BHUTAN

National Action Program to Combat Land Degradation

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General Introduction

It is estimated that worldwide 1.97 billion hectares of all usable land have been affected by various forms of human-induced land degradation. Deforestation, overgrazing, fuel wood consumption, agricultural mismanagement, industries, urbanization, and infrastructure development are the key causes. Poverty, population growth and natural factors such as extreme climate and unstable geology also contribute significantly. At the United Nations Conference on Environment and Development in 1992, the international community called on the UN General Assembly to establish an Intergovernmental Negotiating Committee to prepare a legally binding international instrument to combat desertification. Consequently, a series of international negotiations led to the formulation and adoption of the UN Convention to Combat Desertification in June 1994. Bhutan acceded to the UNCCD in August 2003. Altogether, as of December 2008, 193 countries had become party to this immensely consequential international treaty. All countries party to the UNCCD are required to develop a National Action Program to combat desertification/ land degradation.

The Royal Government of Bhutan has been implementing various programs and projects to combat land degradation since the advent of Five Year Plans in the early 1960s but they have been largely taking place in a piecemeal fashion within individual sector plans and basically without macro-level policy and strategic perspective. Hence, this NAP, regardless of being an obligation under the UNCCD, is perceived as an opportunity for Bhutan to take stock of existing measures, identify new ones, and consolidate and direct future actions to combat land degradation problems and their causes in a more strategic and holistic manner using participatory approaches that captures the insights, experience and views of various stakeholders.

The Bhutan NAP has largely been derived from a broad-based consultative and participatory planning process, involving a wide range of stakeholders. Local community consultations were held in 13 geogs to get a representative sample of land degradation problems and issues at the grassroots level on a first-hand basis. These consultations were followed by a series of four regional consultative workshops which helped to supplement and consolidate the information derived from local community consultations. Finally, a number of workshops and meetings were held with central level agencies and individuals, both within and outside the government, to elicit clarifications, additional information, views and insights required to complete the NAP as a product and a process.

Policy, Legal and Institutional Contexts to Combat Land Degradation in Bhutan

Bhutan has very strong environmental policies and legislations in place through which land degradation problems and issues can be dealt with. The overarching Bhutanese development philosophy of Gross National Happiness enshrines environmental sustainability as one of the four main pillars for pursuing peace, prosperity and happiness. The Constitution of the Kingdom of Bhutan explicitly outlines environmental conservation as a mandate and spells out in very specific terms the environmental responsibilities and rights of the Bhutanese citizens. A number of sector-based policies and laws reinforce the importance of environmental conservation and complement the country's overall philosophy of environmentally sustainable development. The policies that provide for combating land degradation include the National Forest Policy, National Environment Strategy, Bhutan Water Policy, National Urbanization Strategy, and Bhutan Sustainable Hydropower Development Policy. Laws include the Forest and Nature Conservation Act 1995, Mines and Mineral Management Act 1995, Environmental Assessment Act 2000, Road Act of

Bhutan 2004, National Environmental Protection Act 2007, Land Act of Bhutan 2007, and Waste Prevention and Management Act 2009.

With respect to the institutional set-up, the Ministry of Agriculture and National Environment Commission have traditionally had the most direct role in land use and management from the environmental standpoint. The Ministry of Agriculture through its Department of Agriculture, Department of Forest and Department of Livestock are responsible for policies, plans and programs that ensure sustainable management of agriculture, forest and livestock resources for the socio-economic development and environmental wellbeing of the Bhutanese people. The National Environment Commission has the role of ensuring that development policies, plans, programs, and projects fully consider environmental management needs and functions as an inter-ministerial body to guide and support environmentally sustainable development. Other government agencies that are increasingly becoming important and have a key role in combating land degradation include: the Department of Roads and Department of Urban Development and Engineering Services under the Ministry of Works and Human Settlement; Department of Geology and Mines, Department of Energy and Department of Industry under the Ministry of Economic Affairs; and Department of Disaster Management under the Ministry of Home and Cultural Affairs.

There is also a small but effective fraternity of non-governmental organizations in the country. Among them, the Royal Society for Protection of Nature works primarily on environmental issues, including those with links to community livelihoods. There is also the Târâyana Foundation, which works for the socio-economic upliftment of poor and vulnerable communities. The Foundation can play a very important part in mainstreaming land use and management issues in their work with poor communities as generally poverty and land degradation are inextricably linked.

Several bilateral and multilateral development agencies assist Bhutan in implementing development plans and programs. Of relevance to combating land degradation include the Asian Development Bank, Austrian Bilateral Assistance, Danida, European Community, Global Environment Facility, Helvetas, Government of India, Japan International Cooperation Agency, Netherlands Development Organization, United Nations agencies (FAO, UNDP, UNEP and WFP), World Bank, and World Wildlife Fund.

Land Degradation Problems and Issues in Bhutan

In Bhutan, forest fires, excessive use of forest resources, overgrazing, unsustainable agricultural practices, poor irrigation system management, construction of infrastructure without proper environmental measures, mining, industrial development, and urbanization are the key causes of land degradation.

Forest fires persist as a recurrent and widespread phenomenon in the country. According to records maintained by the Department of Forests, 643 incidents of forest fires affecting a total forest area of 83,759 hectares have taken place between 1998/99-2007/08. Almost all of the forest fires in the country are caused by humans accidentally or willfully.

Bhutan's per capita fuelwood consumption is one of the highest in the world. In rural areas, where 69 percent of the country's population live, fuelwood is the main source of energy for cooking and space heating. According to the Department of Energy, in 2005, fuelwood alone accounted for 57.7 percent of the total primary energy supply. Apart from domestic use in rural areas, fuelwood is heavily used for industrial production, agro- and forest products processing, road construction, and in hospitals, schools, military encampments, and monasteries. Construction timber use is also very high with traditional Bhutanese architecture entailing extensive use of timber. Furthermore, construction of socio-economic services infrastructure such as hospitals, basic health units, outreach clinics, schools, agriculture research

and extension centers, and geog administrative offices have surged in the recent years in keeping with government's decentralization policy. Forest management units are created for sustainable timber harvesting based on forest management plans that take account of growing stock and annual allowable cut. However, not all timber needs are met from FMUs. A significant amount of timber needs, especially for rural construction, is met on ad hoc basis. There are also instances when the desired species and size of timber for special infrastructure projects, such as construction or renovation of dzongs or lhakhangs (monasteries), are not available in the FMUs and have to be consequently extracted from forests outside FMUs.

In addition to timber and fuel wood, there is a wide array of non-wood forest products that the Bhutanese use for subsistence and income-generation. These include medicinal and aromatic plants, forest foods such as mushrooms, ferns and wild greens, bamboo and cane for local handicrafts, plant barks and pulps for traditional paper-making, animal fodder, and leaf litter for farmyard manure. In many places, these NWFPs have become, or are becoming, increasingly scarce due to overexploitation.

In Bhutan, overgrazing is closely associated with forest degradation as much of the grazing occurs in forest lands on a free-range basis. Livestock rearing is an important economic activity among the rural communities. In 2007, there were 319,989 cattle and 51,500 yaks in the country. Despite continuous government programs to reduce livestock population through introduction of improved breeds, artificial insemination and sterilization, and increased animal health coverage, livestock population has remained almost unchanged over the past 15-20 years. Local communities continue to maintain large livestock herds because of religious sentiments against culling, status symbol associated with large herds, the perception of livestock as an immediate source of cash in the event of emergency, and for production of farmyard manure.

Unsustainable agriculture practices exist in the form of imbalanced and prolonged use of inorganic fertilizers, farming of lands on steep terrain without adequate soil and water conservation measures, tseri (slash-and-burn) cultivation with shortened fallow cycle, and growing use of chemical pesticides. Poor management of irrigation system is also a major concern. Construction of earthen irrigation channels in places where the soil is highly erodible, poor maintenance of irrigation systems, and lack of management of the tail sections of irrigation channels have weakened adjoining lands and caused downward movement in many places, especially where cultivation lands are on hill slopes.

Construction of roads in the country is enormously environmentally challenging given the mountainous terrain and fragile geologic conditions. Use of heavy machinery and cutting of mountain slopes to build roads without proper environmental safeguards and mitigation measures inevitably cause problems such as slope failure, deforestation, disturbance to wildlife habitats, and sedimentation of water bodies. In addition to direct impacts, the mass influx of migrant road workers bring on additional demographic pressure to the surrounding natural resources, particularly forests and water. A major cause of concern in particular is the quality of farm roads, which are basically earthen roads built at minimal cost to provide access to farmers for production and marketing of agricultural goods. Most of the farm roads in the country are poorly aligned, designed, built, and maintained. They often lack basic structures such as drainage and breast/ retaining walls and, consequently, trigger landslides, gully formation, and sedimentation of water bodies and agricultural fields.

In recent years, mining has become one of the fastest growing economic sectors in the country. In particular, the production of gypsum, talc and dolomite has increased enormously – between 135 to 220 percent – during the period from 2002 to 2008. The most significant adverse impacts of mining are land disturbance and fissure from drilling, blasting, excavation, and site clearing, destruction of natural vegetation, sedimentation and contamination of waters, and air pollution with dust particles affecting

human health and local livelihoods such as agriculture production. Given the destructive nature of mining activities, the Royal Government of Bhutan has enacted very strong laws and regulations to mitigate, and where possible avoid, adverse environmental impacts through responsive environmental management measures during planning, operation and post-operation phases. However, the laws and supporting regulations have not been effectively enforced for a variety of reasons such as lack of inter-agency coordination, ambiguous institutional mechanisms for enforcement, and inadequate technical capacity within the private mining companies to plan and implement environmental management measures and within the Department of Geology and Mines to monitor and provide technical guidance.

Many of the Bhutanese industries depend on extraction of raw materials, such as wood and minerals, from the natural environment. As of 2006, there were 470 forest-based and 91 mineral-based industries in the country. The volume of extraction and the technology used for extraction of these natural resources will have considerable bearing on the environmental quality of the lands from where they are extracted. Other major industrial activities that contribute to land degradation include dumping of industrial waste, discharge of harmful effluents, and conversion of forest and agricultural lands for development of industrial estates.

Urbanization has taken place at a very rapid pace over the last ten years or so. It is estimated that between 2000-2005 the country's urban population has grown at an annual rate of 7.3 percent. At this rate, the urban population is projected to grow from 196,111 in 2005 to 564,284 in 2020 and constitute 73 percent of the country's population by 2020. What is further alarming is that more than half of the current urban population is concentrated in just two towns – Thimphu and Phuentsholing. Burgeoning urban population has created several environmental problems such as air and water pollution, water shortage, municipal waste generation, congestion of traffic and buildings, and land degradation. In order to accommodate surplus population and develop concomitant infrastructure, urban centers have consumed prime agricultural lands in the valleys and encroached on hill slopes which were once forested. In the smaller urban centers, the lack of proper infrastructure and facilities for drainage, sanitation and waste disposal will have cumulative adverse impacts on land and water resources.

The solid waste problem is growing exponentially in the urban centers, especially in Thimphu and Phuentsholing. What adds further to the problem is that there is no proper system of waste segregation at source and the landfills are poorly managed with basically no regular measures to control pollutant emission, leaching and scavenging. This leads to overfilling, stench, contamination of land and water, and aesthetic dilapidation of the landscape.

In addition to the direct factors of land degradation, population growth and structure, poverty, and climate change contribute to land degradation.

Although the country's population in general does not pose a major problem, there are a couple of existing demographic attributes that concern us. One is the geographically-skewed distribution of the population. Population imbalances between dzongkhags and between regions have created localized pressures on the natural environment and led to localized deficits of environmental resources. The other cause of concern is the young age structure of our population with nearly 45 percent of the population being under the age of 20 years. This implies that the population is likely to increase at a higher rate in the near future as a result of growing section of individuals nearing their prime fertility age. Add to this the fact that the current Total Fertility Rate is high, at approximately 2.9, while the Contraceptive Prevalence Rate is quite low, at 31 percent.

There is relatively a high level of poverty in the country. An estimated 23.2 percent of the country's total population live below the national poverty line. Poverty and land degradation are inextricably linked.

Impoverished communities if not provided with livelihood and income-generating opportunities are prone to engage in activities, such as illegal extraction of forest resources, that contribute to land degradation. On the other side, sustainable land management activities – for instance, agro-forestry – can help the poor to enhance their livelihoods and break away from the poverty cycle. Furthermore, the poor are directly dependent on a wide range of natural resources and ecosystem services for their survival and well-being. Therefore, when soil erosion, forest degradation, and decline in biodiversity occur, it is generally the poor who are most severely affected.

The impacts of climate change to Bhutan's natural environment have not yet been properly assessed. Nonetheless, the country has experienced in the recent past a number of incidents that have brought to the fore the dangers of climate change. Prolonged dry winter resulting in exacerbated incidents of forest fires, unprecedented rainfall causing landslides and flash floods, and glacial retreat and glacial lake outburst flood are the key climate-related events that have occurred in Bhutan in the last 10-15 years.

While, in general, we have policies and institutional mechanisms in place to effectively address land degradation problems and issues, there are a few policy and institutional issues that need attention. At the macro-level and as a cross-sectoral issue, the policy perspective on national land use and management is presently lacking. Consequently, land use conflicts between various sectors persist and land use in many instances defies land capability. Furthermore, programs and activities to address land degradation have remained compartmentalized within various sectors. There is also a lacuna in the institutional setting with respect to the overall coordination and management of the technical aspects of land use. Finally, effective environmental law enforcement will greatly depend on the awareness of the public of their environmental rights and responsibilities. At the present, a large majority of the Bhutanese public are not aware of various environmental laws and regulations let alone the intricacies of these laws and regulations. Without public awareness and participation, law enforcement is expected to be very difficult.

Bhutan's Action Program to Combat Land Degradation

This Action Program draws its fundamental essence from the country's overarching development philosophy of Gross National Happiness. It shall first and foremost contribute to the objective of environmental sustainability whilst also directly or indirectly contributing to poverty alleviation, food security, economic growth, and human safety.

The overall goal of the Action Program is to "prevent and mitigate land degradation and its impacts through systems and practices of sustainable land management that protects and maintains the economic, ecological and aesthetic values of our landscapes." To pursue the aforesaid goal, the following specific objectives have been set:

1. Conservation, rehabilitation and sustainable use of forest resources to maintain well-functioning forest landscapes;

2. Development and promotion of sustainable agricultural practices that enhances local livelihoods whilst maintaining the productivity and stability of agricultural lands;

3. Integration of environmental management measures in development activities that pose significant risks of land degradation;

4. Strengthening of systemic and institutional capacity to combat land degradation and its impacts;

5. Information, advocacy and education to create increased policy and public support for sustainable land management.

The Action Program is made up of the following program components and actions:

Conservation, Rehabilitation and Sustainable Use of Forest Resources

- Forest Fire Management activities include: assessment of the occurrence, trends and causes of forest fires; in-depth research on forest fire ecology in various forest ecosystems; development of forest fire management strategies for various fire-vulnerable forest ecosystems; public education and awareness programs; community-based forest fire management schemes targeting specific groups of local communities; rationalization of forest fire penalties; and review and strengthening of institutional arrangements for networking, reporting and forest fire suppression.

