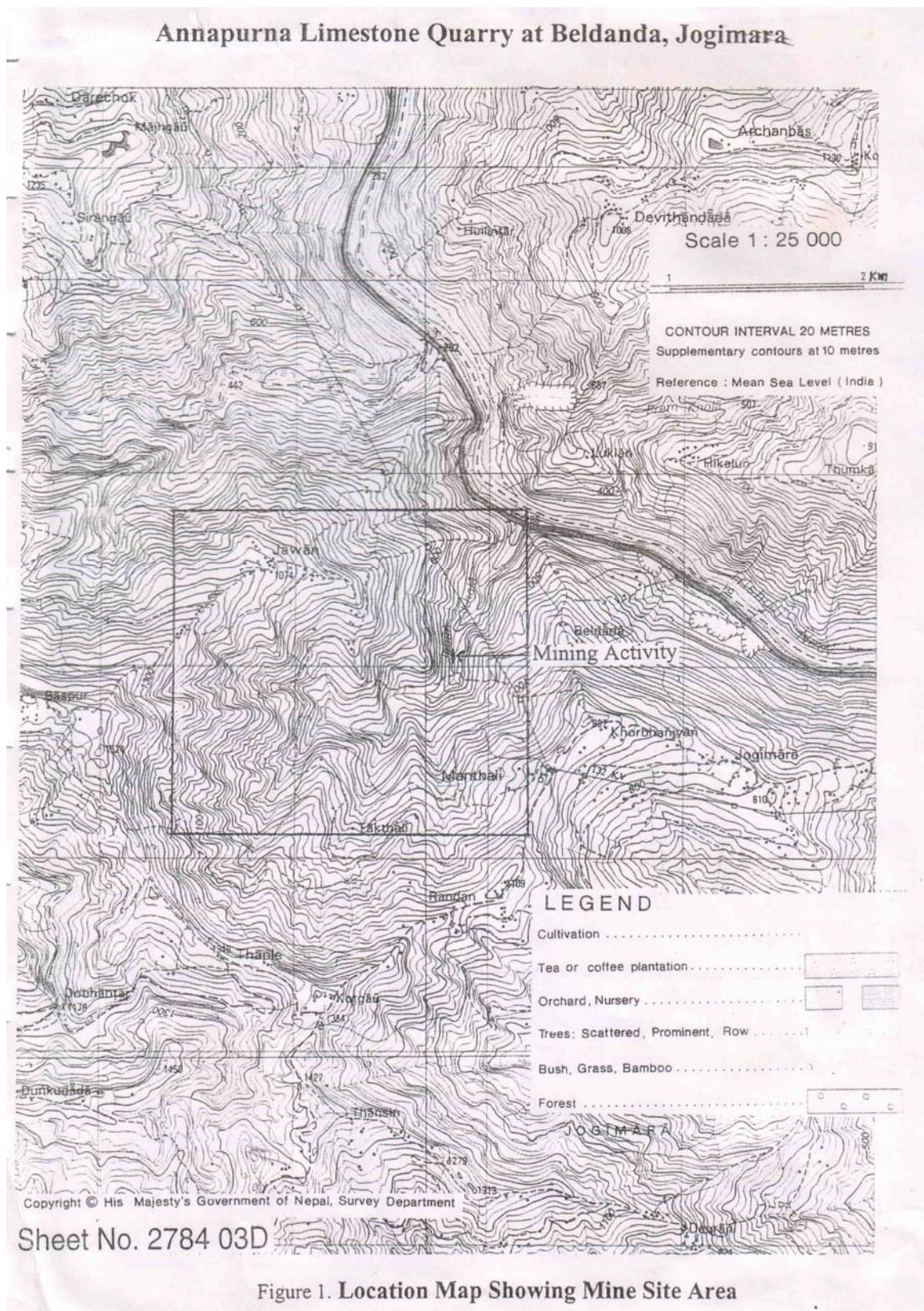
The Annapurna Quarry is in operation at Beldunga along the Jawang stream sub-watershed on an undulating and steep landscape. The quarry site falls in ward nos. 1 and 2 of the Jogimara VDC in Dhading District. It is about 1.5 Km away towards south from the confluence of the Bangdi stream and the Trishuli River along the Prithivi Highway.

