

**MOAC**  
Ministry of Agriculture and Cooperatives, Nepal

**ADB**  
Asian Development Bank

# Initial Environmental Examination Report

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## Initial Environmental Examination

Project Number: TA 7298-NEP  
September 2010

### Proposed Grant

### Nepal: High Mountain Agribusiness and Livelihood Improvement Project

Asian Development Bank



**NIRAS**  
In Association with:  
**Full Bright Consultants Ltd**

## CURRENCY EQUIVALENTS

(as of 1 August 2010)

Nepal Rupees – United States dollars

Rs1.00 = \$ 0.0134589

\$1.00 = Rs 74.3

## ABBREVIATIONS

ADB	Asian Development Bank
APP	Agriculture Perspective Plan
CAA	Commercial Agricultural Alliance
CADP	Commercial Agriculture Development Project
CBS	Central Bureau of Statistics
CFUG	Community Forestry User Group
CIP	Community Irrigation Project
CLDP	Community Livestock Development Project
DADO	District Agricultural Development Office
DCCI	District Chambers of Commerce And Industry
DDC	District Development Committee
DFID	Department for International Development UK
DFSC	Department of Forests and Soil Conservation
DFTQC	Department of Food Technology and Quality Control
DLS	Department of Livestock Services
DLSO	District Livestock Service Office
DOA	Department of Agriculture
DNPWC	Department of National Parks and Wildlife Conservation
DoLIDAR	Department of Local Infrastructure Development and Agricultural Roads
EIA	Environmental impact assessment
FAO	UN Food and Agriculture Organization
FNCCI	Federation Nepal Chambers of Commerce and Industry
GAP	Grants assessment panel
GDP	Gross domestic product
HIMALI	High Mountain Agribusiness and Livelihood Improvement
ICIMOD	International Centre for Integrated Mountain Development
IFAD	International Fund For Agriculture Development
IEE	Initial environmental examination
MAPs	Medicinal and aromatic plant products
MOE	Ministry of Environment
MFSC	Ministry of Forest and Soil Conservation
MOAC	Ministry of Agriculture and Cooperatives
MOF	Ministry of Finance
mt	metric tonne
NGO	Non-government organization
PACT	Project for agriculture commercialization and trade
PMU	Project management unit
TA	Technical assistance
WB	World Bank

## WEIGHTS AND MEASURES

Ha	hectare	–	10,000 square meters
mt	Metric tones	–	1,000 kilograms
m	Meters	–	1,000 millimeters

## GLOSSARY

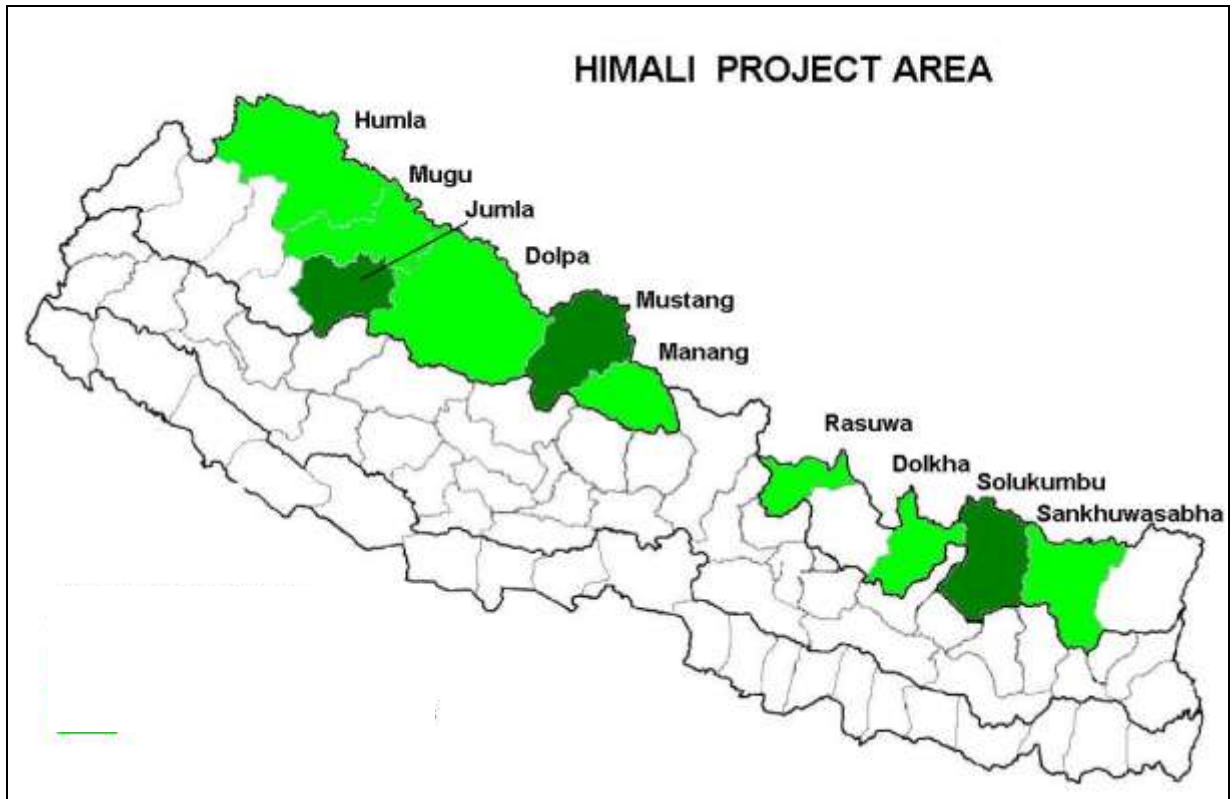
- Value Chain – A value chain includes the full range of activities and actors (enterprises) that are required to bring a product or service from its conception to the final consumer. This includes input supply, production and processing, product design, distribution and marketing, and support services.
- Agribusiness – (i) An individual enterprise engaged in commercial activity involving agricultural products, including commercial farmer and herder groups, cooperatives, and enterprises involved in processing and trading of agricultural inputs and outputs; (ii) Agribusiness may also refer to the collective sector.
- High mountain area – High Mountain areas are defined by the Ministry of Forestry and Soil Conservation according to a land systems classification, ranging from 2,500 to up to 5,000 meters above sea level. On the basis of physiography, geology and geomorphology the land systems of Nepal are classified in five ecological zones, namely Terai, Siwaliks, Middle Mountain, High Mountain and High Himal. High mountain districts encompass the high mountain and high Himal zones, although lower altitude zones also occur in these districts.

## NOTES

- (i) The fiscal year (FY) of the government and its agencies ends on 30 June. FY before a calendar year denotes the year in which the fiscal year ends, e.g., FY2011 ends on 30 June 2011.
- (ii) In this report, "\$" refers to US dollars.

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## EXECUTIVE SUMMARY

### Background

1. The High Mountain Agribusiness and Livelihood Improvement Project HIMALI project will be implemented in 10 high mountain districts: Humla, Mugu, Jumla, Dolpa (Mid-Western Development Region), Mustang, Manang (Western Development Region), Rasuwa, Dolakha (Central Development Region), Solukhumbu, Sankhuwasabha (Eastern Development Region). The regions are characterized by a temperate to alpine climatic range (>2,000 to 4,500 masl). The mountain districts of Nepal are characterized by remoteness from the country's mainstream road network and are not easily accessible. Humla, Mugu, Manang and Dolpa districts are the most remote districts with no road access to date. Other districts, like Jumla, Mustang, Solukhumbu and Sankhuwasabha have seasonal roads and summer monsoon landslides block road access. Remote areas without motor roads access feed value chains via pack animals and porters over traditional trade routes.

2. On the socio-economic side, there is widespread poverty among the inhabitants of high mountain districts. Rising population and their heavy dependence on land and forest resources have led to their over-exploitation, causing negative environmental changes. Agriculture is predominantly subsistence and semi-commercial cropping, fruit and vegetable horticulture, and livestock. The communities commonly collect medicinal and aromatic plant products (MAPs). Herders range seasonally over large high pasture areas with flocks of sheep and goat, and yak and cross bred cattle. Dry conditions lead to seasonal food security issues in the mid-western districts.

3. The HIMALI project envisage to improve rural household livelihood in high mountain districts, by stimulating sustainable agribusiness development, providing Agribusiness Grant assistance to eligible for qualifying business plans, emphasis on farmer participation in value addition and strengthening linkages with markets.

### Name and Address of the Proponent

*Name of Proposal:* High Mountain Agribusiness and Livelihood Improvement [HIMALI] Project.

*Name of Proponent:* Ministry of Agriculture and Cooperatives, Government of Nepal

*Address of Proponent:* Singha Durbar, Kathmandu, Nepal

### Description of the Project Components

4. Three project components are envisaged: (i) mountain agribusiness development will increase the number of commercially viable and sustainable mountain agribusinesses and farmer group enterprises (including community forestry and rangeland groups), and strengthen value chain linkages through advisory services to develop business plans and agribusiness development grants to implement plans; (ii) value chain capacity development will rehabilitate and strengthen selected MOAC district facilities to improve capacity to meet demand for improved crop and livestock genetics, post-harvest quality services, climate adaptive community forestry, rangeland and technology demonstrations as public-private-partnerships; and, (iii) project management will ensure the project is managed, monitored and evaluated effectively.

5. **Component 1 : Mountain agribusiness development activities.** The project will assist farmer groups, community forestry and rangeland groups, private agribusiness and

agricultural value chain enterprises to develop and implement viable and sustainable business plans. Representative models are shown in Table A.

**Table A: Representative Models of Mountain Agribusiness Facilities**

Multipurpose Collection Centre	Slaughterhouse
MAPs Collection and Processing Centre	Sea buckthorn berry Processing Centre
Apple Cold Store	Yak Cheese manufacture facility
Seed Potato Rustic Store	Nursery and plantation
Wool Collection and Primary Processing Centre	Small irrigation, farm road, track, footbridge, culvert
Polythene Greenhouse	

6. **Component 2: Value chain capacity development activities.** The project will: (i) rehabilitate selected MOAC District Service Offices; (ii) upgrade the capacity of selected MOAC Research and Development Stations to produce high quality livestock breeds, fruit varieties and breeder seed, and to operate primary processing demonstration technologies in partnership with producers; and (iii) provide training to MOAC project staff, and training and technical services to producers. Capacity upgrade for five MOAC organizations identified are shown in Table B.

**Table B: Capacity upgrade for five MOAC Research Stations**

Guthichor Sheep - Goat Station, Guthichaur, Jumla	Marpha Horticulture Farm, Mustang
Rajikot Horticulture Station, Rajikhot, Jumla	Shyangboche Yak Breeding Centre, Solukhumbu
Department of Food Technology & Quality Control, District Office Jumla	

### Potential Environmental Impacts and Mitigation Measures

7. An Initial Environmental Examination (IEE) for the HIMALI project was carried out in accordance with the environmental assessment guidelines of the ADB, supplemented by the guidelines of the Government of Nepal. The IEE broadly reviewed environmental concerns in high mountain districts in general as well as assessed potential environmental risks and mitigation plans for project activities including sample assessment of 13 representative agribusiness models, and proposed rehabilitation of representative MOAC district services offices and selected MOAC research stations.

8. The assessment indicated that the nature and scale of environmental impacts of HIMALI project activities vary depending on the type, size, and location of activities. Most of the value-chain development agribusinesses under project financing are demand-driven and likely to be small-scaled, and therefore no large irreversible environmental impacts are envisaged from the individual agribusinesses. The project is classified as a Category B regarding environmental risk based on the results of Rapid Environmental Assessment checklist (refer Annex 1). Environmental risk from project activities is effectively limited to: (i) during facilities construction; and (ii) during business operation. These impacts and risks are identified and appropriate mitigation measures are suggested.

9. During construction, (i) obtaining construction materials (stone, gravel, sand, timber) in unsustainable manner, (ii) earth excavation and slope cutting, (iii) spoil disposal may trigger landslides, loss of forest cover and vegetation, loss top soil and debris washout, damage to water sources and visible damage to landscape. Labor activities may also cause adverse impacts.

10. Potential for environmental impacts during agribusiness operations relates mostly to: (i) sustainable sourcing and use of inputs; and (ii) waste management. High demand for firewood (e.g. preparation of Yak cheese) may trigger deforestation and other associated impacts, particularly at high altitudes where tree growth is slow. Water use must not restrict access by local people or conflict may surface. Sourcing wild-collected MAPs may degrade the resource or lead to species extinction. Over harvesting, wrong timing and wrong methods of collection of wild MAPs have been observed. Management of waste water and effluents from processing units may cause water and soil pollution and direct health implications.

11. Mitigation measures for construction related impacts includes sustainable and environment friendly approaches in collection and use of construction materials, such as proper management of stone quarry sites after completion of extraction, rational use of timber and replanting; proper spoil and construction waste management and use of the well-established labor-based, environmentally friendly and participatory (LEP) approach. During businesses operation, mitigation measures include: minimizing use of firewood and discourage illegal collection of firewood; management of solid waste and waste water through proper and safe disposal; and training suppliers in sustainable collection of wild MAPs; and ensuring certification of timber and MAPs from local Department of Forestry and Soil Conservation offices.

12. The project requires an Environmental Management Plan (EMP) to be submitted with all Agribusiness Grant applications to ensure that the proponents are aware of the environmental implications and its necessity to plan and incorporate mitigation measures into their business plans. These will be assessed by an environmental expert on the Grants Assessment Panel. The applicant will sign a Grant Agreement with the project, specifying the EMP must be fulfilled prior to full disbursement of the grant. Agribusiness operators need to be fully aware of environmental compliance requirements.

13. An EMP has been prepared for sample activities covered by the IEE study and associated with the project, and is included in this IEE report. The EMP suggests mitigation measures, and methods to attain these mitigation measures and their methods for monitoring, schedule and responsible agencies. Overall responsibility for monitoring is on the PMU, which can withhold grant disbursement until compliance is demonstrated, or in severe cases, may legally demand return of the grant since each Grant Agreement is legally binding.



## I. INTRODUCTION

### A. Background

14. The proposed HIMALI project (under ADB support) is built upon the successful design and experience and institutional structures established during implementation of the recently-completed *L1778-NEP: Crop Diversification Project (CDP)*, and the nearly completed *L2071-NEP Community Livestock Development Project (CLDP)*. Lessons learned have been incorporated in project design including from CDP and from progress of the CLDP as well as from other related projects.

15. The proposed project will address the problems of rural household income in the high mountain zones of the Mid West, Western, Eastern and Central Nepal. The project design has a demand-driven mechanism to stimulate private sector agribusiness development, with emphasis on farmer participation in post farm gate value addition at the high mountain level, supported by public sector investments and capacity building. Although the relatively better-off groups will be more involved, substantial numbers of poor and disadvantaged groups will also be benefited.

16. The HIMALI project has selected 10 high mountain districts from Mid-Western, Western, Central and Eastern Development regions as its project districts. Most of the mountain districts of Nepal are characterized by remoteness from the country's mainstream road network and not easily accessible. Mid-western and Far-western mountain districts are remotely located with extremely limited accessibility as compared to Eastern and Central districts. Humla, Mugu, Manang and Dolpa districts are the most remote districts with no road access to date. Other districts, like Jumla, Mustang, Solukhumbu and Sankhuwabha has seasonal roads and not reliable during monsoon. Road network expansion is limited due to difficulty in road construction in mountainous regions with fragile topography and steep slopes.

17. On the socio-economic side, there is widespread poverty among the inhabitants of high mountain districts. Rising population and their heavy dependence on land and forest resources have led to their over-exploitation, causing negative environmental changes, such as soil erosion, deforestation, decline in soil fertility, floods and have consequently degraded and continue to degrade scarce land resources. On the contrary, water and mineral resources are under-utilized due to lack of financial resources and infrastructure. Hence, proper management of mountain resources and socio-economic development warrants for judicious actions to reverse the negative changes and thereby restore sustainability of the rural livelihood systems of Nepalese mountains.

18. There are opportunities for value adding and improving access to markets. The HIMALI project will improve rural household livelihood in high mountain districts, by stimulating sustainable agribusiness development, providing Agribusiness Grant assistance to eligible for qualifying business plans, emphasis on farmer participation in value addition and strengthening linkages with markets.

19. Poor and socially excluded groups however, face considerable financial, skills and social constraints in participating in agribusiness, although some are benefiting from MAPs collection, which does not require skill, money or access to land or water. In this context, the HIMALI project will address improvement of rural household livelihood in high mountain districts, by stimulating private sector agribusiness development, with emphasis on farmer participation in value addition and strengthening linkages with markets. The target beneficiaries are any high mountain people, farmer groups, cooperatives, enterprises or agribusiness who farm, herd, collect herbs, manufacture products, add

value, trade, transport, and who find employment and make business in the various processes along the value chain.

20. This report has undertaken an environmental assessment which broadly reviewed environmental concerns in high mountain districts in general as well as assessed potential environmental risks and mitigation plans for project activities including sample assessment of 13 representative agribusiness models, and proposed rehabilitation of representative MOAC district services offices and selected MOAC research stations.

21. The assessment indicated that the nature and scale of environmental impacts of HIMALI project activities vary depending on the type, size, and location of activities. Most of the value-chain development agribusinesses under project financing are demand-driven and likely to be small-scaled, and therefore no large irreversible environmental impacts are envisaged from the individual agribusinesses. Nevertheless, value-chain development activities can result in localized and small-scale environmental impacts that need to be managed. These impacts may be related to activities during construction works of collection centers, storage facilities, value-added processing, cold store, slaughter house, and small irrigation, rural/link roads, and induced impacts during operation, such as increased pressure on local resources arising, for example, from increased demand of forest resources (firewood, wild MAPs) or discharge of wastes from processing units or related to management of laboratory wastes.

22. In order to manage any environmental impacts, the project requires each agribusiness proposal to conduct an environmental analysis and preparation of Environmental Management Plan (EMP) along with their business plan. The project will assist, through NGOs, in conducting environmental analysis and preparing an EMP for the agribusiness seeking financing from the project.

23. Initial Environmental Examination of sample subprojects is prepared based on the environmental screening using the REA checklist (Annex 1) which has indicated the subprojects to be of environment category 'B' as per the provisions of the Safeguard Policy Statement, 2009 of ADB. The objective of the IEE is to identify and analyze the adverse environmental impacts and propose defined and costed mitigation measures. The Environmental Management Plan (EMP) is prepared listing the impacts, their mitigation measures, as well as the agencies designated for implementing and monitoring the measures. Most of the impacts and mitigation measures relate to construction activities, and they are found to be of low significance owing to the small-scale nature of the construction works. An Environmental Assessment and Review Framework for the Project has been prepared based on the findings of the IEE study.

24. It is expected that the project activities will comply with ADB's and the Government's safeguard requirements.

## **B. Name and Address of the Proponent**

*Name of Proposal:* High Mountain Agribusiness and Livelihood Improvement [HIMALI] Project.