- Sustainable Production and Utilization of Forest Resources includes: development of technical capacity to effectively implement the planning guidelines for management of forest areas outside the FMU system; implementation of the planning guidelines on a pilot basis and evaluation of the applicability and effectiveness of the guidelines; and multi-disciplinary evaluation of the effectiveness of FMUs through out the country in the context of environmental sustainability and socio-economic development to enhance the planning and management of FMUs.

- Rehabilitation of Degraded and Barren Forest Lands includes: assessment of the extent of degraded and barren forest lands, mapping and prioritization of these areas for re-afforestation; re-afforestation of the prioritized areas; establishment of a fully-functional system for developing plans for the establishment and long-term management of forest plantations; and leasing of degraded/ barren forest lands to private parties for plantation and commercial forestry.

- Participatory Forest Management activities include: participatory training to develop community skills for community and private forestry; training of dzongkhag and geog forestry staff in communications and extension approaches and techniques; integration of sustainable use of various types of non-wood forest products in community forestry schemes; and development and promotion of agro-forestry models as part of the private forestry program.

- Livestock and Grazing Management activities include: livestock carrying capacity studies and development of a taxation scheme to discourage the rearing of livestock in excess of the carrying capacity; provision of effective animal health coverage; establishment of farmer cooperatives to oversee proper utilization of forage resources; development of hay meadows with high-yielding fodder legumes and grasses; promotion of homestead forests of species with high forage value; promotion of alternative livelihoods where livestock rearing has become unsustainable; and lease of barren/ degraded government lands to local communities for pasture development.

Development and Promotion of Sustainable Agricultural Practices

- Integrated Soil Fertility Management activities include: development of training and extension materials; training of trainers for extension staff; farmer training; dissemination of the advantages of integrated soil fertility management and the disadvantages of disproportionate and prolonged use of inorganic fertilizers through television and radio; comparative studies on various soil fertility management techniques and practices and improvement of soil fertility management techniques and practices based on the results;

and establishment of soil testing labs at the regional level to provide more expeditious information on soil quality and guidance for soil improvement to extension staff and farmers.

- Sustainable Land Management for Steep Slope Agriculture includes: land capability studies to develop agricultural land capability classification and formulate management guidelines for agricultural land use as per land capability; promotion of low-cost SLM technology for steep slope agriculture; promotion of SLM-based farm enterprises linking SLM with poverty alleviation/ income generation; and mainstreaming SLM in research programs and translation of SLM research results and recommendations into farmer-friendly extension materials.

- Phasing out of Tseri and Promotion of Suitable Alternatives: To decide on this intervention, there is a need to review of all existing reports of studies on tseri cultivation and alternatives, analyze the findings and recommendations, and consolidate them into a succinctly well-analyzed document for discussion and decision at the National Assembly and National Council. Depending on the resolutions of the parliament, policy, legislative and administrative reforms will need to be implemented to phase-out tseri and promote suitable alternatives which are more environmentally sound and economically viable than tseri.

- Integrated Pest Management activities include: consolidation of integrated pest management technology integrating biological measures and good crop management practices to control agricultural pests and diseases; inventory of agricultural pests and diseases that includes an assessment of the severity and prevalence scale of various pests and diseases, control measures applied on them, and the effectiveness of these measures; development of research and extension packages for IPN based on the results of the inventory; development of extension and communication packages on IPM and dissemination through farmer training and television/ radio; and phasing out of pesticides that are significantly hazardous.

- Improvement of Irrigation System Management activities include: review and revision of existing irrigation development guidelines to integrate management of the tertiary irrigation channels and tail sections of the irrigation channels; rejuvenation of dysfunctional Waters Users Associations through training, extension and financial support; training of dzongkhag engineers to provide irrigation-related services and backstopping to Water Users Associations; and rectification of irrigation schemes that pose significant land degradation risks.

Environmental Management of Development Activities that pose High Risks of Land Degradation

- Environment-friendly Road Construction activities include: mandatory adoption of environmental codes of practices in road construction projects; expeditious adoption of the draft farm road development guidelines; training of road engineers, private road contractors and contract engineers in EFRC approach and techniques based on existing ECOP and (approved) farm road development guidelines; cost-benefit analysis between roads built with EFRC techniques and traditional techniques to aid decision-making; rationalization of existing farm road targets vis a vis existing technical and financial capacity for EFRC; provision of adequate road survey equipment to dzongkhag engineering sectors for proper road planning and alignment; and integration of EFRC as a module in diploma/ degree engineering courses provided by Jigme Namgyel Polytechnic and College of Science and Technology.

- Sustainable Mining activities include: review of existing institutional mechanisms for the implementation of mining law and regulations, and strengthening them to enhance law enforcement; training support to private mining companies to develop their technical capacity for environmental management of mining

operations and restoration of mined areas; development of environmental codes of practices for mining activities and making its application mandatory; ensuring all mining companies have submitted environmental management plan and mine restoration plan as per acceptable standard by the end of 2010; capacity development of the Department of Geology and Mines and collaborating agencies for monitoring, inspection, regulation and technical backstopping of environmental management activities of mining operations; cost-benefit analysis of various mining operations in the geologically fragile southern foothills; and dialogue with West Bengal (India) state government authorities to establish a bilateral mechanism to curb illegal mining along border areas.

- Sustainable Urban Development activities include: promotion of regionally-balanced urban development; control of the growth of Thimphu and Phuentsholing urban centers and enhancement of environmental management in these centers; improvement of municipal governance and strengthening municipal capacity to effectively manage urban environments; integrated rural-urban planning to address rural-urban migration and bring about balanced development of rural and urban areas; ecological mapping and zoning of all major urban centers and their peripheries and protection/ rehabilitation of ecologically vulnerable areas.

- Solid Waste Management activities include: introduction of a system for waste segregation at source and adoption of proper landfill management practices; establishment of waste recycling hubs in major towns; creation of appropriate implementation mechanisms for the recently enacted Waste Prevention and Management Act 2009; and public awareness campaigns to change public attitude and inculcate healthy habits for proper waste care and disposal.

Strengthening of Systemic and Institutional Capacity

- Policy and Legislation Development includes: development of a National Land Use and Management Policy; formulation of a National Mining and Mineral Development Policy laying out Bhutan's fundamental position and principles for mining; finalization and ratification of the long due Grazing Management Policy and Act.

- Strengthening Enforcement of Environmental Laws and Regulations includes: assessment of the institutional capacity and identification of capacity needs for the enforcement of various environmental laws and regulations, and strengthening institutional capacities based on the assessment; strict enforcement of the full range of procedures and processes for environmental assessment and clearance on projects which inherently have very high potential of adverse environmental impacts; development of the technical capacity of Dzongkhag Environment Officers and other members of DEC to implement EA process; development of the technical capacity of Competent Authorities within the line Ministries to implement EA process; development of NEC's capacity to carry out compliance monitoring of EA Act and Regulations and provide technical backstopping to the Competent Authorities and DECs; and creation of public awareness of environmental laws and regulations, including their rights and responsibilities, to foster active public participation and support to law enforcement.

- Institutional Development includes: creation a cross-sectoral agency, within NLC or NEC, for overall technical coordination of national land use and management; strengthening the institutional capacity of the Department of Disaster Management and Dzongkhag Administrations to effectively deal with natural disasters; and establishment of a central weather organization supported by regional real-time weather stations for weather monitoring and forecasting.

Information, Advocacy and Education for Policy and Public Support

These include a country-wide quantitative survey of land degradation to assess the nature, extent and scale of land degradation and generate quantitative information to primarily inform decision-making, provide baseline for monitoring land degradation trends, support awareness raising programs, and aid planning of geographically-targeted actions to combat land degradation. Another significant information development activity would be to create a national website dedicated to land degradation issues, through which information views and solutions on land degradation can be exchanged. This website could also contain a "Bhutan-Land Degradation Information System", which could be developed using the data accrued from the land degradation survey. Development and use of Bhutan Environment Outlook/ State of the Environment Reports for advocacy and public education, and production of a TV documentary series highlighting land degradation trends and issues have also been recommended.

NAP Implementation Mechanism

A three-tier mechanism has been outlined for implementation of NAP. At the highest level, it is proposed that a NAP Steering Board (NAP-SB) be constituted for overall supervision and guidance in the implementation of the NAP and to resolve policy and coordination issues if and when they emerge. At the next level, a NAP Monitoring and Coordination Committee (NAP-MCC) is proposed for monitoring and coordinating the implementation of the NAP. At the third level, it is proposed that focal persons be identified in each of the agencies that will have a role in the implementation of NAP. These focal persons will be responsible for submitting progress reports on the implementation of NAP activities belonging to their agencies.

Part A

Introduction and Country Context

1. Overview of the UNCCD

1.1 The Conception of UNCCD

Desertification and land degradation are environmental problems of global dimension. It is estimated that worldwide 1.97 billion hectares of all usable land have been affected by various forms of human-induced land degradation[1]. Deforestation, overgrazing, fuelwood consumption, agricultural mismanagement, industries, urbanization, and infrastructure development are the key causes. Poverty, population growth and natural factors such as extreme climate and unstable geology also contribute significantly. Desertification and land degradation reduce carbon sequestration and storage, increase carbon emission, diminish agricultural productivity, lead to loss of biodiversity, adversely impact water resources such as by means of sedimentation, and increase vulnerability to natural disasters.

The problems of desertification and land degradation were internationally recognized long ago. The United Nations Conference on Desertification (UNCOD) held in 1977 at Nairobi, Kenya, urged the international community to halt land degradation and implement restoration activities. The Conference produced a Plan of Action to Combat Desertification.

In June 1992, the United Nations (UN) convened the UN Conference on Environmental and Development (UNCED), more popularly known as the Earth Summit, at Rio de Janeiro, Brazil, to discuss the wide range of environmental concerns and to come to an understanding of "development" that would support socio-economic development and prevent the continued deterioration of the environment. The Earth Summit laid the foundation for global partnerships between the developing and developed nations, based on mutual needs and common interests that would ensure environmentally sustainable development. Altogether 172 governments, including 108 represented by heads of State or Government, participated in the UNCED.

At the UNCED, the international community adopted Agenda 21 – a blueprint of action on environment and development for the 21st century – and reaffirmed the need for managing fragile ecosystems to combat desertification. They also called on the UN General Assembly to establish an Intergovernmental Negotiating Committee to prepare a legally binding international instrument to combat desertification. Consequently, a series of international negotiations led to the formulation and adoption of the UN Convention to Combat Desertification (UNCCD) in June 1994. The UNCCD came into force in December 1996, i.e. 90 days after 50 countries had deposited the instrument of ratification. Bhutan acceded to the UNCCD in August 2003. Altogether, as of December 2008, 193 countries had become party to this immensely consequential international treaty.

It is estimated that worldwide 3.6 billion hectares, i.e. a quarter of the Earth's land area, are being affected by desertification and various forms of land degradation.

[1] FAO, 1996, in Global Environment Outlook 3

1.2 The Objectives of UNCCD

The main objective of the UNCCD is to "to combat desertification and land degradation and mitigate their effects through effective action at all levels, supported by international cooperation and partnership arrangements, in the framework of an integrated approach which is consistent with Agenda 21 with a view to contributing to the achievement of sustainable development in affected areas.[2]" This objective requires holistic strategies that focus on improved productivity of land, the rehabilitation, conservation and sustainable management of land resources, leading to improved living conditions of communities.

The UNCCD aims to promote effective action through innovative local programs and supportive international partnerships. Key obligations under the UNCCD are outlined below:

- Adoption of an integrated approach addressing the physical, biological and socio-economic aspects of the processes of land degradation[3]. Such an approach should include strategies for poverty reduction into efforts to combat land degradation and mitigate its effects;
- Establishment of institutional mechanisms to combat land degradation and its effects;
- Placing priority to combating land degradation and mitigating its effects and allocation of adequate resources in accordance with national circumstances and capabilities;
- Establishment of strategies and priorities to combat land degradation and mitigate its effects within the framework of national sustainable development plans and/or policies;
- Awareness building and facilitation of the participation of local communities, particularly women and youth, with the support of NGOs in efforts to combat land degradation and mitigate its effects;
- Creation of an enabling environment by strengthening, as appropriate, relevant existing legislation and, where they do not exist, enacting new laws and establishing long-term policies and action programs;
- Development and implementation of a national action program to combat land degradation and mitigate its effects, and its enhancement through a continuing participatory process on the basis of lessons learned from field action and results from research.

[2] In this document, a slight modification to the original UNCCD text has been made in view of the broader scope that the UNCCD has assumed since its conception.

[3] The original UNCCD text refers to desertification and drought. However, in the context of Bhutan the term "land degradation" is considered more appropriate and comprehensible, and therefore has been used in place of desertification.

2. NAP in the Bhutanese Context

2.1 The Rationale for NAP

National Action Programs (NAPs) are a key tool for the implementation of the UNCCD at the country level. They are strengthened by Action Programs at sub-regional and regional levels. As of December 2008, 91 countries had prepared and submitted full-size NAPs to the UNCCD.

The Royal Government of Bhutan (RGoB) has been implementing various programs and projects to combat land degradation since the advent of Five Year Plans (FYPs) in the early 1960s but they have been largely taking place in a piecemeal fashion within individual sector plans and basically without macro-level strategic perspective. The *Report on the Review of Sustainable Land Management Mainstreaming in Government Policies and Plans in Bhutan*, produced by the National Soil Services Centre, Ministry of Agriculture, in October 2008, observes that while targeted programs and projects for sustainable land management (SLM) have increased in the Tenth FYP when compared to the Ninth FYP, they remain basically sector-based as in the past. The review further observes that green sectors such as agriculture and forestry feature SLM more strongly in their policies and programs whereas brown sectors, especially those concerning infrastructure development and urban development, have only cursory or no reference to SLM in their policy and programmatic frameworks. It calls for a broader perspective and an integrated approach to combat land degradation as a problem which cuts across various development sectors. Hence, NAP, regardless of being an obligation under the UNCCD, is an opportunity for us to take stock of existing measures, identify new ones, and consolidate and direct future actions to combat land degradation problems and their causes in a more strategic and holistic manner using participatory approaches that capture the insights, experience and views of various stakeholders.

NAP calls for a broader perspective and an integrated approach to combat land degradation as a problem which cuts across various development sectors.