Two separate studies were carried out to estimate the limestone deposit at Beldanda. The 1987 mining scheme indicated that the area had a deposit of 2.76 million tons of limestone, of which about 2.21 million tons could be extracted, based on 80% recovery and the quarry could be operated for about 33 years assuming an extraction rate of 200

tons per day. The integrated Mining plan and feasibility Study of Beldanda Limestone Deposit, 1996, on the other hand stated that the recoverable reserve was about 3.4 millions tons which could be mined for about 34 years at the rate of 350 mt per day on Running mine basis. The chemical analysis of the limestone found in the area shows that it contains 54.42% of CaO, 0.28% MgO and 1.6% of SiO<sub>2</sub> indicating its high grade. Limestone found in this site is best raw material for high quality cement production.

The mining schemes, 1987 recommended an open cast mining method maintaining bench configuration, drilling and blasting, as well as manual means of fragmentation of the hard rock. After the product is prepared for transportation, mini-dumpers bring them up to chute and they are disposed of from chute, as there is no road facility. Then the products are loaded in the truck and are sent to the concerned clients i.e. Himal Cement Factory.

The leased area of the quarry is a national forest, which comes under the jurisdiction of District Forest Office (DFO), Dhading. The major tree species found in the area are Sal (*Shorea robusta*), Simal (*Bombax cordifolia*), Champ (*Michelia champaca*), Chilaune (*Madhuca Butyracea*), Harro (*Terminalia chebula*) and Barro (*Terminalia belerica*). And, likewise, the following shrub species are found in the area: Titepate (*Artemesia vulgaris*), Lazzabati (*Mimosa pudica*), Khar (*Saccharum spp.*), Babio (*Eulaliopsis binata*) and Aparjita (*Clitoria termatis*).



### **3.3.2 Environmental Audit of Biophysical Environment**

Access road passes through the forest area along Jawing Khola. The proponent has managed to protect the existing four Champ trees (*Michelia champaca*) with the help of the local people, by labeling them as the protected trees (see appendix three). This tree species has legal provision for not allowing transport, export and no fell as per the Forest Regulation, 2051 BS.

To discuss, this initiative could be a good example in conservation practice. This certainly helps to conserve the endangered tree species and enhance the in-situ ecosystem conservation.

Around 1 km of access road from the Prithvi Highway (way to Kathmandu and Pokhara) to quarry site, about 800m road is accessible to light and heavy vehicles like jeeps and trucks for lime stone transportation. Remaining 200m is not accessible for any vehicle (see appendix three). These strategies have been carried out for minimizing the tree and other vegetation losses. Because, if the access road is linked with the highway, there could be high chance of illegal felling of trees in the upper part and/or vicinity of the quarry site. So, those two sections of access road (accessible and non-accessible road) contributed to conserve the forest area nearby the quarry site. This was clearly visible during the field visit on May 2002. Hence, it can be said that, the proponent seemed to be conscious on forest conservation.

The proponent deposited Rs. 50,000 at the DFO as deposit amount for the compensation plantation to restore the lost vegetation/forest products on fiscal year 2056/2057 BS. According to the District Forest Officer of Dhading District, this assignment has not yet been carried out due to the lack of proper plantation area in the quarry site. This area is yet to be explored. DFO justified that it was due to the present situation of country's security problems. However, the proponent is ready to conduct compensation plantation if DFO gives the alternative site for the plantation.

To discuss, this type of deposit money for compensatory plantation must be used in the right time and should not remain unused. For this, concerned stakeholders such as DFO, Proponent and VDC/DDC should have interactions regarding this matter. This could help to explore the site for plantation. In addition, it could explore other alternatives to achieve desired objectives.

