FINAL REPORT

DAAYITWA NEPAL PUBLIC POLICY FELLOWSHIP 2026

A POLICY RESEARCH ON

Enhancing Institutional Mechanisms for Industrial Pollution Monitoring and Compliance in Nepal

conducted as a part of the Daayitwa Nepal Public Policy Fellowship 2026, in partnership with the Industry, Labor and Consumer Welfare Parliamentary Committee

June 2026 – September 2026

FELLOW

Ms. Richa Mandal Dhanuk

Daayitwa Nepal Public Policy Fellow 2026

PUBLIC PARTNER

Hon. Rahbar Ansari

Chair, Industry, Labor and Consumer Welfare Parliamentary Committee

MENTOR

Dr. Sujit Raj Pandey

Sakshyam Research Institute

daayitwa
a shared journey for progress

FUNDING PARTNERS

WORLDLINK · IGI PRUDENTIAL INSURANCE LIMITED · fisoft · eSewa · fuse | machines · CEDAR GATE TECHNOLOGIES

CAPACITY PARTNERS

NEPAL LEADERSHIP ACADEMY · GOVERNANCE LAB

MENTORSHIP & TRAINING PARTNER

NACA

TABLE OF CONTENT

CHAPTER I INTRODUCTION 1
Background 1
Problem Statement 1
Research Question 2
Research Objectives 2
General Objective 2
Specific Objective 2
CHAPTER II LITERATURE REVIEW 3
Policy Context 3
Historical Development of Environment Protection Law in Nepal 3
Federal Government Provisions (EPA 2076) 5
Administrative & Enforcement Mechanisms 5
Environment Protection Regulation 2077 8
Koshi Province Acts and Regulation 10
National Scenario 12
RESEARCH METHODOLOGY 15
Research Design 15
Data Collection Tools and Technique 15
Primary Data 15
Secondary Data 15
Theoretical and Analytical Framework. 16
Sunsari-Morang Industrial Corridor 16
Rationale for Selecting the Study Area 17
CHAPTER III: RESULTS AND DISCUSSION 18
RESULTS 18
The approving ministry also functions as the compliance authority 18
Monitoring and audit obligations exist in law but are weakly operationalised 18
Environmental Units lack the capacity to inspect and verify compliance 18

Environmental Management Plans are often not specific enough to enforce 19
Penalties are stronger than before but detection remains the binding constraint 19
System-wide oversight by the Ministry of Forests and Environment is underused 19
Comparative institutional models point toward viable alternatives 19
Industrial Waste Management: Legal Framework, Findings, and Gaps 20
Legal Framework 20
Findings on Industrial Waste Management 21
Gaps Specific to Industrial Waste Management 22
Gaps 22
Comparative Practice Suited to Resource-Constrained Implementation 23
Tiered project categorization to reduce reviewer caseload (Bangladesh) 24
Self-reporting paired with periodic, not continuous, verification (India) 24
Proponent-financed compliance deposits (Mongolia) 24
Phased, sector-specific rollout of new compliance tools (Mongolia) 25
Linking environmental compliance to an operating licence proponents must renew anyway (China) 25
Proponent-funded independent audits (South Africa) 25
CASE STUDIES 26
Narrative Synthesis 26
Case Study 1: Community Health Impact & Household Burden (Duhabi Case) 26
Case Study 2: Enforcement & Technological Mandates (Katahari Case) 26
Case Study 3: Diffused Waste Streams & Governance Limits (Birgunj Case) 27
National budget context 27
Industrial pollution's measured contribution 28
Industrial waste generation, official Nepal statistics 28
Implications for costing the recommendations 29
Policy-Level Recommendations 29
Theory of Change 33
Long-term goal (impact) 33
Problem statement 33
Inputs 34
Activities 34
Outputs 35

Outcomes 35
Key assumptions and risks 36
Conclusion 37
REFERENCE 39
ANNEX 40
ANNEX I: Provincial KII (KOSHI) 40
ANNEX II (Case Study) - Local Level Government 43
ANNEX III : TRAVEL AUTHORIZATION 46

CHAPTER I INTRODUCTION

Background

Nepal has faced different environmental degradation that are linked to industrial growth. Urban air is likewise affected: fewer than half of factory smokestacks have adequate filters, leading to excessive emissions of sulfur, NOx and heavy metals. Recognizing these risks, Nepal has built a broad legal framework for environmental protection. Key laws (e.g. On Nature Protection, On Atmospheric Air Protection, On Environmental Expertise) set standards and assign oversight to government bodies. Historical analyses noted that Nepal's environmental administration remained a "confused and ill-defined" bureaucracy with weak enforcement. The current institutional and regulatory mechanisms governing industrial pollution, identifies gaps, and suggests reforms drawn from international best practices to strengthen Nepal's environmental governance.

Problem Statement

Depletion of natural resources induced by human activities and subsequent environmental degradation has attracted steadily growing interests in the last few decades. Such concerns make it evident the necessity for the planning authorities to count on sound information about the possible environmental consequences of development actions. One of the tools available to satisfy this need is represented by the procedure of Environmental Impact Assessment (EIA). This procedure involves the systematic identification and evaluation of the impacts on the environment caused by a proposed project. EIA is now applied worldwide in various forms. Its potential role in attaining the objective of sustainable development was explicitly recognized during the Earth Summit 1992 held in Rio de Janeiro (United Nations 1992). These are the general problem faces in Nepal.

Table 1 Category of problem identified from OP-ED

Category	**Description**	**Key Issue**
Weak Enforcement	Environmental laws exist but are not properly implemented.	Environmental regulations are poorly enforced.
Outdated Regulations	Environmental policies are not regularly updated.	Environmental regulations are not up-to-date.
Lack of Coordination	Multiple government agencies do not work effectively together.	Government agencies fail to coordinate effectively.
Limited Public Participation	Public involvement in environmental decision-making is minimal or restricted.	Public involvement in environmental decisions is weak

First, weak enforcement means that even though environmental rules exist, they are not properly followed or checked. Second, outdated regulations mean many rules are old and have not been updated to match current environmental needs. Third, lack of coordination means different government departments do not work well together, so efforts become slow or confused. Finally, limited public participation means

ordinary people do not get enough chance to take part in environmental decisions. Overall, the biggest issue is poor coordination, and because of this, the system does not work as smoothly as it should.

Research Question

The research is focused on the institutional mechanism for the industrial pollution and its monitoring and compliance in Nepal. The problems that are identified are translated into the comprehensive research question. The research questions are listed below:

1. What are the overlapping environmental mandates across the three levels of government?
2. What are the distribution methods of technical expertise and resources at the local level?
3. What is the local level environmental monitoring mechanisms?

Research Objectives

General Objective

To enhance the institutional mechanism for the industrial pollution monitoring and compliance in Nepal

Specific Objective

- To find out the overlapping environmental mandates in all three level of government
- To understand the distribution methods of technical experts and resources at the local level from the federal government
- To understand the local level environmental monitoring mechanisms in industrial corridor

CHAPTER II LITERATURE REVIEW

Policy Context

Environment Impact Assessment (EIA) is defined as the process of identifying, predicting, evaluating and mitigating the biophysical, social, and other relevant effects of development proposals prior to major decisions being taken and commitments made((INTERNATIONAL ASSOCIATION FOR IMPACT ASSESSMENT et al.,). Fischer et al. (2023) explained that the United States was the first nations who introduced the EIA system through the National Environmental Policy Act. The National Environmental Policy Act was the initiation for other countries. At this moment, the United States recognized that EIA for a project is legally required in 187 out of 195 countries. National planning commission of Nepal collaborated with the International Union for Conservation of Nature to develop the first National EIA Guidelines which was initiated under the National Conservation Strategy Implementation Project of year 1994. Bhatt (2023b) explained the Nepal created a legal framework for EIA by presenting the Environment Protection Act (EPA) and Environment Protection Regulation (EPR) in 1997. While after a federal democratic republic nation in 2015, EPA and EPR 1997 were replaced by EPA 2019 and EPR 2020 respectively.

Environment Assessment (EA) are of three types as per the EPR 2020. Those are listed below:

1. Brief Environmental Study (BES),
2. Initial Environmental Examination (IEE), and
3. Environmental Impact Assessment (EIA).

Historical Development of Environment Protection Law in Nepal

Pre-Legislative Environmental Governance (Pre-1993)

Early governance relied on isolated, sector-specific laws (e.g., Forest Act 1961, National Parks and Wildlife Conservation Act 1973, Water Resources Act 1992). Environmental concerns were treated as secondary or incidental to main development objectives. Lacking systematic, pre-project assessment processes, development through the 1960s to 1980s led to significant cumulative impacts, including accelerated deforestation, habitat fragmentation, and river degradation.

The 1993 Environment Protection Act & Limitations

Nepal's first attempt at dedicated environmental legislation established broad conservation principles and created institutional structures. However, it failed to differentiate IEE from full Environmental Impact Assessment (EIA), lacked clear procedural steps, and suffered from weak institutional enforcement capacity, leading to minimal practical impact.

The 1997 Environment Protection Act & Institutionalization

The Environment Protection Act (EPA), 1997 and Environment Protection Regulations (EPR), 1997 formally institutionalized IEE through a two-tiered system:

Schedule 1: Listed projects requiring an IEE.

Schedule 2: Listed major projects requiring a full EIA.

Approval of Structure

Established that IEE reports were reviewed and approved by the respective proponent line ministry (rather than the Ministry of Environment, which reserved EIA approvals). It also mandated minimum content requirements (baseline data, impact assessment, mitigation measures, and Environmental Management Plans).

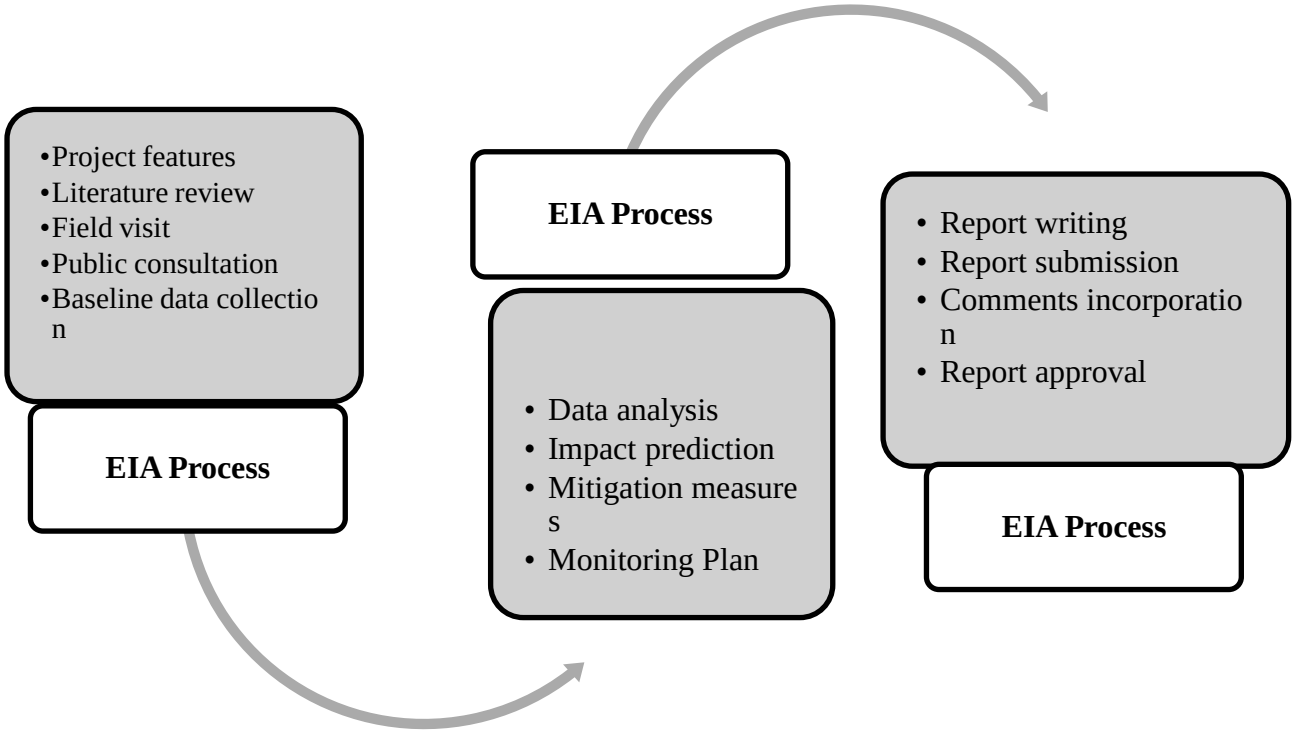
Amendments & Reforms (1997–2019)

Interim administrative and technical reforms introduced sector-specific guidelines (e.g., for roads, hydropower, and tourism). While environmental consulting expanded, the absence of accreditation standards resulted in inconsistent report quality.