2.2 The Importance of Combating Land Degradation

The Bhutanese economy essentially revolves around how land and the resources therein are used and managed. Crop agriculture, livestock rearing, and use of forest products are the economic mainstays of the rural Bhutanese, who make up 69 percent of the country's population. The stability and productivity of arable land, rangeland and forests are therefore critical for the sustenance of rural economy. Hydropower, which is the largest revenue-generating industry and the main engine of socio-economic development, is very much dependent on sound land use and management practices in the watersheds. The mining industry, which in recent years has reportedly registered the highest growth rate among all sectors, can have severe impacts on the land and surrounding environment (air, water, and biodiversity) if essential environmental safeguards and land management measures are not implemented. Similarly, infrastructure development such as construction of roads and power transmission grids, which are necessary for equitable socio-economic development, can have disastrous consequences if geologic stability considerations and environmental management needs are not incorporated in their alignment, design and construction.

Habitable and usable land in Bhutan is severely limited (less than eight percent) as a result of difficult mountain terrain, vast areas of snow and barren rocks, harsh climatic conditions, and vast forest cover, which by law is to be maintained at no less than 60 percent at all times. This has inadvertently led to increased land use competition between various development sectors often without adequate consideration of land capability and environmental management needs. SLM based on holistic approach, involving inter-sectoral dialogue and coordination, is critical to harmonize competitive land use.

Furthermore, the benefits of actions to combat land degradation in Bhutan will not be limited to the country but will be trans-boundary in geographic scale. The protection of watersheds in Bhutan from adverse land use practices, whilst being crucial to sustain hydropower development and agriculture within the country, will also be enormously important to the livelihoods of many downstream communities in the floodplains of India and Bangladesh, who largely subsist on crop agriculture and fishery.

It is also important that we take proactive measures to combat land degradation and its impacts because our landscapes are extremely vulnerable to climate change as a result of the fragile geologic conditions, intense rainfall, and rugged topography. Not only do well-managed landscapes play an important role in moderating the impacts of climate change, they also function as a major carbon sink.

Finally, with the advent of democracy, new environmental challenges are expected to emerge. In the new political scenario, there is the risk of short-term economic development needs of the public taking precedence over the long-term benefits of environmental conservation. In the changing social, economic and political scenarios, proactive and concerted actions for sustainable management of our landscapes have become more crucial than ever before.

2.3 The Process of NAP Preparation

The NAP has largely been derived from a broad-based consultative and participatory planning process, involving a wide range of stakeholders.

The NAP process in Bhutan was initiated with an Inception Workshop on 29th October, 2008, followed by a Process Framework Workshop on 29th December, 2008. These workshops familiarized the representatives of various stakeholder agencies with the concept and objectives of UNCCD and NAP, and discussed the NAP structure and process framework particularly with respect to stakeholder consultations and participatory planning.

Based on the adopted NAP process framework, community consultations were held in 13 geogs[4] to understand land degradation problems and issues at the local community level on a first-hand basis. Altogether, 327 local people participated in the community consultations in various geogs. They included local community leaders, village elders, youths, and women. In order to capture experience as well as new perceptions, local people across various age groups were involved in the community consultations. Persons below 30 years of age made up 18.6 percent of the local people who participated in the community consultations while persons above 60 years made up 15 percent. In addition, 77 local government staff participated in the community consultations in various geogs as observers, providing clarifications and additional insights whenever necessary.

[4] A geog is the smallest geographical unit for public administration, made up of a block of villages.

After the community consultations, a series of four regional consultative workshops were organized in April 2009, in collaboration with the respective regional Renewable Natural Resources Research Centres (RNR-RCs). The workshop for the eastern region was held at RNR-RC, Wengkhar, for the east-central region at RNR-RC, Jakar, for the west-central region at CNR, Lobesa, and for the western region at NSSC, Semtokha. In all, 113 people participated in the workshops. These participants were officials from the agriculture, livestock development, forestry, planning, engineering, and environment sectors of various dzongkhag administrations, and from the territorial forestry divisions and regional RNR-RCs. At the regional consultative workshops, facilitated by the NAP consultant, the participants analyzed land degradation problems and issues, identified the causes, and outlined possible activities to address these causes.

On completion of the regional consultative workshops, the NAP consultant collated and analyzed the results of the workshops as well as those of the community consultations held at geog level to put together the draft NAP document. In preparing the draft NAP, existing documents related to land degradation and sustainable land management were also reviewed and meetings with individuals in various organizations were held for additional information, insights and clarifications.

Table 1: Number of Community Consultation Participants by Age Group

Geog (Dzongkhag)	Below 30 years	30 – 60 years	Above 60 years	Total
Bjena (Wangdue)	2	17	4	23
Bumdeling (Trashiyangtse)	8	14	2	24
Dala (Chhukha)	9	21	1	31
Drujegang (Dagana)	4	15	2	21
Gelephu (Sarpang)	1	14	3	18
Hungrel (Paro)	2	7	5	14
Langthel (Trongsa)	5	20	2	27
Mewang (Thimphu)	5	13	6	24
Orong (Samdrup Jongkhar)	6	26	10	42
Pugli (Samtse)	3	21	8	32
Semjong (Tsirang)	6	12	2	20
Talo (Punakha)	0	18	2	20
Zobel (Pemagatshel)	10	19	2	31
Total (all geogs)	61	217	49	327

The first draft of the NAP was presented to representatives from various organizations on 17th June, 2009, which was also the World Day to Combat Desertification. The draft was then revised, incorporating comments received at the presentation of the first draft, and circulated for wider review and feedback. The final draft of the NAP was presented at a high-level workshop, chaired by the Honorable Minister of Agriculture, on 12th August, 2009.

All the people who participated in various workshops/meetings and were consulted during the course of preparation of the NAP are listed in Appendices 4, 5 and 6.

3. Country Overview

3.1 General Settings

3.1.1 Geo-political Situation

The Kingdom of Bhutan is a small country with a total area of 38,394 km^2 in the Eastern Himalaya. Landlocked and mountainous, the country is bordered by the Indian states of Arunachal Pradesh to its east, Assam and West Bengal to its south, and Sikkim to its west, and the Tibetan Autonomous Region of China to its north and north-west.

Administratively, the country is divided into 20 dzongkhags. The dzongkhags are further divided into several geogs. At the present, there are altogether 205 geogs in the country. Some of the dzongkhags, namely Chhukha, Samdrup Jongkhar, Samtse, Sarpang, Trashigang, and Zhemgang, have sub-districts, known as dungkhags in Bhutanese.

3.1.2 Physiography

Bhutan's terrain is almost entirely mountainous with nearly 95 per cent of the country being above 600 meters (m) (see Figure 1). The terrain is rugged and steep, with altitudes declining from above 7,500 m to under 200 m within a short north-south distance of 170 km. The country can be divided into three broad physiographic zones: one, **the southern belt** consisting of the Himalayan foothills adjacent to a narrow belt of flatland (Duars) along the Indian border with altitude ranging from under 200 m to about 2,000 m; two, **the inner Himalayas** made up of the main river valleys and steep mountains with altitude ranging from about 2,000 m to 4,000 m; and, three, **the great Himalayas** in the north along the Tibetan border consisting of snow-capped peaks and alpine meadows above 4,000 m.

Figure 1: Percentage of Area by Altitudinal Range

3.1.3 Climate

The climate is dominated by southwestern monsoon, which originates from the Bay of Bengal and accounts for 60 to 90 percent of the annual precipitation. Generally, the monsoon starts from June and lasts until early September. Occasionally, during October and November post-monsoon rain occurs and can be sometimes severe. The period from November to March is usually dry, although brief showers may occur due to the westerly wind that brings winter rains in the Himalayan foothills. During April and May, pre-monsoon occurs with light showers. Mean annual rainfall varies from approximately 2,500 to 5,500 millimeters (mm) in the southern foothills, from 1,000 to 2,500 mm in the middle valleys and inner hills, and from 500 to 1,000 mm in the northern part of the country. The country can be divided into three broad climatic zones: sub-tropical in the southern foothills; temperate in the middle valleys and inner hills; and alpine in the northern mountains. Generally, southern foothills are hot and humid during summer and cool in winter. The middle valleys and inner hills are warm in summer and cold in winter, with a pleasant spring and autumn. The alpine mountains are cold through out the year with long icy winter conditions.

3.1.4 Geology

In Bhutan, three main geo-tectonic units have been recognized: the Frontal Belt, making up the foothills and parts of the Lesser or Lower Himalaya; the Central Crystalline Belt, occupying portions of the Lesser and Higher Himalaya; and the Tethyan Belt, covering the Higher Himalaya and isolated but large portions of the Lesser Himalaya.

The Frontal Belt consists of recent deposits of sand, gravel, and boulders in the foothill terraces. The Siwalik group of rocks consists of sedimentary and metasedimentary rocks extending in an east-west direction and dipping north. They are exposed in the south-central part of the country extending from the east of Raidak river (Wang Chhu) to the west of Sarpang town and in the eastern part from the east of Manas river to the eastern boundary with the Indian state of Arunachal Pradesh. The Damuda (Gondwana) and Diuri Formations are exposed in the eastern part of the country. The Damuda rocks of Permian age consist of sandstone, shale, and coal seams; they overlie the Siwalik rocks along the Main Boundary Thrust. The Diuri Formation, at times considered part of the Damuda, comprises grey slate boulders, made up of pebbles of quartzite, phyllite, dolomite, and gneiss in a slaty matrix. The Buxa group of rocks consists of dolomite, variegated phyllite, quartzite, and conglomerate. This group of rocks stretches from the western-most part of the country to the east along the foothills. The Shumar Formation overlies the Buxa group and consists of metasedimentary phyllite, quartzite, and thin marble bands.

The two main lithological groups of metamorphic thrust sheets of the Central Crystalline Belt are the Thimphu Gneissic Complex and the Paro Formation. The Thimphu Gneissic Complex is characterized by migmatites and biotite-granite-gneisses with thin beds of quartzite, quartz mica schist, calc-silicate, and marble, and is the major rock type covering the country. The Paro Formation is characterized by quartz mica schist, quartzite, calc-silicate, marble, and a thin bed of graphitic schist, and this is exposed in and around Paro. The Central Crystalline Belt is affected by intrusion of tourmaline bearing granites and pegmatites in the form of dykes, sills, laccoliths, and larger intrusions. The larger intrusive bodies are concentrated in the northern ranges.

The metamorphic and granitised contact of the Tethyan rocks with the underlying Thimphu Gneissic Complex is gradational. The Tethyan rocks are exposed in the extreme north of the country and the central area of Black Mountains and their surroundings. This rock type basically comprises quartzite, siltstone, sandstone, phyllite, slate, limestone, and conglomerate.

3.1.5 Demography

According to the Population and Housing Census of Bhutan (PHCB) 2005, the country's total population in 2005 was 634,982 with a growth rate of 1.3 percent per annum and a population density of 16 people per km^2. For 2009, the National Statistics Bureau (NSB) has projected a total population of 683,407, which translates to a projected population density of 18 people per km^2.

The majority of the Bhutanese are a homogenous group divided into three main ethnic groups: the Sharchops (inhabitants of the east); the Ngalongs (inhabitants of the west); and the Lhotshampas, (inhabitants of the south). There are also a number of smaller groups and communities with distinct dialects and cultural nuances. These include Bumthaps in Bumthang, Khengpas in Zhemgang and in parts of Mongar and Dagana, Monpas in Trongsa, Kurtoeps in Lhuentse, Layaps and Lunaps in Thimphu, Brokpas and Dakpas in Trashigang, and Doyas in Samtse. The ethnic divisions are, however, gradually fading as a result of growing inter-marriage, inter-regional migration and population mobility.

3.1.6 Economy

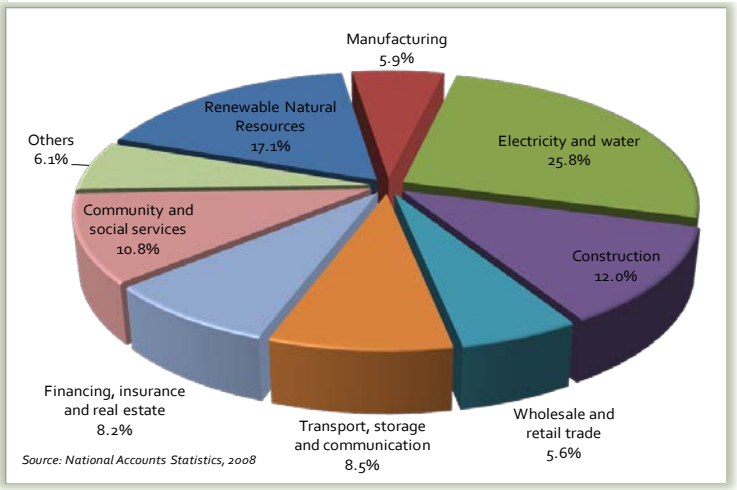
Bhutan's economy is one of the smallest in the world but one which is growing very fast. From 2000 to 2007, the country's Gross Domestic Product (GDP) has grown at an average of 9.1 percent per annum. The Bhutanese economy basically revolves around four key sectors, namely hydropower, renewable natural resources (RNR) encompassing agriculture, livestock development and forestry, tourism, and industry.

Bhutan is endowed with abundant hydropower resources as a result of high precipitation, extensive forest cover and well-preserved watersheds. At the present, the country has a total installed hydropower capacity of 1,488 megawatts (MW). In the next five to ten years, the total installed capacity is expected to increase to 4,359 MW with the completion of ongoing and pipeline hydropower projects. These include Punatsang Chhu I and II, Mangdechhu, and Dagachhu hydropower projects. Income from export and domestic sale of hydropower has increased by more than double from Nu. 2,307.4 million in 2000 to Nu. 5,581.8 million in 2006. The increase was boosted by the commissioning of Kurichhu hydropower project in 2001, Basochhu hydropower project in 2002, and Tala hydropower project in 2006. Hydropower resources accounted for more than 25 percent of the GDP in 2007 (see Figure 2).

The RNR sector, which is made up of agriculture, livestock development and forestry, accounted for 17.1 percent of the GDP in 2007. This sector is very crucial for a sustainable economy as the rural communities, which make up 69 percent of the country's total population, primarily depend on it for their livelihoods.

Despite the policy of "low volume, high value" tourism, the number of tourist arrivals and consequent tourism revenue have grown significantly over the years. The number of tourist arrivals increased from 4,765 in 1995 to 7,559 in 2000 and to 21,094 in 2007. Consequently, direct revenue from tourism increased from US$ 5.8 million in 1995 to US$ 10.5 million in 2000 and to US$ 29.9 million in 2007. Growth in tourism has been due to the "exclusivity" factor stemming from well-preserved culture and relatively unspoiled nature as well as a result of improvement in communications and marketing.