As per the discussion with the technical staffs of DFO, the detail baseline information and/of survey was not carried out before operating the Quarry. So, the loss of vegetations are unknown. Therefore, there is a possibility of extinction of some plant species that inhabit in the rocky ecosystem. Further, the area of quarry site i.e. 1 sq mile has not been demarcated clearly. This field demarcation should be done as soon as possible as it could help to monitor the losses of ground vegetation-diversity and further carry out the programs to restore the indigenous plant species. Nevertheless, there is no any correspondence and communication between the proponent and the

DFO in these regards till the date of field visit for this study.

To discuss, above-mentioned issues certainly accelerate biodiversity loss of the area.

After the enactment of the Local Self-Governance Act, 2055BS, the proponent has to pay royalty of quarry stone to three different institutions of HMG/N i.e. District Forest Office, Department of Mine and District Development Committee for the same purpose. In this matter, proponent has been facing the financial as well as administrative burden. This is not rationale and should be revised and/or reviewed.

### **3.3.3 Environmental Audit of Socio-economic Environment**

The quarry has given priority in employing local indigenous ethnic groups like Praja Community (Chepang), Gurung and Ghale from nearby villages. Around 50 to 60 labors are employed on daily wage basis. They receive Rs 100 per day per person as their wage. The morning and evening shift workers get meals from the proponent at free of cost plus daily wages. This is an incentive to the labor. However, a few technical and administrative staffs including one heavy machine driver from Sindhuli District are outsiders.

Praja community, traditionally known as shifting cultivator, survive inside the forest area and are known as indigenous people of the forest. They changed their traditional occupational behavior as they got alternative employment opportunity as laborer at the quarry site. They are benefited economically and this is the direct beneficial impact on the indigenous people. In addition, the proponent has given high priority to this community for the employment. In conclusion, one can say that if alternative employment has been given to the Praja community for their survival, they are ready to change their traditional occupational behavior as shifting cultivator. In addition, they are always seeking to work at quarry site even in the off-season to make money.

This change in socio-economic and cultural behavior of Praja community, could be further researched with sociological and anthropological aspects, which is beyond this study's limitation. A room for further research has been identified during the field visit in this subject.

The proponent has managed different gears for occupational health and safety e.g. helmet, boot, rope, alarm, whistle and others but the Praja community labors did not comply with these safety gears. Instead, they prefer to work with bare foot without helmet (they used the safety helmet to bring the drinking water during their duty at quarry site). According to Mr. Nara Bahadur Praja, Chairperson, Ward no 02, Jogimara VDC, Dhading District, they felt uneasy to work with these safety gears.

The proponent frequently conducts green campaign with other activities to conserve the forest resources through local *ama samuha* (mother group). This helped to create awareness on conservation of forest resources (natural resources) among local people. They are very conscious against the illegal felling of forest resources and their illegal

cultivation. They act as a watchdog for forest protection.

### 3.3.4 Environmental Audit Matrix

*Table 3.3.4a: Environmental Audit Matrix of AQPL*

Parameters			
Impact predicted	Mitigation measures	Indicators	Findings
<b>Activity: Lime stone quarrying</b>			
Removal of bushes and shrubs for mining (2 ha. of shrub land is affected in the duration of 15 years, and further 3 ha. is expected to be affected in future)	If any tree has to be removed for quarrying, the tree has to be marked, counted and taken permission from DFO, Dhading; Discouragement of outsiders for employment at the quarry; Priority to be give to locals; and Rehabilitation of quarry site once the quarrying activities are discarded.	Status of ground vegetation; Employment opportunities to locals; and Compensatory plantation.	Vegetation distribution in the active quarry sites is sparse due to hard rocks and high gradient terrain; Few technical and administrative staffs including one heavy machine driver from Sindhuli District are outsider. Others are employed locally; most of them are from local indigenous ethnic groups like Praja Community (Chepang) and Gurung and Ghale from nearby villages; Around 50 to 60 labors are employed as per daily wages basis; Praja community has changed their traditional occupational behavior (shifting cultivation) as they got alternative employment opportunity as laborer at the quarry site; The active quarry is still in operation, therefore, rehabilitation is not performed; and Proponent deposited Rs. 50,000 at the DFO as bail money for the compensatory plantation on fiscal year 2056/2057 BS; this amount has not yet been used due to the lack of proper plantation area. The proponent is ready to conduct compensation plantation if DFO gives the alternative site for the plantation.
Fire wood consumption and wildlife hunting/ fishing by locals.	Hunting, trapping, and poaching of wildlife should be prohibited by the workforce.	Fuel wood supply and demand by workforce; and Illegal hunting and poaching.	Most of the workforce are locals; and No cases of illegal hunting and poaching were filed at DFO, Dhading
Disturbance to wildlife due to blasting		Frequency of wildlife visibility.	No clear mitigating measure is recommended for disturbance from blasting in IEE report; and This needs further assessment.
<b>Activity: Access road</b>			