The 2019 Environment Protection Act Framework

The EPA, 2019 and EPR, 2020 modernized the IEE process by mandating public consultations with affected communities, defining institutional roles, introducing post-approval monitoring, environmental auditing, updated project list thresholds, and stricter penalties for non-compliance.

Figure 1 Current EIA Practice the Environment Protection Rules 2020 have set a framework for EIA report.



*Source:*Environment Protection Rules 2020

Based on the sector and scale of an infrastructure project, any one type of EA must be conducted. Generally, an EIA report is prepared for a large-scale infrastructure project that needs to be approved by the Ministry of Forest and Environment (MoFE) of Nepal. Schedule 3 of EPR 2020 categorizes the EIA projects into 12 different sectors.

Federal Government Provisions (EPA 2076)

Administrative & Enforcement Mechanisms

Section 13: Power to prevent

According to Section 13 of the Act, if any person executes a project without having the environmental study report approved pursuant to this Act or contrary to the approved environmental study report, the concerned body may immediately prevent the project from being executed.

Section 15: Control of pollution

Under the provisions of Section 15, the Government of Nepal may, by a notification in the Nepal Gazette, determine necessary standards for the mitigation or doing away with the impacts of pollution from any motor vehicle, device, equipment, industrial enterprise, hotel, restaurant or other place or goods or activity or effects from the disposal or emission of any hazardous substance. Furthermore, no person shall create pollution in such a manner as to cause significant adverse impacts on the public life, public health and environment or do, or cause to be done, any act contrary to the standards determined by the Government of Nepal pursuant to sub-section (1). Similarly, no person or group that visits a mountain or high hill area for expedition, trekking, sightseeing or any other purpose shall do, or cause to be done, any such act that may cause adverse impacts on the environment by making pollution contrary to the standards determined by the Government of Nepal. If it appears that any one has caused adverse impacts on the environment by doing any act contrary to sub-section (1) or (2), the Department may give direction to the relevant person, group or institution to take measures for mitigation of or doing away with pollution, prescribe necessary terms or prohibit the carrying out of any act in a manner to cause adverse impacts on the environment. Additionally, if it appears that the use of any substance, fuel, tool, machine or equipment has caused or is likely to cause significant adverse impacts on the environment, the Department may request the Ministry for necessary action, upon which the Ministry may, in necessary consultation with the concerned body or other stakeholders, prevent the use of such substance, fuel, tool, device or equipment or the production, import, sale, distribution or storage of such materials, and a notice on such prevention shall be published in the Nepal Gazette. To ensure adherence, the Department shall, from time to time, carry out monitoring and evaluation as to compliance with the standards determined pursuant to sub-section (1), while other provisions relating to the control of pollution shall be as prescribed.

Section 21: Environmental inspector

Section 21 establishes that the environmental inspector shall carry out monitoring and inspection as to whether or not acts to be performed in accordance with the environmental study report approved pursuant to Section 7 have been performed effectively and standards relating to pollution control and environmental protection have been complied with. Notwithstanding anything contained in sub-section (1), in cases where the environmental inspector is not available, specific bodies may designate officers or employees as the environmental inspector and depute them for monitoring and inspection. Specifically, the Ministry may designate any officer employee of the Government of Nepal or Provincial Government, as to whether or not acts to be performed in accordance with the environmental study report referred to in clause (a) of sub-section (2) of Section 7 have been performed effectively and standards relating to pollution control and environmental protection have been complied with. Similarly, the Provincial

Ministry may designate any officer employee of the Provincial Government, as to whether or not acts to be performed in accordance with the environmental study report referred to in clause (b) of sub-section (2) of Section 3 approved pursuant to Section 7 or the environmental impact assessment report referred to in clause (c) of sub-section (2) of Section 3 have been performed effectively and standards relating to pollution control and environmental protection have been complied with within its Province. At the local level, the Local Level may designate any employee of the Local Level, as to whether or not acts to be performed in accordance with the environmental study report referred to in clause (c) of sub-section (2) of Section 3 approved pursuant to Section 7 have been performed effectively and standards relating to pollution control and environmental protection have been complied with within its Local Level, while all other provisions relating to the environmental inspector shall be as prescribed.

Section 22: Functions, duties and powers of the environmental inspector

The operational parameters set out in Section 22 state that the functions, duties and powers of the environmental inspector shall be to inspect as to whether or not disposal of hazardous substances has been made or pollution has been caused contrary to this Act or the rules framed under this Act, to inspect as to whether or not the acts of mitigation, avoidance or control of pollution have been carried out in accordance with this Act or the rules framed under this Act, to inspect on site as to whether or not work has been performed consistent with the terms prescribed in the approved environmental study report while executing the proposal, and to inspect as to where the matters prevented pursuant to Section 13 or 15 have been complied with. In the course of making inspection pursuant to sub-section (1), the environmental inspector may, by giving a prior notice to the concerned person, body or proponent, inspect, examine or investigate any house, land, building, factory, industry, motor vehicle, industrial device, tools, machinery, animal, object, records, document or other goods or object, and it shall be the duty of the concerned person, body or proponent to render assistance to the environmental inspector by providing such descriptions or information as demanded. If the concerned person or body does not allow the environmental inspector to make inspection, does not provide descriptions or information, gives false descriptions, creates let and hindrance, or fails to assist, the environmental inspector may immediately impose a fine of up to twenty thousand rupees in case of disallowing inspection or creation of let and hindrance, and a fine of up to fifteen thousand rupees in case of failure to provide information, giving false descriptions, or failure to assist. A party who is not satisfied with a punishment imposed by the environmental inspector pursuant to sub-section (4) may make a complaint to the Director General not later than fifteen days of the date of receipt of information of that punishment. Following the field activity, the environmental inspector shall submit a report of inquiry and inspection carried out pursuant to this Section to the concerned body and the Department, while other functions, duties and powers shall be as prescribed.

Section 35: Fine

Section 35 details the extensive punitive framework of the Act, stating that if any person does the following act, the concerned body may punish that person as follows: a fine not exceeding five hundred thousand rupees if, in the case of a proposal of which the brief environmental study report has to be approved, the proposal is executed without having it approved or if any proposal is executed in a manner inconsistent with the approved report; a fine not exceeding one million rupees if any proposal is executed without having the initial environmental examination approved or in a manner inconsistent with the

approved report; and a fine not exceeding five million rupees if, in the case of a proposal of which the environmental impact assessment report has to be approved, the proposal is executed without having it approved or if any proposal is executed in a manner inconsistent with the approved report. Furthermore, if any person does any act referred to in sub-section (1), the concerned body may give order to stop such act immediately and have the environmental study report approved pursuant to this Act where such report has not been got approved, and to improve the act if acted inconsistent with such a report, and it shall be the duty of the concerned person or body to do as per the order so given, upon which the concerned body may impose a fine that is three-fold of the fine imposed pursuant to sub-section (1) if the order so given is not complied with. If any person does any act inconsistent with this Act or the rules, guidelines, procedures or norms framed under this Act, other than that set forth in sub-section (1), the concerned body may restrict the doing of such act and punish that person with a fine not exceeding three hundred thousand rupees and give order to do the act referred to in this Act or the rules, guidelines, procedures or norms framed under this Act, carrying a fine that is three-fold of the fine imposed pursuant to this sub-section if the order so given is not complied with. If the act referred to in the order given pursuant to sub-section (2) or (3) is not done, such act shall be restricted and the concerned body shall send a request, accompanied by the recommendation, to take necessary action for blacklisting such a person or body. Following such a recommendation, the Department shall, if it finds the content reasonable, blacklist such a person or body for a period of one year to five years. Notwithstanding anything contained in sub-sections (4) and (5), the Department shall make necessary inquiry into non-compliance with the order given by it and take action referred to in sub-section (5). If a body is blacklisted pursuant to sub-section (5), such a person or body may not submit any proposal in that body's name or in any name whatever associated with such a person or body for the period of blacklisting, provided that prior to imposing the fine referred to in this Section, a reasonable opportunity shall be given to the person or body or project which is to be blacklisted.

2. Technical & Infrastructure Mechanisms

Section 18: Power to establish laboratories

In terms of technical infrastructure, Section 18 states that the Government of Nepal or Provincial Government may establish laboratories, as required, to carry out test or examination relative to environment protection and pollution control or prescribe any laboratory recognized by the Government of Nepal to carry out test or examination relative to environment protection and pollution control, with provisions relating to the operation and management of the laboratory established pursuant to sub-section (1) being as prescribed.

Section 19: To allow collection of samples

To facilitate evidence gathering, Section 19 mandates that if the concerned body intends to study, test, examine or analyze the pollution or wastes to be or likely to be generated from any industry, factory, mechanical equipment like a machine and motor vehicle, the concerned owner or relevant person shall allow to collect samples of the pollution or wastes generated from such industry, factory, mechanical equipment like a machine and motor vehicle, while other provisions relating to the collection, study, examination, test or analysis of samples pursuant to sub-section (1) shall be as prescribed.

Section 20: Power to issue pollution control certificate

Regarding regulatory incentives, Section 20 provides that the Ministry or Provincial Ministry may provide a pollution control certificate, as prescribed, to any industry that makes a significant contribution to the control of pollution, and other provisions relating to the pollution control certificate shall be as prescribed.

3. Financial & Resource Management Mechanisms

Section 16: Export and import of hazardous substance

Section 16 dictates that no hazardous substance of any kind shall be imported into Nepal. Notwithstanding anything contained in this primary restriction, any such specific kind of hazardous substance that does not cause significant adverse impacts on the human health and environment as specified by the Government of Nepal by a notification in the Nepal Gazette may be imported. On the other hand, a producer of a hazardous substance or person or body established under prevailing law may export hazardous substance by obtaining permission from the Ministry, where the grounds, criteria for issuance of, and other provisions relating to, permission to export a hazardous substance pursuant to sub-section (3) shall be as prescribed. Finally, any hazardous substance imported contrary to this Act shall be sent to the same country from which it has been imported.

Section 31: Establishment and operation of funds

Finally, Section 31 dictates the financial mechanisms by declaring that there shall be established a fund entitled the environment protection fund, for the protection of environment, prevention and control of pollution, management of climate change and protection of the national heritages. The fund shall be credited with amounts received from the Government of Nepal, Provincial Government or Local Level, amounts received from any native person or organization, and amounts received from any foreign government or international organization. Prior to obtaining the amount referred to in clause (c) of sub-section (2) from foreign sources, approval of the Government of Nepal, Ministry of Finance shall be obtained. Ultimately, the fund shall be audited by the Auditor General, and the operation of the fund shall be as prescribed.

Environment Protection Regulation 2077

14. Provisions Relating to Pollution Control

(1) The Ministry, upon the recommendation of the Department, may make necessary arrangements for the use of alternative materials, fuels, tools, machinery, or equipment that assist in controlling pollution. (2) The Local Level must classify waste according to its nature into biodegradable, reusable, and recyclable and manage it appropriately. (3) If any individual, organization, or industry continues to discharge waste even after a notice or directive has been issued not to do so in violation of the conditions or standards prescribed in the Act or these Rules, and if such discharge causes an adverse impact on public health and the environment, the concerned Provincial Government or Local Level shall remove such waste at its own expense. An amount equal to the cost incurred in removing the waste, plus an additional fifty percent, shall be recovered from the individual, organization, or industry discharging the waste in accordance with the prevailing law. (4) To prevent pollution and remove waste in the Himalayan or high-hilly regions, the Ministry may employ individuals who have undergone mountaineering or tourist guide training, or who have relevant experience, by taking them on a service contract as Mountain Environment Protectors.