*Name of Proponent:* Ministry of Agriculture and Cooperatives,  
Government of Nepal

*Address of Proponent:* Singha Durbar, Kathmandu, Nepal

### **C. Scope of the IEE Study**

25. The scope of the IEE includes:

- (a) review policies and guidelines of the ADB and the Government of Nepal
- (b) examine salient biophysical and socioeconomic conditions of the project districts
- (c) identify environmental risks due to project activities in the project districts
- (d) assess magnitude of the potential environmental impacts due to project activities
- (e) assess potential climate change impacts on the project and evaluation of response strategies and adaptation measures
- (f) mitigation actions required for project implementation and guidelines for compliance monitoring during implementation
- (g) prepare environmental management plan (EMP)
- (h) prepare IEE report.

### **D. Policy, Legal and Administrative Framework**

26. Nepal has enacted comprehensive and wide range of environmental policies and laws that cover a broad range of environmental and sector issues. Environmental Protection Act (EPA) (1997) and Environmental Protection Regulations (EPR) (1997) (amendment 2007) are the two important legal frameworks for environmental protection. According to the EPA and EPR, all development projects should first be screened using criteria that are based on the scale of project stipulated in the Schedule 1 and Schedule 2 of EPR to determine the level of environmental assessment required. Projects that could result in some environmental impacts are required to conduct Initial Environmental Examination (IEE) and large projects that could result in major environmental impacts are required to go through an Environmental Impact Assessment (EIA) process. The EPA makes necessary arrangements to open the EIA report to the general public so they may render opinions and suggestions. The EPR provides for the institutionalization of the EIA system, pollution control, management of environmental conservation areas, and management of environmental fund.

27. Several Acts also have provisions related to environmental consideration. For example, the Forest Act, 1993 ensures the development, conservation, and proper utilization of forests and forest products and calls for carrying out EIA of the development proposals if they are to be implemented in the forest areas and/or passes through the forest area. The Act empowers government to give consent to use any part or the any category of forest areas, in case of absence of alternative, for the implementation of the national priority proposal with the assurance that it does not pose any significant adverse effect in the environment.

28. The National Parks and Wildlife Conservation Act, 1973 deals with the conservation and management of the wildlife and their habitat. The Act restricts entry in National Park area without prior permission. Hunting of animals or birds, build or occupy any houses, shelter or structures, occupy, clear or plant or grow any part of land, cut, fell remove overshadow any tree, remove any quarry or any other activities are banned. The Forest Rules, National Parks Rules, and Conservation Area Management Rules also contain a number of regulatory measures to minimize environmental impacts within the forests, national parks, wildlife reserves and conservation areas. Some environment related Acts, Rules, Regulations and their key issues are as below:

<b>Acts, Rules, Regulations</b>	<b>Pertinent Issues</b>
▪ Forest Protection Act, 1967	: Conserves and manages forest and biodiversity
▪ Forest Areas Land Act, 1971	: Land ownership and usage of forests
▪ Plant Protection Act, 1972	: Monitors the selling, import and export, and transplantation of various kinds of plants and their products from one district to another; regulates the use of pesticides; establishes plant quarantine station; deals with the prevention and treatment of plant diseases
▪ Pasture Lands Nationalization Act, 1973	: Guidelines for management of pasture lands
▪ Soil and Watershed Conservation Act, 1982	: Preserves the comfort and financial interest of the public by controlling natural disasters such as flooding and landslides
▪ National Trust for Nature Conservation Act, 1982	: Formulates rules for conservation, maintenance, and management of wildlife and other natural resources
▪ Waste Management and Resource Mobilization Act, 1987	: Manages solid waste and controls air, water, and soil pollution form solid waste
▪ Seed Act, 1989	: Deals with registration, certification, ownership, and release of seeds
▪ Pesticide Act, 1991	: Calls for the registration of pesticides before they can be imported, exported, and produced. Requires container and label specification and licensing for any person, institution or agency selling, formulating, or professionally spraying pesticides
▪ Industrial Enterprises Act, 1992	: Regulates industries by only providing permits to those industries that will not have significant adverse effect on the environment
▪ Buffer Zone Management Rules, 1996	: Conserves buffer zone around forest, wildlife, natural environments and natural resources, and biodiversity; provides for development work in this area
▪ Buffer Zone Management Guidelines, 1999	: Provides for sustainable utilization and conservation of natural resources in the buffer zones and sustainable protection of national parks and reserves

## **E. The Environmental Categorization**

### **GON's Requirements**

29. Environmental assessment requirement for agribusiness subprojects intended for support under HIMALI project is of small-scale facilities, expected to have localized minor impacts, thus IEE level assessment will suffice and subprojects fall under the Schedule 1 (pertaining to Rule 3) (revised list dated 2007/08/02) of Environment Protection Rules, 1997 (amendment 2007) of the Government of Nepal (GoN). Summary of IEE and EIA requirements under EPR, for Forest, Agriculture and Agro-industry sectors is presented in Annex 2.

## **ADB's Requirements**

30. The Rapid Environmental Assessment (REA) checklist (Annex 1) has indicated that the impacts from the proposed subproject implementation are minimal and of negligible significance. The positive impacts of the subproject on the income generation and livelihood, food security and protection of the environment largely outweigh such impacts. Also, despite some of the subprojects districts have national park and conservation area and their buffer zones, no significant impact will be incurred due to small scale and agri-business nature of the project. Despite these, the subprojects are classified under 'Category B' necessitating an Initial Environmental Examination (IEE) report.

## **II. DESCRIPTION OF THE PROJECT**

### **A. Project Rationale**

31. The main goal of the project is to improve incomes and improve sustainable livelihood options in high mountain areas through increased volume and value addition of agricultural products in 10 high mountain districts. The project is expected to result in: (i) additional economic production of \$20m per year; (ii) \$14.8m additional value added by businesses supported by the project; (iii) \$7m additional value of production from participating farmer group enterprises; and (iv) 7,500 full-time equivalent jobs created by participating enterprises.

32. The project will focus mainly on:

- Increase number of commercially viable and sustainable mountain agribusinesses and farmer group enterprises;
- Strengthen value chain linkages, through advisory services to develop business plans and agribusiness development grants to implement plans; and
- Rehabilitate and strengthen selected MOAC district facilities to improve capacity to meet demand for improved crop and livestock genetics, post-harvest quality services, and technology demonstrations as public-private-partnerships.

33. The project will provide the farmer groups, private agribusiness and agricultural value chain service enterprises, advisory services to develop business plans and agribusiness development grants to implement them. The grant provision will finance civil construction works for facilities such as Collection Centre and Processing Centre fruits, vegetables, cheese, MAPs and wool, Cold Storage, Slaughterhouse, access roads, tracks and bridges, buildings (new markets, collection centres, agribusiness parks, processing equipment), small irrigation schemes, and other small scale infrastructures required by agribusiness plans. The project will finance the improvement and rehabilitation of government offices such as DLSO and DADO and assist in establishment of laboratories for essential analyses and quality testing facilities and improved genetic and planting materials technologies.

### **B. Project Location**

34. The HIMALI project has selected 10 mountain districts from Mid-Western, Western, Central and Eastern Development regions as project districts, as follows:

Mid-Western Development Region:	Humla, Mugu, Jumla, Dolpa Districts
Western Development Region:	Mustang, Manang Districts
Central Development Region:	Rasuwa, Dolakha Districts
Eastern Development Region:	Solukhumbu, Sankhuwasaba Districts

35. The rationale for selection of the project districts is based on value chain trade corridors linking mountain areas to downstream agribusiness and markets. High mountain districts, classed as least developed but with existing agricultural products and value chain with development potentials and having adjacent districts with similar value chains are included. Only some of the project districts have road accessibility and others have seasonal or no road access.

36. The basis of district selection included the following criteria:

- Classified by Government as high mountain area;
- Classed as least developed or intermediate developed;
- Existing agricultural products and value chain with development potential;
- Interest in participation expressed by district stakeholders;
- Complement other initiatives in rural infrastructure and tourism;
- Avoid duplication with other donor projects (e.g. ADB/CADP, IFAD/WUPAP).

37. The project area also includes the downstream locations (e.g. regional centres) where the mountain products are collected and processed. Agribusinesses based outside the project area are linked with high mountain producers, such as contract farming, supply and marketing agreements, input supply, investing in collection and processing facilities. The IEE will therefore include the potential impacts from project activities.

### **C. Description of Project Components**

38. Three project output components planned under the HIMALI project are:

- |             |                                       |
|-------------|---------------------------------------|
| Component 1 | Mountain agribusiness development;    |
| Component 2 | Value chain capacity development; and |
| Component 3 | Project management.                   |

39. Major activities under each 3 components, are:

**Component 1 Mountain agribusiness development** will increase the number of commercially viable and sustainable mountain agribusinesses and farmer group enterprises, and strengthen value chain linkages, through advisory services to develop business plans and agribusiness development grants to implement plans. The key activities are:

- Promotion and mobilization of interest groups in mountain districts;
- Promotion of agribusiness linkages and information;
- Development of agribusiness plans for financing, which must include an acceptable Environmental Management Plan;
- Assessment and processing of grant proposals from agribusinesses linked to the project area;
- Preparation and signing of legally binding grant agreements between the Project and the agribusiness prior to disbursement of the grants;
- Technical advice to implement the grant-financed agreed agribusiness development.

**Component 2 Value chain capacity development** will rehabilitate and strengthen selected MOAC district facilities to improve capacity to meet demand for improved crop and livestock genetics, post-harvest quality services, and implement technology demonstrations as public-private-partnerships.

This component includes:

- MOAC District Service Office rehabilitation

- MOAC Research and Development Station capacity upgrade
- Participatory technology demonstrations
- Climate change adaptation and value chain training

**Component 3: Project management** aims at effective project management at central and district levels.

Components 1 and 2 will have activities that relate to environmental issues during its implementation, and are discussed in detail in the following paragraphs.

**(1) Component 1 – Mountain Agribusiness Development**

40. The project will assist farmer groups, community forestry and rangeland groups, private agribusiness and agricultural value chain enterprises to develop and implement viable and sustainable business plans. The PMU will contract a national NGO to carry out promotion, mobilization of interest groups, and to facilitate small enterprise development. The Agro-Enterprise Center will be contracted to assist the groups, agribusiness and enterprises prepare viable business plans and improve forward and backward market linkages. To assist eligible entities implement plans, the project will provide an Agribusiness Grant for approved applications. Applications, including business plan, financial viability statements and EMP, will be assessed by a Grants Assessment Panel, and if approved, applicants must sign and adhere to a Grant Agreement, binding them to fulfill the EMP and other commitments. Below are the activities under Component 1:

**a. Promotion and mobilization of interest groups**

41. A national NGO with experience in rural enterprise development will assist the PMU to facilitate planning and implementing information campaigns among agricultural groups, cooperatives, value chain enterprises, agribusiness and other stakeholders to:

- introduce the project aims, opportunities and Agribusiness Grant requirements;
- identify eligible groups that have potential to develop agribusiness plans acceptable for project grants; and
- assess their needs for market linkages, and technical and business management capacity strengthening.

42. The NGO will also facilitate in agribusiness planning and maintain the information base of eligible interest groups and enterprises, facilitate local communication and mobilization to link the groups and enterprises with the Agro-Enterprise business development services and other support networks.

**b. Promotion of agribusiness linkages and information**

43. The Agro-Enterprise service provider (the AEC, an agro wing of FNCCI) will promote the project aims and opportunities to agribusiness, manufacturers and exporters in regional centers and the capital. AEC will also provide the groups and enterprises, and the project area in general, information on markets and prices, sources of specialized agro-inputs and equipment, and facilitate commercial linkages with processors and traders. AEC will coordinate with the PMU, DPCs, national NGO, enterprises and agribusiness to conduct or participate in agribusiness trade promotion fairs and value chain development workshops in project district and regional centers.

**c. Development of agribusiness plans**

44. The AEC and NGO will organize workshops and seminars on locally promising value chains and the business planning process to interested groups and stakeholders.

Eligible groups and enterprises identified during the promotion campaign which have potential to develop their agribusiness will be assisted to prepare agribusiness plans by the national NGO and the AEC.

45. The AEC Agribusiness Planning Specialists will assist groups and enterprises to develop viable and sustainable agribusiness plans, and to assist them to prepare eligible proposals for Agribusiness Grants financed by the project. It will also assist in establishing or strengthening commercial links with local and downstream agribusiness and markets, and will assist enterprises to identify suppliers of specialized inputs and processing equipment. Along with the business plan, the NGO and AEC will assist by guiding on environmental safeguard requirements and in preparing an Environment Management Plan (EMP) acceptable to the Grant Assessment Panel (GAP).

#### d. Representative agribusiness models

46. Under Component 1, agribusiness grants finance capital items for approved agribusiness plans including: (i) nurseries and plantations for community forestry, rangeland and forage, and MAPs; and (ii) generally small-scale facilities and equipment, typically for product collection and storage, processing and value adding, grading and quality analysis, packaging and dispatch. Representative models have been developed based on the ideas suggested by stakeholders of Jumla, Mustang and Solukhumbu districts, but are representative of agribusiness interest but may not be complete and other demand-driven agribusiness might be proposed in the other districts (Table 1).

**Table 1 – Representative Models of agribusiness facilities under Component 1**

Type of Facilities	Agribusiness role	Infrastructure and equipment
Multipurpose Collection Centre	Centre for fruit, vegetable, breed seed: <ul style="list-style-type: none"> <li>• apple collection, grading, packaging</li> <li>• vegetable collection, packaging</li> <li>• breed seed collection, packaging</li> </ul>	<ul style="list-style-type: none"> <li>• Collection, storing building</li> <li>• Apple grading equipment</li> </ul>
MAPs Collection and Processing Centre	Centre for MAPs: <ul style="list-style-type: none"> <li>• MAPs collection, cleaning, drying, packaging</li> <li>• Distillation of Jatamashi oil</li> </ul>	<ul style="list-style-type: none"> <li>• Collection, storing building</li> <li>• Distillation plant</li> </ul>
Apple Cold Store	Centre for apple storage (up to 6 month post harvest)	<ul style="list-style-type: none"> <li>• Storing building</li> </ul>
Seed Potato Rustic Store	Centre for seed potato (up to 8 months post harvest)	<ul style="list-style-type: none"> <li>• Storing building</li> </ul>
Wool Collection and Primary Processing Centre	Center for wool: <ul style="list-style-type: none"> <li>• wool collection, primary processing (scouring, drying, bailing)</li> </ul>	<ul style="list-style-type: none"> <li>• Collection, storing building</li> <li>• Wool scouring unit</li> </ul>
Polythene Greenhouse	Individual greenhouses for production of off-sea vegetables	<ul style="list-style-type: none"> <li>• locally fabricated plastic sheet houses</li> </ul>
Slaughterhouse	Center for hygienic production of meat	<ul style="list-style-type: none"> <li>• Slaughterhouse building</li> <li>• Refrigeration unit</li> </ul>
Seabuckthorn Processing Centre	Center for seabuckthron processing: <ul style="list-style-type: none"> <li>• Seabuckthron and other fruits processing</li> </ul>	<ul style="list-style-type: none"> <li>• Collection, storing building</li> <li>• Fruit processing unit</li> </ul>
Yak Cheese Processing Centre	Center for yak cheese: <ul style="list-style-type: none"> <li>• Yak milk collection, pasteurization, storage</li> <li>• Processing into cheese, maturing, storing</li> </ul>	<ul style="list-style-type: none"> <li>• Collection, storing building</li> <li>• Milk chilling, Cheese making plant</li> </ul>



47. The agribusiness facilities identified during project formulation process is discussed below as an indicative model-type facilities:

48. **Multipurpose Collection Centre:** These Centres will function as collection, grading and packaging after post-harvesting of fruits, vegetables, breed seeds etc. In Jumla and Mustang, for instance, apples will be mainly collected in these Centres (harvested during September – October and marketed till December – January), and subsequently the Centre can be used for other fruits or vegetable such as off-season vegetable, seed potatoes and possibly of MAPs also, depending on their production. In addition to collection and storing, the Centre will have primary processing facilities like cleaning, washing, drying and grading.

49. The model Collection Centre building will be typically of 15m x 60m for 50 MT capacity, with internal partitions for temporary storage after arrival, manual segregation, inspection and grading section, weighing and packaging section, storing section before dispatch, rejected/damaged fruit storing and disposal section, and administrative office. The facility will also contain, waste disposal / incineration units, outside storage sheds, water storage and supply units, parking etc. The size of the Center can be suitably varied as per expected transaction volume.

50. The apple brought to the Centre will be weighted and temporarily stored. The damaged and refused fruits will then be segregated manually. Subsequently, size and colour grading will be done by a mechanical fruit grading machine. The separated fruit will be packed in cartons, labelled and stored till dispatched. The rejected fruit will be managed by returning to its owners or disposed suitably. For other vegetable, similar processes will be followed. For MAPs, the materials may need to be dried and washed or cleaned.

51. **MAPs Collection and Processing Centre:** The Centre will be used for collection and processing of MAPs - mainly at the district's head quarter and at other pocket areas. In addition to storing facilities, the Centre will also have a distillation unit for extracting essential oils from the raw materials. The facility will be approximately 10m x 25m in size with washing, cleaning, drying, distilling, oil bottling facilities. The distillation unit will mainly consist of a boiler unit, material loading unit and distillation column. The boiler will have a dual option for firewood or LP gas fuel. The distillation process mainly includes shedding and cutting of raw material, followed by steaming and finally condensing oil-vapour mixture in the distillation column to obtain water insoluble oil, which is subsequently separated. The refining of the oil will be done in other oil refinery plants elsewhere.

52. This primary processing will use considerable volume of fuel for boilers, water for distillation column and cleaning purposes. Some MAPs by-products after extraction of the oils can be further used in making incense sticks. For MAPs, not used for producing oil, their cleaning, grading, drying and packing will only take place in the Centre. The facility will also have waste disposal / incineration units, water supply units, outside storage shed, parking etc.

53. **Apple Cold Store:** These storing facilities provide maintained temperature and humidity so that the fruits can be preserved for 4 to 6 months after harvesting. The stores will have wetted-sand filled double walled closed store with a mud mortar false ceiling. The sand-filled cavity will be continuously wetted and running water channel will maintain inside temperature (4-5°C) and humidity (85-90%). The store will be approximately 7m x 25m in size for a 25 MT capacity store. Several numbers of these stores have been proposed – mainly in Jumla and Mustang districts.

54. **Seed Potato Rustic Store:** For seed potato, keeping the air humidity low is essential during storage in order to keep disease and rotting down to a minimum, for 5 to 6 months after harvesting or till the following plantation season. Rustic Stores are with mud mortar walls, floors and ceiling with ventilation windows for maintaining temperature and emitting diffused sunlight. The store will be approximately 7m x 25m in size for a 30 MT seed potato storage capacity.

55. **Wool Collection and Primary Processing Centre:** The Centre will have facilities for shearing, grading, scouring, carding, drying and bailing of the raw wool. The main process after collecting the wool is cleaning. Chemical detergents are used to wash the wool in washing machines, and naturally dried before it is bailed to reduce volume. Further processing of the wool shall take place elsewhere. The size of the main Processing Centre building will be approximately 15m x 50m, with internal partitions for temporary storing section after arrival, grading section, scouring section, drying area and bailing section and storing before dispatch.

56. The facility will also contain, waste disposal / incineration units, outside storage sheds, water storage and supply units, parking etc. The scouring unit will consist of a boiler and a washing machine unit. The processing will use considerable volume of fuel for boilers and water for washing purposes.