Possibility of illegal cutting of Champ tree in the access road	Special attention to be given to four champ trees, which have been potentiality to be smuggled.	Status of four champ trees in the access road	<p>The four champ trees identified by IEE, 2001 report are well protected and labeled as a protect tree by the proponent and the locals;</p> <p>These trees have the potential to be a mother tree;</p> <p>Around 1 km of access road from the Prithvi Highway to quarry site. About 800m road is accessible to light and heavy vehicles like jeeps and trucks but remaining 200m is inaccessible.</p> <p>This strategy has been carried out for minimizing illegal felling of trees. There will be high chance of illegal felling of trees in the upper part and vicinity of the quarry site, so that, this two section of access road (accessible and non-accessible road) contributes to conserve the forest area nearby the quarry site. Proponent seems to be conscious on forest conservation</p>
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## ***Chapter: Four***

### **4.0 Conclusions and Recommendations**

During this study, It was concluded that the proponents are preparing the EIA report to get the legal clearance from the MOPE and other government line agencies. However, after getting the approval, the recommendations of EIA do not get properly implemented, which can have direct impact on forest resources. Moreover, the concerned government line agencies are not serious as well.

Forest resources is the most important natural resources of the country and must be conserved and utilized rationally to uplift the socio-economic condition of rural people in the country. It would be a tool for alleviating poverty from the country. On the contrary, Forest area in Nepal is declining, and with the disappearance of forested habitat, a consequent decline of biodiversity has been noticed (except in National Parks, Wildlife Sanctuaries and Reserves). There are many reasons for this declination, including implementation of development projects without any due consideration on forest resources conservation.

The general conclusions and recommendations are listed below.

#### ***1. Lack of proper coordination and communication***

There is no healthy coordination and communication between concerned government agencies, proponents and other stakeholders of the project during project implementation phase; almost at negligible level. So, the mitigation measures prescribed in the EIA reports do not seem to implement effectively. Because the proponent always wish to reduce the project cost. Further, there is a lack of regular monitoring system in this regard.

It is recommended that the coordination and communication between and/or among all stakeholders of the projects is a must to restore the forests lost and to minimize it during the project implementation phase. This is totally lacking at field level and central level as well. The meeting among all stakeholders should be organized at least once every three months to follow up the activities carried out by the projects. This could address the real problem in implementing the mitigation measures prescribe in the EIA reports. For example, the deposit money at DFO, Dhading for compensatory plantation of AQPL. Somebody should be responsible for such situation.

For this purpose, the project should have an Environmental Unit with multidisciplinary professional such as forester, engineer, socio-economist and so on. In addition, respective DDC should be the focal point as it represents the local people who are real owner of the local forest resources. They should able to resolve any problems when the prescribed mitigation measures fail at field level.

## **2. *Poor documentation system***

Development projects usually have some negative impact on the forest resources when directly evaluated. The account of these negative impacts on forests resources is must to restore the in-situ conservation. As for example, there is a lack of baseline information of forest resources at AQPL on pre-implementation status of the project. It would be difficult to restore the local forest resources in the days to come. Valuable plant species may have been disappeared due to the implementation of the project.

Besides, the proponents do not follow periodic reporting of mitigation measures prescribed in the EIA reports to the concerned government authorities i.e. District Forest Office, District Soil Conservation Office and National Parks. In addition, these government offices have also been acting ignorant in these regards. Consequently, the restorations of forest resources have remained in a state of confusion.