Figure 2: Gross Domestic Product Share by Sectors, 2007



The industrial sector has grown steadily over the years. Income from exports and domestic sales of major industries has increased from Nu. 2,446.5 million to Nu. 6,069.2 million in 2007. The prospect of mega-scale industrial development in Bhutan is limited because of mountainous topography and small domestic workforce.

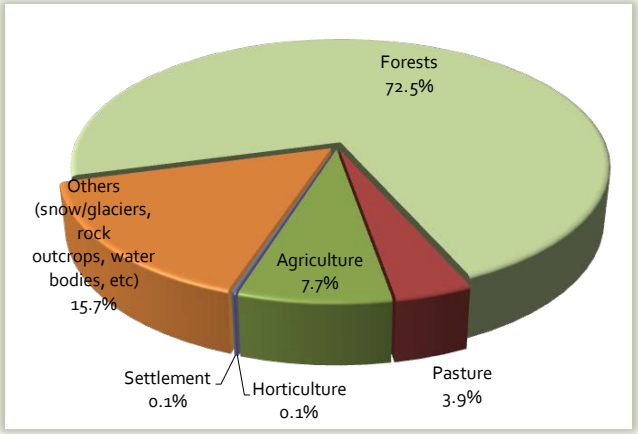
3.2 Environmental Settings

3.2.1 Land Use and Cover

Forests account for 72.5 percent (including 8.1 percent scrub forest) of the country's land cover – one of the highest in the world[5]. Almost all forests in the country are natural, with plantation forest being just about 0.2 per cent. Broadleaf forests and mixed conifers are the main forest types. Other forest types include fir, broadleaf with conifers, blue pine and chir pine. The country's forests are presently managed as government reserved forests under the legal framework of the Forest and Nature Conservation Act 1995. The Bhutanese society, especially those living in the rural areas, depend heavily on forests for timber, fuelwood, roofing shingles, cattle fodder, and many edible, medicinal and aromatic plants.

While the rural communities, which make up 69 percent of the Bhutanese population, largely subsist on farming, agricultural lands make up less than eight percent of the country's total area. These lands are mostly located in the central valleys and adjoining slopes, and in the southern foothills. The main land uses for agriculture are kamzhing (dryland cultivation), chhuzhing (wetland cultivation), and mixed cultivation.

Figure 3: Land Cover in Percentage



Kamzhing is either terraced or unterraced rainfed agricultural land. It is found throughout the country, mainly on mountain slopes. It is the most dominant agricultural land use type. Maize and potato are the main crops grown on kamzhing. Besides these crops, other annual crops such as mustard, buckwheat, turnip and vegetables are grown in the temperate areas. In the subtropical areas, millet is grown as a secondary crop. Under kamzhing, there also exists the practice of tseri, i.e. slash-and-burn agricultural production. Tseri areas are cultivated on a rotational basis with an average fallow period of 5 to 6 years, with periods being shorter in the subtropical areas and longer in the temperate areas. The land is left fallow to allow regeneration of vegetative cover and soil nutrients. Common tseri crops are maize, millet, wheat, barley, and buckwheat. Other crops such as chili, beans and leafy vegetables are grown as inter-crops. Since tseris are generally located inside or adjacent to forests, crop depredation by wildlife is high. The practice of tseri is being discouraged in the country for environmental and economic reasons, and suitable alternatives are being explored and promoted.

Chhuzhing is irrigated, bench terraced paddy cultivation. While rice is the primary crop, other crops such as wheat, potatoes and vegetables are grown as secondary crops in some places. In the subtropical areas, paddy can also be grown twice in a year. Chhuzhing is mainly found in the fertile valleys of Paro, Wangdue and Punakha. In other parts of the country such as Trashigang, Mongar, Lhuentse and Trongsa, chhuzhing is found scattered on hill slopes. In southern foothills, it can be found in long and extensive stretches, and is partly rain-fed.

[5] Land use and cover figures currently in use are based on data dating back to early 1990s. The Ministry of Agriculture is currently reviewing and updating the land use and cover figures, including more detailed categorization than the previous version.

The rest of the land cover is basically snow and glaciers (7.5 percent), barren rocks (5 percent) and pastures (3.9 percent). Urban area is presently negligible but increasing rapidly with the expansion of Thimphu and Phuentsholing towns, and emergence of new townships such as in Mongar and Paro.

3.2.2 Water Resources

The country has an extensive network of rivers, rivulets and streams arising from high level of precipitation, presence of numerous glaciers and glacial lakes, and relatively well-preserved forests. The country's river system can be divided into four major river basins, namely Amo Chhu (Toorsa), Wang Chhu, Puna Tsang Chhu (Sunkosh), and Drangme Chhu (Manas)[6]. Drangme Chhu, which is the largest river basin, drains more than one-third of the country. In addition, there are several small river basins occupying largely the southern part of the country. These include Samtse Area multi-river, Gelegphu Area multi-river, Samdrup Jongkhar Area multi-river, and Shingkhar-Lauri multi-river.

In addition, there are a number of small and medium-sized lakes spread across the country but, at the present, no systematic assessment of the area and location of various lakes in the country, excepting the glacial lakes, has been carried out. As for glacial lakes, the Inventory of Glaciers, Glacial Lakes and Glacial Lake Outburst Floods in Bhutan produced in 2001 by the Department of Geology and Mines reports a total of 2,674 lakes in the country[7]. However, most of the glacial lakes are extremely small. The largest of all the lakes is the Raphstreng Tsho at an altitude of 4,360 m in the eastern part of Lunana[8].

Table 2: River Systems of Bhutan

River Basin	Major Tributaries	Basin Area (km^2)
Amo Chhu (Toorsa)	-	2,400
Wang Chhu	Thim Chhu, Pa Chhu, Haa Chhu	4,689
Punatsang Chhu (Sunkosh)	Mo Chhu, Pho Chhu, Dang Chhu, Daga Chhu	10,355
Drangme Chhu (Manas)	Mangde Chhu, Chume Chhu, Chamkhar Chhu, Kuri Chhu, Kholong Chhu, Gongri Chhu	16,599
Samtse Area multi-river	-	962
Gelegphu Area multi-river	-	1,956
Samdrup Jongkhar multi-river	-	2,279
Shingkhar-Lauri multi-river	-	779

Source: Water Resources Management Plan. DoE, 2003

3.2.3 Biological Diversity

Bhutan's biological diversity is considered one of the most outstanding for a country of its size. The country's location at the junction of two major biogeographic realms – the Palearctic realm of the temperate Eurasia and the Indo-

[6] The names within the parenthesis are the ones used in southern parts of the country and the adjoining states of India.

[7] The Inventory was produced with support from the International Center for Integrated Mountain Development and the United Nations Environment Program.

[8] The lake measured 1.94 km long, 1.13 km wide, and 107 m deep (WAPCOS, 1997).

Malayan realm of the tropical Indian subcontinent – and its extremely heterogeneous physical relief and climatic conditions, have given rise to a diversity of ecosystems ranging from the hot and humid subtropical forests and grasslands through temperate mountain forests and valleys to alpine scrublands and meadows.

The country's diverse ecosystems harbor a remarkable assortment of wild flora and fauna. The Flora of Bhutan, published by the Royal Botanic Garden of Edinburgh, has recorded 5,603 species of vascular plants, including 105 species that are endemic – found nowhere else in the world[9]. The country's wild fauna includes 677 species of birds and close to 200 species of mammals. These include several globally threatened species such as the Bengal tiger *Panthera tigris tigris*, snow leopard *Uncia uncia*, Asian elephant *Elephas maximus*, red panda *Ailurus fulgens*, golden langur *Trachypithecus geei*, takin *Budorcas taxicolor* (which is also the national animal of Bhutan), white-bellied heron *Ardea insignis*, and black-necked crane *Grus nigricollis*[10]. Other wild fauna, such as herpetofauna and invertebrates, although only partially assessed so far, are also expected to occur in significant numbers.

To give an idea of the kind of crop genetic diversity that is present in the country; there are some 350 landraces of rice, 47 of maize, 24 of wheat, and 30 of barley.

In terms of agro-biodiversity, there are more than 80 species of agricultural crops and 15 species of livestock. Some of these have adapted in the country's rugged mountain and harsh climatic conditions and, therefore, bear distinctive features. Consequently, genetic variations of food crops can be found in very high numbers. To give an idea of the kind of crop genetic diversity that is present in the country; there are some 350 landraces of rice, 47 of maize, 24 of wheat, and 30 of barley.

[9] All figures pertaining to biodiversity cited in this document are from the Biodiversity Action Plan for Bhutan 2009.

[10] Globally threatened species are those which are characterized as critically endangered, endangered, or vulnerable in the Red List of Threatened Species maintained by the World Conservation Union (IUCN).

Part B

Existing Conditions for Combating Land Degradation in Bhutan

4. Policy and Legal Framework

4.1 Overall Development Policy Context

4.1.1 Gross National Happiness Philosophy and Bhutan 2020

Development processes in Bhutan are to be based on the overarching development philosophy of "Gross National Happiness" (GNH), first propounded by His Majesty the Fourth Druk Gyalpo Jigme Singye Wangchuck in the 1980s. While conventional development models stress economic growth as the ultimate objective, the concept of GNH is based on the premise that true development of human society takes place when material, spiritual and emotional well-being occur side by side to complement and reinforce each other.

The GNH philosophy recognizes environmental sustainability as a key ingredient of development. It advocates a multi-dimensional development approach that seeks to maintain harmony and balance between economic growth, environmental sustainability, cultural preservation, and good governance. 'Bhutan 2020', the country's vision document outlining development goals, objectives and targets with a twenty-year perspective, enunciates the following four essential constituents to maximize GNH:

The concept of GNH is based on the premise that true development of the human society takes place when material, spiritual and emotional well-being occur side by side to complement and reinforce each other.

- Equitable socio-economic development, ensuring equity between individuals and communities as well as regions to promote social harmony, stability and unity and to contribute to the development of a just and compassionate society.

- Conservation of the environment, ensuring development pursuits are within the limits of environmental sustainability and are carried out without impairing the biological productivity and diversity of the natural environment.

- Preservation and promotion of culture, instilling appreciation of the cultural heritage and preserving spiritual and emotional values that contribute to happiness and cushion the people from the negative impacts of modernization.

- Promotion of good governance, developing the country's institutions, human resources and systems of governance and enlarging opportunities for people at all levels to fully participate and effectively make development choices that are true to the circumstances and needs of their families, communities and the nation as a whole.

4.1.2 Environmental Conservation as a Constitutional Mandate

In keeping with the country's longstanding commitment to environmentally sustainable development and recognition of environmental conservation as one of the cornerstones of GNH, the Constitution of the Kingdom of Bhutan, which was formally adopted on 18th July, 2008, explicitly features environmental conservation as a constitutional mandate. Article 5 of the Constitution stipulates that:

- Every Bhutanese is a trustee of the Kingdom's natural resources and environment for the benefit of the present and future generations and it is the fundamental duty of every citizen to contribute to the protection of the natural environment, conservation of the rich biodiversity of Bhutan and prevention of all forms of ecological degradation including noise, visual and physical pollution through the adoption and support of environment friendly practices and policies;

- The Royal Government shall: (a) protect, conserve and improve the pristine environment and safeguard the biodiversity of the country; (b) prevent pollution and ecological degradation; (c) secure ecologically balanced sustainable development while promoting justifiable economic and social development; and (d) ensure a safe and healthy environment;

- The Government shall ensure that, in order to conserve the country's natural resources and to prevent degradation of the ecosystem, a minimum of sixty percent of Bhutan's total land shall be maintained under forest cover for all time;

- The Parliament may enact environmental legislation to ensure sustainable use of natural resources and maintain intergenerational equity, and reaffirm the sovereign rights of the State over its own biological resources; and

- The Parliament may, by law, declare any part of the country to be a National Park, Wildlife Reserve, Nature Reserve, Protected Forest, Biosphere Reserve, Critical Watershed and such other categories meriting protection.

4.2 Existing Policies and Strategies

4.2.1 National Forest Policy

The National Forest Policy is the earliest policy document to stipulate among other things the protection of land and the natural resources therein against degradation. The Policy, which was first formulated in 1974 and subsequently revised in 1979 and 1991, serves as the main guiding policy framework for development of forestry programs, plans, supplementary policies, laws and regulations.

The Policy aims to ensure conservation of the environment, and only thereafter aims at deriving economic benefits from the forest as rationally managed resource. Economic benefits from forest resources are considered secondary and are to be derived only within sustainable limits. It hinges on the following four key principles:

- Protection of the land, its forest, soil, water resources and biological diversity against degradation, such as loss of soil fertility, soil erosion, landslides, floods and other ecological devastation and the improvement of all degraded forest land areas, through proper management systems and practices;

- Contribution to the production of food, water, energy and other commodities by effectively coordinating the interaction between forestry and farming systems;

- Meeting the long-term needs of Bhutanese people for wood and other forest products by placing all production forest resources under sustainable management;

- Contribution to the growth of national and local economies, including exploration of export opportunities, through fully developed forest based industries, and to contribute to balanced human resources development through training and creation of employment opportunities.

The National Forest Policy is currently under review and revision to address new and emerging forest conservation issues and needs. Four regional consultative workshops have been held and final deliberation of the policy document is ongoing. The existing draft of the revised National Forest Policy, among other things, stresses on people-centered forest management and sustainable use of forest products and services for economic growth and poverty reduction.

4.2.2 National Environment Strategy

The National Environment Strategy titled "The Middle Path", published in 1998, was derived through an inter-sectoral, consultative process. The Strategy, which can be equated to a National Sustainable Development Strategy, enshrines the concept of sustainable development and identifies three main avenues for such development: hydropower development based on integrated watershed management; agricultural development based on sustainable practices; and industrial development based on effective pollution controls and environmental legislation. It also outlines areas of special importance for environmentally and culturally responsive economic development. These include tourism, roads, financing for sustainable development, public health, urbanization, gender mainstreaming, environmental impact assessments, and population management. Finally, it goes on to outline five key cross-sectoral needs that the country must effectively address to integrate environmental considerations into economic development planning and policy-making. These needs pertain to information systems and research, institutional development, popular participation, policies and legislation, training and education, monitoring, evaluation and enforcement.

The National Environment Strategy identifies three main avenues for sustainable development: hydropower development based on integrated watershed management; agricultural development based on sustainable practices; and industrial development based on effective pollution controls and environmental legislation.

4.2.3 Bhutan Water Policy

The Bhutan Water Policy was developed under the aegis of Bhutan Water Partnership, a collaborative entity made up of a broad range of stakeholder agencies related to water resources use and management. The Policy, which was adopted in April 2003, covers all forms of water resources including snow, glaciers, rivers, lakes, streams, springs, wetlands, rainwater, soil moisture and groundwater. The Policy establishes Bhutan's water vision which states that "water will continue to be available in abundance to pursue socio-economic development in Bhutan. Present and future generations of Bhutanese people will have assured access to adequate, safe and affordable water to maintain and

enhance the quality of their lives." It views water resources from a broad, multi-sectoral perspective while recognising the responsibility of the sub-sectors to play their part in meeting the policy objectives.