57. **Greenhouse for Off-season Vegetables :** Polythene sheet greenhouses are low cost options for producing off-season vegetable production such as tomatoes, cucumbers etc. which yields high income to the farmers. These are simple to construct, provided the polythene sheets and agro-nets are available. Average size of a greenhouses size is 5m x 20m x 3.5m with first layer of polythene sheet over metal frame and outer layer of agro-net sheet.

58. **Slaughterhouse :** Village slaughterhouses have been necessary for hygienic supply of fresh meat to the local market. The facility consists of meat shops with cold storage, slaughter facilities, waste disposal and its management, water supply system and pens for small and large ruminants. As a model, slaughter of 30 small ruminants per day maximum and of building size 15m x 20m is proposed.

59. **Seabuckthorn Processing Centre :** Seabuckthorn berries are collected for processing it into its juice. A processing plant for juice extraction and building of size 7m x 15m for a 20 MT raw produce capacity is proposed. Adequate quantity of water is needed for cleaning and other purposes.

60. **Yak Cheese Processing Centre :** The Yak Cheese Processing Centre is proposed where yak/nak milk collection is possible. The Centre consists of pasteurization unit, cheese making units, maturing and storing units and packaging units. The Cheese Processing Centre consumes considerable amounts of fuel and water for cleaning. In Solukhumbu's higher areas, firewood is the only option for fuel, at present.

61. **Small Scale Infrastructures :** The grant provision under Component 1 may include small scale infrastructures specified in agribusiness plans. The following infrastructures are some example:

Small Scale Irrigation: Micro-level irrigation system which is seen to be beneficial for considerable increase in output can be proposed to be financed by the project. The system may include simple intake structures, conveyance canals, crossing system, slope protection works, etc. These irrigation systems may be new or may only need rehabilitation.

Agriculture Access Road: Short lengths of roads that connections to collection centre / cold storages / processing centres etc. with the main road head and saves transportation costs and facilitates for transporting of bulky goods shall fall under this category. The road shall be gravel, of 5 m width and possibly up to 1 km length.

Livestock Access Track: Mule track standard tracks for livestock for access to fodder and pasture area and access to market centre for carrying agro-input /outputs and other consumer goods shall fall under this category. The tracks shall be 3 m wide and possibly less than 1 km in length.

Foot Bridge and Culvert: Small footbridge and culverts for livestock, access to fodder, fire wood and pasture area and access to market centre for carrying agro-input /outputs and other consumer goods shall fall under this category. The footbridge or culvert shall be of 2m wide and up to 4m long.

## **(2) Component 2 – Value Chain Capacity Development**

62. Under Component 2 of *value chain capacity development*, the project will support infrastructure development (rehabilitation or new construction) for MOAC facilities which are necessary to support value chain development. Specifically, the project will: (i) rehabilitate selected MOAC District Service Offices; (ii) upgrade the capacity of selected MOAC Research and Development Stations to produce improved crop, fruit and livestock genetics, post-harvest quality services and breeder seed, and to operate primary processing demonstration technologies as private-public-partnership with producers; and (iii) provide training to MOAC project staff, and training and technical services to producers. Below are the activities under Component 2:

### **a. MOAC District Service Offices rehabilitation**

63. The rehabilitation of MOAC District offices includes District Livestock Services Offices (DLSO) and District Agriculture Development Office (DADO). These offices give services to local farmers through their Centers and Sub-centers, located throughout the districts. In general, offices lack in basic infrastructures and facilities and offices have submitted their proposals. Regarding Jumla DLSO office, a new office building (with total of 10 rooms), a training hall, staff quarters, laboratory, post-mortem and AI facilities with equipment, have been requested. For DADO Jumla, an annex building for seed bank building is requested as well as some minor site improvement works. A new office building is currently under construction. During project implementation, MOAC will assess the overall proposals from all project district offices against service demand, condition of existing facilities and finalize the rehabilitation office. MOAC has suggested one district services centre office per district. DLSO and DADO offices are owned by the MOAC and new construction is proposed inside respective office premises, therefore additional land acquisition and resettlement is necessary.

### **b. MOAC Research and Development Station capacity upgrade**

64. The project, under Component 2, will upgrade the capacity of five MOAC Research and Development Stations (Table 2) to produce high quality livestock breeds, fruit varieties and breeder seed and to operate primary processing demonstration technologies in partnership with producers. Following are the proposed centres for capacity upgrading:

**Table 2 – Capacity upgrade for MOAC Research Stations under Component 2**

Station Location	Agribusiness role	Technology demonstration partnerships
Guthichaur Sheep and Goat Station, Guthichaur, Jumla	Center for wool and pashmina: <ul style="list-style-type: none"> <li>• wool collection, processing</li> <li>• wool sheep breeding</li> <li>• animal health</li> <li>• grazing and forage</li> </ul>	<ul style="list-style-type: none"> <li>• shearing, wool washing, carding and de-hairing, bulk packing for transport</li> <li>• sheep wool breed improvement</li> <li>• forage production</li> </ul>
Rajikot Horticulture Station, Rajikhot, Jumla	Center for seed and varieties: <ul style="list-style-type: none"> <li>• certified breeder seed sales</li> <li>• improved variety fruit tree sales</li> </ul>	<ul style="list-style-type: none"> <li>• seed cleaning, grading and certification</li> </ul>
Department of Food Technology & Quality Control, District Office Jumla	Center for fruit processing: <ul style="list-style-type: none"> <li>• apple, vegetable and MAPs processing</li> <li>• laboratory quality analysis</li> </ul>	<ul style="list-style-type: none"> <li>• processing for juice, dried product, essential oils and extracts</li> <li>• post-harvest packing and handling</li> <li>• quality management systems</li> </ul>
Marpha Horticulture Farm, Mustang	Center for horticulture: <ul style="list-style-type: none"> <li>• apple and MAPs processing</li> <li>• laboratory quality analysis</li> <li>• improved variety fruit tree sales</li> </ul>	<ul style="list-style-type: none"> <li>• apple processing</li> <li>• quality management systems</li> </ul>
Shyangboche Yak Breeding Centre, Solukhumbu	Center for yak genetic conservation: <ul style="list-style-type: none"> <li>• Yak breeding and sale</li> <li>• animal health</li> <li>• grazing and forage</li> </ul>	<ul style="list-style-type: none"> <li>• yak breeding and cross breeding</li> <li>• yak management</li> <li>• forage production</li> <li>• yak agro-tourism products</li> </ul>

### **Guthichaur Sheep and Goat Station and Establishment of Wool Processing Unit (under PPP), Jumla District**

65. Rehabilitation and new construction of NARC buildings at Guthichaur Sheep and Goat Station (GSGS), such as training hall and accommodation / dormitories are proposed. Improvement of existing sheep sheds, construction of new feed trial sheds, lab and dispensary unit, hay storage sheds, dipping tank, wool shearing yard are also proposed. Similarly, grazing pasture land fencing, existing office / quarters improvement are also proposed.

66. For the establishment of new wool primary processing unit, to be commissioned as a demonstration unit and later executed under PPP model, the facilities for wool shearing, grading, washing, carding, drying, bailing units are proposed. The primary processing proposed at the centre is wool cleaning, drying and bailing ready for shipment. Further processing of the wool shall be done at other facilities elsewhere. The size of the main Processing Centre building will be approximately 15m x 50m, with internal partitions for temporary storing section after arrival, grading section, scouring section, drying area and bailing section and storing before dispatch. The facility shall also contain, waste disposal / incineration units, outside storage sheds, water storage and supply units, parking etc. The scouring unit will consist of a boiler and a washing machine unit. The processing will use considerable volume of fuel for boilers and water for washing purposes. The proposed processing centre will be built within the premises of GSGS and acquisition of land and resettlement is not necessary.

### **Rajikot Horticulture Station and Establishment of Vegetable Seed Processing Unit (under PPP), Jumla District**

67. The proposed rehabilitation and new construction works in Rajikot Horticulture Station is as follows : seed potato storage building, seed threshing floor and shade house, laboratory building, new greenhouses, staff quarter building for block A, watchman's quarters, fencing of Rajikot Station (5 km), and internal road repairs and facility improvements, rehabilitation of small-scale irrigation systems and delivery canal.

68. A separate Vegetable Seed Processing Unit is proposed, which is a demonstration unit and later to be turned into a PPP unit, capable of handling 50 MT of vegetable seed. The size of the Seed Processing building is 10m x 25m and the processing equipments include cleaning, grading, de-hairing, drying, packaging, as well as facilities for germination tests and seed viability and purity. The Rajikot Horticulture Station, under NARC, has adequate land to construct proposed facilities within this centre and land acquisition and resettlement is not required.

**Fruit Processing Centre and Establishment of Fruit Processing Unit (under PPP), Department of Food Technology & Quality Control, Jumla District**

69. The present state of this processing centre, under DFTQC, is not satisfactory – with very limited usable processing equipment. Rehabilitation of existing building including the total refurbishment and re-equipping of the processing unit and quality control laboratory is necessary. In addition, one training cum dormitory building is proposed as an extension to the existing building.

70. A separate Fruit Processing Center is proposed, within the Center's premises, to be used as a demonstration unit and later to be operated by private party under PPP. The facility would be used as a processing unit for producing fruit juice, dried apple slices, jams, cider and brandy, including processing of seabuckthorn. The Fruit Processing Unit will be approximately 15m x 30m in size for a 20 MT capacity. Necessary equipment includes: juice extractor, pulper, cabinet drier, boiler, pasteurisation tank, bottle washer, apple peeler/corer and slicer, steel vats, packaging machine, weighing machine, bottle cap sealer, potato drum peeler and chipping machine, spicing machine, bean grinding machine and juice and pulp storage vats. The Apple processing centre also requires other facilities such as water supply and water tank, waste disposal, boundary fencing etc. The Center presently own 0.25 ha of land, where the present office is situated. The remaining land is enough for constructing the proposed processing center, so land acquisition and resettlement issues are not necessary.

**Marpha Horticulture Farm, Mustang District**

71. The new construction works for Marpha Horticulture Farm is as follows : office and officers' quarter and fencing of farm area (4 km). For rehabilitation works, following are proposed: Seed house, training hall, dormitory and guest house, quarters and seed threshing floor. The farm is need of some machinery and equipments such as: power tiller, tractor, sprayer, thresher, fruit juicers, seed separator, freezer, dryers etc. The Marpha farm has adequate land to construct proposed facilities within this farm and land acquisition and resettlement is not required.

**Shyangboche Yak Breeding Centre, Solukhumbu District**

72. The proposed new construction works in Syangboche Centre is as follows : office building with training hall, staff quarter, yak farm, water harvesting tank, fencing (1.2 km). Rehabilitation of farm manager's quarter is also required. In addition, improved breed demonstration unit has been requested by the farm. All the new construction works will take place within the Centre's present land and thus land acquisition and resettlement is not necessary.

**c. Climate Change Adaptation and Value Chain Training**

73. The activities under this sub-heading under Component 1 are intended to improve capacity for climate change adaptation by establishing nurseries and demonstration plots with community grazing land management groups and community forestry groups to rehabilitate natural resources used by the community. Demonstrations involve species for forage and rangeland grazing, timber, MAPs and watershed management. In addition, trainings to farmer groups including disadvantaged groups, women, landless herders and

indigenous people, will be provided to increase involvement in agribusiness value chain activities. The project will also provide trainings and study tours for MOAC staff in the PMU and for DPCs to enhance their capacities.

#### **d. Gender Equity, Social Inclusion, Environment and Peace Safeguards**

74. The activities under this sub-heading under Component 2 will ascertain that women and disadvantaged groups are included in project promotion campaigns and women's groups and enterprises will have equal access to all project benefits, including access to business planning and eligible applications for Agribusiness Grants, demonstration partnerships and community forage and community forestry activities. Civil works required for component 1 and 2 will be carried out according to the labor-based, environmentally friendly, and participative procedure (LEP) used by the ADB Development of Rural Infrastructure for Livelihoods project, which ensures local people are employed in construction and participate in relevant planning processes.

### **III. DESCRIPTION OF THE ENVIRONMENT**

75. **Background:** The high mountain areas in Nepal that runs across the entire 885 km in the east to west direction in northern parts comprises of some of the most rugged and difficult hills and mountain terrains. These hills and mountain regions cover 77% of the country's total land mass and consists mainly four physiographic divisions, namely: Churia Hills or Siwaliks (300-700masl), mid-hills (700-2,500masl), high mountains (2,500-5,000masl), and High Himalayas (above 5,000 masl). Around 52% of the country's population is inhabited in these hills and mountain regions. The remaining populations live in valleys amongst the mid-mountain hills and in Terai (below 300m) regions<sup>1</sup>.

76. Sharp variations are observed in climate, vegetation, ecology, and land use pattern across these physiographic regions and agro-ecological, social and economic contexts and characteristics change within these regions. Both horizontal and vertical variations contribute to the diversity and uniqueness of ecosystem, flora and fauna.

77. **High Mountains:** The high mountain region is extended from the mid hills to the high Himalayas, at altitudes of mostly ranging between 2,500 and 5,000 masl. Human settlements are found up to 3000 masl. The trans-Himalayan valleys of Dolpa, Manang and Mustang, support human settlements up to elevations of 4,000 masl and more.

78. Climate is strongly associated to elevation – and varies from temperate, alpine to tundra in higher mountain areas. Alpine climate is found at altitudes between 3,500 and 5,000m along the lower slopes of the Himalaya mountains. Precipitation varies both geographically and seasonally, about 80% falling during the monsoon season from June to September. Rainfall is more in the south-eastern regions, decreasing towards the north-western regions and distinct moisture gradient can be noticed. The western districts, at elevations 2300 to 3500 masl, receive annual rainfall of about 800 mm, which is much less compared to the eastern districts which receive more than 1200 mm. Rain-shadow areas exist in the trans-himalayan regions of Dolpa, Manang and Mustang as well as some parts of western Nepal.

79. In the mountain areas, cultivable river-side terraces are less extensive than they are in the mid hills since rivers tend to develop deep V-shaped incisions which leave little room for valley cultivation. The little agricultural land available in the area is found in the valleys and in some cases in sheltered pockets of the hills-slopes, like in Jumla.

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<sup>1</sup> CBS, ICIMOD, SNV, 2003. Districts of Nepal, Indicators of Development

Throughout the high mountain districts, agriculture land can normally support only one crop of buckwheat, barley or potato once a year or even once every two years. Extensive areas of pasture land are found in the form of alpine pastures in mostly western mountain districts of Humla, Mugu and Jumla. Migrating livestock from lower areas utilize the pastures of this area during the monsoon.

80. In the temperate zone (2000-3000m) evergreen oaks (*Quercus lantana*) are common in both east and west. Deciduous forests, such as of maples (*Acer* spp) and horse chestnut (*Aesculus indica*) are found at lower elevations in this range, while blue pine (*Pinus wallichiana*) predominates at higher elevations in the west. Up to the tree line in sub-alpine zone (3000-3600m), firs (*Abies* spp), hemlocks (*Tsuga dumosa*) and yews (genus *Taxus*) predominate in the east, while Himalayan birch and silver fir are found throughout this altitude. In wetter areas, rhododendrons are common tree line species, while in dry areas, junipers are found. The alpine zone (above 3600m) is characterized by hardy perennials and the annuals. Rhododendron bushes are the dominant shrubs along with the numerous alpine herbs. Dolpa, Mustang and Manang represent arid zones and large parts of these districts are treeless - only on the north-facing slopes, forest patches, generally of *Pinus wallichiana* and *Betula utilis* occurs and treeless steppes have domination of shrubs, *Caragana brevifolia* and *Lonicera spinosa*. Above the tree line in meadows numerous species of medicinal and aromatic herbs are found, especially in western areas, aromatic rhizomes, including commercially important species such as Jatamansi (*Nardostachys grandiflora*) and Sugandahwal (*Valeriana jatamansi*) are found. Other important MAPs include Panchaule (*Dactylorhiza hatagirea*) and Kutki (*Picrorhiza scrophulariiflora*). Yarchagumba (*Cordyceps sinensis*) is collected from high alpine meadows in high altitudes 3,500 - 5,500 masl from May to June in Dolpa, Jumla, Humla, Mugu, Darchula, Bajhang, Rasuwa, Rukum districts.

81. The wildlife of this region includes the Himalayan bear, snow leopard, musk deer, barking deer, porcupine, wildboar and occasionally blue sheep and Himalayan tahr sometimes being seen on steep rocky faces above 2400m. The red panda and snow leopard are among the more interesting of the mammals found in the areas. Wild Yak and great Tibetan sheep are occasionally found in areas such as Dolpa and Humla. Yaks are the only livestock, which thrive at high altitude. The rich and varied avifauna of this region includes several spectacular and beautiful pheasants, including the Danfe pheasant.

82. Several protected areas are located in the high mountain districts. Shey Phoksundo National Park (3,565 sq. km) lies within Mugu and Dolpa districts and Rara National Park (106 sq. km) is within Mugu district. Similarly large parts of Mustang and Manang districts lies within Annapurna Conservation Area (7,829 sq. km). Solukhumbu is within Sagarmatha National Park (1,140 sq. km), Sankhuwasabha district contains Makalu Barun National Park (1,500 sq. km) and Rasuwa district contains Langtang National Park (1,710 sq. km). Protected areas except Annapurna Conservation Area are managed by the Department of National Parks and Wildlife Conservation (DNPWC) under Ministry of Forest and Soil Conservation (MoFSC). Annapurna Conservation Area is under the mandate of National Trust for Nature Conservation (NTNC), managed with its modalities based on the integrated conservation and development programs (ICDP) for achieving a balance between the environment conservation and socio-economic development.

83. **Ecology and Climate Change:** The country is cut by several steep-sided north-south flowing river systems from the Himalayas. In the central Nepal, the Kali Gandaki river roughly defines the beginning of a broad eco-zone to western Nepal, dividing it from eastern Nepal. The Kali Gandaki river valley is extremely dry towards its north, with reduced flora, while towards the south it has lush humid tropical forest. Another such river

system is Karnali river which is a major western watershed which is found within Humla and other districts of the north-west. These major rivers form some interesting valleys where riverain and tropical evergreen forests exists. The western region (west of 83°30'E) and eastern region (east of 86°E) show distinct west-himalayan and east-himalayan biotic components, respectively, while the central region connects both the regions bio-geographically. In the rain-shadow trans-himalayan areas, while north aspect may support forests, the dry south aspect generally remains treeless. Due to ecosystems ranging from desert and semi-arid areas in the north, subtropical, mountain and alpine forest in the mid hills to tropical monsoon forest in the south, Nepal fosters wide biological diversity. However, the ecosystems are rapidly changing. They are susceptible to accelerated soil erosion, landslides and rapid loss of habitat and genetic diversity.