So, any activity concerning the restoration of forest resources must be documented properly during the project implementation phase at field level. This will make environmental auditing more efficient and simple.

In addition, available documents are also in scattered form. Therefore, the available documents should be centralized. The question of where should be the central documentation center, needs further assessment.

## **3. *Compensatory plantation***

In case of CHEP, compensatory plantation at access road had failed and follow-up plantation program had not been carried out during the field visit for this study. Although it complies with the prescription of mitigation measures, it fails during implementation stage. This could happen in other development projects as well.

Likewise, in AQPL, the deposit money for compensatory plantation was not utilized. These two cases indicate that compensatory plantation remain in dilemma.

Therefore, before any compensatory plantation, there should be proper technical assessment on where, how and when the compensatory plantation should be carried out and what species should have the preference as per the site condition and local people's demand and/or desire. In this matter, concerned DFO should take initiation with healthy consultation with proponent and local people. In addition, the proponent should not ignore the DFO.

## **4. *Auction of timber and fuelwood***

In case of CHEP, Langtang National Parks could not sell the extracted timber and fuelwood even though, they were auctioned twice. Due to this, the calorific value of fuelwood decreased everyday. Likewise, monetary value of the timber and fuelwood also depreciated.

The same problems may have recurred in other development projects. Therefore, the proponent should take those timber and fuelwood extracted during the implementation of the projects at government royalty rate, if the forest is government managed national forest. Nevertheless, this needs further study.

### ***5. Employment generation***

Any development project open the market for the employment opportunities. The studied three projects employed the local people as per their knowledge and skills. This certainly enhances the socio-economic condition of the local people. Adding together, it also helps to conserve the forest resources because, they are well aware of their local environment and forest resources. It is easy to convince them for conserving the local forest resources.

Hence, this study recommends that proponent should employ the local people for the shake of conserving forest resources. This can be made compulsory for the proponent but this needs further assessment.

### ***6. Professionalism in EIA practices***

Although this study does not aim at this topic, I realized that there is a lack of professionalism in the EIA practices as it is a multidisciplinary. Anyone, without proper academic background, has been doing EIA as a consultant. In practice, the name of the team members and their academic background are not included in the EIA reports. As for example, I argue that the professional foresters should do the work related to the forestry rather than other professional as it happens in EIA practices. S/he has a professional ethics while conducting the field study. Likewise, sociologist should carry out the socio-economic survey. However, it costs more; it will be beneficial in long run. This will certainly enhance the professionalism in EIA practices.

EIA, as baseline information for environmental audit, are being only prepared for the shake of legal requirement as prescribed in EPA, 96 and EPR, 97. This will not be effective for conserving local as well as national environment in a long run. As I perceive, this could be a serious dilemma in days to come. So, why not does prepare the professional code of conduct for EIA practitioners at earliest?

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## **Appendix: One**

### ***Checklist of Chilime Hydroelectric Project***

Parameter

Impact predicted	Mitigation Measure	Indicators	Sources	Methods
<b>Activity: Access road from Dhunche - Somdang to head work</b>				
<b>Forest degradation</b> <b>Illegal cutting of trees;</b> <b>About 1.65 ha forest changed; and</b> <b>Goljhung FUG directly affected</b>	<b>Job opportunity for locals &amp; discourage Illegal felling;</b> <b>Afforestation;</b> <b>Alternative fuels at reasonable cost; and</b> <b>Cash compensation to FUGs.</b>	<b>Demand/ Origin of fuelwood;</b> <b>Availability of alternative fuel;</b> <b>Local employment at Project;</b> <b>Condition of forest;</b> <b>Number &amp; condition of plantation;</b> <b>Volume/Species of trees; and</b> <b>Area of forest lost</b> <b>Trees extracted from CF Goljhung</b>	<b>Project;</b> <b>DFO/IFO/RP;</b> <b>DSCO;</b> <b>CFUGs/VDC;</b> <b>Timber contractor; and</b> <b>Local people.</b>	<b>Field observation and survey; and</b> <b>Discussion with key informants.</b>
<b>Activity: Head work and powerhouse constructions</b>				
<b>Illegal hunting of birds; and</b> <b>Damage of reptile habitats.</b>	<b>Temporary check post of LNP at Syabru Besi.</b>	<b>Establishment of check post; and</b> <b>Cases of violation of Forest legislation (illegal hunting, cutting)</b>	<b>DFO/IFO/RP;</b> <b>LNP;(Check post)</b> <b>Contractor;</b> <b>Project;</b> <b>DFO/IFO/RP;</b> <b>FUGs/VDC; and</b> <b>local residents</b>	<b>field observation</b> <b>interaction with local people and VDC members</b>