22. Provisions Relating to Pollution Control Certificate

(1) An industry wishing to obtain a pollution control certificate pursuant to Section 20 of the Act must prepare a detailed statement concerning the industry's operational processes, sources of pollution, and measures adopted for pollution control, and submit an application to the following bodies:- (a) In the case of industries that have undergone an Environmental Impact Assessment, or a Brief Environmental Study or an Initial Environmental Examination pursuant to Clause (a) of Subsection (2) of Section 3 of the Act, to the Ministry, (b) In the case of industries that have undergone a Brief Environmental Study or an Initial Environmental Examination pursuant to Clause (b) or (c) of Subsection (2) of Section 3 of the Act, to the Provincial Ministry. (2) When submitting an application pursuant to Subsection (1), a report prepared by testing the wastewater, smoke, dust, noise, or light emitted from the industry in accordance with the standards enforced by the Government of Nepal must also be attached. Provided that such report must have been prepared within the last three months. (3) If any application is received pursuant to Subsection (1), the Ministry or the Provincial Ministry must constitute a team to conduct an on-site inspection of the industry to ascertain the status of pollution control. (4) The team pursuant to Subsection (3) may, as necessary, re-test the volume of wastewater, smoke, dust, noise, or light emitted from the industry. (5) The team pursuant to Subsection (3) must submit a report along with definite opinions regarding the pollution control of such industry to the Ministry or the Provincial Ministry. (6) On the basis of the report pursuant to Subsection (5), the Ministry or the Provincial Ministry may issue a pollution control certificate to the industry, conditionally or unconditionally, for a period of three years in the format prescribed in Schedule-19. (7) An industry that has obtained a pollution control certificate pursuant to Subsection (6) must measure its wastewater, smoke, dust, noise, or light every six months and submit the test report to the body that issued the pollution control certificate. (8) If the volume of wastewater, smoke, dust, noise, or light in the test report pursuant to Subsection (7) is found to exceed the prescribed standards, the industry must make necessary improvements within three months to bring it into compliance with the standards, and submit the test report thereof to the body that issued the pollution control certificate. (9) If the test report is not submitted pursuant to Subsection (7) or (8), or if the volume of wastewater, smoke, dust, noise, or light is found to exceed the prescribed standards even after three months pursuant to Subsection (8), or if at any time the industry is found to have adversely affected the environment by violating the standards, the Ministry or the Provincial Ministry must revoke the pollution control certificate obtained by such industry. (10) After the expiry of the validity period of a pollution control certificate issued once, such industry may obtain a new pollution control certificate by completing the process pursuant to this Rule again. (11) The Ministry or the Provincial Ministry must maintain an updated record of the industries that have obtained a pollution control certificate.

28. May Participate in Carbon Trade

(1) The Government of Nepal may sell reduced carbon emissions or increased carbon stocks achieved through sustainable forest management in the national or international market. (5) While carrying out activities pursuant to Subsection (1) or (2), the per-unit price of emission reduction or carbon stock shall be determined by the Government of Nepal through mutual negotiation and agreement with the purchasing country or organization. (6) If any private forest owner wishes to include the forest under their ownership in carbon trade, the Ministry may include it in the carbon trade under the condition that the owner works in accordance with the action plan.

41. Award of Compensation

(1) Upon receiving an application for compensation pursuant to Subsection (1) or (2) of Section 36 of the Act, the concerned body or officer must, within fifteen days of receiving the application, constitute a committee including an expert on the related subject to investigate the application. (2) Notwithstanding anything contained in Subsection (1), for applications regarding damage caused by pollution filed before the bodies or organizations pursuant to Subsections (4) and (5) of Section 36 of the Act, a committee shall be constituted pursuant to the same subsections to conduct the investigation. (3) The committee pursuant to Subsection (1) or (2) shall investigate the received application, inspecting the ground reality of the concerned location as necessary, and submit a report along with its opinions to the concerned body or officer within thirty days. (4) In the report pursuant to Subsection (3), the committee must specify the exact type, quantity, effect, and impact of the loss suffered by the victim, and clearly disclose the amount of compensation to be awarded. (5) While determining the effect and impact of the damage pursuant to Subsection (4), it must be done based on immediate damage caused to human health or the environment, potential long-term damage, or the overall scope of such damage. (6) On the basis of the report received pursuant to Subsection (3), the concerned body or officer must make a decision regarding the compensation within sixty days and inform the applicant as well as the individual, organization, or proponent required to pay the compensation.

43. Recovery of Compensation from Liabilities/Assets

(1) If the concerned individual, organization, or proponent required to pay compensation fails to pay the compensation amount within the time limit pursuant to Rule 42, the individual or organization entitled to receive such compensation may, within thirty days of the expiry of the said time limit, submit an application to the body or officer pursuant to Subsection (1) of Rule 41 to recover the compensation, specifying the liabilities or assets of the individual, organization, or proponent responsible for paying such compensation. (2) Upon receiving an application pursuant to Subsection (1), such body or officer shall auction and sell the liabilities or assets of the individual, organization, or proponent responsible for paying the compensation in accordance with the prevailing law, cause the compensation amount to be paid, and return the remaining balance to the concerned individual, organization, or proponent.

47. Provision of Reward or Letter of Appreciation

The Ministry may, as a token of appreciation, provide a cash reward or a letter of appreciation to any individual or organization that makes a remarkable contribution to the protection of the environment, prevention and control of pollution, and conservation of national heritage.

Koshi Province Acts and Regulation

21. Formulation of Eco-Friendly Plans

The Ministry, in coordination with the local level, may formulate and implement eco-friendly plans for waste management in wetland areas, religious sites, roads, neighborhoods, and other public places, incorporating subjects such as bio-energy, organic fertilizer production, technology-based machinery, and tree plantation.

22. Integrated Pollution Control System

(1) For the prevention and control of environmental pollution within the province, the Provincial Government may, as required, formulate and implement an integrated pollution control system plan in coordination with the Federal Government, local levels, or both, to control various types of pollution in major cities, industries, industrial areas, agricultural farms, and high-risk zones. (2) The Provincial Government, in coordination with the Government of Nepal and local levels, may formulate and implement procedures regarding the collection and utilization of river-based materials extracted from rivers and streams within the province, excluding forest areas. (3) If river-based materials washed down by rivers and streams accumulate on anyone's private land, the respective landowner may excavate, sell, and distribute such materials, provided that it does not cause an adverse impact on the environment and follows prevailing laws by conducting an environmental study if required, or by getting an environmental management plan approved by the respective local level if an study is not required; upon such sale and distribution, the landowner must pay sales tax to the respective local level. (4) The local level must remit a certain percentage of the sales tax collected pursuant to sub-section (3) to the Provincial Government in accordance with prevailing laws.

23. Greenery Promotion for Environmental Cleanliness

The Ministry or the concerned body, in cooperation, coordination, and partnership with the local level, local communities, non-governmental organizations, and community-based organizations, may carry out greenery promotion activities such as tree plantation and flower garden construction in a manner that does not cause disruptions to physical infrastructure along major cities, industries, industrial areas, riverbanks, roadsides, public places, schools, universities, health institutions, and other locations within the province.

25. Issuance of Pollution Control Certificate

The Ministry may provide a pollution control certificate, as prescribed, to any industry, institution, group, or individual contributing to pollution control, and other arrangements regarding the pollution control certificate shall be as prescribed.

46. Corporate Social Responsibility

When implementing or operating any program or project capable of causing an adverse impact on the environment, any person, institution, or group must allocate a minimum of one percent of their annual net profit for corporate social responsibility purposes and formulate plans and programs to spend that amount in the field of environmental protection; furthermore, the concerned person, institution, or group must submit a progress report of the program operated, along with the details of the expenses incurred in the field of environmental protection pursuant to sub-section (1), to the Ministry or the concerned body.

44. Recovery of Compensation

If any person, institution, or group suffers any loss or damage due to the creation or discharge of pollution, noise, heat, or hazardous waste by anyone in violation of this Act or the rules or guidelines formed under this Act, or due to any accidental pollution, the affected person, institution, or group may submit an application to the designated authority for the recovery of compensation for the loss suffered; similarly, if any development project, plan, program, or business operation fails to complete its work within the scheduled time, or if a natural disaster or damage occurs because of it, the victim must submit an application to the concerned authority, whose responsibility it shall be to evaluate the received

application and cause the operator to provide and pay the compensation for the damage caused. Upon conducting an investigation and inquiry into the application received pursuant to sub-section (1), if the designated authority determines that loss or damage has indeed occurred, the authority shall ascertain the amount of damage and cause the person, institution, group, or proponent who caused such loss or damage to pay the compensation to the victim, and the criteria for determining compensation and other arrangements under this section shall be as prescribed.

48. Power to Monitor and Inspect

The Ministry, the concerned body, or the designated body may conduct monitoring and inspection regarding whether this Act, or the rules, guidelines, procedures, or standards formed under this Act, have been implemented; furthermore, the concerned body or designated body must submit a report regarding the monitoring and inspection it has conducted to the Ministry, and all other arrangements regarding the monitoring and inspection carried out pursuant to sub-section (1) shall be as prescribed.

Annual Report to be Prepared

The Ministry shall prepare an annual report consisting of the details obtained from the monitoring and inspection conducted pursuant to Section 48, the progress of programs operated in the field of environmental protection by the Ministry or bodies under the Ministry, details regarding provincial activities on climate change, and any other necessary details; furthermore, the Ministry must submit this annual report to the Council within two months from the date of completion of each fiscal year, and the Council must then intimate the Provincial Assembly with the report received pursuant to sub-section (2) through the Office of the Chief Minister and Council of Ministers.

National Scenario

The Bara-Parsa industrial corridor is home to approximately 1,200 small and large factories with decades of polluting environment in the year 2026. The major problem is faced by the people, mostly the public health hazards, damage of local culture and ecosystems. The Sirsiya river is the main source of disposing of the waste produced from the industries that range from small to large factories. The futile environmental regulation and poor settings mid government agencies have given the prospects of factories to dump the untreated waste, sewage and pollution that has the impacted the environment and rendered a public health hazard (“A River Carries Industrial Waste and Sewage from Nepal to India,” 2026).1

In year 2025, the residents from the Birjung-Pathlaiya Corridor have been facing breathing problems where the industry’s furnace is directly released into the air without treatment that produces the thick black cloud that irritates the eyes, harms animals and makes it difficult to breathe. The factory owner has ignored the complaints and taken no measures to control the emissions. Residents say that the industries in the Birjung-Pathlaiya Corridor continues to violate the rule and yet the authority has not yet acted upon it (“Locals Protest Against Industrial Pollution in Bara,” 2025).2

The worsening air quality has been the problem across Nepal. Municipalities like Biratnagar, Birjung, Pokhara and sub-metropolitan cities, including Butwal, Nepalgunj, Janakpur, and Dhagadhi have also been facing the period of dry, winter and pre-monsoon months that have frequently been recorded as series of unhealthy pollution levels because of rising vehicle emission, unplanned urbanization and

expanded construction activity with the weak enforcement of environmental regulations. Over the river the problem has passed to India at Raxaul and the government officials have informed the situation to the officer of Nepal, yet the complaints have been ignored. The industrialist of Bara-Parsa corridor says that a large-scale effluent treatment plant is needed in Nepal. A feasibility study for an effluent treatment plant for the discharges from the industries in the Birjung-Pathlaiya section. The study identified 18 types of pollutants from 16 categories of industries and found that 122 industries are directly discharging wastewater into rivers. The study recommends 3 treatment u nits with a combined capacity of 13.4 million liters per day (3.5 million gallons) at an estimated cost of about 2.5 billion Nepali rupees, but it require federal budget. 3

In 2019, Kathmandu's average PM2.5 concentration reached 88micrograms per cubic meter which is far above the WHO safe limit of 5 micrograms with the industrial boilers and furnaces remaining key sources of harmful emission. Nepal has unveiled a draft environmental and social framework to implement the Nepal Clean air for prosperity project that is a major initiative aimed at reducing industrial air pollution and strengthening air quality governance. The main goal of the framework is to accelerate and cost-effectively reduce emissions from the major industrial and commercial sources that contribute to serving air pollution in Kathmandu Valley and the Tarai region. It also aims to strengthen monitoring, enforcement, and air quality governance nationwide. The framework also proposes allowing industries within Industrial Districts and Special Economic Zones to install rooftop solar system to ensure energy security during outrages. Under current provisions of the Industrial Enterprise Act, customs duty on machinery using cleaner fuels is set at one percent. The ministry plans to propose additional exemptions for equipment imported for energy conversion in the next fiscal year. While the clean Air for Prosperity project offers a comprehensive roadmap, experts say Nepal's success will depend on coherent tax policies, reliable energy supply and strong institutional coordination ("Clean Air Framework Unveiled to Cut Industrial Pollution," 2024). 4

In year 2020,the report "Dirty Stacks, high stakes, an overview of Brick Sector in South Asia" has reviewed brick industries in three countries of South Aisa -Bangladesh, India and Nepal and offers an analytical discussion on the sectors technological, institutional and regional particularities. Co-author of the report said that it is estimated that about 600 deaths were caused by the pollution of the brick sector in Nepal in 2015. A total of 1,600 brick klins are operating in Nepal with an annual production of 5 billion bricks. The Kathmandu Valley alone has around eight percentage of the total bricks klins in Nepal, with 122 brick klins. The report has expressed concern over the use of traditional technologies and negligible adaptation of modern technologies. Nepal has less than one percentage of market penetrationa of advanced and efficient technologies which includes Hoffman, Hybrid Hoffman (HHK) and tunnel Klin (TK). The lack of adequate investment and bank financing, low levels of human capital and know-how, weak or absent regulation, oversight, poor working conditions and wages; and largely stalled transition to higher-quality products and more efficient production technologies and approaches, as major barriers of the modernization and improvement of the brick sector in Nepal. The Indo-Gangetic Plain and Himalayan Foothills Region shares an airshed, meaning that the pollutants can travel across borders, affecting air quality in multiple countries ("Pollution by Brick Kilns Kills 600 Each Year in Nepal," 2020). 5