Recognizing that land use has direct impact on water resources, the Policy calls for land use planning at the river basin level. It also identifies surface water protection, watershed management, soil erosion control, and bioengineering as special areas of attention for applied research in water resources development and management.

4.2.4 National Urbanization Strategy

The Ministry of Works and Human Settlement (MoWHS) produced the National Urbanization Strategy in March 2008. The Strategy recognizes various adverse environmental impacts, including conversion of agricultural and forest lands, caused by current trends of urbanization. It calls for a proactive approach for regionally balanced urban development by way of integrating policy, financial and institutional interventions to support the emergence and channelization of growth into "regional growth centers." It has identified potential growth centers using a three-level (regional-dzongkhag-town) analysis of demographic, economic, environmental, and public infrastructure indices. Related to land use and management, it outlines the need for zoning of ecologically-vulnerable lands and institutional strengthening of the environmental units of the municipal bodies to address environmental degradation in urban areas.

4.2.5 Bhutan Sustainable Hydropower Development Policy

One of the key objectives of the Bhutan Sustainable Hydropower Development Policy is to "ensure that hydropower development is in accordance with the sustainable development policy of the Royal Government, keeping in view the fragile mountain ecosystem of the country." It is also expected to contribute to the development of hydropower as a clean energy that would mitigate problems related to global warming and climate change.

The Policy also provides for the creation of a Renewable Energy Development Fund which among other things could be used for environmental services in the form of hydropower upstream catchment protection and for renewable energy initiatives. It stipulates the RGoB to ensure that hydropower development is pursued in line with the environmental laws of the country, particularly in respect of carrying out comprehensive environmental impact assessment (EIA) and implementing environment management plan (EMP) to mitigate potential adverse environmental impacts. In addition, it recognizes the importance of sustainable agricultural land use and nature conservation in the catchment areas and calls for collaborative development of modalities for integrated sustainable water resources management by the Ministry of Agriculture (MoAF) and the Ministry of Economic Affairs (MoEA). This collaboration is to entail channeling of at least one percent of the royalty from hydropower sales on annual basis to the MoAF to initiate and implement integrated sustainable water resources management activities in the catchment areas.

4.2.6 National Disaster Risk Management Framework

The Natural Disaster Risk Management Framework (NRDMF) was launched in September 2006 by the Ministry of Home and Cultural Affairs (MoHCA). Most of the natural disasters (such as land slides and flash floods) identified in the NDRMF are either causes or results of land degradation. It was conceived with the objectives to:

- promote a disaster risk management approach instead of an *ad hoc* reactive approach to dealing with disasters;

- recognize the respective roles of different organizations in disaster risk management and provide all possible support to their work within the national framework for disaster risk management; and
- establish linkages between disaster risk management and the other ongoing activities in different development sectors such as environment (adaptation to climate change), governance (decentralization), health and education.

The Framework outlines four key strategic components of intervention, which include strengthening of institutional mechanisms at various levels, capacity development at dzongkhag and geog levels, knowledge management and partnerships, and mainstreaming of disaster risk management in development programs and plans.

4.2.7 Biodiversity Action Plan for Bhutan

Biodiversity Action Plans (BAPs) are "living documents" that report on the state of biological diversity in the country and describes actions that the government and its partners plan to take for the conservation and sustainable use of biological diversity in keeping with the principles and objectives of the Convention on Biological Diversity. So far, Bhutan has produced three Biodiversity Action Plans: the first in 1998, the second in 2002 and the latest in 2009. BAPs and NAPs to a great extent would complement one another as many of the issues, such as forest fires, overgrazing, infrastructure development and land use conversions, are common to both biodiversity loss and land degradation.

4.2.8 National Adaptation Program of Action for Climate Change

The National Adaptation Program of Action for Climate Change (NAPA) is a tool under the United Nations Framework Convention on Climate Change (UNFCCC) that provides a process for Least Developed Countries to assess their climate change issues and identify priority activities that respond to their urgent and immediate needs with regard to adaptation to climate change. The Bhutan NAPA was prepared in 2006 by the National Environment Commission in consultation with a wide range of stakeholders through a series of national and regional level workshops. It consists of a portfolio of nine priority projects, short-listed from an initial list of 55 project ideas based on an agreed set of criteria, to address urgent and immediate climate change adaptation needs. The NAPA projects pertain to landslide management, flood prevention and control, community-based forest fire management, disaster relief, mitigation of the effects of glacial lake outburst floods, and weather forecasting system. These projects are expected to contribute, directly or indirectly, to the mitigation of the causes and/or impacts of land degradation.

4.3 Existing Legislations and Supporting Regulations

4.3.1 Forest and Nature Conservation Act 1995

Bhutan Forest Act 1969, the country's first modern legislation, brought all forest resources under government custody with the intent to regulate forest utilization and prevent over-exploitation of forest resources. This law was repealed with the enactment of the Forest and Nature Conservation Act 1995 to address evolving conservation needs including community stewardship of forest resources. The objective of the 1995 Act is to "provide for the protection and sustainable use of forests, wildlife and related natural resources of Bhutan for the benefit of present and future generations."

Provisions to deal with land degradation are entrenched in the Act. Chapter VIII of the Act is dedicated to soil and water conservation matters. In addition, the Act covers sustainable forest management, protection of government reserved forests against illegal use, social and community forestry, and establishment and management of protected areas, all of which would contribute to combating land degradation and its impacts.

To support the implementation of the Forest and Nature Conservation Act 1995 and in accordance with the powers and duties conferred under that Act, the MoAF promulgated the **Forest and Nature Conservation Rules** in 2000, which underwent some revision in 2006. The Rules establish regulations for forest management, private and community forestry, establishment and management of protected areas, wildlife protection, prevention of forest fires, land clearance, and other activities potentially impacting soil, water and wildlife resources, among other things.

4.3.2 Mines and Mineral Management Act 1995

The Act recognizes the preservation, protection and setting of environmental standards and conservation of natural resources as critical requirements for sustainable mining practices. It requires that restoration of areas that are mined is carried out in a proper manner with the objective of creating a suitable and acceptable environment as approved by the National Environment Commission (NEC). Prior to granting a mining lease, a final mine feasibility study based on an assessment of technical, financial, environmental and social parameters, is required. Among other things, the feasibility study needs to contain a Mine Plan, Environment Management Plan and Mine Restoration Plan. These plans put together are to ensure that adverse environmental impacts, including those on land, from mining are minimal to the extent possible.

In exercise of the powers conferred by Article 50 of the Mines and Mineral Management Act 1995, the Ministry of Trade and Industry (now Ministry of Economic Affairs) promulgated the **Mines and Mineral Management Regulations 2002**. The Regulations stipulate the requirement of environmental clearance (Articles 32-34), conditions for environmental restoration bond (Articles 56-61), maintenance of records on mining operation including environmental protection measures (Article 86 clause 86.8), compliance with all emission limits and ambient air quality standards adopted by the NEC (Article 154 and 155), water, dust and noise pollution management needs (Articles 159-170), monitoring of environmental quality in and around the mine lease area, and reporting of the area's environmental state (Articles 182-184).

4.3.3 Environmental Assessment Act 2000

The Environmental Assessment (EA) Act 2000 is a very encompassing environmental law. It relates to environment in a holistic manner and applies to a wide range of activities across a number of sectors. The Act establishes procedures for the assessment of potential effects of strategic plans, policies, programs, and projects on the environment, and for the determination of policies and measures to reduce potential adverse effects and to promote environmental benefits. The Act requires the RGoB to ensure that environmental concerns are fully taken into account when formulating, renewing, modifying and implementing any policy, plan or program as per regulations that may be adopted within the appropriate provision of the Act. It makes environmental clearance (EC)[11] mandatory for any project or activity that may have adverse impact on the environment, and is especially applicable to projects

[11] Article 6.11 of the EA Act 2000 defines Environmental Clearance as the decision, issued in writing by the NECS or the relevant Competent Authority, to let a project proceed, which includes terms (and conditions) to ensure that the project is managed in an environmentally sound and sustainable way.

that concern infrastructure development and natural resource use such as roads, hydropower, mines and industries, where land degradation and pollution concerns are generally considerable.

To implement the EA Act 2000, regulations were promulgated in 2002 for the environmental clearance of projects and for strategic environmental assessment. **The Regulation for the Environmental Clearance of Projects 2002** defines responsibilities and procedures for the implementation of the EA Act 2000 concerning the issuance and enforcement of EC for individual projects and to:

- provide meaningful opportunities for public review of potential environmental impacts of projects;
- ensure that all projects are implemented in line with the sustainable development policy of the RGoB;
- ensure that all foreseeable impacts on the environment, including cumulative effects are fully considered prior to any irrevocable commitments of resources or funds;
- ensure that all feasible alternatives are fully considered;
- ensure that all feasible means to avoid or mitigate damage to the environment are implemented;
- encourage the use of renewable resources, clean technologies and methods;
- ensure that concerned people benefit from projects in terms of social facilities;
- help strengthen local institutions in environmental decision making; and
- help create a uniform, comprehensive data base on the environmental and cultural conditions and assets in the country.

To support the implementation of the EA Act and Regulation, sectoral EC application guidelines have been prepared for highways and roads, forestry, hydropower, industrial projects, mines, power transmission and distribution lines, urban development, and tourism projects. In addition, environmental codes of practice (ECOP) have been formulated for storm water drainage system, installation of underground and overhead utilities, tourism activities, and roads, and environmental standards have been set to control air and water pollution.

The other regulation supporting the EA Act is the **Regulation for Strategic Environmental Assessment 2002,** which was promulgated with the specific purpose to:

- ensure that environmental concerns are fully taken into account by all government agencies when formulating, renewing, modifying or implementing any policy, plan or program, including FYPs;
- ensure that the cumulative and large scale environmental effects are taken into consideration while formulating, renewing, modifying or implementing any policy, plan or program;
- complement project-specific environmental reviews and encourage early identification of environmental objectives and impacts of all government proposals at appropriate planning levels;

- promote the design of environmentally sustainable proposals that encourage the use of renewable resources and clean technologies and practices; and

- promote and encourage the development of comprehensive natural resource and land use plans at the local, dzongkhag and national levels.

4.3.4 Road Act of Bhutan 2004

This Act establishes powers and responsibilities of various agencies for road planning, design, construction and maintenance at the central, dzongkhag, geog and municipal levels. The Act also provides the framework for setting technical standards and requirements for road construction and maintenance. Section 4(1)(h) gives the Department of Roads (DoR) the mandate to adopt and promote environment friendly road construction (EFRC) techniques. Section 7(2) requires that all road construction and maintenance works conform to environmental considerations, geological stability considerations and preservation of agricultural lands. The DoR has formulated ECOP for road projects in keeping with its objective to promote environment-friendly road construction. The ECOP require that road projects fully assess all potential adverse environmental impacts right from alignment, design and planning through construction to operation and maintenance of roads, and implement measures to mitigate these impacts.

4.3.5 National Environmental Protection Act 2007

The National Environmental Protection Act (NEPA) 2007 has been enacted as an umbrella legislation. All other laws and regulations governing the use of land, water, forests, minerals and other natural resources are required to be consistent with this Act. It specifically lays down principles and directives for the protection of environmental quality and the maintenance of forest, biodiversity and ecosystem integrity. Salient features include the right to environmental information and citizen participation in environmental management, and provision for establishment of an Environmental Tribunal as a quasi-judicial authority with the power to hear, investigate and pass decisions on environmental disputes.

The following sections of the Act are expected to contribute to sustainable land use and management:

- Section 7: In order to achieve sustainable, natural resources such as forest, water, air, biodiversity, soil, minerals and the overall integrity of the environment shall not be degraded. In line with the Government's Middle Path Strategy, economic development and environmental conservation shall receive equal priority;

- Section 9: A developmental activity shall be strategically planned and executed in harmony with the carrying capacity of the country's sensitive ecological settings and geographical terrains;

- Section 10: A person taking natural resources from the environment or deriving economic benefits is responsible to ensure sustainable use and management of those resources and their ecology;

- Section 68: The NEC shall ensure that, in order to conserve the country's natural resources and to prevent degradation of the fragile mountain ecosystem, a minimum of 60 percent of Bhutan's total land shall be maintained under forest cover for all time. Any changes in the present national forest cover and protected areas shall be made only by the Parliament;

- Section 69: In order to ensure 60 percent forest cover in perpetuity, the NEC shall constitute a high-level committee comprising of relevant stakeholder agencies to: (a) periodically review existing policies, plans and programs and recommend necessary changes in policies, plans and programs, including implementation and enforcement mechanisms; (b) initiate afforestation and reforestation programs in degraded and barren land to enhance forest cover; (c) review policies and programs on forest fire management and measures to curb forest fire in the country;

- Section 71: The NEC, in consultation with other relevant agencies, shall ensure conservation and protection of wetlands, alpine regions, watersheds, and other vulnerable ecosystems in addition to the existing protected areas.

4.3.6 Land Act of Bhutan 2007

The Land Act of Bhutan 2007 came into force on 1st January, 2008, superseding the Land Act 1979[12]. The new legislation provides for the establishment of a National Land Commission (NLC) as an independent authority and highest decision-making body in matters related to the implementation of the provisions of the Land Act of Bhutan 2007 through policy and regulatory work, inter-agency coordination, cadastral survey and land registration, and management of national land records among other things. It spells out rights, responsibilities and legal conditions for the management, regulation and administration of the ownership and use of land.

To support the implementation of the Land Act of Bhutan 2007, the NLC has formulated **Land Rules and Regulations for the Kingdom of Bhutan 2007**. The rules and regulations define in detail the institutional functions, procedural requirements and regulatory provisions for management of national land records, land ownership entitlements and land rights, land registration, land conveyance, land acquisition and compensation, land grants, allotment of government land, cadastral survey, documentation and mapping, land conversion, land lease, easement, and annulment of land.

In relation to land use and management, the provisions in the Act are basically limited to use and management of tsamdro and sokshing. The Act provides for grazing management and pasture development on tsamdro based on a tsamdro management plan and for vegetative and land improvement on sokshing based on a sokshing management plan.

4.3.7 Local Governments Act 2009

The Local Government Act 2009 was formulated to support decentralized governance in the new democratic system introduced by the advent of parliamentary democracy in 2008. The legislation was enacted through a Special Session of the Parliament in August 2009.

Chapter 4 of the Act empowers the Dzongkhag Tshogde (DT) with regulatory and administrative powers and functions for: the conservation and enhancement of environment in general [Section 42, Clause (i)]; regulation of air, water and noise pollution [Section 44, Clause (b)]; and clearance of mining activities according to mining legislation [Section 45, Clause (d)].