**Activity: Transmission line**

**Loss of vegetation and Wildlife habitat disturbance inside and outside the LNP.**

**Minimize tree felling.**

**Local informants  
LNP**

**investigation and interaction with the concerned stakeholders;**

**Focus group discussion;**

**Field survey/ observation; and**

**Record review;**

### ***Checklist of East Rapti Irrigation Project***

Parameter

Impact predicted	Mitigation Measure	Indicators	Sources	Methods
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**Activity: Construction phase**

<b>Construction of dam across East Rapti River will lower dry season flow</b>	<b>The project to be reformulated excluding the construction of the dam; and  Scope of the irrigation component was limited to the rehabilitation and improvement of 85 existing FMIS</b>	<b>Water intake structures at East Rapti River.</b>	<b>Project/DIO; DFO/IFO/RP; CFUGs/VDC; Local people;</b>	<b>field observation and survey; and discussion with key informants.</b>
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**Activity: Operational phase**

<b>Beneficial impact of the project is inclusion of 18 Km river embankment along the right bank of East Rapti River to prevent the flood devastation.</b>	<b>Considering 1993 flood devastation in East Rapti River, the project has added an 18 Km long flood embankment in the right bank of East Rapti River in Pratappur. The plantation of trees to be done along the embankment.</b>	<b>Incidence of floods; and Status of plantation</b>	<b>FUGs/VDC; and Local residents.</b>	<b>field observation; and interaction with local people and VDC members.</b>
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## ***Checklist of Annapurna Quarry Private Limited***

Parameter

Impact predicted	Mitigation Measure	Indicators	Sources	Methods
<b>Activity: Lime stone quarrying</b>				
<b>Removal of bushes and shrubs for mining (2 ha. of shrub land is affected in the duration of 15 years, and further 3 ha. is expected to be affected in future)</b>	<b>If any tree has to be removed for quarrying, the tree has to be marked, counted and taken permission from DFO, Dhading; Discouragement of outsiders for employment at the quarry; Priority to be give to locals; and Rehabilitation of quarry site once the quarrying activities are discarded.</b>	<b>Status of ground vegetation; Employment opportunities to locals; and Compensatory plantation.</b>	<b>Proponent; DFO/IFO/RP; DSCO; VDC/DDC; and Local people.</b>	<b>Field investigation; and Discussion with key informants.</b>
<b>Fire wood consumption and wildlife hunting/ fishing by locals.</b>	<b>Hunting, trapping, and poaching of wildlife should be prohibited by the workforce.</b>	<b>Fuel wood supply and demand by workforce; and Illegal hunting and poaching.</b>	<b>DFO/IFO/RP; Proponent; DFO/IFO/RP; FUGs/VDC/DDC; and Local residents</b>	<b>Field observation interaction with local people and VDC members.</b>
<b>Disturbance to wildlife due to blasting</b>		<b>Frequency of wildlife visibility.</b>		

**Activity: Access road**

<b>Possibility of illegal cutting of Champ tree in the access road</b>	<b>Special attention to be given to four champ trees, which have been potentiality to be smuggled.</b>	<b>Status of four champ trees in the access road</b>	<b>DFO/IFO/RP VDC/DDC Local informants</b>	<b>investigation and interaction with the concerned stakeholders;  Focus group discussion;  Field survey/ observation; and  Record review;</b>
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## **Appendix: Two**