84. Nepal's high mountainous regions are directly affected by global changes, including climate change and high altitude areas are most vulnerable to these changes. Impacts of climate change can be easily noticed in the high mountain trans-himalayan regions. However, the level of understanding and awareness on the issue of climate change is limited. Due to climate change, general scarcity of fresh water is observed, less snow during winter resulting in less water in irrigation channels, less vegetative growth, increase in temperature, weather induced hazards like heavy rain, windstorms and hailstorms are increasingly common, and incidence of disease in agriculture has increased. In the arid mountain regions, the following climate change related impacts are being noticed: rising temperatures, and changes in quantity and timing of precipitation, resulting in sudden dryness and flash floods, and influencing traditional and contemporary farming practices, productivity, and livestock systems; permafrost melt, affecting land usage and slope stability; changing seasonal patterns, affecting transhumance and nomadic livestock migration patterns; and, less predictable annual melting regimes of upstream glaciers and snow packs, and changes in hydrological cycles impacting downstream domestic water and energy needs.

85. **Accessibility:** The lack of all-season road accessibility is the primary concern in both the western and eastern mountain districts. Access to suppliers, services and markets is a serious constraint due to the absence of road connectivity. Roads to district headquarters of Humla, Mugu, Doplá and Manang does not exist to date. Mustang has been connected by road. Rasuwa and Dolkha have all-weather road links. Road up to Solukhumbu is nearing completion and Sankhuwasabha is operational.

86. In Jumla, the Surkhet-Jumla road is under construction (236 km out of which 170 km is being upgraded with WB funding; the other 66 km will take another 3-4 years to complete). Currently the road is operational only for 8-9 months of the year, with July to September closed due to landslides. It takes 2-3 days to travel by road from Jumla to Surkhet. In Mustang, road from Pokhara via Beni to Jomsom (158 km) is already in use, with the Pokhara to Beni section an all-weather road. Also the Beni to Jomsom (80 km) road a seasonal road but not so much of a problem as compared to the Jumla road, as it is in a rain shadow area so less problems in the rainy season. There is however a 30-40 km stretch in the middle which is problematic. It is planned to have this road operational in 4-5 years. For Solukhumbu there are two main routes from Bharatnagar (all weather road) via Okhaldhunga to Salleri road constructed by the ADB and SDC is complete and (ii) from Kathmandu (all weather road) via Jiri to Salleri. Road up to Jiri (200 km from Kathmandu) exists and Jiri to Salleri is only by mule tracks (3-4 days).

87. There is air links to headquarters of Humla, Mugu, Doplá, Jumla, Manang and Solukhumbu districts but all flights in high mountain districts are weather sensitive.

88. **Socio-economy:** The 10 high mountain districts of Nepal are inhabited by 0.8 million people. In the east these areas populated by very diverse populations in which



ethnic minorities form majorities. The districts west of Mustang have majorities of Brahmins and Chhetris with only sparse populations of Tibetan-origin people in the highest mountain VDCs. District-wise Socio-economic data is attached in the Annex 2.

89. The majority of the population of the high altitude areas depends on subsistence agriculture and natural resources for its livelihood. About 90 percent of the farmers in mountainous areas depend on marginal and small land holdings, where they typically cultivate less than one hectare per household and mostly rely on traditional farming and animal husbandry. In many cases, they augment their income by using other natural resources, mostly collection of NTFPs and MAPs. Trade has been important for few Tibetan-origin ethnic groups like Thakali, Sherpa and Tibetans. Tourism is important for Mustang, Manang and Solukhumbu. Collection of high value medicinal herbs has become an important income source in many of the western districts, notably Dolpa. The importance of cash crops is still low in the mountain areas, except apples in Jumla and Mustang.

90. The general conditions of the high mountain districts are physical and socio-economic marginalization of the rural population, low population density, harsh climate with low rainfall, prolonged dry periods, low temperature and severe winter, unseasonable snow, a rugged and fragile terrain, high soil erosion rates due to wind and water run off, food deficiency due to short growing seasons, limited suitable agriculture land, and limited/ lack of access to basic technical services.

91. In the agriculture sector, declining productivity is a critical concern in food crops and in horticulture. Problems of increasing soil acidity, loss of crop vigor, lack of appropriate technological inputs and inadequate technical outreach as well as changes in weather patterns as possible causes contributing to lower productivity. In addition, subsequent soil nutrient losses and diseases occur frequently and hamper the sustainability of benefits. Furthermore, the increasing use of pesticides on horticultural crops has been reported, and poses additional health and safety challenges<sup>2</sup>. In the livestock sector, milk from cattle and meat from sheep and goat shows progressive decline due to low quality of fodder and forage, particularly during the winter months. For the livestock, the carrying capacity of pasture land is low due to the unavailability of nutritious plants and overgrazing.

92. Poverty incidence in the mountains is 33% which is close to the country's average. There are however considerable differences between and within districts. The mid and far western mountain districts belong to the poorest in the country in terms of income and food security. In district like Solukhumbu, the Northwest VDCs has benefited greatly from tourism, whereas the eastern VDCs are among the poorest for East Nepal. Food availability in the mountain districts is for four to five months (in some cases, may be less) – food security for the rest of the year has to be ensured through food imports. Western districts (Humla, Mugu, Jumla and Dolpa) are more prone to food deficits compared to eastern districts. Poor accessibility is a major constraint in transporting food to food shortage districts in the mountain areas.

93. Poverty is directly related to resource poverty, remoteness and social exclusion. For example poverty incidences in 2003 for the remote, drier and more mountainous Midwestern region (45%), Dalits and disadvantaged indigenous people (35%-44%), are substantially higher than the average, and also higher than for accessible Western, Eastern and Central Regions (27%-29%), and for advantaged groups of Newar, Brahmins and Chhetris (14%-21%). However, because of the higher population densities in the

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<sup>2</sup> Tuladhar J.K. et al 1998. Towards Sustainable Soil Fertility Management in the Hills of Nepal. Lumle Agricultural Research Centre. Pokhara.

Central and Eastern regions, more poor people live there than in the much poorer Mid- and Far West. 7.5% of all people below the poverty line lived in the mountains in 2003. Poverty distribution patterns are similar when comparing Human Development Indices for large regions.

#### **IV. POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES**

94. Representative models for different potential agribusinesses, their infrastructural needs and operational modalities have been identified. The HIMALI project intends to finance the building of infrastructures needed by the agribusiness – for private agribusinesses under project's component 1 and for government owned facilities such as offices, laboratories under component 2. These agribusiness infrastructure facilities and government facilities are likely to have certain impacts on environment during their construction and while the businesses are in operation. The project is financing small-scale infrastructures, therefore no large-scale, critically sensitive environmental impacts are envisaged. The IEE study has studied the potential environmental risks and mitigation measures to be taken to minimize adverse impacts have been suggested. The environmental risks from project activities are effectively limited to (i) during facilities construction and (ii) businesses operation.

##### **1. During Construction of Facilities**

###### **a. Unsustainable use of local Construction Material – Stones and Timber**

95. The project under Component 1 will finance the construction of agribusiness facilities, such as collection centres, processing centres, storage centres; and small-scale public infrastructures such as small irrigation system, access tracks and footbridge required by the agribusiness facility. Secondly, under Component 2, the project will also finance the construction of facilities (new and rehabilitation) for MOAC district entities, such as office buildings, training halls, laboratories and technology demonstration facilities. All these facilities need to be built according to national building norms, standards, and practices, in environmentally sound construction methods. However, in mountainous districts, where road accessibility is not fully developed, the availability of desired construction materials at reasonable prices would pose as a major constraint, forcing use of locally available materials, usually extracted in environmentally problematic manners.

96. **Stone use:** In the hill and mountain districts of Nepal, where bricks are not available for masonry construction, local practice is to use stones, extracted from nearby quarries or boulders from rivers, found in abundance in the nearby locality. Roofing slates are also quarried locally. Local quarry operators, after acquiring quarrying permits and paying a levy to local government body, will supply quarried stones, most of the times, with little or inadequate concern for preservation of environment and posing environmental risks. The extraction method, volume extracted and methods of decommissioning after extraction will have direct impacts on the local environment.

97. The project will be financing the construction of agribusiness facilities, at different locations, and will require large quantities of stones and timber cumulatively. Constructing one unit of 15m x 60m sized, 1 floor stone masonry structure premises will require approximately 600 m<sup>3</sup> of stones and 15 m<sup>3</sup> of timber. If extraction stones and timber is not done in appropriately sustainable manner, following adverse impacts will be likely:

- Triggering of land slides and erosion in surrounding areas

- Permanent loss of forested areas and vegetation cover at quarry site and along access road
- Loss of top soil and growth of natural vegetation cover will be minimal and slow due to loss of top soil, on exposed surfaces
- Soil and gravel debris washed down hills causing debris cover in lower cultivable area
- Pollution of streams and increased silt loads in streams due to debris washout
- Water from natural springs are contaminated and water sources permanently destroyed
- Unaesthetic, visible scar on the landscape against surrounding background
- Human activities and loss of forest may have direct impact on wildlife habitat
- Dangers due to over-hanging rock mass because of abandoning quarry sites after excavating
- Fire-wood consumed if heat breaking of large rocks is carried out
- Natural land cover destruction while excavation in search of rock mass

98. These indirect but interlinking impacts are prevalent due to extraction of stones from quarries. Environmental concerns due to quarrying is less considered serious, possibly because these quarries maybe are hidden away inside the forests, away from direct eye-catching locations and do not cause immediate catastrophic consequences. Secondly the abundance of rocks is little concern for worry.

99. **Mitigation:** It is the primary responsibility of the agribusiness proponent to ensure that construction material used for construction of its facilities is sourced in an environmentally sound manner. In case of stones, the proponent need to ensure that the adverse impacts due to quarrying is minimized and proper mitigation measures are implemented during and after extraction. The proponent shall oversee the extraction process and guide the supplier of stones to follow mitigation measures. As an alternative to stone masonry works, locally made cement hollow blocks could be one possibility. Economic and viability analysis of these needs to be done, for places where cement can be transported. **However, care should be taken to maintain local surrounding architectural blend and aesthetic – especially in potential tourist destinations.** Mitigation measures for management of stone quarries include:

100. For starting new quarry:

- Avoid start of new quarry - source from existing quarries as far as possible
- Avoid stone quarrying in known sensitive hazard prone, landslide prone areas
- Assess the site suitability, in terms of expected volume, possibility of debris contaminating streams and destroying water sources, vicinity to human settlement and cultivation area, prior to start of quarrying
- Provide necessary methods to conserve water sources, prior to start of quarrying
- Select sites (for quarry and access road) devoid of trees, remove only necessary trees, after receiving appropriate approvals, and plan and find land for compensatory plantation, and appropriate management of felled trees as per local regulations
- As per EPR, 1997 Schedule 1, an IEE needs to be carried out and approved by local administrative body, for quarrying over 300 ft<sup>3</sup> (8.5 m<sup>3</sup>) daily. The quarry operator needs to abide by this requirement and the proponent is obliged to get stones only from such quarries
- All local taxes, levies are to be paid, as per local rules and regulations

101. During quarry operation:

- Avoid opening up unnecessarily large areas. Estimate extraction volume and requirements
- Conserve and store top soil, to be used for resurfacing after closing quarry site
- Avoid soil and debris wash out by suitably constructing catch drains. Avoid excavating during rainy seasons

- Prohibit use of heavy equipment or blasting. Avoid fire-wood heating for breaking large rocks. Use labour-based, environmentally friendly methods of extraction
- Observe high levels of safety considerations for workers, passer-bys during and after construction

102. Decommissioning after quarry operation

- Appropriately close quarry, with reapplication of top soil, bio-engineering with grass seeds and saplings, and tree plantation so that natural generation can occur
- Remove all dangerously over-hanging rock mass
- Periodically inspect natural vegetative growth, and if necessary, manage with soil application and plantation

103. **Timber use:** Timber is another construction material widely used in hills and high mountain districts, as structural components for floor beams (*dalins*), roof truss, rafter, floor planks, wall panels, door and window frames and shutters. Trees mostly used as timber are mostly blue pine (*Pinus wallichiana*). The average girth of trees logged for timber ranges from 50 to 75 cm, average height of 25 m, and naturally grown trees. Controlling and managing from government agency for logging, milling, sales and distribution of timber is weak – which has resulted in gross misuse of natural forest resources by its traders.

104. Likely adverse impacts related to timber use from forests include:

- Permanent loss of forested areas and vegetation cover
- Triggering land slides and erosion, loss of top soil in an around deforested area
- Change in rainfall patterns, decrease in natural water supply
- Loss of fodder for livestock
- Permanent loss of natural forests, the collection of timber also indirectly causes impacts in the depletion of NTFP and MAPs, while loggers cut and transport trees from the forest.

105. **Mitigation:** In case of construction timber, the proponent need to ensure that the adverse impacts due to felling of trees are minimized and proper mitigation measures are implemented. The proponent shall oversee the extraction process and guide the supplier of timber to follow mitigation measures. Mitigation measures for management of forest loss due to timber use include:

- Avoid use of timber as structural members, as far as possible. Use reinforced concrete floors, if steel bars and cement can be transported economically to site
- If no other alternatives exist, obtain timber from government approved sources only
- Avoid cutting of immature, small girth strands
- Avoid cutting from steep, sloped areas, and already thin forest area
- Avoid cutting from rich areas of NTFPs and MAPs
- Minimize loss by providing sawing, milling facilities
- Re-plantation of locally adapting tree saplings – through the initiative of local District Forest Office (DFO), DNPWC and ACAP officials. Establish nurseries, locate land for compensatory re-plantation and its conservation. Compensatory plantation shall be in the ratio of 25 plantation for each cleared tree.

106. Protected areas such as National Parks<sup>3</sup> and buffer zones of Mugu, Dolpa, Solukhumbu, Sankhuwasabha and Rasuwa are managed by Department of National Park and Wildlife Conservation under the Ministry of Forest and Soil Conservation – who is responsible for management and protection of forests and wildlife. Similarly Conservation areas of Mustang and Manang, Annapurna Conservation Area, is managed

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<sup>3</sup> Shey Phuksundo NP (Mugu, Dopl), Rara NP ( Mugu), Sagarmatha NP (Solukhumbu), Makalu Barun NP (Sankhuwasabha), Langtang NP (Rasuwa), and Annapurna Conservation Area (Mustang and Manag)

by National Trust for Nature Conservation – which is responsible for the protection of forests and wildlife within the Annapurna Conservation Area.

107. **Spoil Disposal:** The disposal of debris and spoil from construction sites may have environmental risks. The adverse effect due to such methods of disposal will result in pollution of streams and water bodies. Disposal of debris and spoil into nearby streams, rivers or open space is to be prohibited and safe locations identified such as natural depression, quarry site – where environmental impacts are minimal.

108. **Other Construction Impacts:** Other construction related impacts may be deterioration of air, noise and vibration from construction equipment, water pollution, etc. Such impacts need to be avoided with suitable construction methods and adequate precautions. In addition, loss or damage to private and public community infrastructure and cultural sites will be strongly protested by their stakeholders and affected people. The proponent need to be sensitive of such issues and impacts and take precautions seriously and provide appropriate mitigation and compensatory measures. Some possible impacts and possible mitigation are hereunder:

Impacts	Mitigation
<p><u>Air, noise, and vibration</u> : Due to construction equipment or vehicular emission, dust due to construction activities. Direct health hazards to workers, adjacent residents</p>	<ul style="list-style-type: none"> <li>▪ Avoid excessively air and noise polluting equipment / vehicles, especially near settlement areas</li> <li>▪ Provide dust control measures like water sprinkling</li> <li>▪ Covering of dust producing construction materials</li> </ul>
<p><u>Water pollution:</u> Due to construction material storage, spoil, erosion, quarrying etc.; Due to bad sanitation practices by temporary workers. Direct health hazards to water supply users</p>	<ul style="list-style-type: none"> <li>▪ Strict regulations to prohibit water pollution, especially water used for domestic purposes</li> <li>▪ Proponent to oversee water pollution condition and make sure domestic water is not polluted or contaminated</li> </ul>
<p><u>Public and private infrastructure damage:</u> Such as damage to irrigation canals, rupture of water pipelines, damage to existing road surface, damage to public resting places (<i>Chautaras, shattal, pati</i>), religious and culturally and historically important sites (temples, shrines, mela/jatra sites, graveyards, etc.) ; Private houses, sheds, fences, loss of fruit trees etc. due to construction activities</p>	<ul style="list-style-type: none"> <li>▪ Strict instructions to avoid damage to public and private infrastructures</li> <li>▪ Reconstruction of damaged structure to original stage, immediately</li> <li>▪ Provide adequate compensation to private owners, for losses incurred</li> <li>▪ Avoid culturally sensitive areas such as graveyards and cremation areas etc.</li> </ul>

## **b. Social Environmental Impact : Labour related issues**

109. During construction of project facilities, the Contractor of works, may hire large numbers of construction labours from outside the area, (sometimes due to insufficient local workers available and sometimes due to cheaper wage rates for outside workers). These labours, who may stay within the construction site in temporary camps, may excessively and indiscriminately use local resources such as water and firewood, and does not maintain proper sanitation – causing increased burden on social infrastructures and services and consequently causing disharmony with the surrounding local people. In addition, the migrant workers having different backgrounds, are likely to be insensitive towards local environment, local cultural practices and traditional beliefs, cause friction among the local people. Other labour related problems, such as dissatisfaction among women workers due to wage differences in male and female workers, employment of child labour and discrimination due to ethnicity and poverty in work opportunity, may be prevalent at the construction site.

110. **Mitigation:** The proponent constructing the facilities, or the owners of the facilities, while carrying out construction works need to be sensitive to labour related social environmental aspects – even though the Contractor of works is responsible for managing the workforce. Mitigation measures for avoiding labour related social environmental aspects include:

- Provide work opportunity to locally available labours, as a first priority
- Provide skilled, semi-skilled job trainings, if required, to local workers, and give opportunity to enhance work skills
- Apply labour-intensive work methods and avoid using heavy machinery, as far as practicable
- Ensure approved minimum wages for both male and female workers
- Avoid discrimination based on ethnicity and poverty on work opportunity. Provide work opportunity to poor and marginalized people, by appropriately advertising among possible work seekers
- If migrant workers are needed, alert and educate them on use of fire-wood, water, waste disposal and sanitation measures. Also educate them of local cultural practices, etc. and importance of maintaining social harmony
- Enforce strict rules to control alcoholism, prostitution and vandalism
- Hire workers based on established criteria
- Avoid child labor at any stage of project implementation

## **2. During Operation of Agribusiness Facilities**

111. The types of agribusiness development facilities as representative models have been identified. Some of these facilities have a processing unit to produce value added products. The operation of these processing units needs to be environmentally sound and the agribusiness proponent is required to ensure it accordingly. The following agribusinesses have processing units:

- MAPs Collection and Processing Centre – for mainly primary processing - washing, cleaning, drying, volume reduction, and distillation to extract oil from some MAPs
- Wool Collection and Primary Processing Centre – for collection of sheep wool and scouring, cleaning, drying and bailing
- Yak Cheese Processing Centre – for production of cheese from local yak milk and maturing, storing and packaging
- Apple and Fruit Processing Centre – for processing fruits (apple, apricot, peach, seabuckthorn) into jam, jelly, juice, wine and cider and bottling and packaging them

- Slaughterhouse – for supplying fresh meat to local consumers

112. These processing units will require fuels, water, chemicals etc. and may have issues relating to waste disposal and other environmental implications, which are discussed in the following paragraphs.