The supreme court has issued an order to close the brick klins operating in Panchkhal Municipality in Kavrepalanchok district. The apex court ordered the closure of brick kilns, citing their serious impacts on the environment and public health. The locals had filed a writ petition in the supreme court on December

30,2019, making Panchkhal Municipality, the Ministry of Forests and Environment, the Ministry of Education, and the Department of Archaeology the defendants. At present, eight brick klins are in operation in Panchkhal. Meanwhile, Panchkhal Municipality has adopted a policy to promote industries, including brick klins in a corrective manner by formulating an environmental policy, according to a press release issued by the supreme court on year 2025("SC Orders to Shut Brick Kilns Operating in Panchkhal," 2025). 6

Single-sector solutions are not sufficient to meet any clean air target. Public policy and investment need to optimize air quality actions across sectors, prioritizing those with the most cost-effective solutions, says the World Bank in the new report. The report, 'Towards Clean Air in Nepal: Benefits, Pollution Sources, and Solutions', serves as a foundational assessment of air pollution in the country and the airshed of the Indo-Gangetic Plain and Himalayan Foothills (IGP-HF). The report states that air pollution reduces life expectancy by 3.4 years for the average Nepali and causes approximately 26,000 premature deaths annually. The economic cost of poor air quality is equivalent to more that 6 percent of Nepal's Gross Domestic Product (GDP) each year (*Air Pollution Is Number One Health Risk in Nepal*, 2025).7

An entire village in Sunsari district has been affected by industrial pollution. The village, Narsingh -1, is literally engulfed by thick smoke and dust when the industry located near it is in operation. At other times, the village is polluted by the murky water drained out from industry. The local Baba Paper Industry and Arabinda Paper Mill which are close to this hamlet and the main culprits of the pollution are less bothered about the health hazards to locals. Over 50 families in Narsingh village are living in the stench-laden environment due to lack of management of the industrial effluence. Due to the lack of management of the industrial waste, people are living in polluted environment as the effluence is nt properly managed and processed with the high risk of different diseases while people are already living with headaches, eye irritation and eye sore ("Industrial Pollution Affects Entire Village in Sunsari," 2010).8

The Department of Environment currently has just 16 environment inspectors, whose jobs involve minimizing pollution and enforcing compliance with the laws made for the protection of the environment and to make things worse, five of the inspectors are currently abroad on study leave.9

RESEARCH METHODOLOGY

Research Design

A comprehensive analysis of the policy of federal, provincial level and the local level is carried out along with the stakeholder consultation and case study of the local level. A research is completely based on the qualitative research design along with the triangulation of the all there level of the government supported by the findings of from the stakeholder and the case study of the local level for bringing the changes in the institutional mechanism of industrial pollution monitoring and compliance in Nepal.

Data Collection Tools and Technique

Primary Data

A non-probability, purposive sampling method was employed to identify key actors directly involved in municipal administration and policy enforcement. Primary data were gathered through semi-structured Key Informant Interviews (KIIs) with municipal chairpersons, chief administrative officers, heads of environmental desks and Industry across the three jurisdictions. These primary narratives capture real-time field realities, such as localized pollution complaints, enforcement bottlenecks, and administrative challenges.

Province		Type of qualitative data	No. of participants
Koshi Province	Ministry of Tourism, Forest and Environment	KII	4
	Conducted KII in Ministry of Industry, Agriculture and Cooperatives	KII	5
	Duhabi Municipality	KII and unstructured Field notes	5
	Biratnagar Metropolitan	KII and unstructured Field notes	1
	Katahari Rural Municipality	KII and unstructured Field notes	5
Madhesh Province	Birjung Metropolitan (Comprehensive)	Empirical Data	Hon. Rahabar Ansari, Rt. Arvind Sah, CDO, CAO, Mayor, Deputy Mayor, more than 25 Industrialist, Federation of Nepalese Chamber of Commerce & Industry

Secondary Data

A clear chain of evidence was developed by cross-referencing primary interview data with large amounts of secondary data sources. Legislative documents and formal executive documents, including national policy documents such as the Environment Protection Act (2019) and Local Government Operation Act (2017), local municipal bylaws, and executive documents, were included in desk review documents. The health economic burden on local populations was estimated by incorporating published secondary

quantitative health metrics and macro-level indicators of health expenditure from the Ministry of Health and Population, the World Health Organization (WHO, 2007) and the World Bank (2025).

Theoretical and Analytical Framework.

Thematic coding and cross case pattern matching were used to synthesis the qualitative data derived from the interview transcripts. The theoretical integration of the WHO Leadership and Governance (Stewardship) Framework and the model of World Bank Public Sector Governance was used to guide the analytical process. Primary KII findings were analyzed into four categories:

(1) local policy monitoring and bylaws,

(2) vertical and horizontal intergovernmental coordination,

(3) Municipal technical capacity

Table 2 Research Approach

	Method / Source	**Stakeholders Involved**	**Purpose / Role in Study**
Primary Data	Key Informant Interviews (KIIs), Purposive Sampling	Ministry of Forest and Environment (MoFE) officials	Provide policy-level insights and explain institutional bottlenecks in environmental regulation
Primary Data	Key Informant Interviews (KIIs), Purposive Sampling	Local Municipality Representatives	Share ground-level implementation challenges and coordination issues
Primary Data	Key Informant Interviews (KIIs), Purposive Sampling	Private Sector Representatives	Provide industry perspective on compliance challenges and regulatory burden
Secondary Data	Review of laws, acts, and policy documents	Environmental laws, legislative frameworks, international agreements	Analyze alignment of Nepal's environmental policies with international standards and identify regulatory gaps

Sunsari-Morang Industrial Corridor

The Sunsari-Morang Industrial Corridor is facing severe air pollution due to widespread non-compliance with environmental regulations by industries. Although the Environment Protection Act (2019) and Environment Protection Regulations (2020) require industries to conduct air and water quality tests every six months, more than 500 of the 550 industries operating in the corridor have failed to do so. As a result, untreated wastewater, industrial smoke, and particulate emissions continue to threaten public health, increasing the risk of respiratory and cardiovascular diseases. While Duhabi Municipality has taken steps to enforce pollution monitoring by directing industries to conduct mandatory testing, other local governments including Itahari Sub-Metropolitan City, Budhiganga Rural Municipality, Biratnagar Metropolitan City, and Katahari Rural Municipality have not implemented similar measures. Despite legal provisions allowing fines of up to Rs. 5 million for non-compliance, weak monitoring and enforcement

have resulted in poor industrial compliance, highlighting significant gaps in environmental governance, regulatory oversight, and policy implementation at the local level.

Rationale for Selecting the Study Area

The Sunsari–Morang Industrial Corridor has been selected as the study area because it is one of Nepal's largest industrial hubs and faces significant environmental governance challenges arising from rapid industrialization. Recent reports have highlighted widespread non-compliance with environmental regulations, weak monitoring by regulatory agencies, and limited enforcement by local governments, making the corridor an appropriate setting to examine the implementation of environmental governance policies.

The study area is also highly relevant to the research objectives, as it includes multiple local governments with varying levels of institutional response to industrial pollution. This variation provides an opportunity to compare governance practices, enforcement mechanisms, and intergovernmental coordination in environmental management.

From a practical perspective, the research must be completed within the remaining two-month study period. Since my permanent residence is located within the study area, I have easy access to the selected municipalities and key stakeholders. This proximity will substantially reduce costs and time, making the research financially feasible while allowing more frequent field visits, easier coordination with respondents, and timely completion of data collection.

Furthermore, my familiarity with the local context, language, and administrative environment will facilitate access to government officials, industries, and community members, improving the efficiency and quality of data collection. Selecting a geographically accessible study area also minimizes logistical challenges and supports the completion of a rigorous field-based study within the available timeframe and resources.

CHAPTER III: RESULTS AND DISCUSSION

RESULTS

The approving ministry also functions as the compliance authority

Under Nepal's sectoral approval model, IEE approval for industrial projects is granted by the Ministry of Industry, Commerce and Supplies rather than by an independent environmental authority. The same ministry that is institutionally mandated to attract industrial investment and expand the sector is also responsible for scrutinising the environmental adequacy of the projects it promotes and for overseeing their post-approval compliance. This creates a structural rather than merely personal conflict of interest: an institutional culture oriented toward development outcomes tends to treat environmental conditions as obstacles to be minimised rather than safeguards to be enforced, with predictable consequences for the rigour of compliance monitoring.

Monitoring and audit obligations exist in law but are weakly operationalised

Approved industrial projects are legally required to implement their Environmental Management Plan (EMP) and to submit periodic environmental monitoring reports, typically on a quarterly or semi-annual basis. The Environment Protection Act, 2019 further introduced environmental auditing as a dedicated post-approval compliance mechanism, empowering the Ministry of Forests and Environment or the concerned proponent ministry to commission audits of approved projects. In practice, however, this mechanism remains at an early stage of implementation, with only a limited number of audits conducted to date. Monitoring reports submitted by proponents are frequently accepted without independent verification of the underlying data, meaning that the compliance record for most industrial facilities rests almost entirely on self-reporting.

Environmental Units lack the capacity to inspect and verify compliance

The Environmental Units embedded within proponent ministries, including the Ministry of Industry, are generally under-resourced relative to the volume of submissions and approved projects they are responsible for. Some units operate with only one or two technical staff. These units lack the staffing, equipment, and travel budgets needed to conduct regular site inspections of approved industrial facilities, and staff turnover is heightened by a general civil-service transfer system that moves officers between postings without regard to accumulated technical

expertise. As a result, compliance monitoring in practice tends toward a paper-based check of submitted reports rather than field verification.

Environmental Management Plans are often not specific enough to enforce

Many EMPs attached to industrial IEE approvals describe mitigation and monitoring obligations in general terms for example requiring that waste be 'properly disposed of' or that dust suppression measures 'be implemented' without specifying technical parameters, monitoring frequency, trigger thresholds, or a defined verification method. Because approval conditions form the legal basis for enforcement action, this vagueness makes it difficult for inspectors, auditors, or courts to determine objectively whether a given facility is in compliance.

Penalties are stronger than before but detection remains the binding constraint

The 2019 Act materially increased the financial penalties available for IEE non-compliance: proponents who implement a project without IEE approval face a fine of up to NPR 500,000 and a potential halt order, while proponents who violate approval conditions face fines of up to NPR 100,000 per day of continuing violation, capped at an aggregate of NPR 1,000,000. These enhanced penalties, however, only function as a deterrent if violations are actually detected. Given the inspection capacity constraints described above, many violations of industrial approval conditions go undetected and therefore unpunished, which limits the practical deterrent value of the strengthened penalty regime.

System-wide oversight by the Ministry of Forests and Environment is underused

The Ministry of Forests and Environment (MoFE) maintains a national registry of IEE approvals and holds formal authority to review and, where necessary, intervene in IEE approvals issued by proponent ministries such as the Ministry of Industry. This oversight power is exercised infrequently in practice, constrained both by MoFE's own limited capacity and by inter-ministerial sensitivities around a central environmental authority overriding the decisions of a sectoral line ministry. The result is that the one institution positioned to provide cross-sectoral, independent oversight of industrial compliance rarely does so in a systematic way.

Comparative institutional models point toward viable alternatives

Other jurisdictions demonstrate that the conflict-of-interest problem is addressable through institutional design rather than requiring an entirely novel governance approach. India's state-

level Environmental Impact Assessment Authorities (SEIAAs) and Bangladesh's Department of Environment both centralise environmental clearance and compliance functions in bodies that are institutionally separate from the ministries promoting industrial and infrastructure development. India additionally requires biannual compliance reporting by proponents combined with periodic government site visits, while South Africa requires an independent, expert-prepared environmental audit report at intervals fixed in the approval itself, with structured findings on both the level of compliance achieved and the adequacy of the EMP's mitigation measures. The broader international literature on EIA follow-up identifies tiered licensing (where compliance with one approval is a precondition for the next), expanded statutory powers of entry, sampling, and interview for enforcement officers, and dedicated environmental funds financed by project levies as further mechanisms available to Nepal.