### ***List of Local Resource Persons contacted during Field Visit***

<b>Name</b>	<b>Designation</b>	<b>Address</b>
<b>Chilime Hydroelectric Project, Rasuwa and Nuwakot District</b>		
Lila Bhattarai	Project Coordinator	CHP, Shyafrubesi, Rasuwa
Milap Bahadur Pandey	Engineer	CHP, Shyafrubesi, Rasuwa
Gopal Man Shrestha	Geologist	CHP, headwork, Rasuwa
Krishna Kanta Pandit	Civil Engineer	CHP, headwork, Rasuwa
Prakash Yadav	Ranger	DFO, Rasuwa
Shyam Bahadur Tamang	Forest Guard	DFO, Rasuwa
Raghu Nath Adhikari	Forest Guard	DFO, Rasuwa
Chandra Bahadur Chand	Ranger	Langtang National Park
Ramesh Basnet	Senior Games Scout	Langtang National Park
Ram Mani Dhital	DFO	DFO, Nuwakot
Krishna P. Osti	AFO	DFO, Nuwakot
<b>East Rapti Irrigation Project, Chitwan District</b>		
Prem Bahadur Thapa chhetri	Secretaty	Purbi Chitwan Shichai Jal Upobhokta Sanstha
Kamal Prasad Devkota	Secretary	Kuchkuche CFUG
Ramji Siwakoti, Assistant	Warden	RCNP, Sauraha
Jas Bahadur Tamang	Vice-president	Bagmara CFUG
Govind Adhikari	Office Secretary	Bagmara CFUG
Ram Bilash Pathak	Member	Bagmara CFUG
Bharat Nepal	Secretary	Kumroj CFUG, Kumroj
Rajendra Upreti	Member	Kumroj CFUG, Kumroj
Kamal Prasad Regmi	Chief District Engineer	DIO, Chitwan
Tej BC	Forest Officer	Park and People Project, Kasara

<b>Annapurna Quarry Private Limited, Dhading District</b>		
<b>Name</b>	<b>Designation</b>	<b>Address</b>
Navraj Ghimire	Proprietor	AQPL, Dhading
Bhuvan Hari Sharma	Asst. Manager	AQPL, Dhading
Tanka Bahadur Malla	Chairman	Jogimara VDC, Dhading
Laxman Bahadur Praja	Local	Jogimara VDC-01, Dhading
Nara Bahadur Praja	Local	Jogimara VDC-02, Dhading
Arun Kumar Shreewasta	DFO	DFO, Dhading
Loknath Lamsal	Ranger	DFO, Dhading
Bechan Yadav	Ranger	DFO, Dhading

### **Appendix: Three**

#### **Photographs of study area (ALL PHOTOGRAPHS BY RABINDRA ROY).**

##### **Chilime Hydroelectric Project**



Plate 01: An overview of Head work



Plate 02: Intake structure of Chilime Hydroelectric Project



Plate 03: Access road to the head work without any vegetation (barren land at river side)



Plate 04: Entrance of powerhouse constructed as the tunnel structure.



Plate 05: Spoil deposition at powerhouse site



Plate 06: Stacking of Timber and fuelwood at LNP premises. They were harvested during transmission line construction and could not be auctioned yet; losing their calorific value daily.

### **East Rapti Irrigation Project**



Plate 07: Irrigation canal through the agricultural land.



Plate 08: Distribution channel to irrigate the agricultural field.



Plate 09: Informal discussion with local beneficiaries.



Plate 10: River training structure on the right bank of Rapti River to reduce flood hazard and one of the intakes of irrigation canal.



Plate 11: Rapti river flowing along the Royal Chitwan National Park's border.



Plate 12: Natural and plantation forests at Kumroj BZCF area.

**Annapurna Quarry Private Limited**



Plate 13: Access road to quarry site.



Plate 14: Ground vegetation at quarry site.



Plate 15: Active land slide at quarry site.



Plate 16: Extracted limestone from the quarry site used as raw material for cement factory.