113. **Firewood Use:** The proposed processing units, such as for MAPs, fruits, cheese and wool, requires heating requirements. Constraints in road transport services leads to unavailability of petro-chemical fuels and relying on firewood becomes inevitable. Owing to large consumption of firewood by these newly established processing centres, they will add to the rate of depletion of forest areas. It is estimated that 100 kg of firewood is consumed for operation of one unit of steam distillation unit of 25T capacity for one cycle of operation in two days for extraction of essential oil from *jatamasi*. The problem of use of firewood for operating processing units will be greatly reduced if operational roads transport coal or petro-chemical fuels to replace firewood.

114. **Mitigation:** Complete mitigation of firewood related problem would be possible by converting the units into non-firewood using system. If non-use of firewood is not possible at present, its effects can be minimized. Mitigative measures for firewood related environmental aspects include:

- Ensure construction of scientifically designed, fuel efficient processing unit
- Construction dual-function heating for easy conversion of firewood system to non-firewood system
- Strict prohibition to buy firewood from unauthorized wood sellers to avoid collection of firewood in an unsustainable, illegal manner
- Ensure supply of required quantities of firewood from approved sources
- Concerned forest authorities (DOF, DFO) to regulate tree felling for firewood and regularly conduct campaigns for tree plantation and conservation of planted trees
- Establish tree sapling growing nurseries and distribute saplings to CFUGs, NGOs, and apply appropriate methods for its conservation
- Action plans to collect firewood (from where, how much, what kind) from government and or community forests by concerned agencies (CFUGs, DFO)
- Strictly prohibit felling of immature, small girth strands
- Enforce Forest Acts and Regulations to discourage unsustainable collection of firewood

115. **Water Use:** Processing units use water for washing, cleaning, distilling purposes. Potable water is generally scarce in most rural localities and regular public supply is either non-existent or very limited. Large quantities of water needed for processing units may cause pressure on the limited water available for public use – causing disharmony between the local people and processing unit operators.

116. **Mitigation:** The agribusiness proponents and owners shall identify water sources and ensure sufficient supply for operating their facilities without causing pressure on local public use. Mitigation measures include:

- Ensure construction of scientifically designed processing unit where water loss is minimized, and reuse of water is possible
- Identify water sources from local streams, from where collection of water does not affect downstream water users
- Potable water is to be used only where necessary. Clean potable water should not be used for MAPs cleaning, facility cleaning etc.

117. **Waste water:** Waste water disposal, if not managed properly by the unit operators, may create environmental and social problems. If the effluents from processing units are directly discharged into nearby water bodies, especially chemicals containing

effluents, then downstream water users, animals and aqua creatures suffer adverse effects.

118. **Mitigation:** Mitigation measures include:

- Ensure effluents containing chemicals are not directly discharged into water bodies. Suitable pre-treatment / detoxification prior to discharge shall be done
- All effluents must meet acceptable effluent standards as per existing Regulations.
- Where drainage facilities are not present, deep soil drainage system shall be followed in specific cases that are not likely to pollute ground water and soil.

119. **Chemical hazards:** Various chemicals are used in fruit and milk processing units, wool washing units, seed processing units and laboratories. Breed seeds, especially seed potato, needs to be treated with health hazardous chemicals in considerable quantities. Pesticides are used in crops, vegetable, and fruits. Handling, transportation and application of chemicals needs high levels of precautions to avoid them from exposing into surrounding air and water environment, causing health hazards to humans as well as livestock and fisheries.

120. Likely adverse impacts related to use of chemicals include;

- Possible entrance of chemicals and pesticide into human food chain
- Possible increase of chemicals and pesticide residues in products
- Contamination of vegetable and crops due to use of hazardous pesticides
- Loss of soil organisms, non-targeted beneficial insects and aquatic life due to toxic effects of chemicals and pesticides
- Increasing chemical resistivity by crops and plants requiring higher doses in future

121. **Mitigation:** It becomes a major responsibility for agribusiness proponent to ensure full health safety from their produce. All applicable rules and regulations on food safety shall be strictly complied at all levels. Mitigation measures for avoiding chemical hazards include:

- Ensure effluents containing chemicals are not directly discharged into water bodies. Suitable pre-treatment / detoxification shall be done to bring the effluents to acceptable levels prior to disposal
- Use only registered chemicals from legally approved sources
- Promote non-chemical, biocides / organic methods of pest, disease control in fruit and vegetable farming
- Avoid uncontrolled surface runoff of water containing pesticides and fertilizers from fields
- Laboratory generated hazardous wastes shall be properly treated (by incineration) and destroyed before its disposal. Regulatory measures shall be complied.

122. **Solid Waste Management:** Management of solid wastes from processing units are also important. Wastes of organic natures from fruit, vegetable, NTFPs, MAPs are decomposable and are less problematic than inorganic wastes such as unusable bottles, cans, packaging materials. Non-decomposable and incombustible wastes cause greater environmental risks. In case of wastes from slaughterhouse - hides, carcass, bones, horns, hoofs, internal organs, gastrointestinal contents will cause foul odor and unhygienic conditions if not properly managed immediately.

123. **Mitigation:** Mitigation measures for solid waste management includes;

- Aim at reducing solid wastes at source
- Mandatory separation of organic and non-organic wastes at source
- Apply bio-decomposition methods of organic waste within site
- Recycle non-degradable wastes as far as possible, incinerate safely combustible wastes



- Prohibit total disposal along river banks. If landfill site is available, follow all rules and regulations to use them, without causing environmental impacts
- Waste from Slaughterhouse need to be handled separately – making use of gastrointestinal contents for biogas production – and incinerating otherwise unused parts

## Biological Impacts

124. **Collection and supply of MAPs for processing units:** In addition to agribusinesses based on cultivated fruits and vegetables, the HIMALI project intends to promote value chains in MAPs. At present, the value addition through processing of raw MAPs at local level is only a small fraction of the potential one and export in raw form is the common practice. The project has conceived providing grants to establish facilities for collection and primary processing of MAPs within the district for value addition. As a result of establishing processing facilities, within easier access to the local collectors, it is projected that increased collection of wild raw MAPs will result. Increased collecting of wild MAPs will evidently have long term environmental implications, if collection exceeds levels of sustainable yields, including inappropriate collection methods and timing.

125. Likely adverse impacts related to over harvesting, wrong timing and wrong methods of collection of wild MAPs include;

- Gradual loss or diminishing of natural regenerative capacities
- Spreading of invasive and resilient species and gradually displacing natural MAPs
- Fear of total disappearance of some species having inherently small population in nature (e.g. *Podophyllum hexandrum*)
- Species depletion due to selective harvest and habitat deterioration (e.g. Kutki – *Neopicrorhiza scrophulariiflora*),

126. **Mitigation:** Sustainable collection of wild MAPs is a challenge in the present context. Enforcement of strict regulations on collection, along with extensive education to locals on the long term impacts of over harvesting, and develop programs to advice and assist in developing alternative sources of livelihood for those collectors who have made wild collection their one source of livelihood. A carefully designed action-plan within a legal framework for management of MAPs for its sustainable use is deemed urgently necessary. Mitigation measures for sustainable collection of MAPs include:

- MAPs to be collected only when they are matured and already have shed their seeds
- Prohibit 100% collection – recommend safe proportions of harvest, e.g. leave not less than 20% of plant population in case of *jatamasi* and *kutki* rhizomes
- Prohibit harvesting each season – recommend rotational cycle to be maintained, e.g. 5 years for *jatamasi* and 3 to 5 years for *kutki* rhizomes
- Encourage domestication of MAPs, cultivating in ecologically suitable habitats and soil conditions – mandatory contract cultivation to be enforced by agribusiness proponent – on a percentage basis of the collection.
- Agribusiness Collection centres shall maintain a mapped database of type, volume, harvest months, area etc. for source identification and to workout a basis for providing collection guidelines to collectors – if over harvesting is noticed from a certain area, non-buying of such material to discourage collectors and to encourage them to follow centre's collection guidelines
- Agribusiness centres shall provide extensive trainings on collection technique, timing and ways to avoid destruction, to local collectors and traders

127. **Pasture land preservation:** In highland areas, where livestock rearing is a means of livelihood, the phenomenon of diminishing of productive pasture land in higher altitudes is a major problem. Climatic reasons such as reduced snowfall resulting in moisture deficiency and less grass production and short-growing season, infertile soil and

degraded lands, ingress of weeds, uncontrolled over grazing resulting in suppression and loss of preferred species, livestock trampling resulting in soil compaction and degradation, causes imbalance in resource use and livestock demand, and shall produce ecological problems resulting in greater threats to the sustainability of livestock based mountain livelihood. The project's objective of increasing production of quality wool from increased numbers of sheep flocks is likely to be affected by reduction of productive pasture land.

128. **Mitigation:** Mitigation measures mainly include management of rangelands and forage development programs, including:

- Introduction of an appropriate sustainable range management practices, for specific conditions. Transhumant/nomadic flock grazing management needs to be scientifically studied in order to generate appropriate management practices to reduce overgrazing in the lower pasture areas.
- Use of appropriate pasture/range species with high rates of adaptation.
- Develop appropriate technologies for forage development and establish improved forages and hay meadow, support seed production of forages, identify high altitude pasture species

129. **Loss of Biodiversity:** The loss in biodiversity of the high mountain regions has been mainly due to habitat losses which in turn are due to deforestation, overexploitation of natural resources and human settlements/encroachments, habitat destruction and fragmentation, forest fires (which affect regeneration) and natural calamities. Other human factors include over collection of medicinal and aromatic plants (MAPs) by indiscriminate methods and poaching and illegal trade of wildlife. Excessive grazing of pasturelands causes depletion of the scarce forage for wildlife, habitat degradation, reduction in the breeding performance of both wildlife and domestic stock.

130. Efforts to minimize loss of biodiversity have been made by designating protected areas such as national parks and conservation areas. The ten HIMALI project districts contain five national parks and one conservation area<sup>4</sup>. The Annapurna Conservation Area, the largest protected area, is more effectively managed by National Trust of Nature Conservation (NTNC) than other national parks are managed by Department of National Parks and Wildlife Conservation, in achieving environmental conservation and socio-economic development, through people's participation. Strict regulations on environmental conservation and use of natural resources have been enforced within ACAP region, which has been considered exemplary.

131. The HIMALI project's agribusiness activities are likely to cause pressure on biodiversity on high mountain natural forests areas – especially when increased collection of MAPs, timber, grazing practices is performed. These increased human activities are like to cause pressure on many endemic species of flora and fauna for which appropriate measures are to be adopted.

132. **Mitigation:** Activities that most likely have repercussions on loss of biodiversity need to be critically planned and administered. Precautions need to be taken to avoid triggering of chain of impacts causing biodiversity loss. Some mitigation measures include:

- Strict security checks at protected areas' check points
- Controlled entry, controlled collection
- Providing education to local collectors on endangered flora and fauna, education on methods of conservation of endangered species

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<sup>4</sup> Shey Phuksundo NP (Mugu, Doplá), Rara NP ( Mugu), Sagarmatha NP (Solukhumbu), Makalu Barun NP (Sankhuwasabha), Langtang NP (Rasuwa), and Annapurna Conservation Area (Mustang and Manag)

- Special arrangements on MAPs collection by agribusinesses – implementation of codes of conduct

### **3. Benefits after Project Implementation**

133. The proposed project addresses livelihoods in high mountain areas through development of on-farm production and agribusinesses, in the context of relevant value chains, promoting productive private sector investments and public sector infrastructure and services. The major benefits of the whole project are the quantified economic and financial / poverty reduction benefits. The quantified benefits for different stakeholders are projected to be:

- economic returns to the country, through the EIRR of 17.1% for the whole project;
- financial returns to the investor/owners, through FIRR averaging 25% for primary production and 18% for marketing and processing agribusinesses, generating annual profits of some \$3.8m - 18% of sales revenue;
- poverty reduction and enhanced livelihoods for off-farm and on-farm labourers in the project communities, of whom many are poor, through new annual labour income streams of some \$6.1m - 34% of sales revenue;
- poverty reduction and enhanced livelihoods for agriculture and livestock farmers, many of whom are poor, through the increased annual demand for their products of some \$4.6m - 26% of sales revenue.

134. The increased incomes of individuals in the project area will result in improved standards of living and quality of life in such terms as better housing, health and education standards.

135. The Mountain Agribusiness Development (Component 1) will have indirect and non-quantifiable benefits in terms of improved environmental sustainability of livestock and agriculture activities, including in terms of the capacity to respond to long term climate change impacts. This is expected to include increased sustainability of rangeland and forest management, such as through improved MAPS wild harvest management and domestication of MAPS primary production.

136. The Value Chain Capacity Development (Component 2), will contribute directly to the quantified benefits - particularly the farmer training programmes. These include improvements to District Service Offices and MOAC stations and training for project related MOAC staff. It is intended that these should improve the provision of public services to communities in the project areas as this could have significant and quantifiable benefits.

## **V. ALTERNATIVE ANALYSIS**

137. The project envisages improving sustainable livelihood options through increased volume and value of high value products of selected communities in high mountain areas. Mountain Agribusiness Development component is primarily demand-driven and at present only representative agribusiness models have been identified. The exact type, size, number, and locations at each district will be determined later after agribusiness grant finalization, thus analysis of possible alternatives are to be carried at that stage. While selecting location, methods, and material use for facilities construction, due considerations for long term environmental soundness need to be analyzed.

## **VI. INSTITUTIONAL REQUIREMENTS**

### **A. Institutional Requirements**

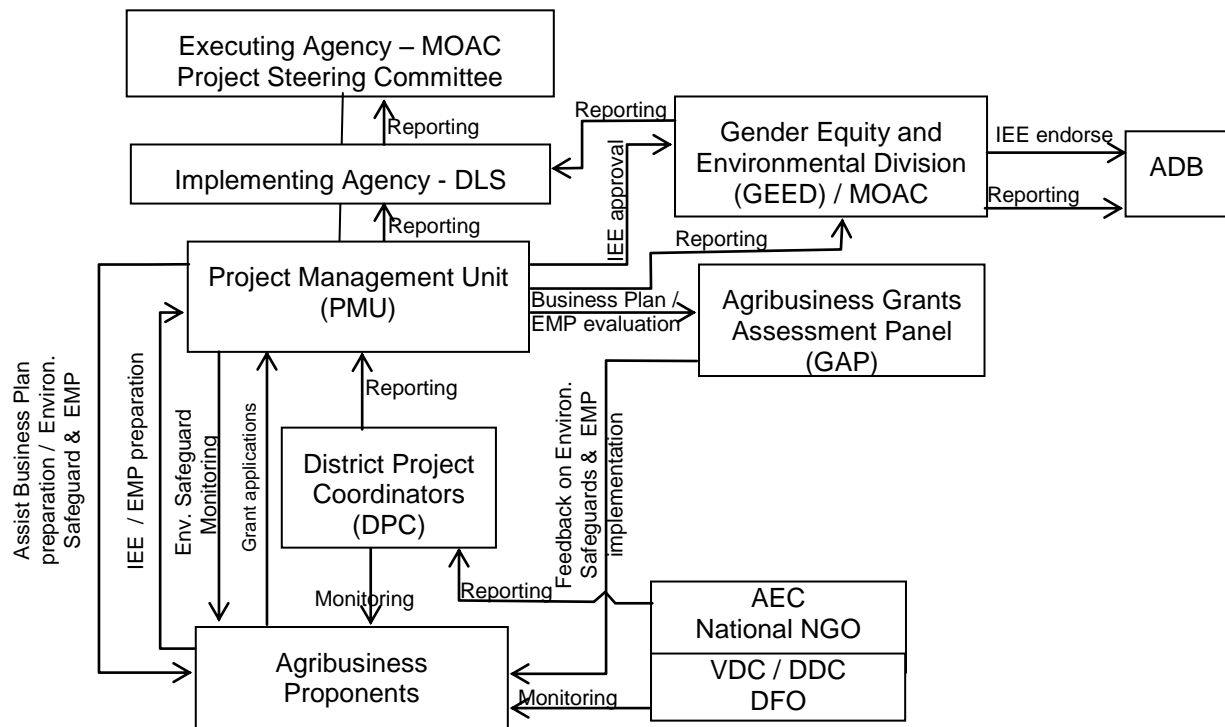
138. According to GON environmental regulatory provision, the concerned body shall monitor and evaluate the implementation of the project on environment. At the national level, Ministry of Agriculture and Cooperatives (MOAC) has been established as the Executive Agency (EA) to oversee the preparation and implementation of the overall project. The implementing agency (IA) will be the Department of Livestock Services (DLS) and is responsible for overall project management and coordination in collaboration with the Department of Agriculture (DOA). MOAC will establish a project management unit (PMU) which will be the sole organisation for monitoring activities of the project, which will get support from monitoring and evaluation units of MOAC and its departments.

139. The MOAC has a Gender Equity and Environmental Division (GEED), which is mandated with the overall environmental responsibility of the Ministry. The GEED/MOAC is mandated to approve the Terms of Reference (TOR) and IEEs of subprojects that will be implemented by the HIMALI project. The individual agribusiness proponents will have the responsibility of conducting the IEE preparation of Final report and submission to the PMU, which will approve them or advice the proponents on all other discrepancies on IEE or EIA process.

140. The PMU will compile all the implementation reports and will be responsible for performance monitoring. The other organizations involved at the district level, in monitoring will be District Project Coordinator (DPC) attached to AEC and national NGO. The DPC will compile data, document and send to PMU for further analysis and reporting. The local NGO could be contracted for baseline survey.

141. The agribusiness proponents will be primarily responsible for implementation of activities and compliance with mitigation measures and codes of practices as mentioned in the business proposal and EMP approved by the Grant Assessment Panel. Supports from PMU in aspects related to IEE /EIA or other technical matters can be received and the environmental safeguard specialist from the Grant Assessment Panel can provide feedbacks on methods to be employed on environmental safeguards to the agribusiness proponents. The PMU will also develop reporting formats for the proponents, where they can also discuss their difficulties and their approach to finding amicable solutions.

**Fig. 1 Institutional arrangements for EMP implementation monitoring and reporting**



**B. Monitoring Plan**

142. Environmental Monitoring Plan includes description of types of monitoring, parameters to be monitored, and methods to be used and schedules for operating monitoring activities to ensure implementation of mitigation measures. Monitoring also provides project authorities to evaluate environmental management so that changes can be made as and when required to ensure continuous improvement to the entire process.

143. Monitoring activities for the project are to be divided in three types: (i) Pre-Construction - Agribusiness planning phase; (ii) Construction Phase Monitoring and (iii) Agribusinesses Operational Phase Monitoring.

144. **Pre-Construction - Agribusiness planning phase:** The planning stage of agribusinesses under component 1, includes preparation of an implementable environment management plan (EMP), while preparing the business plan. Ensuring that mitigation measures are proposed in the EMP is the first important step towards conducting an agribusiness in an environmentally friendly manner. Thus monitoring to ensure that business plans are accompanied with an commitment from the proponent to implement necessary mitigation measures is essential. Monitoring at planning phase is primarily done by project management unit (PMU), district project coordinator (DPC), AEC and national NGOs, while the agribusiness proposal is been accessed. These agencies will assist the proponent of agribusinesses in preparing the EMP for the proposal.