Industrial Waste Management: Legal Framework, Findings, and Gaps

Legal Framework

Industrial waste in Nepal is governed primarily not by the Environment Protection Act, 2019 itself, but by the Solid Waste Management Act, 2011 (2068 B.S.), which defines "Industrial Waste" as harmful and polluted waste discharged from industrial enterprises and places the general duty to manage solid waste collection, transfer, treatment, and final disposal infrastructure on local bodies (municipalities and rural municipalities). Within this framework, industries and health institutions are placed under a distinct, narrower duty: they are required to process and manage their own hazardous waste according to prescribed standards, and may request that the local body manage residual waste only for a fee. The Act empowers the central Solid Waste Management Technical Support Centre to set differentiated standards and directives for the management of different categories of waste, and includes offence and punishment provisions criminalising the discharge of harmful, chemical, or industrial waste by an industrial enterprise in any place other than that prescribed by the local body.

This creates a bifurcated institutional structure for industrial pollution as a whole: environmental approval and EMP conditions for an industrial project are governed by the Environment Protection Act, 2019 and Environment Protection Regulations, 2020, under the approval authority of the Ministry of Industry, Commerce and Supplies, while the ongoing legal duty to

manage the waste that project generates sits with a separate Act administered primarily through local bodies and a central technical centre under a different line ministry.

Findings on Industrial Waste Management

Self-management with limited independent verification. The Solid Waste Management Act's model for industrial hazardous waste is essentially self-regulatory: industries are legally required to manage their own hazardous waste to prescribed standards, but the Act does not establish a routine, independent inspection or waste-manifest system to verify that this is actually happening at the level of an individual facility . This mirrors the self-reporting weakness already identified in the IEE compliance system :the entity generating the waste is also the primary party responsible for certifying that it has been properly managed.

No dedicated regulatory track for hazardous industrial waste. Unlike jurisdictions that regulate hazardous industrial waste (chemical, biomedical, electronic) under a separate legal and permitting track from general municipal solid waste, Nepal's principal statute treats industrial waste as one category within a single Solid Waste Management Act oriented primarily around municipal solid waste collection and landfill infrastructure . Comparative assessment work on Nepal's solid waste sector has specifically noted the absence of a dedicated hazardous-waste regulatory framework of the kind that exists in India and the Philippines.

Weak segregation and treatment infrastructure at the point of disposal. Field assessments of Nepal's municipal solid waste system have found that industrial and hazardous waste is frequently not segregated from the general municipal solid waste stream and, in many cases, ends up in municipal landfill sites with partial or no treatment . Nepal's largest urban centre, Kathmandu, disposes of solid waste at a single landfill site with only minimal functioning waste segregation and recycling infrastructure, most of it informal.

Weak linkage between IEE approval conditions and waste-specific standards. As already noted in the findings on IEE quality ,Environmental Management Plans attached to industrial IEE approvals frequently describe waste-related mitigation obligations in general terms for example, that waste "shall be properly disposed of" without specifying waste type, quantity thresholds, treatment method, or a disposal destination consistent with the standards set under the Solid Waste Management Act. This means the two legal regimes governing industrial waste (IEE

approval conditions and the Solid Waste Management Act) are not consistently linked at the level of individual facility conditions.

Institutional fragmentation across ministries and levels of government. Responsibility for industrial waste is split three ways: IEE approval and EMP conditions sit with the Ministry of Industry, Commerce and Supplies; the general solid waste management mandate sits with local bodies under the Ministry of Local Development (through the Solid Waste Management Technical Support Centre); and overall environmental standard-setting sits with the Ministry of Forests and Environment. None of these institutions has end-to-end responsibility for verifying that a given industrial facility's waste is being managed as approved.

Gaps Specific to Industrial Waste Management

- Verification gap : Industrial hazardous waste management is self-certified by the generating enterprise, with no routine independent inspection or waste-tracking (manifest) system to confirm actual disposal practice.
- Regulatory-design gap : Hazardous industrial waste is regulated within a general Solid Waste Management Act oriented toward municipal waste, rather than under a dedicated hazardous-waste framework with quantified handling, storage, and disposal standards.
- Infrastructure gap : Few or no facilities exist for the specialized treatment or secure disposal of hazardous industrial waste separate from general municipal landfill sites, so hazardous and non-hazardous waste streams are frequently co-mingled.
- Standard-linkage gap : IEE approval conditions for industrial projects are not consistently drafted to reference or incorporate the specific waste-handling standards set under the Solid Waste Management Act, weakening the enforceability of either instrument.
- Institutional fragmentation gap : No single authority holds end-to-end responsibility for industrial waste, with the approval function (Ministry of Industry), the general waste mandate (local bodies and the Solid Waste Management Technical Support Centre), and environmental standard-setting (Ministry of Forests and Environment) each operating with only partial visibility of the others' decisions.

Gaps

- Institutional gap : No authority independent of the industrial-promotion ministry exists to approve, monitor, and enforce compliance for industrial pollution; approval and enforcement functions sit within the same institution as investment promotion.

- Capacity gap : Environmental Units lack sufficient trained inspectors, dedicated budgets, and a routine inspection calendar for industrial facilities; staff turnover undermines accumulated sectoral expertise.
- Data-integrity gap : Proponent-submitted monitoring reports are generally accepted without independent field verification, so the official compliance record rests on self-reporting rather than third-party confirmation.
- Standard-setting gap : EMP conditions for industrial pollution (effluent discharge, air emissions, solid and hazardous waste) are frequently unquantified, making objective compliance determination difficult even where inspection does occur.
- Audit-implementation gap : Environmental auditing is established in law (Section 15 of the 2019 Act) but lacks a prescribed audit schedule, a standardised audit protocol, and a systematic mechanism for following up on audit findings.
- Transparency gap : IEE reports, approval conditions, and monitoring or audit reports for industrial projects are not proactively published online, limiting the ability of civil society, researchers, or affected communities to supplement formal government oversight.
- Deterrence gap : Even with strengthened 2019 Act penalties, the low probability of detection keeps the expected cost of non-compliance low relative to the cost of implementing pollution-control measures for many industrial operators.
- Coordination gap : MoFE's statutory oversight of proponent-ministry IEE approvals is discretionary rather than systematised, so cross-sectoral quality control over industrial compliance decisions is inconsistently applied.
- Waste-verification gap : Industrial hazardous waste management is self-certified under the Solid Waste Management Act, 2011, with no routine independent inspection or waste-tracking system to confirm actual disposal practice
- Waste-infrastructure gap : Nepal lacks a dedicated hazardous industrial waste treatment or disposal regulatory track, resulting in co-mingling of hazardous and non-hazardous waste at general municipal landfill sites

Comparative Practice Suited to Resource-Constrained Implementation

Nepal's institutional capacity constraints : a small number of Environmental Unit staff, limited inspection budgets, and a general civil-service transfer system that erodes accumulated technical expertise : mean that reform proposals modelled on heavily staffed, well-resourced regulators are

unlikely to be implementable in the near term. The practices below are drawn from regional neighbours and comparable low- and middle-income jurisdictions specifically because they shift cost and administrative effort onto the regulated industry itself, or reduce the volume of work facing already-stretched government reviewers, rather than requiring large new government expenditure or staffing.

Tiered project categorization to reduce reviewer caseload (Bangladesh)

Bangladesh's Environmental Conservation Rules classify projects into four categories by pollution risk: Green, Orange-A, Orange-B, and Red; with only Orange-B and Red projects requiring an Initial Environmental Examination or full Environmental Impact Assessment respectively. Because this reform operates entirely through the threshold schedule rather than through new staff or budget, it is a governance improvement Nepal could adopt at negligible cost; re-tiering the existing Schedule 1 industrial list into finer risk bands would divert low-risk facilities away from the IEE queue, freeing scarce Environmental Unit capacity for higher-risk industrial projects.

Self-reporting paired with periodic, not continuous, verification (India)

India's post-clearance compliance system requires project proponents to submit compliance reports on a biannual basis, combined with government site visits at six-monthly or annual intervals rather than continuous inspection, with much of this responsibility delegated to State Pollution Control Boards to spread the workload across institutions. This model does not assume that Nepal can immediately staff a full-time inspectorate; it instead accepts proponent self-reporting as the primary data source while adding a low-frequency, low-cost verification step that meaningfully increases the credibility of the compliance record.

Proponent-financed compliance deposits (Mongolia)

Mongolian mining regulation requires project proponents to deposit fifty percent of the annual cost of implementing their Environmental Management Plan into a dedicated government environmental protection account; the deposit is refunded according to a set schedule only where compliance performance is verified as satisfactory. This mechanism requires no ongoing government expenditure to operate : it uses the proponent's own capital as the enforcement lever

: and would translate directly into Nepal's industrial IEE conditions as a refundable compliance bond tied to EMP implementation.

Phased, sector-specific rollout of new compliance tools (Mongolia)

Rather than mandating a new compliance instrument across all regulated projects simultaneously, Mongolia introduced cumulative impact assessment as a distinct legal requirement in 2012 but piloted it at a deliberately limited scale : four assessments in four years, targeted specifically at its highest-risk sector, mining : while institutional capacity and methodology were developed. This phased approach is directly transferable to Nepal: new tools such as third-party auditing or independent monitoring verification could be piloted first in the highest-pollution industrial sub-sectors (for example cement, dyeing and textile, or ferro-alloy industries) before broader rollout, rather than attempting simultaneous nationwide implementation with existing capacity.

Linking environmental compliance to an operating licence proponents must renew anyway (China)

Chinese practice links environmental approval procedurally to the broader project or operating permit, so that a facility found non-compliant with its environmental approval conditions faces an obstacle to the renewal of its operating permit, rather than relying solely on a separate, slower administrative penalty process .Because Nepal's Department of Industry and local governments already issue and periodically renew industrial operating licences, requiring proof of current IEE-compliance status as a precondition for licence renewal would create an enforcement lever using administrative processes that already exist, without requiring a new inspection bureaucracy.

Proponent-funded independent audits (South Africa)

South Africa's 2014 reforms require an environmental audit report prepared by an independent expert at intervals fixed in the environmental authorisation itself, with the audit's cost borne by the project proponent rather than the state, and with structured, verifiable findings on both the level of compliance achieved and the continued adequacy of the Environmental Management Plan's mitigation measures. This is directly relevant to operationalising Section 15 of Nepal's Environment Protection Act, 2019 , to the extent it defines auditing obligations: requiring industrial proponents to commission and fund their own periodic third-party audit ,subject to

government-set standards and spot-checks, would allow Nepal's audit mechanism to function without new government audit expenditure.

CASE STUDIES

Narrative Synthesis

Case Study 1: Community Health Impact & Household Burden (Duhabi Case)

Focus: Direct out-of-pocket health costs imposed on local households due to lags in environmental controls.

Pollution Source: Dense particulate emissions and untreated liquid discharge from agricultural processing units.

Finding: Key informant interviews with local leadership in Duhabi Municipality indicate that industrial noise pollution and unabated emissions cause significant health issues in the community. Upper respiratory tract infections and decreased lung capacity are common, alongside dermatological issues linked to exposure to untreated industrial water and airborne toxics.

Relevance: Within the WHO stewardship framework, this case illustrates how inadequate early-stage environmental surveillance shifts costs from industry onto vulnerable households — highlighting the significance of out-of-pocket medical expenditure as a hidden burden of regulatory delay.

Case Study 2: Enforcement & Technological Mandates (Katahari Case)

Focus: Reactive enforcement technologies and the end-of-pipe controls adopted as a result.

Intervention: Forced shutdown of an oil plant; mandatory installation of air filters and primary wastewater treatment.

Finding: In Katahari Rural Municipality, escalating public complaints over health impacts triggered the closure of an oil manufacturing unit. Before reopening, the industry was required to install primary wastewater treatment facilities and industrial air filters.

Relevance: Demonstrates that local governments can exercise executive authority to enforce end-of-pipe pollution controls when acute public health threats arise — but only after harm has already occurred (reactive, not preventive, governance).

Case Study 3: Diffused Waste Streams & Governance Limits (Birgunj Case)

Focus: Limits of point-source enforcement in restoring ecosystem health.

Finding: While a few large manufacturing industries in Birgunj have installed primary waste treatment, restoration of the Sirsiya River remains impossible due to multi-sectoral discharge. Field data shows the river absorbs industrial chemical effluents, restaurant/hospitality waste, and unmanaged municipal sewage.

Relevance: Even where major polluters are fined under the Protection of Environment Act, the ecosystem cannot recover without parallel control over commercial (restaurants/slaughterhouses) and municipal waste — revealing a structural gap: environmental law regulates industry, but comprehensive municipal waste management and commercial sanitation regulation are still missing.