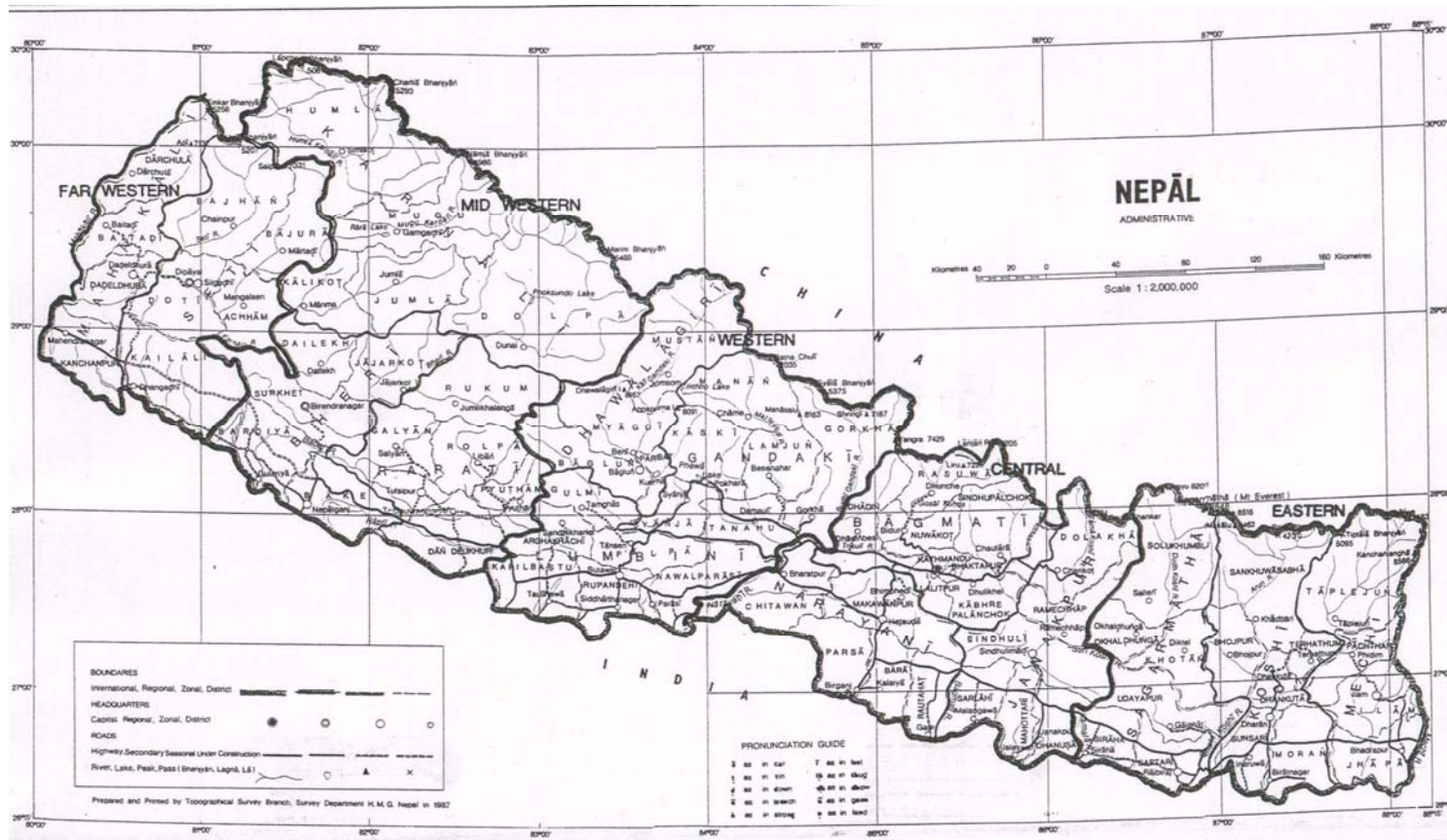
Plate 17: Champ tree at the quarry site.



Plate 18: Labeled as protected tree of Champ species.

## **Appendix: Four**

### **Map of Nepal**



### **Districts of Study Area**