145. Priority monitoring issues and the responsible monitoring agencies for the pre-construction – agribusiness planning phase is as follows:

<b>Monitoring issues</b>	<b>Monitoring agency</b>
Review agribusiness plan, REA checklist, and verify requirements for IEE as per current rules	NGO / AEC
Verify that all government permits and approvals are received prior to commencement of construction	NGO / AEC, DPC
Assess issues identified in the agribusiness EMP and confirm that agribusiness plan and design has considered the recommendation made by IEE study. Ensure mitigation recommendations relevant to the Contractor's responsibility are incorporated in the tender specifications	NGO / AEC, DPC, PMU, GAP
Assess level of preparation for implementing mitigation measures. Verify that land, property and crop and livestock disturbance compensation have been made, if required for establishment of agribusiness facility	NGO / AEC, DPC
Review information on the type of materials to be used, material collection site and methodology, design for drainage management, disposal of excess construction materials	NGO / AEC, DPC, PMU
Collection of baseline information on sensitive areas, including protected areas, community forests, settlements and unstable areas;	PMU, DOF, DFO
Survey and documentation of existing wild MAPs collection volume and practices	PMU, DOF, DFO

146. **Constructional phase of agribusiness facilities:** Monitoring at this stage of project is primarily focused on construction and management practices to check compliance with the best practices, norms, and standards and on implementation of the mitigation measures prescribed by EA.

147. Monitoring activities at this stage focus on:

<b>Monitoring issues</b>	<b>Monitoring agency</b>
Verifying that construction materials (stone, gravel, sand, timber etc.) have been obtained by employing environmentally friendly methods and as specified and mitigation measures are implemented as specified in the EMP	Concerned VDC, DDC, DPC
Ensuring that construction methods do not affect surrounding environment and people in a negative manner	Concerned VDC, DDC, DPC
Verifying that disposal of spoil and construction wastes are done properly as specified in the EMP	Concerned VDC, DDC, DPC
Ensuring that locals are given priority for labour employment and LEP approach is employed. Also ensuring that occupational health and safety standards are met	DPC
Verifying that ample care is taken against disruption of community infrastructures and private properties, if any	Concerned VDC, DDC, DPC

148. **Agribusinesses Operation phases :** Monitoring at the operation period will focus on running the business without causing unsustainable pressures to environmental receptors and their impacts on receiving environment. The agribusiness proponent or developer will have the primary responsibility for operation phase monitoring and implement prescribed mitigation and enhancement measures.

149. Monitoring activities at this stage focus on:

<b>Monitoring issues</b>	<b>Monitoring agency</b>
Ensuring that requirement (mainly firewood) is obtained in a sustainable manner, and reforestation is widely practiced	DPC, PMU, DFO
Obtaining wild MAPs in sustainable manner so that over-harvesting is checked and natural regenerative state is maintained	DPC, PMU, DFO, ICIMOD
Solid wastes and waste water from processing units are properly managed and does not create adverse impacts to the surrounding environment	PMU, DDC
Ensuring that no public health and sanitation concerns are prevalent	PMU, DDC

## **VII. ENVIRONMENTAL MANAGEMENT PLAN (EMP)**

150. Environmental Management Plan (EMP) sets forth a plan for mitigation, monitoring, and institutional measures to be taken during implementation and operation to eliminate or reduce potentially adverse environmental impacts to acceptable levels. The EMP provides information about key environmental aspects, particularly the environmental impacts of the project and the effectiveness of mitigation measures. Such information enables the monitoring agency to evaluate the success of mitigation as part of project supervision, and when needed suggests corrective actions. Therefore, the EMP identifies monitoring objectives and specifies the type of monitoring, with linkages to the impacts assessed in the EA report.

151. An EMP (Table 3) has been prepared for activities associated with the project. The EMP mainly includes :

- environmental risks and issues to be addressed and their environmental indicators
- mitigation measures that shall be implemented to avoid or mitigate adverse environmental impacts
- activities to be performed by monitoring agency to attain mitigation measures that has been suggested
- monitoring requirements (methods, schedules and location), and
- responsible implementing and monitoring agencies

152. The purpose of this EMP is, broadly as:

- a guideline for PMU, at the proposal assessment stage, prior to final grant approval, to check whether the agribusiness proponents have completely drawn up an EMP for their business, in line with the mitigation measures proposed herein, both for construction and operation stages
- a guideline for PMU for making sure that the agribusiness proponent complies to the mitigation measures proposed through its EMP, by obtaining documentary evidences, committal statements, plans etc. from the proponent
- a guide to methods of monitoring of the mitigation proposed by the proponent, its schedule
- indicate the primary responsible agency who is required to carry out the proposed mitigation plans, and
- indicate overall responsible agency for monitoring the mitigation actions taken by the proponent

**Table 3. Environmental Management Plan (EMP) for HIMALI project**

Environmental Risks	Indicators	Mitigation Measures	Methods to attain mitigation measures	Methods of monitoring	Monitoring schedule, location	Responsible implementing agency	Responsible monitoring agency <sup>5, 6</sup>
<b>1. Construction Stage</b>							
Extraction of construction materials (stone, gravel, sand)	Visible landscape damage, loss of vegetation cover, damage to water sources, downstream littering, dangers to passer-bys	Avoid stone quarrying in known sensitive hazard prone, landslide prone areas; Avoid opening of unnecessarily large areas; Conserve and store top soil, to be used for resurfacing after closing quarry site; Avoid soil and debris wash out by suitably constructing catch drains. Avoid excavating during rainy seasons; Appropriately close quarry, with reapplication of top soil, bio-engineering with grass seeds and saplings, and tree plantation so that natural generation can occur.	<ul style="list-style-type: none"> <li>• Require EMP to mitigate direct, indirect impacts</li> <li>• Commitment to decommission of quarries after completion of extraction</li> <li>• Order halting of quarrying and investigate if locals lodge complaints</li> </ul>	<ul style="list-style-type: none"> <li>• Site inspection on extraction methods</li> <li>• Observation on other impacts not mentioned in EMP, if any</li> <li>• Conduct investigation if any complaints are lodged</li> </ul>	<ul style="list-style-type: none"> <li>• Once before operation</li> <li>• Randomly during extraction period</li> <li>• After extraction complete and upon decommissioning</li> <li>• One year after decommissioning for checking natural growth</li> </ul>	<ul style="list-style-type: none"> <li>• Agribusiness proponent company</li> <li>• Quarry Operator</li> <li>• Contractor of works</li> </ul>	<ul style="list-style-type: none"> <li>• NGO / AEC</li> <li>• DPC</li> <li>• PMU</li> <li>• DDC</li> </ul>
Extraction of construction material (timber)	Deforestation, rise in illegal smuggling of timber, destruction of forest biodiversity, triggering of landslides, soil erosion, wildlife habitat loss	Avoid cutting of immature, small girth strands; Avoid cutting from steep, slopped areas, and already thin forest area; Avoid cutting from rich areas of NTFPs and MAPs; Minimize loss by providing sawing, milling facilities; Re-plantation of locally adapting tree saplings – through the initiative of local District Forest Office (DFO). Establish nurseries, locate land for compensatory re-plantation	<ul style="list-style-type: none"> <li>• Mention legal procedures of obtaining timber, evidence of consent to sell timber from legal agency (e.g. DOF, DFO)</li> <li>• Strict prohibition of felling of immature trees and disturbances to other flora and biodiversity</li> <li>• Re-plantation plans</li> <li>• Commitments not to demand/buy more timber than needed and not to use timber for other purposes</li> </ul>	<ul style="list-style-type: none"> <li>• Site inspection of forest, type of trees felled, effects to surrounding biodiversity</li> <li>• Verify with DOF, DFO</li> <li>• Verify legal transactions</li> <li>• Verify re-plantation</li> </ul>	<ul style="list-style-type: none"> <li>• Once before felling at proposed felling forest site</li> <li>• Randomly during felling period</li> <li>• After felling complete and on re-plantation</li> <li>• One year after re-plantation for checking natural growth</li> </ul>	<ul style="list-style-type: none"> <li>• Agribusiness proponent company</li> <li>• Timber selling agency (e.g. DOF, DFO)</li> <li>• Contractor of works</li> </ul>	<ul style="list-style-type: none"> <li>• NGO / AEC</li> <li>• DPC</li> <li>• PMU</li> <li>• DOF, DFO</li> <li>• DDC</li> </ul>
Social problems due to construction labour	Social disharmony,	Provide work opportunity to local labours; Provide skilled, semi-skilled	<ul style="list-style-type: none"> <li>• Minimum of 50% local labours requirement</li> </ul>	<ul style="list-style-type: none"> <li>• Inspection of construction site</li> </ul>	<ul style="list-style-type: none"> <li>• Initial stages of construction at</li> </ul>	<ul style="list-style-type: none"> <li>• Agribusiness proponent company</li> </ul>	<ul style="list-style-type: none"> <li>• NGO</li> <li>• DPC</li> </ul>

<sup>5</sup> NGO = non governmental organization hired to facilitate private sectors on application requisites and oversee implementation ; AEC = agro-enterprise service center; PMU = project management unit; DPC= district project coordinator; DOF = Department of Forest; DFO = District Forest Office; DDC = District Development Committee; DNPWC = Department of National Parks and Wildlife Conservation; ACAP = Annapurna Conservation Area Project

<sup>6</sup> Local NGO, AEC, DPC, PMU will have field presence only up to project period, after which, monitoring responsibility will lie with Government Agencies



Environmental Risks	Indicators	Mitigation Measures	Methods to attain mitigation measures	Methods of monitoring	Monitoring schedule, location	Responsible implementing agency	Responsible monitoring agency <sup>5,6</sup>
work force	excessive pollution due to outside workers, Social grievances due to unequal work opportunity and wages, unacceptability of project activities	trainings, if required, to local workers; Ensure approved minimum wages for both male and female workers; Apply labour-intensive work methods, as far as practicable; Avoid discrimination based on ethnicity and poverty on work opportunity. Provide work opportunity to poor and marginalized people; For migrant workers aware and educate them on use of firewood, water, waste disposal and sanitation measures and local cultural practices.	<ul style="list-style-type: none"> <li>• Minimum wage rates to be provided</li> <li>• Plans to including poor and underprivileged workers</li> <li>• Commitment to follow LEP approach</li> <li>• Commitment to prohibit child labour</li> <li>• Commitment for occupational safety, accident insurance</li> <li>• Plans for labour camps and its facilities</li> <li>• Plans for Job training opportunities</li> </ul>	<ul style="list-style-type: none"> <li>• on labour composition, wage rates</li> <li>• Inspection on Job trainings, skills enhancement</li> <li>• Inspection on labour facilities, sanitary conditions</li> <li>• Interview local people about labour related disturbances</li> </ul>	<ul style="list-style-type: none"> <li>• construction site</li> <li>• Randomly during construction progress</li> </ul>	<ul style="list-style-type: none"> <li>• Contractor of works</li> </ul>	<ul style="list-style-type: none"> <li>• PMU</li> </ul>
Management of construction spoil, debris disposal	Unaesthetic disposal and pollution hazards	Prohibit disposal of debris and spoil into nearby streams, rivers or open space; find natural depression, quarry site – where environmental impacts are minimal; receive prior approval from concerned agencies for disposal	<ul style="list-style-type: none"> <li>• Plans for safe disposal of construction wastes</li> <li>• Application of top soil, for bio-engineering with grass seeds and saplings</li> </ul>	<ul style="list-style-type: none"> <li>• Inspect disposal methods at disposal site</li> </ul>	<ul style="list-style-type: none"> <li>• After disposal complete at disposal sites</li> </ul>	<ul style="list-style-type: none"> <li>• Agribusiness proponent company</li> <li>• Contractor of works</li> </ul>	<ul style="list-style-type: none"> <li>• NGO</li> <li>• DPC</li> <li>• PMU</li> </ul>
<b>2. Agribusinesses Operation Stage</b>							
Use of firewood for processing units (heating boilers, steam distillation units)	Rise in deforestation, rise in illegal smuggling of firewood, destruction of forest biodiversity, triggering of landslides, soil erosion, wildlife habitat loss	Buy firewood from approved sources only; DOF, DFO, CFUGs to regulate tree felling for firewood; Establish tree sapling growing nurseries and distribute saplings to CFUGs, NGOs, and apply appropriate methods for its conservation; Action plans to collect firewood supply (from where, how much, what kind); Strictly prohibit felling of immature, small girth strands	<ul style="list-style-type: none"> <li>• Indicate daily firewood consumption quantity</li> <li>• Plan of buying firewood from legal sellers</li> <li>• Commitment of non-buying of firewood from unauthorized local sellers</li> <li>• Commitment to switch to LPG when locally available</li> </ul>	<ul style="list-style-type: none"> <li>• Verify with agency where firewood is bought</li> <li>• Verify on illegal transactions of firewood</li> <li>• Observation at processing site</li> </ul>	<ul style="list-style-type: none"> <li>• Randomly during operation of processing unit, 4 times annually</li> </ul>	<ul style="list-style-type: none"> <li>• Agribusiness proponent company</li> </ul>	<ul style="list-style-type: none"> <li>• NGO / AEC</li> <li>• DPC</li> <li>• PMU</li> <li>• DOF, DFO</li> <li>• DDC</li> </ul>
Excessive water requirements for processing units	Pressure on public water supply, disharmony	Construct processing unit where water loss is minimized, and reuse of water is possible; Identify water	<ul style="list-style-type: none"> <li>• Identify water sources</li> <li>• Evidence that other water users are not affected by</li> </ul>	<ul style="list-style-type: none"> <li>• Observation, inspection at processing site</li> </ul>	<ul style="list-style-type: none"> <li>• Randomly during operation of processing unit, 4</li> </ul>	<ul style="list-style-type: none"> <li>• Agribusiness proponent company</li> </ul>	<ul style="list-style-type: none"> <li>• NGO / AEC</li> <li>• DPC</li> <li>• PMU</li> </ul>

Environmental Risks	Indicators	Mitigation Measures	Methods to attain mitigation measures	Methods of monitoring	Monitoring schedule, location	Responsible implementing agency	Responsible monitoring agency <sup>5,6</sup>
(in cleaning, boilers, distillation, wool washing)	among local people and operators due to water sharing issues	sources from local streams, from where collection of water does not affect downstream water users; potable water should not be used for MAPs cleaning, facility cleaning etc.	water collection • Evidence of government agency's approval for water use • Investigation upon complaints from local people	• Inspection at water sources • Discussions with surrounding local residents	times annually		• DDC
Excessive waste water production from processing units, after cleaning, washing	Pollution of water bodies, unhygienic conditions, long term effects due to chemically contaminated waste water	Ensure effluents containing chemicals are not directly discharged into water bodies; Suitable pre-treatment / detoxification prior to discharge shall be done; All effluents must meet acceptable effluent standards as per existing Regulations; where drainage facilities are not present, deep soil drainage system shall be followed in specific cases that are not likely to pollute ground water and soil.	• Indicate waste water quality – effluent chemical contents • Plan of pre-treatment prior to disposal into public sewer or nearby streams, water bodies • Evidence that other local people are not affected by waste water disposal • Evidence of government agency's approval for waste water disposal • Investigation upon complaints from local people	• Observation, inspection at processing site • Inspection of waste water discharge outlets • Discussions with surrounding local residents	• Randomly during operation of processing unit, 4 times annually	• Agribusiness proponent company	• NGO / AEC • DPC • PMU • DDC
Excessive production of solid wastes from processing units (both organic and inorganic like packaging materials)	Health hazards, foul odor, spread of communicable disease, pollution of water bodies	Aim at reducing solid wastes at source; apply bio-decomposition methods of organic waste within site; recycle non-degradable wastes; incinerate combustible wastes; prohibit total disposal along river banks; waste from Slaughterhouse need to be handled separately – making use of gastrointestinal contents for biogas production – and incinerating otherwise unused parts	• Quantify daily bio-degradable and non-degradable wastes • Plans for composting, incineration and recycling waste (biogas from slaughterhouse wastes) • Plans to reduce odor, non-effects to surrounding local people • Plans to manage wastes from slaughterhouse	• Observation, inspection at processing site • Inspection of solid waste disposal methods • Discussions with surrounding local residents	• Randomly during operation of processing unit, 4 times annually	• Agribusiness proponent company	• NGO / AEC • DPC • PMU • DDC
Production of chemically contaminated wastes from food processing and wool processing units	Long term health hazards, pollution of water bodies, effects to aqua culture	Ensure effluents containing chemicals are not directly discharged into water bodies; suitable pre-treatment / detoxification prior to discharge shall be done; use only registered / non-systemic chemicals	• Indicate volume and type of chemical waste • Commitment to use only legal chemicals (especially for food industry – chemicals, color, preservatives etc.)	• Observation, inspection at processing site • Inspection of effluent quality test reports	• Randomly during operation of processing unit, 4 times annually	• Agribusiness proponent company • Research Lab operators	• NGO / AEC • DPC • PMU • DDC

Environmental Risks	Indicators	Mitigation Measures	Methods to attain mitigation measures	Methods of monitoring	Monitoring schedule, location	Responsible implementing agency	Responsible monitoring agency <sup>5,6</sup>
		from legally approved sources; promote non-chemical, biocides / organic methods of pest, disease control in fruit and vegetable farming; avoid uncontrolled surface runoff of water containing pesticides and fertilizers from fields; laboratory generated hazardous wastes shall be properly treated (by incineration) and destroyed before its disposal. Follow regulatory measures.	<ul style="list-style-type: none"> <li>Plans to separate chemical waste from non-chemicals, neutralize and detoxify</li> <li>Safe disposal methods – safe incineration, underground application</li> <li>Commitment to prohibit contamination of water bodies</li> <li>Tests of effluents</li> <li>Investigation of complaints from local people</li> </ul>	<ul style="list-style-type: none"> <li>Discussions with surrounding local residents</li> </ul>			
Unsustainable collection of wild MAPs	Year-on depletion of wild MAPs, extinction of rare species, increase in number of collectors	MAPs to be collected only when they are matured and already have shed their seeds; prohibit 100% collection – safe proportions of harvest; prohibit harvesting each season, rotational cycle; cultivate MAPs in suitable habitats; maintain a mapped database of type, volume, harvest months, area etc. for source identification and for collection guidelines to collectors; provide training on collection technique, timing and ways to avoid destruction, to local collectors and traders	<ul style="list-style-type: none"> <li>Commitment to encourage only sustainable harvesting methods</li> <li>Buy only from collectors who follow sustainable collection guidelines and those following existing collection rules and regulation</li> <li>Maintain traceability and database of sources – to issue collection guidelines</li> <li>train collectors on sustainable collection methods</li> </ul>	<ul style="list-style-type: none"> <li>Site inspection of collection areas, effects to surrounding biodiversity</li> <li>Verify with DOF, DFO on MAPs buying</li> <li>Verify harvesting, quantities and timing</li> <li>Verify training, cultivation</li> </ul>	<ul style="list-style-type: none"> <li>Random sampling at MAPs collection areas</li> <li>Randomly during collection season at Centre</li> </ul>	<ul style="list-style-type: none"> <li>Agribusiness proponent company</li> <li>DOF, DFO</li> </ul>	<ul style="list-style-type: none"> <li>NGO / AEC</li> <li>DPC</li> <li>DOF, DFO</li> <li>PMU</li> <li>DDC</li> </ul>

Pasture land preservation	Depletion of productive vegetative pasture area	Introduction of an appropriate sustainable range management practice; establish forage meadows, support seed production of forages, identify high altitude pasture species	<ul style="list-style-type: none"> <li>• implement community grazing action plans</li> <li>• Conduct training to herders on grazing management</li> </ul>	<ul style="list-style-type: none"> <li>• Observe management practices</li> <li>• Verify with NARC officials</li> <li>• Verify pasture land</li> <li>• Discussions with herders</li> </ul>	<ul style="list-style-type: none"> <li>• Every year during summer season, at different commonly used pasture land</li> </ul>	<ul style="list-style-type: none"> <li>• Agribusiness proponent company</li> <li>• NARC</li> </ul>	<ul style="list-style-type: none"> <li>• NGO / AEC</li> <li>• PMU</li> <li>• NARC</li> <li>• DDC</li> <li>• ICIMOD</li> </ul>
Impact on endangered flora and fauna of Conservation Area and National Park	Increased loss of endangered flora and fauna from PA forests	Strict security checks at check points; Controlled entry, controlled collection; Local education on endangered flora and fauna, education on methods of conservation of endangered species; Special arrangements on MAPs collection by agribusinesses – implementation of codes of conduct	<ul style="list-style-type: none"> <li>• Coordinate with Security agency (Nepal Army)</li> <li>• Oversee education program for collectors</li> <li>• Penalty to law breakers</li> <li>• Periodic study of status of endangered species</li> <li>• Complete entry prohibition in certain sensitive / risk areas</li> </ul>	<ul style="list-style-type: none"> <li>• Records on species collected</li> <li>• Interview with local collectors</li> <li>• Watch illegal transactions</li> </ul>	<ul style="list-style-type: none"> <li>• Throughout the year, especially in harvesting times, at entry exist points of PA, in coordination with Security Agency</li> </ul>	<ul style="list-style-type: none"> <li>• Security Agency (Nepal Army)</li> <li>• Police force</li> </ul>	<ul style="list-style-type: none"> <li>• DNPWC</li> <li>• ACAP</li> <li>• DOF, DFO</li> </ul>

## EMP Budget

### (a) Environmental Mitigation

153. Environmental mitigation costs for implementing EMPs are included in the project cost tables for Component 2 activities for rehabilitation of Government agricultural offices and stations. For Component 1, all private sector and community sub-projects financed by Agribusiness Grants, costs for implementing EMP must be included in each sub-project business plan, and thus must be included in the costs of these business development projects. All environmental mitigation is the responsibility of the proponent and is not separately financed or managed by the project.