Nepal Budget Context and Quantitative Data for Policy Design

This section summarises the budget and pollution/waste data most relevant to designing implementable reforms, since the case for proponent-funded and administratively low-cost mechanisms (Section 5 above) depends on how constrained Nepal's existing environmental and industrial budgets actually are, and the case for prioritising industrial-sector interventions depends on how large industry's measured contribution to pollution and waste actually is.

National budget context

- The Ministry of Forests and Environment (MoFE) the institution best positioned to hold system-wide oversight of industrial IEE compliance was allocated NPR 15.70 billion for FY 2024/25 (Ministry of Finance, 2024) and NPR 18.61 billion for FY 2025/26 (Ministry of Finance, 2025), within a total national budget of NPR 1.86 trillion for FY 2024/25 (Government of Nepal, 2019). MoFE's allocation therefore represents well under 1 percent of the national budget.
- The Ministry of Industry, Commerce and Supplies the current IEE approval authority for industrial projects was allocated NPR 9.28 billion for FY 2024/25, a reduction of NPR 180 million from the prior year (Kathmandu Post, 2024), with a budget ceiling of NPR 8.31 billion set for FY 2026/27 against a ministry request of NPR 10.13 billion (Ministry of Finance, 2024).
- Neither ministry's budget documents identify a distinct line item for industrial compliance inspection, environmental auditing, or waste-compliance verification consistent with the finding (Section 2.3 above) that Environmental Units operate without dedicated, ring-fenced funding.

- Against this backdrop, reforms that require new sustained government expenditure are unlikely to be funded competitively against existing ministry priorities; this is the quantitative basis for prioritising proponent-funded mechanisms (compliance deposits, proponent-paid audits, licence-linked compliance checks) over new government-funded inspectorates in Section 5 and Section 7 below.

Industrial pollution's measured contribution

- Ambient air pollution from human activity was responsible for more than 35,000 deaths in Nepal in 2021, with an estimated economic value of US$3.5 billion (Romanello et al., 2024).
- Industry is the second-largest identified sectoral source of PM2.5 in Nepal, contributing 12.8 percent of PM2.5 emissions behind residential buildings (39 percent) but ahead of agriculture (9.2 percent) and energy (7.7 percent) (Romanello et al., 2024).
- Industry contributes 7.2 percent of Nepal's black carbon emissions, the second-largest sector after buildings (86.3 percent) (Romanello et al., 2024).
- In the Kathmandu Valley specifically, open burning of waste much of it improperly segregated and, per Section 3.2 above, sometimes including industrial and hazardous waste was found to contribute 18 percent (±4 percent) of PM2.5 organic carbon, identifying it as a major, largely uncontrolled pollution source distinct from industrial stack emissions (Islam et al., 2020).

Industrial waste generation, official Nepal statistics

- Nepal's urban municipalities generate approximately 997,937 metric tonnes of solid waste per year, of which industries contribute 94,392 tonnes per year (approximately 9.5 percent of the total) a similar share to health institutions (101,507 tonnes/year, 10.2 percent) (Central Bureau of Statistics, 2022).
- Of all urban solid waste nationally, 389,983 tonnes/year (39.1 percent) is disposed of in landfills, 315,069 tonnes/year (31.6 percent) ends up dumped directly into the environment, 22,075 tonnes/year (2.2 percent) is openly burned, and only 8,690 tonnes/year (0.9 percent) is recycled (Central Bureau of Statistics, 2022) figures that quantify the "co-mingling" and weak-treatment findings in Section 3.2 above, since Nepal's official waste statistics do not track industrial waste separately once it leaves the generating facility.
- The 2013 ADB assessment of Nepal's solid waste sector explicitly noted that industrial and hospital wastes were not tracked separately in national municipal solid waste statistics, "although they go to the MSW stream with partial or no treatment in many"

cases (Asian Development Bank, 2013) direct evidence, from an official assessment, of the absence of a dedicated hazardous/industrial waste tracking system identified as a gap in Section 3.3 above.

- The World Bank's global waste database estimates Nepal's total waste generation at 1.8 million tonnes in 2016, projected to rise to 2.2 million tonnes by 2030 and 2.9 million tonnes by 2050 (Kaza et al., 2018) meaning the industrial share of the waste stream will grow in absolute terms even if its proportional share stays constant, reinforcing the urgency of establishing dedicated tracking and treatment capacity before volumes increase further.

Implications for costing the recommendations

Read together, these figures support two design principles already reflected in Section 5 and Section 8 below. First, because MoFE and the Ministry of Industry's combined budgets are a small fraction of the national budget and contain no dedicated compliance line item, new institutional mechanisms should default to proponent-funded models (compliance deposits, proponent-paid audits, licence renewal fees) rather than assuming new sustained appropriations. Second, because industry's measured contribution to Nepal's air pollution burden (12.8 percent of PM2.5, 7.2 percent of black carbon) and waste stream (approximately 9.5 percent of tracked urban solid waste, with an unknown additional share going untracked into general landfill, open dumping, and burning) is substantial but not the largest single sector, resourcing decisions should weigh industrial compliance reform against comparable investment in the residential and waste-burning sources that contribute a larger individual share while recognising that industrial pollution is the most administratively tractable of the major sources, since it originates from identifiable, licensed facilities rather than diffuse household or agricultural activity.

Policy-Level Recommendations

1. Establish an independent industrial pollution compliance and inspection function. Create a dedicated Industrial Pollution Compliance and Inspection Unit : either housed within MoFE or established as a standalone body : that is institutionally separate from the Ministry of Industry's investment-promotion mandate, following the SEIAA model used in India. This unit, not the promoting ministry, should hold responsibility for post-approval inspection, compliance verification, and enforcement recommendations for industrial facilities. Example: India's State Environmental Impact Assessment Authorities (SEIAAs) sit outside the industry-promoting line ministries and hold dedicated

environmental clearance and compliance authority for Category B projects . A Nepali equivalent could be a small "Industrial Compliance Cell" under MoFE with delegated sign-off power over industrial IEE compliance status, leaving the Ministry of Industry to retain only the licensing and promotion functions. Given MoFE's total FY 2025/26 budget of NPR 18.61 billion , even a modest reallocation of 0.5-1 percent (roughly NPR 93-186 million) could fund a small dedicated cell's core staffing without requiring a new supplementary budget line.

2. Require quantified, verifiable EMP conditions at the approval stage. Mandate that industrial IEE approvals specify measurable parameters ; discharge limits, emission concentrations, monitoring frequency, and defined trigger thresholds : rather than general mitigation language, so that compliance can be assessed objectively by inspectors, auditors, and courts alike. Example: Instead of an approval condition reading "wastewater shall be properly treated before discharge," the condition would read "effluent BOD not to exceed 30 mg/L and pH maintained between 6.5 and 8.5, verified by monthly laboratory testing submitted to the Ministry" , a standard specific enough that an inspector can pass or fail it without interpretation.

3. Operationalize environmental auditing on a fixed schedule. Prescribe mandatory third-party audits for industrial facilities at defined intervals (for example, biennially, or annually for higher-risk categories), following South Africa's model of independent, expert-prepared audit reports with structured, verifiable findings on both compliance status and EMP adequacy. Example: South Africa's 2014 EIA Regulations require an audit report at intervals fixed in the environmental authorization itself, prepared by an independent expert and paid for by the proponent, with structured findings on compliance and EMP adequacy . Nepal could require, for example, a mandatory biennial audit for chemical and dyeing industries as the pilot high-risk category, with the proponent bearing the audit cost : avoiding any draw on the Ministry of Industry's constrained NPR 9.28 billion annual budget , which currently has no dedicated compliance-audit line item.

4. Introduce independent verification of self-reported monitoring data. Require periodic random field sampling and laboratory cross-checks, conducted by government inspectors or accredited third-party labs, rather than accepting proponent-submitted monitoring reports at face value. Example: India requires biannual proponent self-reporting but pairs it with government site visits every six months to a year, with much of the verification workload delegated to State Pollution Control Boards rather than a single central agency. Nepal's Environmental Units could adopt the same low-frequency verification model rather than assuming continuous inspection capacity.

5. Build ring-fenced inspection capacity. Allocate dedicated staffing, budget, and training for industrial-sector environmental inspectors, and exempt this cadre from the general civil-service transfer system so that sector-specific technical expertise is retained over time. Example: Bangladesh's Department of Environment maintains standardised, project-type-specific review guidelines and dedicated technical staff for different industrial categories rather than rotating generalist officers through the role . A comparable ring-fenced technical cadre within Nepal's Ministry of Industry Environmental Unit; exempt from general transfer postings; would preserve accumulated expertise on, for example, dyeing-industry effluent characteristics.

6. Convert MoFE's oversight role from discretionary to systematic. Establish a statutory duty for MoFE to periodically review and report on industrial IEE compliance outcomes across the Ministry of Industry's portfolio, rather than leaving intervention to ad hoc discretion. Example: Rather than MoFE's current infrequent, case-by-case intervention in proponent-ministry approvals, a statutory duty could require MoFE to publish an annual industrial-sector compliance report summarising audit findings, penalties issued, and unresolved violations across all Ministry of Industry approvals : a reporting obligation, not a veto power, that is politically easier to legislate.

7. Adopt a tiered licensing approach for industrial operations. Condition continued operation, renewal, or expansion approvals on demonstrated compliance with existing EMP and monitoring obligations, creating an ongoing enforcement lever beyond the point of initial approval. Example: Chinese practice links environmental approval procedurally to the broader operating permit, so a facility found non-compliant faces an obstacle to permit renewal rather than only a slower separate penalty process . Nepal's Department of Industry or local governments, which already renew industrial operating licences periodically, could require proof of current IEE-compliance status as a precondition for renewal.

8. Strengthen deterrence and publish enforcement outcomes. Review penalty ceilings against the cost of compliance for common categories of industrial pollution, and maintain a public register of inspection results, violations, and penalties to add reputational and civil-society pressure alongside formal sanctions. Example: China's 2014 Environment Protection Law raised penalties and opened a public interest litigation channel allowing civil society to bring compliance actions. Nepal could pair its existing NPR 100,000/day penalty ceiling with a simple public online register listing which industrial facilities have been audited, what violations were found, and what penalties were issued : a low-cost transparency measure that does not require new enforcement staff. For context, industrial air pollution alone is associated with a share of the US$3.5

billion annual economic cost of PM2.5-related deaths in Nepal, so even modest gains in detection and deterrence carry economic significance well beyond the ministries' combined administrative budgets.

9. Digitize the industrial IEE and monitoring pipeline. Develop an online portal, comparable to India's PARIVESH system, for submission, status tracking, and public disclosure of industrial IEE reports, approval conditions, monitoring reports, and audit findings, supporting both MoFE oversight and public scrutiny. Example: India's PARIVESH portal, administered under its environmental clearance framework, allows online submission, tracking, and public disclosure of clearance applications and compliance reports across all approving authorities. A scaled-down Nepali version could start with a single searchable public database of industrial IEE approval conditions and audit outcomes, before expanding to full online submission.

10. Assess cumulative industrial pollution burden at the landscape or watershed scale. Develop methodological guidance for cumulative impact assessment in industrial corridors and clusters, so that individual facility-level approvals and compliance monitoring are informed by the aggregate pollution load in the surrounding area. Example: Mongolia piloted cumulative impact assessment at a deliberately small scale : four assessments over four years, targeted at its highest-risk sector, mining : rather than mandating it across all projects at once. Nepal could pilot the same approach in its most industrially concentrated corridor, for example the Birgunj-Parsa industrial belt, before expanding methodological guidance nationwide.

11. Link IEE approval conditions to Solid Waste Management Act standards. Require that EMPs for industrial IEE approvals reference specific waste categories, quantities, and the treatment or disposal standards prescribed under the Solid Waste Management Act, 2011, so that the two legal regimes governing industrial waste operate as a single enforceable standard rather than two loosely connected instruments. Example: An EMP condition would specify that a facility's classified "Industrial Waste" under Section 2 of the Solid Waste Management Act must be handled per the standards the Act empowers the Solid Waste Management Technical Support Centre to set , with the IEE approval cross-referencing the applicable waste category rather than using the generic phrase "waste shall be properly disposed of."