[12] Excepting provisions pertaining to water channel and embankments, and compensation on crop damage by cattle.

The same chapter also empowers the Geog Tshogde (GT) for: monitoring the establishment of mines and quarries [Section 47, Clause (d)]; regulation of the harvesting of edible forest products in accordance with forest legislation [Section 47, Clause (f)], prevention of encroachment of community lands, government lands and forests [Section 47, Clause (i)]; custody of community lands, community forests and medicinal herbs [Section 48, Clause (e)]; and protection and conservation of water sources and bodies [Section 48, Clause (f)].

4.3.8 Waste Prevention and Management Act 2009

This Act was ratified at the Third Session of the Parliament in July 2009. It covers all types of wastes emanating from residential, agricultural, commercial, medical, and industrial sources. Specific provisions of the legislation pertain to: principles of waste prevention and management; management requirements for various types of wastes; implementation responsibilities and powers of various institutions with NEC as the overall regulatory and coordinating body; requirements of implementation mechanisms; and liable offences and penalties.

5. Current Institutional Set-up

5.1 Central Government Agencies

5.1.1 Ministry of Agriculture

MoAF was formed in 1985, bringing together the Departments of Agriculture (DoA), Livestock (DoL) and Forests (DoF) under one organizational umbrella. Until then, the DoF was under the then Ministry of Trade, Industries and Forests while the DoA and DoL were under the then Ministry of Development. The three departments constitute what is also known as the renewable natural resources (RNR) sector. The key functions of the MoAF are to: develop agriculture, livestock and forests for the benefit of the Bhutanese through continuous research and development processes; raise the living standards of the rural communities through promotion of farm-based activities and delivery of research, extension and marketing services; protect the natural environment through sustainable and judicious use and management of land, water, forest and biological resources; and ensure food safety through preventive and mitigation measures.

In addition to DoA, DoL and DoF, the Ministry is made up of a number of non-departmental agencies namely the Council for RNR Research of Bhutan (CoRRB), National Biodiversity Center (NBC), Agriculture Marketing Services, Information and Communication Services, and Bhutan Agriculture and Food Regulatory Authority (BAFRA).

Department of Agriculture

With the mandate to oversee, coordinate and provide technical guidance to agricultural production activities, the DoA has responsibility for ensuring sound management of agricultural lands. Through coordination and guidance to the *dzongkhag* agriculture staff, the DoA's Agriculture and Horticulture Divisions support the implementation of field programs for agricultural production including extension, marketing and processing. The Engineering Division provides engineering services for construction and maintenance of farm roads and irrigation channels and assists the dzongkhag agricultural staff in technical and economic feasibility assessments of farm roads and irrigation channels.

Also, under DoA is the National Plant Protection Centre (NPPC) and the National Soil Services Centre (NSSC). The NPPC functions as a coordinating and advisory agency for activities to prevent and control plant diseases. These include coordination and oversight of pesticide distribution and use, and promotion of integrated pest management practices. The NSSC serves as a research and referral facility for soil survey, soil analysis and soil fertility management, and is mandated to coordinate soil management research activities of the RNR sector and provide laboratory testing and analysis services. The Centre is currently the national focal agency for activities related to UNCCD.

Department of Forests

Established in 1952, the DoF is the oldest government department. It is the overall authority for the management of forest resources and wild biodiversity. At the central level, the DoF consists of Forest Protection and Utilization Division (FPUD), Forest Resources Development Division (FRDD), Social Forestry Division (SFD), Nature Conservation Division (NCD), and Royal Botanical and Recreational Parks Division (RBRPD). The Watershed Management Section of the SFD has been recently upgraded to a new Division under the DoF.

The FPUD is mainly responsible for matters related to forest land allotment, swapping, leasing, clearance, forest encroachment, forest demarcation, forest fire control, and utilization of forest products. The FRDD is mandated to identify and create Forest Management Units (FMUs) through forest inventories and development of forest management plans for sustainable harvesting of timber and wood products. The SFD provides guidance, coordination and technical support to social forestry and re-afforestation programs. The NCD has the responsibility for *in situ* conservation of wild biodiversity through creation and management of protected areas, buffer zones and biological corridors. The RBRPD was created in 2008 to coordinate and support management of natural areas for public recreation and education.

At the field level, the DoF presently has a widespread institutional network of territorial forestry divisions and protected area management offices to implement activities pertaining to protection and sustainable use of forests and wildlife resources. Community-forestry related activities in the field are implemented by the dzongkhag forestry sectors.

Department of Livestock

The DoL is responsible for coordination, administration and management of services related to livestock production, livestock health and pasture development. DoL's activities pertaining to improvement of breeds, animal health and care, and feed and fodder development have environmental benefits in terms of reducing livestock population and overgrazing of natural areas.

Council for RNR Research of Bhutan

The CoRRB coordinates RNR research at the national level and ensures an integrated approach to RNR research programming and technology generation. It provides guidance and management of the research programs and activities carried out by the regional RNR-Research Centres. The RNR-RCs are located at Yusipang (Thimphu) covering western region, Bajo (Wangdue) covering west-central region, Jakar (Bumthang) covering east-central region, and Wengkhar (Mongar) covering eastern region. The research programs focus on forestry, field crops, livestock development, horticulture, plant protection, soil and soil fertility, water management, and farming systems.

5.1.2 Ministry of Economic Affairs

Department of Geology and Mines

The DGM has the responsibility for geologic mapping, geologic hazard and risk assessments, geotechnical advisory service, mineral exploration, enforcement of Mines and Minerals Management Act 1995 and Mines and Minerals Management Regulations 2002. A major program of the DGM in recent years is the monitoring of glacial retreats and mitigation of risks associated with glacial lake outburst flood (GLOF).

Department of Energy

The DoE has the mission to facilitate and administer sustainable hydropower development for national economic growth and to provide reliable and clean energy to the Bhutanese society. In keeping with its mission to facilitate sustainable hydropower development, the DoE's remit also now includes collaboration with the MoAF to support integrated watershed management particularly focusing on sustainable use and management of agriculture lands and conservation of nature in the catchment areas. The DoE is also engaged in collection of hydro-meteorological data, weather forecasting and flood warning services including GLOF.

Department of Industry

The DoI is mandated to provide planned industrial development by creating enabling investment conditions, developing industrial infrastructure and promoting private sector participation. In view of the potential adverse environmental impacts of industrial development especially in terms of pollution of air, water and land, and conversion of forest and agricultural lands for development of industrial infrastructure, the DoI envisages to promote industrial development in a manner that is environmentally sustainable. It has adopted and internalized EA procedures in the industry sector and collaborates with NEC to carry out environmental monitoring of industries.

5.1.3 Ministry of Home and Cultural Affairs

Department of Disaster Management

The DDM is a newly-created agency under the Ministry of Home and Cultural Affairs. It was fundamentally created to deal with natural disasters, such as landslides, floods and earthquakes, through policy and strategy formulation, capacity development and inter-agency coordination. The DDM is made up of divisions for preparedness and mitigation, response and early warning, and relief and reconstruction. Furthermore, the Ministry is responsible for local governance, which includes the enforcement of relevant environmental policies, laws and regulations by the dzongkhag and geog administrations.

5.1.4 Ministry of Works and Human Settlement

Department of Roads

The DoR, under MoWHS, has the mandate to promote environment-friendly road construction (EFRC) concept and practices. In its bid to promote EFRC, the DoR has developed EFRC guidelines and ECOP for road construction. It is also entrusted with the responsibility to ensure that road projects are subjected to environmental assessment process

and that environmental management plans are developed and implemented to mitigate potential adverse environmental impacts.

Department of Urban Development and Engineering Services

The DUDES, under MoWHS, is the lead government agency for urban planning and development. This mandate includes the creation and management of environmental management infrastructure such as storm water drainage, sewerage and municipal solid waste disposal systems. The DUDES oversees the City Corporations[13] which among other things are responsible for implementing urban development plans involving effective use and management of land for development of urban infrastructure and facilities.

5.1.5 National Environment Commission

The NEC was first established in 1989 by Royal Decree as a National Environment Committee under the Planning Commission. Subsequently, in September 1992, it was delinked from the Planning Commission to serve as a more vigorous, autonomous government body. Reconstituted in September 1998, it now functions as a high level body with inter-ministerial representation for policy decisions and guidance on matters related to environmentally sustainable development and institution of measures to integrate environmental management in the overall development process. The Commission is currently chaired by the Honorable Prime Minister and is served by an independent Secretariat, headed by the Honorable Deputy Minister of Environment.

The NEC Secretariat (NECS) is organized into Environmental Assessment Division, Monitoring, Information, Communication and Outreach Division, and Policy and Planning Division. The Environmental Assessment Division is responsible for implementation of the Environmental Assessment Act 2000 and supporting regulations, development of capacity of line agencies and *dzongkhag* environmental committees for environmental assessment and monitoring, and development of sectoral guidelines for environmental assessment. The Monitoring, Information, Communication and Outreach Division is responsible for research, monitoring, statistics, information, communication and public outreach. The Policy and Planning Division deals with matters related to environmental policy and program coordination. There is also a legal unit within NECS to develop, revise and amend environmental laws and regulations, provide inputs to line ministries in the development of environmental laws and regulations, provide guidance and support to other divisions in matters related to environmental legislation, and prepare necessary documents to facilitate ratification of international environmental treaties and conventions.

5.1.6 National Land Commission

The NLC was formed in 2007 as the apex government body to implement the Land Act of Bhutan 2007 primarily through policy and regulatory work, inter-agency coordination, cadastral survey and land registration, and management of national land records. The membership of the commission is made up of the Gyalpoi Zimpon (Royal Chamberlain), the secretaries of the ministries of agriculture, works and human settlement, finance, economic affairs, and home and cultural affairs, and a representative each from the agency responsible for international boundary, private sector, NEC, Thromde Tshogdu (Municipal Committee) and the Surveyor General of the NLC Secretariat as the member secretary. The NLC is supported by a Secretariat, which is responsible for implementation of the

[13] At the present, there are only two city corporations – one for Thimphu and the other for Phuentsholing. Other towns are relatively small and administered by municipal committees instituted within respective Dzongkhag Administrations.

policies, programs, regulations and guidelines issued by the NLC and for day-to-day administration of the provisions of the Land Act of Bhutan 2007 and supporting rules and regulations. The NLC Secretariat is largely made up of managerial and technical staff of the erstwhile Department of Survey and Land Records.

5.1.7 Gross National Happiness Commission

Bhutan's Planning Commission was reconstituted as the GNH Commission in January 2008. The GNHC is chaired by the Honorable Prime Minister and includes the secretaries of all the government ministries and the head of NEC as members. The Cabinet Secretary serves as the vice-chair and the GNHC Secretary as the member secretary. The GNHC functions as the central government body for direction and coordination of the formulation of all national and sectoral policies, plans and programs and to ensure that the GNH concept is fully considered in the policy-making, planning and implementation processes. Other functions include monitoring and evaluation to assess development impacts and progress towards national goals and targets, coordination of international development assistance, and capacity building support for development planning and management.

The GNHC Secretariat is made up of several divisions. These include the Perspective Planning and Prioritization Division, Plan Monitoring and Coordination Division, Local Development Division, Research and Evaluation Division, Development Cooperation Division, and Program Services Division. In addition, it manages the Sustainable Development Secretariat which was established to coordinate, disburse and monitor external assistance to Bhutanese organizations under the Sustainable Development Agreement, a development cooperation framework between Benin, Bhutan, Costa Rica and the Netherlands.

5.2 Dzongkhag and Geog Institutions

5.2.1 Dzongkhag Institutions

The Dzongkhag Administrations are the executing agency of development programs and activities at the dzongkhag level. Headed by the dzongdag, they are made up of agriculture, livestock and forestry sectors in addition to other government sectors such as health, education and engineering. Dzongkhag policies, plans and programmes are reviewed, approved and guided by the DT. The DT is made up of: a chairperson, who is elected from among the voting members; gups as ex-officio voting members; mangmis as ex-officio voting members; a representative of municipalities/ towns as a voting member; dzongrab, or in his/ her absence dzongkhag administrative officer as ex-officio non-voting member secretary; dungpas, in dzongkhags with such posts, as observers; representatives of various sectoral agencies as observers; and other representatives of municipalities/ towns as observers[14].

Since 2004, Dzongkhag Administrations and NECS have formed Dzongkhag Environmental Committees (DECs) with the responsibility to ensure integration of environmental concerns in dzongkhag plans and to implement environmental assessment and clearance procedures for dzongkhag and geog level projects and activities that are small-scale and unlikely to have any major adverse environmental impacts. The formation of DECs is in line with the RGoB's decentralization policy and the requirement of the Environmental Assessment Act 2000. It is also intended to cut down the bureaucracy and time involved in the environmental assessment and clearance of smaller projects and

[14] The functioning and structure of DYTs and GYTs are likely to undergo some changes with the enactment of the Local Governance Act, which is under preparation.

activities. DECs are in place in all the dzongkhags and they are usually made up of the dzongdag and dzongkhag sectoral heads especially those belonging to forestry, agriculture, livestock development and engineering fields. Dzongkhag Environmental Officers have been placed in all the dzongkhags to manage the activities of DECs and to assist the Dzongkhag Administration in matters related to environmental management and environmental clearance.

5.2.2 Geog Institutions

Responsibilities for geog-level planning, management and implementation of development programs and activities lie with the GT, which is chaired by the gup. Other members include the mangmi and tshogpas. Gaydrung (geog clerk) and representatives of various sectoral agencies at the geog level sit in the GYT as observers. Since 2007, the RGoB has appointed a geog administrative officer in each geog to facilitate the implementation of government plans and programs at the geog level.

In relation to RNR activities, the GYT is aided by the **Geog RNR Centre**, which is in place in most geogs. Each Geog RNR Centre is staffed with extension agents for agriculture, livestock development and forestry. The programs and activities of the Geog RNR Centre are supervised and monitored by the respective sectors in the Dzongkhag Administrations.

5.3 Non-Government Organizations/ Autonomous Agencies

5.3.1 Royal Society for the Protection of Nature

The RSPN is a non-government organization (NGO) founded in 1987 to promote environmental conservation in the country. In the early years, RSPN focused on environmental education for school children and conservation of black-necked cranes. Over the years, with the improvement in its implementation capacity, it has expanded its range of conservation programs and activities. Its current range of programs and activities pertain to endangered species conservation, sustainable livelihoods, environment education, and conservation areas management. The NGO also currently serves as a Secretariat to the Bhutan Water Partnership.