154. For general, non-specific impacts, such as slope failures, landslides management, re-plantation, conservation awareness programs etc., management costs, are included, as indicative amounts, shown below:

**Table 4. Environmental Management Costs Estimate** (Indicative costs for 1 district)

Management Measures	Costs (NRs.)
<b>Physical Environment</b>	
Slope instability / landslide / soil erosion/ runoff management	500,000
Landscape management	800,000
<b>Biological Environment</b>	
Conservation awareness program	500,000
MAPs harvesting methods training	300,000
Re-plantation and protection of trees in areas of project sites are cleared	1,000,000
Safeguarding of endangered species of flora and fauna / Species conservation / habitat conservation	500,00

### (b) Environmental Monitoring

155. Environmental monitoring cost of sub-projects is covered by the PMU positions (Social and environmental safeguards specialist) and the district NGOs financed by the PMU, during project period, hence no additional costing is done. The monitoring of sub-projects is carried out in terms of compliance to terms and conditions of grants and compliance to EMP. Social and environmental safeguard specialist from the PMU will perform environmental monitoring works for the agribusiness that receive the grants under the project.

## VIII. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

156. Stakeholder participation was an integral part of the project design of the HIMALI project. Participatory consultations also formed an integral part of field assessment during IEE study. IEE process consultations were held with stakeholders and local people and prospective agribusiness proponents from Jumla, Mustang and Solukhumbu in July 2010. These interactions included informal interviews with local people (farmers, housewives, retailers, vendors, school teachers, roadside tea shop owners and other key informants) (Annex 4). Information on project's overall concept, possible environmental concerns, possible mitigation measures, social concerns, labour situations, proposed working modalities were discussed and feedbacks were solicited from the local people and private sectors. The local people freely discussed their problems on agriculture commercialization, value addition, environmental changes regarding climate change impacts.

157. A significant aspect of public consultations on environmental issues is that the local population is generally aware of the important local environmental problems and long term sustainability of the agribusinesses. They expressed their concerns on additional pressures on environment and natural resources (especially on firewood and water) that they depend on, due to establishments of agribusiness. Nonetheless, almost all respondents expressed support and approval of the HIMALI objectives in promoting agribusinesses.

158. As part of information disclosure, concept paper describing the project's objectives, availability of grants for agribusiness, eligible agribusinesses, eligibility criteria, modes of operation and other related information was circulated as preliminary information in the districts. Environmental safeguarding requirements and its necessity to abide by pertinent EMP were discussed in detail with the prospective proponents.

159. The PPTA team had participatory stakeholder consultations as one of the important tasks in project design and formulation. As part of the preparation task, during the inception work phase, completed in December 2009 to February 2010, stakeholder consultation workshops were held in three core study districts of Jumla, Mustang and Solukhumbu. Comprehensive series of stakeholder meetings and focus group discussions with concerned district line agencies from government, donor community, civil society, NGOs and private sector, including importantly farmers/producers, community groups and cooperatives and potential project beneficiaries were organized. In all a total of over 300 stakeholders were involved in the various deliberations. This ensured full participation of the stakeholders (horizontal and vertical) of the value chains for defining the status, constraints and options for niche product development.

160. In addition, it was considered essential that for each value chain identified, a workshop was convened with all the major stakeholders, public and private to discuss the characteristics of the niche products, identify opportunities and constraints and try to identify potential options. A series of product-based five one day stakeholder value chain workshops with private sector and specialists convened in Kathmandu at the end of February beginning of March 2010 on: (i) apple and off-season vegetables; (ii) seeds (potato & vegetables), (iii) MAP's (medicinal, aromatic and other NTFP's), (iv) dairy (yak cheese), and (v) wool (goat and sheep).

161. Two workshops were held to disseminate the information about the proposed project actions and learn from the participants their views on the project objectives and actions and to receive their feedback with a view to finding out their perceptions, needs, and expectations. The first Interim Report workshop was held in Kathmandu on 11 April, 2010. In the workshop, the Team Leader outlined the goals, objectives, project components, and the implementation phases and strategies of the HIMALI project and presented the PPTA's value chain assessments for the niche products for the 10 high mountain districts based on three core districts.

162. The second Draft Final Report workshop was held on 16 August, 2010 in Kathmandu which included the officials of the project implementing agency, representatives of potential NGOs who may be associated with the project. In the workshop, two plenary sessions were organized. In the first plenary session, the Team Leader presented the HIMALI project related findings and project descriptions suggested in the draft report, followed by open discussion among the participants. The second session was on participatory action research' component of the HIMALI PPTA (carried out by ICIMOD 2010-2012), on climate change adaptation and natural resources management for high mountain districts. This session too, was followed by open discussion by the participants.

## IX. FINDINGS AND RECOMMENDATIONS

163. The Initial Environmental Examination (IEE) assessed potential environmental impacts and mitigation plans for project activities during construction and operation of agribusiness facilities under Component 1 and 2 activities. Exact type, locations, scale and size of agribusinesses under Component 1 will be identified only after the proposals have been reviewed and finally accepted by the Grant Assessment Panel. At this stage, 13 representative agribusiness models have been identified, based on stakeholders' suggestions from Jumla, Mustang and Solukhumbu districts, and in addition, proposed rehabilitation of representative MOAC district services offices and five selected MOAC research stations has been identified under Component 2. Possible environmental issues and risks for other similar type of agribusinesses are expected to be similar in nature as for the identified representative models.

164. The IEE has revealed that the adverse environmental impacts are mostly of small magnitudes and localized for construction related impacts, and adverse impacts generated while agribusiness activities are in operation are of mitigable nature and magnitudes. Measures to mitigate potential adverse effects, methods of attaining these mitigation measures and monitoring and compliance schemes have been outlined in the report.

165. The project is classified as a Category B regarding environmental risks and further EIA is deemed not necessary. The proposed agribusinesses will be however subjected to individual IEE or environmental due diligence requirements, according to their size, nature, processes etc. as per the regulation stipulated in EPR, 1997 of GON and ADB guidelines.

166. Environmental risk from project activities is effectively limited to: (i) during facilities construction; and (ii) during business operation. During construction, obtaining construction materials (stone, gravel, sand, timber) in unsustainable manner may trigger landslides, loss of forest cover and vegetation, loss top soil and debris washout, damage to water sources and visible damage to landscape. Labor activities may also cause adverse impacts. Disposal of spoil and construction wastes must be managed properly. Similarly, potential for environmental impacts during agribusiness operations relates mostly to: (i) sustainable sourcing and use of inputs; and (ii) waste management. High demand for firewood fuel may trigger deforestation and other associated impacts, particularly at high altitudes where tree growth is slow. Yak cheese making is known to result in this impact if not managed. Water use must not restrict access by local people or conflict may surface. Management of waste water and effluents from processing units may cause environmental impacts and direct health implications.

167. The project requires an EMP to be submitted with all Agribusiness Grant applications to ensure that the proponents are aware of the environmental implications and its necessity to plan and incorporate mitigation measures into their business plans. These will be assessed by an environmental expert on the Grants Assessment Panel. The applicant will sign a Grant Agreement with the project, specifying the EMP must be fulfilled prior to full disbursement of the grant. Smaller sized proposals with less processing volumes will require environmental due diligence with EMPs with less technical details, whereas larger proposals must meet the Environment Protection Regulations 1997, requiring IEE and implementable mitigation plans and monitoring mechanisms, for construction and operation phases. In addition, GoN's regulations for environmental compliance shall be applicable and need for conducting IEE for each individual agribusiness proposal will be determined as per EPR, 1997 and ADB guidelines. Thus, agribusiness operators need to be fully aware of environmental

compliance requirements and managing and implementing environmental mitigation measures is their prime responsibility. Environmental soundness for agribusiness operations are a prerequisite for grant approvals and environmental compliance during business operation is mandatory.

168. Sustainable harvesting of wild MAPs is of prime importance and significance where communities from mountain districts commonly collect wild MAPs to supplement household incomes. Over harvesting, wrong timing and wrong methods of collection of wild MAPs have been observed which may lead to degradation and even species extinction over time. The HIMALI project assisting private businesses to establish MAPs collection and processing units will benefit the collectors but on the other hand, may also encourage excessive collection, thus activities need to address issues for managing sustainable and environmentally friendly modes of MAPs collection and value adding at local level. Activities such as domestication / cultivation of MAPs, regulating its collection, educating and training the collectors are recommended.

169. The HIMALI project shall also include activities that will improve mountain communities' resilience to climate change by supporting the implementation of rangeland and watershed management activities to improve climate change adaptation action plans<sup>7</sup>, and community forestry and rangeland group action plans for timber, grazing and medicinal plants collection<sup>8</sup>. Also training and awareness of sustainable grazing land management to herders; demonstration and adoption of fuel efficient yak cheese making units to reduce deforestation at high altitudes; training of fruit and vegetable farmers in sustainable and organic practices; and training and awareness of sustainable management of wild harvest MAPs resources; development and promotion of MAPs cultivation instead of wild harvest. The practice of habituating local people to think and act in an environmentally sensitive manner – especially in the use of natural resources, is important in high mountain districts as in other areas.

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<sup>7</sup> Outputs from the 'Participatory action research' component of the HIMALI PPTA (carried out by ICIMOD 2010-2012) climate change adapted natural resources management interventions will be tested and demonstrated. If found successful, the examples of better land use and water management practices is planned to be upscaled under the ensuing grant/loan project, and funded under HIMALI Project. At the same time, the opportunity will be taken to collect scarce data to document climate change impacts in arid mountain areas for usage in regional climate change data bases.

<sup>8</sup> There are 11,200 registered forestry and grazing groups in the Federation of Community Forest Users Nepal, under the Forest Act 1993. (ref. [www.fecofun.org](http://www.fecofun.org))



## X. CONCLUSION

170. The IEE for the HIMALI project was carried out in accordance with the environmental assessment guidelines of the ADB, supplemented by the guidelines of the Government of Nepal. The project activities fall within the threshold criteria of Schedule 1 of EPR, and IEE level assessment is adequate. This IEE, based on representative agribusiness models, has determined that the project actions will not have any significant adverse environmental impacts. The IEE, however, has revealed that there could be some small-magnitude adverse impacts, like obtaining construction materials (stone, gravel, sand, timber) during construction stage and sustainable sourcing and use of inputs and waste management during agribusiness operations. Measures to mitigate minor adverse effects, and monitoring and compliance tasks have been outlined in this report.

171. The individual agribusiness proponents are required to perform environmental assessment of their proposed agribusiness plans prior to their grant approval, the framework of which is detailed in Environmental Assessment and Review Framework (EARF). Small-scale agribusinesses not requiring any IEE shall provide a simplified EMP, whereas larger businesses requiring either an IEE or EIA shall provide an elaborative EMP which are incorporated in their respective business operation plans. The requirements of IEE or EIA, as per GON's EPR Schedule 1 and 2, and ADB's guidelines shall be fulfilled. Finally, the IEE has suggested several actions for undertaking action-plans under national legal framework for the management of MAPs and pastureland management works.

## Annex 1. Rapid Environmental Assessment (REA) Checklist

### Instructions:

(i) The project team completes this checklist to support the environmental classification of a project. It is to be attached to the environmental categorization form and submitted to the Environment and Safeguards Division (RSES) for endorsement by Director, RSES and for approval by the Chief Compliance Officer.

(ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.

(iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title:

NEPAL / High Mountain Agribusiness and Livelihood Improvement (HIMALI) Project

Sector Division:

Screening questions	Yes	No	Remarks
<b>A. Project siting</b> Is the project area adjacent to or within any of the following environmentally sensitive areas?			
▪ Cultural heritage site		X	
▪ Protected area	X		Mugu : Shey Phoksundo National Park, Rara National Park Dolpa : Shey Phoksundo National Park Mustang : Annapurna Conservation Area Manang : Annapurna Conservation Area Solukhumbu : Sagarmatha National Park (World Heritage) Sankhuwasabha : Makalu Barun National Park Rasuwa : Langtang National Park
▪ Wetland		X	
▪ Mangrove		X	
▪ Estuarine		X	
▪ Buffer zone of protected area	X		Parts of districts lie within buffer zones of above mentioned protected areas
▪ Special area for protecting biodiversity		X	
▪ Bay		X	
<b>B. Potential environmental impacts</b> Will the project cause...			

Screening questions	Yes	No	Remarks
<ul style="list-style-type: none"> <li>Ecological disturbances arising from the establishment of a plant or facility complex in or near sensitive habitats?</li> </ul>		X	Any new facilities must be supported by an EMP and must comply with buffer zone management plan as required
<ul style="list-style-type: none"> <li>Eventual degradation of water bodies due to discharge of wastes and other effluents from plant or facility complex?</li> </ul>	X		Processing facilities (fruit, vegetable, wool, cheese, slaughter house) need to have waste treatment units which prohibit direct untreated discharge into water bodies. Though through decentralized small units the impact is predicted low.
<ul style="list-style-type: none"> <li>Serious contamination of soil and groundwater?</li> </ul>		X	
<ul style="list-style-type: none"> <li>Aggravation of solid waste problems in the area?</li> </ul>		X	No landfill sites. Waste from small-scale agro-processing facilities can to be managed by composting or used as animal feed
<ul style="list-style-type: none"> <li>Public health risks from discharge of wastes and poor air quality; noise and foul odor from plant emissions?</li> </ul>		X	Small scale facilities are envisaged. Village slaughter houses and public markets must have adequate waste management systems.
<ul style="list-style-type: none"> <li>Short-term construction impacts (e.g. Soil erosion, deterioration of water and air quality, noise and vibration from construction equipment?</li> </ul>		X	Small scale building construction using local stone and timber may cause direct environmental impacts. All construction plans must be supported by an adequate EMP.
<ul style="list-style-type: none"> <li>Dislocation or involuntary resettlement of people?</li> </ul>		X	The project will not support any activity that involves land acquisition or transfer. Support will only be provided to entities which provide evidence of land ownership.
<ul style="list-style-type: none"> <li>Disproportionate impacts on the poor, women and children, indigenous peoples or other vulnerable groups?</li> </ul>		X	The project area has high levels of poverty and women involved in agricultural value chains. Positive employment and income impacts are expected on poor, indigenous and women.
<ul style="list-style-type: none"> <li>Environmental degradation (e.g. Erosion, soil and water contamination, loss of soil fertility, disruption of wildlife habitat) from intensification of agricultural land use to supply raw materials for plant operation; and modification of natural species diversity as a result of the transformation to monoculture practices?</li> </ul>	X		Rangeland and habitat has degenerated in some areas due to centuries of goat and sheep grazing, recent climate change, and unsustainable collection of medicinal plants. The project mitigates these through support for pasture improvement, fodder production, training and awareness on sustainable collection practices, and cultivation of medicinal plants rather than wild harvest. The impacts, though associated with construction works will be low due to small scale construction.
<ul style="list-style-type: none"> <li>Water pollution from discharge of liquid effluents?</li> </ul>	X		Potential effluent from small scale processing facilities. Treatment of effluents prior to disposal necessary
<ul style="list-style-type: none"> <li>Air pollution from all plant operations?</li> </ul>		X	
<ul style="list-style-type: none"> <li>Gaseous and odor emissions to the atmosphere from processing operations?</li> </ul>		X	
<ul style="list-style-type: none"> <li>Accidental release of potentially hazardous solvents, acidic and alkaline materials?</li> </ul>		X	Small scale of facilities implies not of serious

Screening questions	Yes	No	Remarks
<ul style="list-style-type: none"> <li>▪ Uncontrolled in-migration with opening of roads to forest area and overloading of social infrastructure?</li> </ul>		<b>X</b>	No roads constructed
<ul style="list-style-type: none"> <li>▪ Occupational health hazards due to fugitive dust, materials handling, noise, or other process operations?</li> </ul>		<b>X</b>	Small scale of facilities implies not of serious.
<ul style="list-style-type: none"> <li>▪ Disruption of transit patterns, creation of noise and congestion, and pedestrian hazards aggravated by heavy trucks?</li> </ul>		<b>X</b>	No relation to project activities
<ul style="list-style-type: none"> <li>▪ Disease transmission from inadequate waste disposal?</li> </ul>		<b>X</b>	Minor if inappropriate management of wastes from village slaughter houses
<ul style="list-style-type: none"> <li>▪ Risks and vulnerabilities related to occupational health and safety due to physical, chemical, and biological hazards during project construction and operation?</li> </ul>		<b>X</b>	Not foreseen
<ul style="list-style-type: none"> <li>▪ Large population increase during project construction and operation that cause increased burden on social infrastructure and services (such as water supply and sanitation systems)?</li> </ul>		<b>X</b>	Not foreseen
<ul style="list-style-type: none"> <li>▪ Social conflicts if workers from other regions or countries are hired?</li> </ul>		<b>X</b>	Possible during construction period. Project will use local workers and local supervision.
<ul style="list-style-type: none"> <li>▪ Community health and safety risks due to the transport, storage, and use and/or disposal of materials likely to create physical, chemical and biological hazards during construction, operation and decommissioning?</li> </ul>		<b>X</b>	Some minor physical risks are possible in construction. Can be avoided by on-the-job the carriers and workers.