12. Establish a dedicated hazardous industrial waste regulatory track. Develop hazardous-waste-specific regulations : covering handling, storage, manifest tracking, and disposal or treatment standards : separate from the general municipal solid waste framework, following the separate regulatory tracks used for hazardous industrial, biomedical, and

electronic waste in India and the Philippines, and require common or centralised treatment facilities for industrial clusters where individual on-site treatment is not economically viable for small and medium enterprises. Example: India and the Philippines regulate hazardous, biomedical, and electronic waste under dedicated rules separate from general municipal solid waste, with specific handling and disposal standards for each category. Nepal could similarly require, for example, a common hazardous-waste treatment facility serving a textile or dyeing industrial cluster, funded jointly by member enterprises, rather than expecting each small facility to build individual on-site treatment capacity.

Theory of Change

The theory of change below sets out the causal logic connecting the reforms recommended in Section 7 to the long-term goal of reduced industrial pollution and improved compliance in Nepal. It is structured as a standard results chain Inputs, Activities, Outputs, Outcomes, and Impact with the key assumptions on which the chain depends made explicit, since these assumptions are exactly where implementation is most likely to break down given Nepal's institutional resource constraints.

Long-term goal (impact)

Measurably reduced industrial pollution air emissions, effluent discharge, and improperly managed solid and hazardous waste and improved public health and environmental outcomes in and around Nepal's industrial areas, consistent with the constitutional right to a clean and healthy environment under Article 30 of the Constitution of Nepal, 2015.

Problem statement

Despite a legally comprehensive framework for industrial environmental approval (the Environment Protection Act, 2019 and Regulations, 2020) and for waste management (the Solid Waste Management Act, 2011), industrial pollution and improperly managed industrial waste continue largely unchecked in practice. This is not primarily a gap in the law itself but a gap in the institutional mechanism that is supposed to turn legal obligations into verified, ongoing compliance: the same ministry that promotes industrial investment also approves and is meant to police it, monitoring relies on self-reported data with little independent verification, and no single institution holds end-to-end responsibility for a facility's environmental performance.

Inputs

- Existing legal framework Environment Protection Act, 2019; Environment Protection Regulations, 2020; Solid Waste Management Act, 2011 as the statutory basis for reform rather than a need for new primary legislation in most cases.
- Political commitment to separating industrial promotion from environmental compliance functions, even partially.
- Proponent-financed resources compliance deposits, audit fees, licence fees as the primary funding mechanism, given constrained government budgets.
- Existing administrative infrastructure Ministry of Industry Environmental Units, MoFE's national IEE registry, local body waste management structures, and industrial operating-licence renewal processes as platforms to build on rather than replace.
- Technical assistance and phased donor or development-partner support for piloting new compliance tools in high-risk sectors.

Activities

- Establish an independent industrial pollution compliance and inspection function, separate from the Ministry of Industry's promotion mandate.
- Require quantified, verifiable EMP and waste-management conditions at the point of IEE approval, linked explicitly to Solid Waste Management Act standards.
- Operationalise environmental auditing on a fixed, proponent-funded schedule, including for hazardous waste handling.
- Introduce independent field verification of self-reported monitoring and waste-disposal data through random sampling and cross-checks.
- Re-tier the industrial project schedule by pollution risk to reduce reviewer caseload for low-risk facilities.
- Link industrial operating-licence renewal to demonstrated IEE and waste-management compliance.
- Pilot new compliance tools audits, cumulative impact assessment, hazardous-waste tracking in the highest-risk industrial sub-sectors before nationwide rollout.
- Digitise IEE, monitoring, and waste-compliance records with public disclosure.

Outputs

- A functioning compliance and inspection unit, institutionally separate from investment-promotion functions, with a defined caseload of industrial facilities.
- Industrial IEE approvals containing measurable, enforceable EMP and waste-handling conditions rather than general mitigation language.
- A regular cycle of independent, proponent-funded compliance audits with structured findings.
- Field-verified compliance and waste-disposal data, rather than unverified self-reports, for a growing share of industrial facilities.
- A public compliance and enforcement register, and a digital IEE/monitoring portal.
- A reduced Environmental Unit review backlog for low-risk projects, freeing capacity for higher-risk facilities.

Outcomes

- Increased probability of detection for non-compliance with EMP and waste-management conditions, strengthening the practical deterrent effect of existing penalties.
- Reduced structural conflict of interest between industrial promotion and environmental compliance decision-making.
- Improved reliability and transparency of industrial compliance data, supporting both government oversight and civil society scrutiny.
- Better coordination across the Ministry of Industry, MoFE, and local bodies on industrial pollution and waste, rather than fragmented, siloed oversight.
- Increased proponent investment in genuine EMP implementation and proper waste management, driven by both credible enforcement and financial incentives (refundable deposits, licence renewal conditions).

Theory of Change: Enhancing Industrial Pollution Monitoring and Compliance in Nepal

INPUTS

- EPA 2019, EPR 2020 & Solid Waste Mgmt Act 2011 (existing law, no new legislation needed)
- MoFE budget NPR 18.61B (FY25/26); Ministry of Industry NPR 9.28B (FY24/25) no compliance line item
- Proponent-financed resources: compliance deposits, audit fees, licence fees

▼

ACTIVITIES

- Independent compliance & inspection unit, separate from Industry's promotion mandate
- Quantified EMP conditions; proponent-funded audits; tiered licensing
- Field verification of self-reported data; digital disclosure portal

▼

OUTPUTS

- Functioning compliance unit with defined industrial caseload
- Enforceable, measurable EMP & waste-handling conditions
- Regular independent audit cycle; public compliance register

▼

OUTCOMES

- Higher detection probability → stronger deterrent effect of existing penalties
- Reduced conflict of interest between promotion & compliance functions
- Better MoFE–Industry–local body coordination on industrial waste

▼

IMPACT

- Reduced industrial share of PM2.5 (currently 12.8%) and black carbon (7.2%)
- Reduced industrial waste mismanagement (94,392 t/yr, 0.9% currently recycled)
- Fewer of the 35,000+ annual PM2.5 deaths (US$3.5B/yr economic cost) tied to industry

Key assumption running through every arrow above: political will to separate promotion from compliance functions, and industrial proponents' willingness to fund deposits, audits, and licence conditions rather than treat them as negotiable.

Key assumptions and risks

This chain depends on several assumptions that are not guaranteed to hold, and should be treated as risks to monitor rather than settled premises. First, it assumes sufficient political will exists to accept some institutional separation of promotion and compliance functions within the Ministry of Industry, even though this reduces that ministry's discretion over its own sectoral approvals.

Second, it assumes industrial proponents will generally comply with financially-based mechanisms such as compliance deposits and audit fees rather than treating them as a negotiable cost of doing business, and that a functioning independent audit and consulting sector is available to conduct proponent-funded audits credibly. Third, it assumes local bodies responsible for solid waste management have or can build sufficient capacity to coordinate with a newly strengthened industrial compliance function, given that local government capacity varies enormously across Nepal's 753 local units. Fourth, it assumes that phased, sector-specific piloting will generate genuine lessons that inform wider rollout, rather than stalling indefinitely at pilot scale for lack of follow-through. Finally, the chain assumes that economic pressure for industrial growth does not translate into political pressure to weaken newly introduced compliance mechanisms once they begin to constrain politically connected proponents the same dynamic already identified as a driver of weak enforcement in the current system.

Conclusion

Nepal's legal framework for industrial environmental governance has been substantially strengthened by the Environment Protection Act, 2019, particularly through higher penalties and the introduction of environmental auditing. The persistent weakness lies not in the statutory text but in the institutional mechanism for turning approval conditions into verified, ongoing compliance: the same ministry that approves and promotes industrial projects is largely responsible for monitoring them, Environmental Units lack the capacity to inspect, and monitoring data is rarely independently verified. Addressing this requires institutional separation of promotion from compliance functions, quantified and enforceable approval conditions, a fully operational audit system, and sustained investment in inspection capacity. Given Nepal's resource constraints, the most realistically implementable reforms are those that shift cost and administrative effort onto regulated industry tiered categorisation, proponent-funded audits and compliance deposits, licence-linked compliance checks, and phased sector-specific rollout rather than reforms that presuppose large new government budgets or staffing, consistent with practice already functioning in India, Bangladesh, China, Mongolia, and South Africa.

REFERENCE

ANNEX

ANNEX I: Provincial KII (KOSHI)

KII Questions on Environmental Governance in Koshi Province

Provincial KII (Koshi Province)

Integrated Pollution Control System (Section 22)

6. Does your institution have any integrated pollution control plan or strategy?
६. तपाईंको निकायसँग प्रदूषण नियन्त्रण सम्बन्धी कुनै एकीकृत योजना वा रणनीति छ?

7. How is coordination carried out between the provincial government, local governments, and federal agencies to control environmental pollution?
७. वातावरणीय प्रदूषण नियन्त्रणका लागि प्रदेश सरकार, स्थानीय तह तथा संघीय सरकारबीच समन्वय कसरी भइरहेको छ?

8. Which types of pollution are considered the most significant environmental challenges in your jurisdiction (air, water, solid waste, industrial pollution, noise, etc.)?
८. तपाईंको कार्यक्षेत्रमा सबैभन्दा गम्भीर वातावरणीय प्रदूषणका समस्या कुन-कुन हुन्? (जस्तैः वायु, पानी, ठोस फोहोर, औद्योगिक, ध्वनि प्रदूषण आदि)

9. How effective are current pollution control mechanisms?
९. हाल सञ्चालनमा रहेका प्रदूषण नियन्त्रण संयन्त्रहरू कत्तिको प्रभावकारी छन्?

10. Are industries and businesses complying with environmental standards? How is compliance assessed?
१०. उद्योग तथा व्यवसायहरूले वातावरणीय मापदण्ड पालना गरेका छन्? यसको अनुगमन र मूल्याङ्कन कसरी गरिन्छ?

11. How is the extraction and management of river-based materials monitored to minimize environmental impacts?
११. वातावरणीय प्रभाव न्यूनीकरण हुने गरी नदीजन्य पदार्थको उत्खनन तथा व्यवस्थापन कसरी अनुगमन गरिन्छ?

12. What are the major governance challenges in regulating riverbed material extraction?
१२. नदीजन्य पदार्थको उत्खनन तथा व्यवस्थापनमा प्रमुख सुशासन सम्बन्धी चुनौतीहरू के-के छन्?

Greenery Promotion and Environmental Improvement (Section 23)

13. What tree plantation or greenery promotion programs have been implemented in your area?
१३. तपाईंको क्षेत्रमा वृक्षारोपण वा हरियाली प्रवर्द्धन सम्बन्धी के-कस्ता कार्यक्रम सञ्चालन भएका छन्?

14. Which agencies or organizations participate in these initiatives?
१४. यी कार्यक्रमहरूमा कुन-कुन सरकारी निकाय, गैरसरकारी संस्था वा सामुदायिक संस्थाहरूको सहभागिता रहेको छ?

15. How are local communities involved in plantation and environmental conservation activities?
१५. स्थानीय समुदायको सहभागिता वृक्षारोपण तथा वातावरण संरक्षण कार्यक्रममा कसरी सुनिश्चित गरिएको छ?

16. Have these programs contributed to improving environmental quality? If yes, how?
१६. यी कार्यक्रमहरूले वातावरणीय गुणस्तर सुधारमा कस्तो योगदान पुऱ्याएका छन्? यदि छ भने कसरी?

17. What obstacles affect the sustainability of greenery promotion programs?
१७. हरियाली प्रवर्द्धन कार्यक्रमको दिगोपनामा मुख्य चुनौतीहरू के-के छन्?

Pollution Control Certification (Section 25)

18. Are you aware of the Pollution Control Certificate provision under the provincial law?
१८. प्रदेश वातावरण संरक्षण ऐनमा व्यवस्था गरिएको प्रदूषण नियन्त्रण प्रमाणपत्र सम्बन्धी प्रावधानबारे तपाईंलाई जानकारी छ?

19. Has your institution or any industry in your jurisdiction received or applied for such certification?
१९. तपाईंको निकाय वा कार्यक्षेत्रभित्रका कुनै उद्योग वा संस्थाले प्रदूषण नियन्त्रण प्रमाणपत्र प्राप्त गरेका छन् वा आवेदन दिएका छन्?

20. What criteria are used for issuing Pollution Control Certificates?
२०. प्रदूषण नियन्त्रण प्रमाणपत्र प्रदान गर्न कुन-कुन आधार वा मापदण्ड प्रयोग गरिन्छ?

21. Do you think this certification system motivates industries to adopt environmentally responsible practices? Why or why not?
२१. तपाईंको विचारमा यो प्रमाणपत्र प्रणालीले उद्योगहरूलाई वातावरणमैत्री अभ्यास अपनाउन प्रोत्साहन गरेको छ? किन वा किन होइन?