5.3.2 Târâyana Foundation

Formally launched in 2003, Târâyana Foundation is an NGO which is working towards the socio-economic upliftment of vulnerable and disadvantaged individuals and communities, thus complementing government efforts to alleviate poverty. Although the Foundation's direct involvement in land degradation is currently limited, there is considerable potential in the future for it to develop and support activities that link sustainable land management with poverty reduction goals. At the present, it is involved in a project to help the local communities of Kheng Silambi to regenerate bamboo and cane species for use in production of artisan crafts.

5.3.3 Bhutan Trust Fund for Environmental Conservation

Created in 1992 and legally incorporated under the Royal Charter in 1996, the BTFEC is as an independent grant making organization to sustain environmental conservation in the country. Under the guidance of a high-level management board, the BTFEC uses its annual income generated by its US$ 40 million-endowment to support a wide range of environmental projects.

5.4 Corporations

5.4.1 Druk Holding and Investments

The Druk Holding and Investments (DHI) is an autonomous conglomerate created in 2007 to enhance the management and performance of government-linked companies and guide these companies in corporate governance and investment management.

Natural Resources Development Corporation Limited

The Forestry Development Corporation Limited was reconstituted as Natural Resources Development Corporation Limited (NRDCL) in 2007. The NRDCL is a quasi-autonomous corporate entity under the DHI. Its main responsibility is to carry out sustainable harvesting operations in the FMUs according to approved forest management plans and to cater to the market demands for timber and timber products. It is also involved in re-afforestation of logged areas in the FMUs. With its reconstitution, it has also the mandate to cater to the market demands for other natural resources such as sand and stone in a sustainable manner.

Druk Green Power Corporation Limited

The DGPCL, also under the aegis of DHI, is a corporate amalgamation of Basochhu, Chhukha, Kurichhu, and Tala Hydropower projects. The DGPCL was created to promote, develop, and manage renewable energy projects, particularly hydropower, in an efficient, responsible and sustainable manner, and maximize wealth and revenues for the nation.

5.4.2 City Corporations

At the present, there are two city corporations: Thimphu City Corporation and Phuentsholing City Corporation. These agencies have been created to provide planned growth of their respective municipal areas, deliver effective and efficient public services such as for water supply, sanitation and solid waste management, and ensure that development and use of urban lands are done according to existing laws and approved structural plans. They are governed by City Committees made up of members elected from various municipal zones and non-elected representatives from relevant government agencies.

5.5 Institutes/ Colleges

5.5.1 College of Natural Resources

Established as the Natural Resources Training Institute at Lobesa in 1992, the institute was renamed as the College of Natural Resources (CNR) and was inducted as a member institute of the Royal University of Bhutan (RUB) in July 2004. The CNR provides two-year diploma courses in the fields on animal husbandry, agriculture and forestry and focuses on producing competent natural resources management professionals for the development of rural communities. A primary emphasis of the CNR is to use integrated and participatory approaches in the management of renewable natural resources with farm households at the center of the rural development process.

5.5.2 Ugyen Wangchuck Institute for Conservation and Environment

The MoAF established the Ugyen Wangchuck Institute for Conservation and Environment (UWICE) in August 2008. The mandate of the UWICE is to provide professional training and education and enhance research and development in the field of forestry and environmental studies, thereby contributing to the conservation and sustainable management of natural resources for the well being of the environment and the society in general. Named after Bhutan's First King, the UWICE commenced one-year certificate courses from September 2008. In the immediate future, it will also provide two-year diploma courses covering various aspects of conservation science, wildlife management and forestry and include subjects such as soil conservation, social forestry, and extension and communication.

5.5.3 Royal Development Training Center

Established in 2008, the RDTC has been created by the MoAF to provide skills-based farm business training, agriculture awareness and apprenticeship training, and community leadership and management training. The training institute can considerably contribute to developing farmers' knowledge and skills for SLM-based farm enterprises, integrated soil fertility management, and integrated pest management.

5.5.4 Jigme Namgyel Polytechnic

The Jigme Namgyel Polytechnic is a member institute of the RUB. It was established in 1972 at Dewathang in Eastern Bhutan and was previously known as the Royal Bhutan Polytechnic. The institute provides 30-month degree courses in civil, electrical and mechanical engineering with the aim to produce progressive engineering professionals. The institute has a great potential role in combating land degradation resulting from road construction activities as many of their graduates get engaged in various road construction projects as government or private contract engineers.

5.5.5 College of Science and Technology

The CST is a RUB-member institute located at Rinchending, close to Phuentsholing. It provides four-year undergraduate degree courses in engineering to produce highly competent engineers with advanced knowledge and skills for modern-day engineering services. Like Jigme Namgyel Polytechnic, the CST can potentially play a very important role in combating land degradation resulting from road construction activities. Toppers from diploma courses at the Jigme Namgyel Polytechnic are admitted into CST for undergraduate programs in addition to direct intake of fresh students.

5.6 External Development Partners

5.6.1 Asian Development Bank

Bhutan became a member of the Asian Development Bank (ADB) in 1982. Current support of ADB is largely in the areas of improvement and expansion of road network, energy development and rural electrification, and urban development with special attention to developing sewerage and solid waste management systems. The AsDB employs environmental and social safeguard policies to ensure that ADB projects are designed and implemented in an environmentally and socially responsible manner.

5.6.2 Austrian Government

The Austrian Government started formal development assistance in 1989 with the opening of the office of Austrian Coordination Bureau in Thimphu. Bilateral assistance from Austria is mainly in the areas of hydropower and energy development, forestry development, tourism, and preservation of cultural heritage.

5.6.3 Danish International Development Agency

Danish development cooperation started in Bhutan in 1978. According to Danida's Strategy for Development Cooperation in Bhutan (2008 to 2013), Danish assistance will be rendered mainly in three key areas. These are social sector support focusing on health care and education, environment and urban development support focusing on decentralized natural resources management and basic urban environment management infrastructure, and good governance focusing on election system, judiciary, land administration, and decentralization.

5.6.4 European Community

Bhutan has been receiving development assistance from the EC since 1982. Given the country's largely agrarian economy, EC assistance has primarily focused on watershed management, crop protection against pests and diseases, and extension support to agriculture and livestock development for improved rural livelihoods. The EC-Country Program Strategy (2007-2013) indicates that the RNR sector will account for 60 percent of the ongoing EC assistance.

5.6.5 Global Environment Facility

The world's first environment trust fund – Bhutan Trust Fund for Environment Conservation – came into being in 1991 as a result of major financing from the Global Environment Facility (GEF). Since then, GEF has been supporting a wide range of environmental projects. Ongoing GEF support is in the areas of environmental policy development, management of protected areas, sustainable land management, local environmental governance, mitigation of risks from glacial lake outburst floods, and agro-biodiversity conservation. Almost all the GEF-financed projects in Bhutan are managed by the UNDP Bhutan Country Office. Also in operation in Bhutan since 1998 is the GEF Small Grants Program (GEF-SGP), managed the UNDP Bhutan Country Office. The GEF-SGP focuses on supporting local community actions to address the global concerns of biodiversity loss, adverse climate change and land degradation.

5.6.6 Government of India

The Government of India (GoI) is the biggest donor of development aid to Bhutan. In fact, Bhutan commenced Five Year Plan (FYP)-based development in 1961 with full funding support from the GoI for the first two FYPs. Hydropower projects, industries, roads, civil aviation, education and human resources development, and health care form the core of GoI's development assistance to Bhutan.

5.6.7 Helvetas

Most of Swiss development assistance to Bhutan is provided through Helvetas, a Swiss NGO which started to work in Bhutan in 1977. Helvetas supports several rural development programs and projects, especially within the RNR sector, to improve food security, conserve and sustainably manage natural resources, enhance rural income-

generation and livelihoods, generate rural employment opportunities, and develop capacity of rural communities and agricultural service institutions. Key Helvetas-supported projects include the Rural Development Training Project located in Zhemgang, East Central Region Agriculture Development Project covering Bumthang, Trongsa, Zhemgang and Sarpang dzongkhags, Participatory Forest Management Project, and the Natural Resources Training Institute at Lobesa (now known as College of Natural Resources), which trains extension personnel in the fields of agriculture, livestock development and forestry.

5.6.8 International Centre for Integrated Mountain Development

ICIMOD, based in Kathmandu, Nepal, is a regional knowledge development and learning centre focusing on the stability of the fragile mountain ecosystems and livelihoods of the local communities in the Hindu Kush-Himalayas. In Bhutan, ICIMOD's has worked with government agencies and NGOs to support sustainable use of medicinal and aromatic plants, inventory of glacial lakes and assessment of glacial lake outburst floods, and capacity development for use of Geographic Information System in natural resources management, and soil and water conservation techniques.

5.6.9 Japan International Cooperation Agency

JICA supports rural development and poverty alleviation through grant assistance for farm mechanization, development of rural access, agriculture research and extension, and strengthening of capacities for decentralization and local governance and through technical advisory and human resources development assistance in the areas of agriculture, rural access and local governance.

5.6.10 Netherlands Development Organization

The Netherlands Development Organization (SNV) commenced development support in Bhutan in 1988. In relation to land use and management, SNV is supporting programs and projects for collaborative forest management and development of rural enterprises based on sustainable natural resource use. In partnership with the World Bank, it also supported the Department of Roads in the implementation of the EFRC Support Project. The project focused on formulating policy framework and guidelines for EFRC and developing personnel capacity of dzongkhag staff, local communities, and private contractors for adoption of EFRC practices.

5.6.11 United Nations Agencies

The United Nations Development Program (UNDP) began its work in Bhutan in 1974. The current focus of UNDP's work in the country is in the areas of democratic governance, poverty reduction, sustainable energy and environment including disaster management, and gender mainstreaming. Its environmental projects include policy support, sustainable land management, local environmental governance, disaster risk management, climate change adaptation, and energy development.

The United Nations Environment Program (UNEP), although without any institutional presence in Bhutan, is currently working in collaboration with the UNDP to support poverty-environment mainstreaming in national policies, plans and programs. UNEP has also provided direct support to the NEC to prepare the State of the Environment Report 2002 and Bhutan Environment Outlook 2008.

The UN's World Food Program (WFP) in Bhutan focuses on increasing rural children's access to education, encouraging the building of rural feeder roads that promote trade, and improving access of rural households to agricultural services.

The Food and Agriculture Organization of the UN (FAO) renders agriculture-related technical advisory assistance to the RGoB. The FAO is also the supporting the MoAF in the development and establishment of Virtual Extension, Research and Communication Network to enhance linkages between agriculture research and extension programs so as to respond to farmers' needs more effectively.

5.6.12 World Bank

Bhutan became a member of the World Bank in 1981. A large part of World Bank's initial support was in the area of forestry development, focusing on reforestation and sustainable forest management. Much of ongoing World Bank assistance pertains to development of rural infrastructures such as roads, irrigation schemes, and *geog* RNR centers. In addition, the World Bank functions as the international implementing agency for the Sustainable Land Management Project funded by the Global Environment Facility (GEF). All World Bank-assisted projects and more especially those involving infrastructure development are subjected to World Bank environmental and social safeguard policies.

5.6.13 World Wildlife Fund

WWF started supporting conservation work in Bhutan in 1977. It is currently supporting the DoF in the management of Royal Manas National Park, Sakten Wildlife Sanctuary, and Thrumshingla National Park and the conservation of prioritized endangered species namely tiger, snow leopard, Asiatic elephant, black-necked crane, and white-bellied heron. In addition, it is supporting sustainable livelihood projects using integrated conservation and development approach on a pilot basis.

5.6.14 Internation Fund for Agricultural Development (IFAD)

Since the early 1980s, IFAD has been investing in programs and projects in Bhutan. It has concentrated its operations in the eastern part of the country, which has a relatively dense population and rather high food insecurity as compared to the other parts of the country. The programmes and projects are part of IFAD's long term effort to support the government in empowering poor rural people to achieve greater food security and higher incomes, while ensuring environmental sustainability. Support focuses on the development of economic capital, especially rural infrastructure.

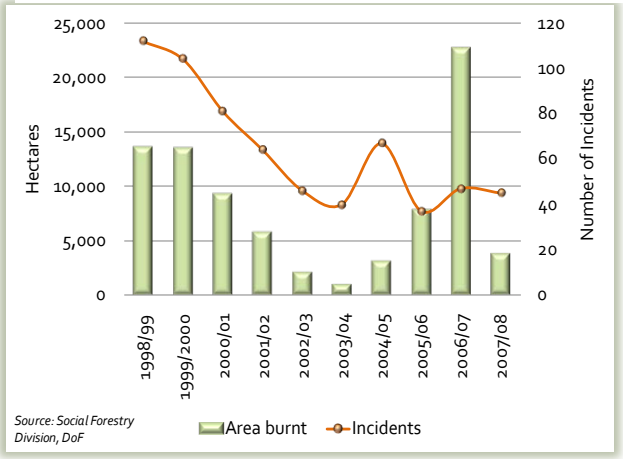
Part C
Land Degradation Problems and Issues

6. Direct Factors

6.1 Forest Fires

Each year, about 20 million hectares of forests worldwide are razed by wildfires[15]. Globally, loss and degradation of forest lands resulting from forest fires is estimated to be equivalent to that caused by the combined factors of destructive logging and conversion of forest lands to agriculture. In Bhutan, forest fires persist as a recurrent and widespread phenomenon. They typically occur between November and May in the western region and between January and June in the eastern region. These periods are characterized by dry and windy weather conditions. According to records maintained by the DoF, 643 incidents of forest fires affecting a total forest area of 83,759 hectares have taken place in the last decade since 1998 (see Figure 4)[16]. This translates to an average of 64 forest fire incidents and 8,376 hectares of burnt forests each year.

Figure 4: Forest Fire Occurrence Trend 1998/99 to 2007/08



The impacts of forest fires will basically depend on local site conditions and the time they occur. In steep areas the negative impact may be immediate, especially if heavy rains follow a forest fire. The rainwater washes away topsoil and ash, depriving the exposed area of nutrients to support natural regeneration. When such a process recurs several times, a succession process is triggered whereby the site may completely degenerate into a barren area. However, some species such as chir pine *Pinus roxburghii* can tolerate a few forest fires and even need them partly for germination. Nevertheless, recurrent forest fires year after year can lead to gradual degeneration of the site and obliteration of associate species rendering the site vulnerable to land degradation and ecosystem change.

Forest fires are not always necessarily detrimental. In some natural areas, for instance in Manas and Kaziranga National Parks in India, controlled burning of ground vegetation is used as a habitat management tool. It is also believed that in chir pine forest, which is a fire-adapted ecosystem, moderate frequency of fires can have beneficial effects in terms of reducing fuel loads that may accumulate as a result of prolonged absence of forest fire.

[15] Tishkov, 2004.

[16] Although official forest fire records for 2008-09 are yet to be fully compiled, it is very likely that occurrence of forest fires for that year would be significantly high considering frequent reports of forest fires in the news media.