## Annex 2. GON Requirements for IEE and EIA as per EPA and EPR

Related to Forest, Agriculture, Agro-industry Sectors,

*Refer to EPR, 1997 (amended 1999) Schedule 1 and 2, pertaining to Rule 3 (as per revised list dated 2007/08/20), for complete list of all sectors*

Article No.	IEE Threshold Criteria	Article No.	EIA Threshold Criteria
A. 11	Establishment of herbal centre in public forest and shrub land in order to grow herbal plants and aromatic shrubs on commercial basis.	A. 5	Establishment of forest based industries within 1 km of same forest
A. 6	Harvesting 5 to 50 tones of NTFPs per annum	A. 8 A. 9 A. 10 A. 11	Collecting of more than 50 tones annually of same species of roots Collecting of more than 100 tones annually of same species of tree barks Collecting of more than 100 tones annually of NTFP from same district Collecting of more than 50 tones of same species NTFP from same district
A. 12	Commercial collection and pollution free industrial processing of herbs and aromatic plants	A. 6	Commercial and industrial processing of herbs and aromatic plants, which emit pollution and discharge, wastes
F. 3 (a) – (c) F. 4 (a)	Irrigation scheme development : a) for new schemes: 25-2000 ha in Tarai; 15-500 ha in hills and valleys; 10-200 ha on hill slopes & mountains. b) Rehabilitation of irrigational schemes	F. 4 (a) – (c) F. 5	Irrigation scheme development : a) for new schemes: over 2000 ha in Tarai; over 500 ha in hills and valleys; over 200 ha on hill slopes and mountains. b) All kinds of water resource development works that involves permanent displacement or resettlement of more than 100 people
J. 1	Development of farmland through clearing of national forests covering an area up to 1 ha in hills and 5 ha in Tarai	J. 1	Development of farmland through clearing of national forests covering an area up to (i) More than 1 ha in hill (ii) More than 5 ha in Terai
J. 2 (a) J. 2 (b) J. 2 (c) J. 2 (e)	Construction Works related to Agriculture Sector : • poultry-house with a rearing capacity over 30,000 birds • shed to accommodate large animals over 1000 • shed to accommodate small animals over 5000 • Slaughterhouse construction		
		L.	Implementation of Projects in sensitive areas: • Historical, cultural and archeological sites • National parks, wild life sanctuaries and conservation areas • Area with main source of public water supply
L.	Project costs of NRs. 50 million to 250 million	L1.	Project costs of over NRs. 250 million.

\*Source: The Environmental Protection Act (EPA, 1997 amended 1999) Environmental Protection Rules (EPR, 1997) provides following screening criteria for IEE and EIA

### Annex 3. Socio-Economic Profile of HIMALI Project Districts

**Table A. Demographic Information<sup>9</sup>**

Districts	Census 2001			2010 Projection			Number of households	Average Household Size	Area in Sq. Km.	Pop. Density Person per Sq. Km.	Literacy Rate
	Total	Male	Female	Total	Male	Female					
Humla	40,595	20,962	19,633	48,131	24,853	23,278	6,953	5.84	5,655	7	26.62
Mugu	43,937	22,250	21,687	52,001	26,334	25,667	8,261	5.32	3,535	12	27.79
Jumla	89,427	45,848	43,579	103,435	53,030	50,405	15,850	5.64	2,531	35	32.41
Dolpa	29,545	14,735	14,810	34,294	17,104	17,191	5,812	5.08	7,889	4	34.66
Mustang	14,981	8,180	6,801	15,627	8,533	7,094	3,243	4.62	3,573	4	51.75
Manang	9,587	5,034	4,553	15,938	8,369	7,569	1,776	5.4	2,246	4	59.91
Rasuwa	44,731	23,355	21,376	53,316	27,838	25,479	8,696	5.14	1,544	29	33.96
Dolakha	204,229	99,963	104,266	236,638	115,826	120,812	43,165	4.73	2,191	93	50.64
Solukhumbu	107,686	53,173	54,513	117,985	58,258	59,726	21,667	4.97	3,312	33	45.81
Sankhuwasabha	159,203	77,853	81,350	176,459	86,292	90,168	30,766	5.17	3,480	46	55.31

**Table B. Population by Caste / Ethnic Group<sup>10</sup>**

(% of total population)

Districts	Chhetri	Thakuri	Sherpa	Brahman	Kami	Dalit	Damai /Dholi	Bhote	Tamang	Sanyasi	Sarki	Sonar	Gurung	Magar	Thakali	Newar	Thami	Jirel	Sunuwar	Rai	Gharti /Bhujel	Unid. Caste	
Humla	43.8	19.6	13.96	6.27	4.95	3.48	2.27	1.41															
Mugu	31.72	12.17	7.26	3.11	2.13	11.67			2.26	0.38													
Jumla	48.86	4.39		7.38	4.01	1.45	1.61				5	1.21											
Dolpa	32.79	2.78	1.62	1.96	4.36				0.8				16.9	9.82									
Mustang	5.86												45.19	6.1	16.54								
Manang	2.13		8.95	2.49	1.42				3.58				73.99	0.95		1.51							
Rasuwa	3.38		1.04	15.83	2.02				63.75				6.72	1.27		2.8							
Dolakha	28.49		4.77	9.2	2.88		1.5		13.52		1.71			1.66		7.75	6.82	2.26	1.07				
Solukhumbu	15.2		18.3	5.13	5.33		1.6		9.43				1.07	4.6		2.54					31.49	1.51	1.02
Sankhuwasabha	19.43		5.19	6.58	4.4			2.87	9.45				5.78	3.15		5.06					22.44		

<sup>9</sup> CBS, Population Census, 2001

<sup>10</sup> Based on CBC 2001 Census Data, District and VDC Profile of Nepal - 2010

**Table C. Indigenous People Data<sup>11</sup>**

District	IP	% IP	Most numerous IP
Humla	6,820	17%	Humli (Bhote)
Mugu	4,384	14%	Mugali (Bhote)
Jumla	1,619	2%	-
Dolpa	8,899	40%	Dolpo
Mustang	11,648	78%	Thakali, Baragaonle, Lhopa
Manang	8,850	92%	Manangba
Rasuwa	34,120	76%	Tamang
Dolkha	81,167	46%	Tamang, Thami, Sherpa, Jirel, Newar
Solukhumbu	75,415	70%	Rai, Sherpa, Tamang, Magar
Sankhuwasabha	102,577	64%	Rai, Tamang, Gurung, Sherpa, Newar, Limbu, Yakkha
<b>HIMALI TOTAL</b>	<b>335,499</b>	<b>50%</b>	
Nepal Total	8,267,292	36%	

**Table D. Economically Active and Inactive Population<sup>12</sup>**

District	Economically Active			Economically Inactive		
	Total	Male	Female	Total	Male	Female
Humla	29,719	14,967	14,752	4,856	2,887	1,969
Mugu	24,148	12,434	11,714	1,661	978	683
Jumla	47,983	23,888	24,095	9,824	6,845	2,979
Dolpa	15,742	7,950	7,792	3,016	1,646	1,370
Mustang	9,945	5,749	4,196	2,834	1,328	1,506
Manang	9,256	5,218	4,038	4,297	1,953	2,344
Rasuwa	32,692	17,586	15,107	7,096	3,495	3,601
Dolkha	121,732	59,617	62,115	32,381	15,485	16,896
Solukhumbu	70,386	34,263	36,123	17,274	8,601	8,673
Sankhuwasabha	89,550	50,267	39,284	31,148	13,245	17,903

<sup>11</sup> CBS, Population Census, 2001<sup>12</sup> Based on CBC 2001 Census Data, District and VDC Profile of Nepal - 2010

**Table C. Agricultural Conditions<sup>13</sup>**

District	Paddy		Maize		Millet		Wheat		Barley		Oil Seed		Potato		Cattle	Buffaloes	Sheep	Goat	Milk (MT)	Meat (MT)	Wool (Kg.)	Citrus		Winter		Summer	
	Area	Prod.	Area	Prod.	Area	Prod.	Area	Prod.	Area	Prod.	Area	Prod.	Area	Prod.								Area	Prod.	Area	Prod.	Area	Prod.
Humla	550	910	82	140	1360	1300	990	431	680	280	58	21	664	6640	32546	1750	29053	33561	1140	292	21790			317	2546		
Mugu	1050	1785	565	1000	1572	1550	2015	1690	1200	1260	30	16	605	6153	31366	7225	44708	34821	2227	552	33531	20		334	2764		
Jumla	2850	4844	4625	6850	4000	4400	2850	1532	3650	3200	130	95	2222	18887	71625	3688	45893	47977	1595	605	34420	NA	NA	978	9136	NA	NA
Dolpa	270	475	2282	4360	317	275	2365	1088	180	95	19	9	646	5386	22385	2624	32876	52218	823	295	24657			423	3312		
Mustang	-	-	537	795	4	4	620	1024	330	400	30	15	240	3200	6860	78	5598	23720	375	90	4199			407	3712		
Manang	-	-	166	365	3	3	290	454	180	240	25	20	740	9250	3974	8	5370	12928	203	63	4028			119	1015		
Rasuwa	1325	3300	2350	4500	1050	1155	842	1393	300	344	115	100	2520	36292	26458	21020	11038	31715	4665	967	7947	23	162	287	2505	84	360
Dolakha	3125	6318	5390	10800	3575	3580	4400	5105	231	230	275	242	2445	26550	93752	38938	22916	180287	12817	2234	16500	295	2898	150	1220	154	465
Solukhumbu	1620	2916	12950	29100	2052	2566	3680	3574	200	224	315	220	10138	151640	47138	42506	8280	84340	7977	1955	6210	183	1940	269	2278	153	329
Sankhuwasabha	15932	28677	14672	28209	9977	9956	1505	2288	30	29	675	574	3085	33186	122498	46278	14103	162587	13210	2762	10577	334	3185	224	1938	495	2004

Note: Area in hectares, Production in metric tones

<sup>13</sup> Based on CBC 2001 Census Data, District and VDC Profile of Nepal - 2010



## Annex 4. List of Persons Consulted

District : Jumla

Date : June / July 2010

Name	Occupation / Post	Affiliation / Location
Mr. Laxmi Chandra Mahat	Enterprise Dev Officer	MEDEP Jumla
Mr. Garendra Thapa	Junior Technician	DLSO, Jumla
Mr. Dhan Bir Nepali	Sheep & Goat Farmer	Patmora, Jumla
Mr. Prajit Thapa	Sheep & Goat Farmer	Patmara, Jumla
Mr. Man Bdr Thapa	Sheep & Goat Farmer	Patmara, Jumla
Mr. Hari Bdr Buddha	Sheep & Goat Farmer	Patmara, Jumla
Mr. Medir Singh Thapa	Sheep & Goat Farmer	Patmara, Jumla
Mr. Jaya Bdr Kathayat	Sheep & Goat Farmer	Patmara, Jumla
Mr. Prachandra Jaisi	Sheep & Goat Farmer	Patmara, Jumla
Mr. Purna Prasad Neupane	Admin. Officer	DFO, Kharidar, Jumla
Mr. Gobinda Shahi	Chairman	DCCI, Jumla
Mr. Ram Kumar Chaulagai	Apple Distillation Plant operator	Mahat gaun, Jumla
Mr. Dilaram Bandari	Officer	DADO, Jumla
Mr. Surya Datta Saphota	District Project Assistant	Surya Social Service Society (4S) FAO, Jumla
Mr. Basu Neure	Program Coordinator	4S, Jumla
Mr. Ramesh Kumar KC	LDO	DDC, Jumla
Ms. Maya Ngawothe	Member Executive Committee	DCCI, Jumla
Mr. Ram Dutta Rawal	Sec General	DCCI, Jumla
Mr. Gurhka Bdr Parsai	Member Executive Committee	DCCI, Jumla
Mr. Puri Chandra Devkota	Vice Chairman	DCCI, Jumla
Mr. Cheet Bdr Rana	Junior Technician	NARC, Jumla
Mr. Paras Mani Mahat	Junior Technician	NARC, Jumla
Mr. Ram Bdr Bhujel	Sen. Research Officer	NARC, Jumla
Mr. Dhan Raj Gautam	Project Officer,	EIG, SAPPROS, Jumla
Mr. Ritesh Prasad Shah	District Coordinator	EIG, Jumla
Mr. Giri Dhari Subedi	Sen. Scientist	NARC Horti Station, Rajikot, Jumla
Mr. Shyam Prasad Ghimire	Admin Officer	NARC Horti Station, Rajikot, Jumla
Mr. Basu Dasa Hagsarumba	Accounts Officer	NARC Horti Station, Rajikot, Jumla
Mr. Kuldev Khatri	Agro-Vet	Jumla
Mr. Shambhu Prasad Upadhayay	Admin Officer	Cottage & Small Industry Board, Jumla
Mr. Torchi Tamang	Manager	Agri. Dev Bank, Jumla
Mr. Dharma Raj Khatri	Apple Farmer	Bohara gaun, Jumla
Mr. Krishna Bdr Mahat	Apple Farmer	Bohara gaun, Jumla
Mrs. Laxmi Subedi	Apple Farmer	Bohara gaun, Jumla
Mr. Laxman Raj Devkota	Apple Farmer	Bohara gaun, Jumla
Mr. Mahindra Tharmen	Project Coordinator	World Vision, Jumla
Mr. Prakash Dewali	Livelihoods Comp. Manager	World Vision, Jumla
Mr. Gwandetta Poudel	Finance Coordinator	World Vision, Jumla
Mr. Bhaskar Dutta Neupane	Admin Officer	District Soil Conservation Officer, Jumla
Mr. Bhupendra Sharma	Program Coordinator	Sustainable & Equity Dev Academy (SEDA), Jumla
Mr. Barhat Bdr Hama	Social Mobiliser	Sustainable & Equity Dev Academy (SEDA), Jumla
Mr. Narandra Raj Khatri	Social Mobiliser	Action Aid, Jumla
Mr. Govinda Ghimery	Trader	Seabuckthorn Trader, Jumla
Mr. Amar Bdr Rokaya	Local Trader	Seabuckthorn Trader, Jumla
Mr. Rurma Sad Neupane	Chairman	JABEC, Jumla
Mr. Gajendra Bista	Local Political Activist	Kalanga, Jumla
Mr. Kamal B. Silwal	Local Trader	Kalanga, Jumla
Mr. Thule Bam	MAPs collector / retailer	Depalgaun, Jumla
Mr. Badri Demal	Sheep Herder	Guthichaur, Jumla
Mr. Krishna Sapkota	Timber Dealer	Garjangkot, Jumla
Mrs. Maili Thapa	Housewife, farmer	Deepalgaun, Jumla
Mrs. Suntali Maya Khatri	Housewife, farmer	Garjangkot, Jumla
Ms. Hari Maya Gurung	Tourism Assistant	Annapurna Cons Area Project
Mr. Fadindra Prasad Thakali	Agro-Vet Entrepreneur	Agro-Vet Syang, Mustang
Mr. Bishnu Raj Hirachan	Farmer & Entrepreneur	Marpha Farm, Mustang

Mr. Manahar Kadariya	Hortic Dev Officer	DADO, Jomsom, Mustang
Dr. G.P. Khakurel	DLSO	DLSO, Jomsom, Mustang
Mr. Hari Narayan Chaudhary	Junior Technician	DLSO, Jomsom, Mustang
Mr. Kumar Gewali	LDO	DDC, Jomsom, Mustang
Mr. Khagendra Tulachan	President	DCCI, Jomsom, Mustang
Mr. Bhim Bahadur Thakali	Junior Technician	DADO, Jomsom, Mustang
Mr. Bidh Ras Dhakal	Junior Technician	THDC, Marpha, Mustang
Mr. Suresh Sharma Kharidar	Junior Technician	THDC, Marpha, Mustang
Mr. James Hirachan	Apple Farmer & Entrepreneur	Marpha, Marpha
Mr. Surandra Hirachan	Apple Farmer & Entrepreneur	Marpha, Mustang
Mr. Hira Sherchan	Apple Farmer	Marpha, Mustang
Mr. Ram Prasad Sherchan	Goat Farmer	Chhusang, Mustang
Mr. Tasi Gurung	Goat Farmer	Chhusang, Mustang
Mr. Amar Gurung	NR Conservation Assistant	ACAP, Jomsom, Mustang
Mr. Paras B Singh	OIC, Conservation Officer	ACAP, Jomsom, Mustang
Mr. Hridaya Pd Shrestha	Soil Cons. Officer	Soil Cons. Office, Jomsom, Mustang
Ms Sarita Shrestha	Officer	District Cottage Industries, Jomsom
Mr. Rajendra Raj Regmi	Branch Manager	Agri. Dev. Bank, Jomsom, Mustang
Ms. Meena Thapa	Officer	Mustang Dev Service Assoc, Jomsom
Mr. Birendra Thakali	Chief Community Leader	Thinni, Mustang
Mr. Bal Bahadin Thakali	Community Leader	Thinni, Mustang
Mr. Aita Bahadur Thakali	Junior Technician	DLSO, Thinni, Mustang
Mr. Subash Gurung	Vegetable & Fruit Trader	Dupche, Mustang
Mrs. Sani Thakali	Housewife, hotelier	Jomsom, Mustang
Mr. Mani Sherchan	Political Activist	Jomsom, Mustang
Mr. Daya Bahadur Gurung	Local School Teacher	Marpha, Mustang
Mr. Pradip Kamel	Chief District Officer	Solukhumbu
Mr. Soma Nath Nepal	CDO Officer	Solukhumbu
Mr. Yogendra P Kaini	Vet. Officer	Solukhumbu
Mr. Jaya Prasad Rai	Chairman DFFC	Solukhumbu
Mr. B.K. Shrestha	Director	Global Action Nepal, Solukhumbu
Mr. Buddi N Shrestha	Officer	Young Star Club, Solukhumbu
Mr. Ashok Kumar Jaiswal	Ranger/DFO	DFO, Solukhumbu
Mr. Suresh Kumar Sah	Junior Technician	DADO, Solukhumbu
Mr. Shyam Babadur Bhusel	Manager	Agric Dev Bank, Salleri, Solukhumbu
Mr. Ganesh Raj Pandey	Officer-In- Charge	Horti. Station Phaplu, Solukhumbu
Mr. Kami Chering Sherpa	Member, Community Forest Association	Kumjung, Solukhumbu
Mr. Phurba Chhutup Mahatara	Chouri herder	Chutra village, Solukhumbu
Mr. Dingma Lamu Sherpa	Yak herder	Sangma, Solukhumbu
Mr. Ang Chring Sherpa	Yak milk collector	Cheplung, Solukhumbu
Mr. Wangche Sherpa	Yak milk collector	Techho, Solukhumbu
Mrs. Dolma Sherpa	Housewife, local retailer	Chaurikharka, Solukhumbu
Mrs. Shanti Tamang	Manager, women's group	Chaurikharka, Solukhumbu