Corporate Social Responsibility (CSR) for Environmental Protection (Section 46)

22. Are industries in your jurisdiction allocating at least one percent of their annual net profit toward environmental protection as required by law?
२२. तपाईंको कार्यक्षेत्रका उद्योगहरूले आफ्नो वार्षिक खुद नाफाको कम्तीमा १ प्रतिशत वातावरण संरक्षणका लागि खर्च गर्ने कानुनी व्यवस्था पालना गरेका छन्?

23. What types of environmental activities are industries supporting through CSR?
२३. उद्योगहरूले CSR अन्तर्गत वातावरण संरक्षणका लागि के-कस्ता कार्यक्रम सञ्चालन गरेका छन्?

24. How does your institution monitor or verify CSR expenditures related to environmental protection?
२४. वातावरण संरक्षणमा गरिएको CSR खर्चको अनुगमन वा प्रमाणीकरण कसरी गरिन्छ?

25. What challenges exist in ensuring industries comply with CSR provisions?
२५. उद्योगहरूले CSR सम्बन्धी कानुनी व्यवस्था पालना गर्नमा के-कस्ता चुनौतीहरू छन्?

26. How could CSR contributions be made more effective for environmental conservation?
२६. वातावरण संरक्षणमा CSR लाई अझ प्रभावकारी बनाउन के गर्न सकिन्छ?

Environmental Damage and Compensation (Section 44)

27. Have there been cases where pollution or environmental degradation caused harm to communities?
२७. प्रदूषण वा वातावरणीय क्षतिका कारण समुदाय प्रभावित भएका घटनाहरू छन्?

28. How are complaints regarding environmental damage received and addressed?
२८. वातावरणीय क्षतिसम्बन्धी उजुरी कसरी दर्ता गरिन्छ र सम्बोधन गरिन्छ?

29. Is there an established mechanism for assessing environmental damage and providing compensation?
२९. वातावरणीय क्षतिको मूल्याङ्कन तथा क्षतिपूर्ति उपलब्ध गराउने कुनै प्रभावकारी संयन्त्र छ?

30. What challenges exist in implementing compensation provisions?
३०. क्षतिपूर्ति कार्यान्वयनमा मुख्य चुनौतीहरू के-के छन्?

31. In your experience, do affected communities have adequate access to justice and compensation?
३१. तपाईंको अनुभवमा प्रभावित समुदायले न्याय तथा क्षतिपूर्तिमा पर्याप्त पहुँच पाएका छन्?

Environmental Monitoring and Inspection (Section 48)

32. How frequently does your institution conduct environmental monitoring and inspections?
३२. तपाईंको निकायले वातावरणीय अनुगमन तथा निरीक्षण कति नियमित रूपमा सञ्चालन गर्छ?

33. Which environmental indicators are regularly monitored?
३३. अनुगमनका क्रममा मुख्य रूपमा कुन-कुन वातावरणीय सूचकहरू मूल्याङ्कन गरिन्छ?

34. What procedures are followed when violations are identified?
३४. कानुनी उल्लङ्घन भेटिएमा के-कस्तो प्रक्रिया अवलम्बन गरिन्छ?

35. Are sufficient human and financial resources available for environmental monitoring?
३५. प्रभावकारी अनुगमनका लागि आवश्यक जनशक्ति तथा वित्तीय स्रोत पर्याप्त छन्?

36. What are the major limitations affecting effective monitoring and enforcement?
३६. वातावरणीय अनुगमन तथा कार्यान्वयनमा मुख्य सीमितताहरू के-के छन्?

Environmental Reporting and Accountability

37. Does your institution prepare or contribute to the Provincial Annual Environmental Report?
३७. तपाईंको निकायले प्रदेशको वार्षिक वातावरणीय प्रतिवेदन तयार गर्न वा त्यसमा योगदान पुऱ्याउँछ?

38. What information is typically included in these reports?
३८. यस्तो प्रतिवेदनमा सामान्यतया के-कस्ता विवरणहरू समावेश गरिन्छ?

39. How are monitoring findings used to improve environmental governance and policy implementation?
३९. अनुगमनबाट प्राप्त निष्कर्षहरू वातावरणीय सुशासन तथा नीति कार्यान्वयन सुधार गर्न कसरी प्रयोग गरिन्छ?

40. Are annual reports publicly available and accessible?
४०. वार्षिक वातावरणीय प्रतिवेदन सार्वजनिक रूपमा उपलब्ध हुन्छ?

41. How could environmental reporting be strengthened to improve transparency and accountability?
४१. वातावरणीय प्रतिवेदन प्रणालीलाई अझ पारदर्शी र जवाफदेही बनाउन के सुधार आवश्यक छन्?

Institutional Coordination

42. How would you describe coordination among the provincial government, local governments, industries, and other stakeholders in environmental management?
४२. वातावरण व्यवस्थापनमा प्रदेश सरकार, स्थानीय तह, उद्योग तथा अन्य सरोकारवालाबीचको समन्वयलाई तपाईं कसरी मूल्याङ्कन गर्नुहुन्छ?

43. What institutional challenges hinder effective environmental governance?
४३. प्रभावकारी वातावरणीय सुशासनमा मुख्य संस्थागत चुनौतीहरू के-के छन्?

44. Are roles and responsibilities clearly defined among different levels of government?
४४. विभिन्न तहका सरकारबीच भूमिका तथा जिम्मेवारी स्पष्ट रूपमा निर्धारण गरिएको छ?

45. What mechanisms exist for resolving conflicts related to environmental management?
४५. वातावरणीय व्यवस्थापनसम्बन्धी विवाद समाधानका लागि के-कस्ता संयन्त्रहरू उपलब्ध छन्?

Overall Environmental Governance

46. In your opinion, how effective is the implementation of the Koshi Province Environment Protection Act?
४६. तपाईंको विचारमा कोशी प्रदेश वातावरण संरक्षण ऐनको कार्यान्वयन कत्तिको प्रभावकारी भएको छ?

47. Which provisions of the Act have been implemented successfully?
४७. ऐनका कुन-कुन प्रावधानहरू सफलतापूर्वक कार्यान्वयन भएका छन्?

48. Which provisions remain difficult to implement, and why?
४८. ऐनका कुन-कुन प्रावधानहरूको कार्यान्वयन अझै चुनौतीपूर्ण छ? त्यसका प्रमुख कारणहरू के हुन्?

49. What policy, institutional, or resource gaps limit effective environmental governance?
४९. प्रभावकारी वातावरणीय सुशासनका लागि नीति, संस्थागत व्यवस्था वा स्रोत व्यवस्थापनमा के-कस्ता कमीहरू छन्?

50. What recommendations would you provide to strengthen environmental governance and pollution control in Koshi Province?
५०. कोशी प्रदेशमा वातावरणीय सुशासन तथा प्रदूषण नियन्त्रणलाई अझ प्रभावकारी बनाउन तपाईंका सुझावहरू के छन्?

ANNEX II (Case Study) - Local Level Government

Environmental Governance and Industrial Environmental Compliance in

1. Birjung Metropolitan
2. Duhabi Municipality
3. Katahari Rural Municiplaity

Policy and Institutional Arrangements

1. Does your local government have any policies, bylaws, or guidelines related to industrial environmental management?
2. What is the role of the local government in ensuring industries comply with environmental standards?
3. Which department or unit is responsible for monitoring industrial environmental compliance?
4. How are responsibilities shared between the local government, provincial government, and federal agencies regarding industrial pollution?

Policy and Institutional Arrangements

1. Does your local government have any policies, bylaws, or guidelines related to industrial environmental management?
2. What is the role of the local government in ensuring industries comply with environmental standards?
3. Which department or unit is responsible for monitoring industrial environmental compliance?
4. How are responsibilities shared between the local government, provincial government, and federal agencies regarding industrial pollution?

Environmental Compliance

5. Are industries required to obtain environmental approval before establishing or expanding their operations?
6. Does the local government require industries to submit environmental compliance reports?
7. What environmental standards or regulations are industries expected to follow?
8. How does the municipality verify whether industries are complying with these standards?

Monitoring and Enforcement

9. Does your local government conduct regular inspections of industries?
10. How frequently are inspections carried out?

11. What environmental issues are most commonly observed during inspections?
12. What actions are taken when industries fail to comply with environmental standards?
13. Have any industries been penalized or issued notices for environmental violations? If yes, what types of violations were most common?

Institutional Capacity

14. Does the municipality have adequate human resources to monitor industrial environmental compliance?
15. Are sufficient financial resources allocated for environmental monitoring?
16. Have municipal staff received training on environmental monitoring or environmental governance?
17. What challenges does the municipality face in enforcing environmental regulations?
18. Coordination
19. How does your municipality coordinate with provincial and federal environmental authorities?
20. Do you collaborate with industries to promote environmental compliance?
21. Are community members involved in reporting or monitoring environmental pollution?

Challenges

22. What are the major barriers preventing effective enforcement of environmental standards?
23. Why do you think mandatory environmental measures have not yet been fully implemented in your municipality?
24. Are there political, institutional, financial, or legal factors that limit enforcement?
25. How do industries generally respond to environmental regulations?

Future Directions

26. What measures is your municipality planning to strengthen environmental governance?
27. What support is needed from the provincial or federal government?
28. What policy reforms would improve industrial environmental compliance?
29. How can collaboration between industries and local governments be strengthened?

ANNEX III : TRAVEL AUTHORIZATION

NAME: Richa Mandal Dhanuk

DATE: 8th July 2026, Wednesday

TITLE: Daayitwa Public Policy Fellow

DUTY STATION:

Madhesh Province: - Bara District

Koshi Province: - Sunsari District and Morang District

PURPOSE OF TRAVEL: Key Informant Interview, Data Collection

ITINERARY: Birjung Metropolitan, Biratnagar Metropolitan, Duhabi Municipality and Katahari Rural Municipality

DURATION: 14 Days FROM: 8/07/2026 TO: 28/07/2026

MODE OF TRAVEL: Airfare and Bus

TRAVEL ADVANCE REQUIRED: Reimburse

DETAILS

Particulars	Purpose	Amount (Rs.)
Food	Annapurna Hotel, and Restaurant	5067
Accommodation	Annapurna hotel	7900
Travel	Flightfare, Busfare, and Petrol	(14600+3000+3500)
Miscellaneous	Food while travelling to Burjung (Does not have Bill) Phone Recharge Print	(600+500+200)

Total	35,367 only

Travel Approved By

Date	No. of Days	Activities	Accommodation	Expense (in Rs)	Remarks
8th July 2026	1	Traveled From Kathmandu to Biratnagar by Flight	-	7200	
9th July 2026	2	Visited Biratnagar Metropolitan and Duhabi Municipality to build rapport and scheduled it to Thursday	Stayed at home	1688	
10th July 2026	3	Visited to Ministry of Industry, Agriculture and Cooperatives to build rapport and provide the Questions to the officer and scheduled KII to Tuesday Visited to Biratnagar Metropolitan with letter provided by Daayitwa for scheduling KII	Stayed at home	718	Suggested by Biratnagar Metropoliton to conduct extensive KII from Ministry of Tourism, Forest and Environment for better results.
13th July 2026	4	Visited to Ministry of Tourism, Forest and Environment to build rapport and provide the Questions to the officers	Stayed at home	1418	
14th July 2026	5	Visited to ministry of Industry, Agriculture and Cooperatives to conduct KII Conducted KII in Ministry of Tourism, Forest and Environment with Akhilesh Kumar Gupta (Spokesperson)	Stayed at home	518	Postponed with Visited to ministry of Industry, Agriculture and Cooperatives
15th July 2026	6	Conducted KII with Bikram Aamatya and Dipak Sen Bhandari in Ministry of Tourism, Forest and Environment.	Stayed at home	378	
16th July 2026		Visited toDuhabi Municipality for KII	Stayed at home	-	Postponed
17th July 2026		Conducted KII with Krish Basnet (Env. Inspector) in Ministry of Tourism, Forest and Environment. Visited Katahari Rural Municipality for Rapport building	Stayed at home	1538	
20th July 2026		Visited to Duhabi Municipality to schedule time with Suvarna Ghimire (CAO) Conducted KII with	Stayed at home	1600	

		Environment officer of Duhabi Municipality			
21th July 2026		Visited Katahari Rural Municipality for case study	Stayed at home	518	
22nd July 2026		Traveled to Birjung by Bus	Annapurna Hotel	1500 + 300 (Food)	
23th July 2026		Program Attended with Hon. Rahabar Ansari	Annapurna Hotel	7900	
24th July 2026		Traveled to Duhabi by Bus	-	1500 + 300 (Food)	
27th July 2026		Conducted KII in Ministry of Industry, Agriculture and Cooperatives	Stayed at home	418	
28th July 2026		Travelled to Kathmandu by flight	-	7400	
Total Expense				35367	