Virtually all forest fires that occur in the country are caused by human, accidentally or willfully. The main reasons for occurrence of forest fires include:

- Unregulated agricultural and horticultural burning operations resulting in escaping of fire into adjacent forests. Such burning operations generally occur in tseri (slash-and-burn cultivation) lands and orchards.

- Burning of forests to enhance lemon grass regeneration. In lemon grass growing areas, which includes the eastern dzongkhags of Lhuentse, Mongar, Trashigang, and Trashiyangtse, lemon grass oil production is a major source of income for the local communities. Lemon grass grows wildly as undergrowth in chir pine forests. Forest fires in eastern Bhutan are to a large extent attributed to deliberate setting of forest fires to invigorate regeneration of lemon grass. While there are no data to directly compare incidents of forest fires before and after introduction of lemon grass oil production, interactions with the local people suggest that forest fires have increased since the advent of lemon grass oil production. In a socio-economic survey of lemon grass oil distillers carried out by RNR-RC (East) in 1997/98, more than 83 percent of the respondents believed that the frequency of forest fires had increased after lemon grass oil production was introduced[17]. Furthermore, statistical analysis of available forest fire data reveals that forest fire occurrence was highest in the lemon grass growing dzongkhags of Mongar, Lhuentse, Trashigang and Trashiyangtse in terms of forest area burnt and number of incidents. These dzongkhags collectively accounted for 39 percent of the country's total area burnt by forest fires and for 32 percent of the total forest fire incidents in the country between 1998/99 and 2007/08.

- Burning of forests to enhance cattle forage. Free-range grazing in forests, whereby cattle feed on forest fodder, is a very common practice in Bhutan. Cattle herders are known to set forest fires to enhance forest forage.

- Prevention against wildlife incursions. Crop and livestock depredation by wildlife is a widespread problem in the rural areas. In order to drive away wildlife and prevent wildlife incursions, local communities some time resort to burning of forest vegetation adjacent to farms.

- Accidental burning due to campfires left un-extinguished by picnickers and cattle herders, careless disposal of lit cigarettes by travelers, short-circuits of poorly maintained electrical lines, playing with match-sticks by children, and roadside fires used for melting bitumen.

There are a number of key issues related to the persistence of forest fires as a major problem in the country. One, existing forest fire fines and penalties are too severe to be enforced on offenders, who in most cases turn out to be peasants or children. In such circumstance, forest authorities have to, more often than not, either ease the fine or let off the offender with a warning. Two, the country lacks a national strategy for forest fire management. In absence of such a strategy, activities such as for prevention and control of forest fires, research on forest fire management, and public education and awareness generally tend to be planned and implemented in an *ad hoc* manner. Then, there is the question of public education and awareness activities for prevention and control of forest fires. Current public education and awareness activities for prevention and control of forest fires do not seem to have had the desired impact on the public if one goes by existing trend of forest fire occurrence. Lastly, suppression of forest fires, especially in mountainous terrain such as ours, is a highly perilous and arduous task that requires special training and

[17] RNR-RC (East), 1998.

gear such as fire-proof clothing and fire-fighting tools. However, existing fire fighting capacity in terms of training as well as equipment is rudimentary and far from adequate.

6.2 Excessive Forest Use

Bhutan's per capita fuelwood consumption is one of the highest in the world. In rural areas, where 69 percent of the country's population live, fuelwood is the main source of energy for cooking and space heating. Although collection of dry fuelwood in the form of fallen twigs and driftwood is common, bulk of the fuelwood needs is met from natural forests. According to the Department of Energy, in 2005, fuelwood alone accounted for 57.7 percent of the total primary energy supply[18]. Apart from domestic use in rural areas, fuelwood is heavily used for industrial production, agro- and forest products processing, road construction, and in hospitals, schools, military encampments, and monasteries.

Construction timber use is also very high with traditional Bhutanese architecture entailing extensive use of timber. Almost all traditional housing structures – floor, roof, staircase, windows and doors, and beams and pillars – are made of wood. Dilapidation of old houses, population growth and fragmentation of families, make construction of new houses necessary. Wooden roofing shingles need to be replaced every two to four years depending on climatic conditions[19]. Furthermore, construction of socio-economic services infrastructure such as hospitals, basic health units, outreach clinics, schools, agriculture research and extension centers, and *geog* administrative offices have surged in the recent years.

Forest management units (FMUs) are created for sustainable timber harvesting based on forest management plans that take account of growing stock and annual allowable cut (aac). However, not all timber needs are met from FMUs. A significant amount of timber needs, especially for rural construction, is met on *ad hoc* basis. Such practices could lead to unsustainable harvesting and cause forest degradation. There are also instances when the desired species and size of timber for special infrastructure projects, such as construction or renovation of dzongs or lhakhangs (monasteries), are not available in the FMUs and have to be consequently extracted from non-FMU areas. The FRDD has developed planning guidelines for management of forest areas outside the FMU system so that these areas can be used for extraction of forest resources based on simple but sound silvicultural principles and practices. However, these guidelines have not yet been applied in the field for want of technical capacity development in terms of staff training and equipment.

Fuelwood accounted for 57.7 percent of the total primary energy supply in 2005 according to the Department of Energy

Other major concerns related to logging operations include depletion of water availability to downstream communities as a result of felling of trees in catchment areas[20], and soil erosion and destruction of young natural regeneration due to dragging and rolling of logs along slopes in places where cable cranes have not been installed for timber extraction.

[18] DoE, 2007.

[19] Wooden roofing shingles are being increasingly replaced with corrugated galvanized iron sheets (imported from India) especially in places which are closer to roads.

[20] During local community consultations, villagers of Hungrel geog (Paro) and Mewang geog (Thimphu) expressed their concern of decreasing water availability in their geogs and felt that it was occurring as a result of logging in the upstream catchment forests which fall inside Gidakom FMU.

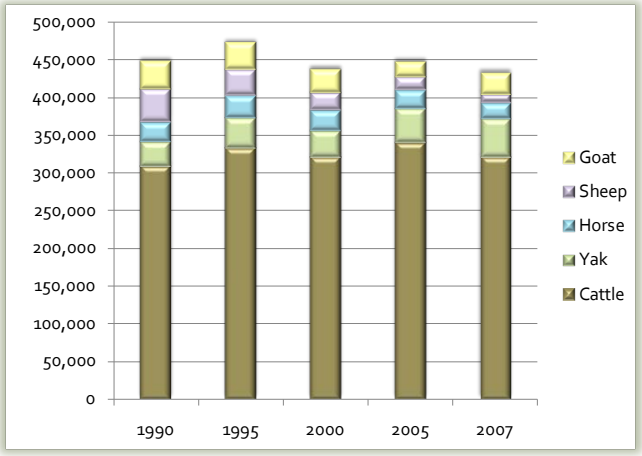
In addition to timber and fuelwood, there is a wide array of non-wood forest products (NWFPs) that the Bhutanese use for subsistence and income-generation. These include medicinal and aromatic plants, forest foods such as mushrooms, ferns and wild greens, bamboo and cane for local handicrafts, plant barks and pulps for traditional paper-making, animal fodder, and leaf litter for farmyard manure. In many places, these NWFPs have become, or are becoming, scarce due to overexploitation.

Illicit harvesting of timber and fuelwood is also a major concern. According to DoF records, there is on average around 450 forest offence cases every year pertaining to illicit timber and fuelwood extraction. Many more are likely to have occurred undetected. In the forest areas bordering India, illegal extraction of fuelwood and timber is reportedly common because of the exhaustion of forest resources and burgeoning human population across the border. A porous international border and shortage of forest law enforcement personnel make it very difficult to regulate cross-border illegal forest harvesting.

6.3 Overgrazing

In Bhutan, overgrazing is closely associated with forest degradation as much of the grazing occurs on forest lands. Livestock rearing is an important economic activity among the rural communities. Cattle are owned by almost all of the rural households in the country and it dominates the temperate and subtropical regions of the country. In the alpine and sub-alpine regions of the country, such as Laya and Lingshi, yaks are the dominant animals, and the economy is solely based on yak products. Yaks are reared for dairy products, meat and transportation of goods. In 2007, there were 319,989 cattle and 51,500 yaks in the country[21]. Despite continuous government programs to reduce livestock population through introduction of improved breeds, artificial insemination and sterilization, and increased animal health coverage, livestock population has remained almost unchanged (see Figure 5). Local communities continue to maintain large livestock herds because of religious sentiments against culling, status symbol associated with large herds, and the perception of livestock as an immediate source of cash in the event of emergency.

Figure 5: Population of Major Livestock Types 1990-2007



Where livestock densities are high, overgrazing readily occurs. Removal of protective vegetation and trampling of exposed soils by livestock hooves lead to decline in biological productivity of the land, reduced water infiltration and storage, and soil compaction and erosion.

In Bhutan, free-range, migratory grazing is the most common practice as it is far less labour-intensive compared to stall-feeding. Consequently, some of the pastures and forest lands, especially in the temperate region, are subjected to grazing through out the year – by yaks in winter and cattle in summer – allowing very little time for recuperation of grazed areas.

[21] Livestock Population Statistics 2008, Ministry of Agriculture

6.4 Unsustainable Agriculture

6.4.1 Imbalanced Use of Inorganic Fertilizers

Traditionally, farmers have relied on farmyard manure (cattle dung or cattle dung mixed with forest litter and/or crop residue) for fertilizing agricultural soils. It is still pre-dominant in many parts of the country. Use of inorganic fertilizers for crop production started in Bhutan only in the 1960s, concurrently with the promotion of high-yielding crop varieties and cash crops. With the expansion of road network, development of distribution systems, promotional activities through subsidies and agricultural extension services, and increasing farming of high-yielding crop varieties and cash crops, the use of inorganic fertilizers grew substantially over the years. In the 1980s, import of inorganic fertilizers averaged 700 to 800 metric tons per year[22]. It has nearly quadrupled in the recent years; a total of 12,121 metric tons of inorganic fertilizers at the rate of 3,030 metric tons per year was distributed in the country between 2004-2007 (see Table 3).

Table 3: Distribution of Chemical Fertilizers in metric ton, 2004-2007

Dzongkhag	2004	2005	2006	2007	Total	%
Trashigang	725.08	701.90	591.26	685.70	2,703.94	22.3
Bumthang	502.47	503.99	544.06	594.20	2,144.72	17.7
Wangdue	370.25	506.57	488.40	537.93	1,903.15	15.7
Paro	231.15	268.39	249.77	279.11	1,028.42	8.5
Thimphu	246.52	187.24	204.58	212.33	850.67	7.0
Chukha	161.65	230.84	176.79	222.32	791.60	6.5
Punakha	154.45	146.20	129.45	153.35	583.45	4.8
Trashiyangtse	97.18	165.00	163.50	117.00	542.68	4.5
Mongar	128.20	142.10	148.95	114.30	533.55	4.4
Pemagatshel	80.00	104.05	112.00	72.00	368.05	3.0
Lhuentse	45.05	46.00	41.55	44.60	177.20	1.5
Haa	32.00	43.00	27.50	34.50	137.00	1.1
Trongsa	22.00	23.50	19.00	19.60	84.10	0.7
Samdrup Jongkhar	8.00	24.00	9.55	23.00	64.55	0.5
Samtse	16.92	11.30	11.55	13.90	53.67	0.4
Sarpang	6.50	3.40	6.75	32.05	48.70	0.4
Dagana	18.10	3.30	8.86	16.85	47.11	0.4
Tsirang	-	-	16.30	24.15	40.45	0.3
Zhemgang	1.00	4.00	4.40	8.70	18.10	0.1
Gasa	-	-	-	-	-	0.0
All dzongkhags (total)	2,846.52	3,114.78	2,954.22	3,205.59	12,121.11	100.0

Source: Agriculture Statistics 2004, 2005, 2006, 2007, Ministry of Agriculture

[22] Gyeltshen, 1995

Although absolute levels of use of inorganic fertilizers in Bhutan is still comparatively low by global standards, at the household level their use has becoming increasingly significant. Furthermore, the use of inorganic fertilizers is geographically skewed with Trashigang, Bumthang and Wangdue dzongkhags accounting for more than 55 percent of the total amount of inorganic fertilizers distributed in the country between 2004-2007.

Urea (nitrogen-supplying compound) is the most commonly used fertilizer because it is highly affordable compared to other inorganic fertilizers. This has resulted in an increasing gap between the application of N (Nitrogen) and that of P (Phosphorus) and K (Potassium), creating an imbalance in soil nutrient management. The NPK ratio at the national level is 6:1:1. The ratio varies between the regions, with the eastern region having the highest at 16:1:1 and the western the lowest at 3:1:1 (see Table 4)[23]. Consequently, mining of natural soil nutrients and chemical degradation of agricultural lands are likely to have occured. Interactions with local communities suggest that lumping of soil is taking place as a result of recurrent use of urea in greater proportion.

Table 4: Share Plant Nutrients by Region (1997-2006)

Region	N	P_2O_5	K_2O	Total	NPK Ratio
Eastern	3,789.4	280.3	239.3	4,309.0	16:1:1
East-central	736.6	459.5	96.8	1,292.9	8:5:1
West-central	1,243.6	387.0	313.1	1,943.7	4:1:1
Western	1,351.8	508.8	504.7	2,365.3	3:1:1

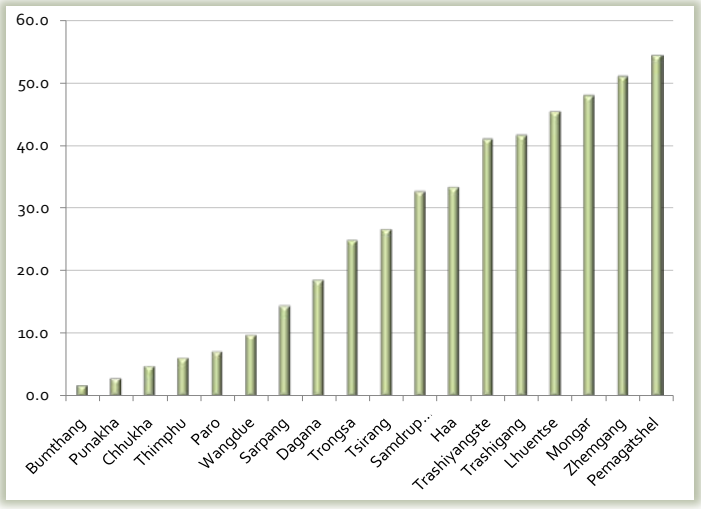
Source: Norbu C, 2008 In: Journal of Renewable Natural Resources Bhutan, Vol. 4 Number 1, August 2008

The DoA has been imparting training to farmers on balanced use of inorganic fertilizers and on combining use of inorganic fertilizers and farmyard manure. Technological adoption has, however, been limited for a number of reasons. Rising prices of compound fertilizers, participation by wrong members[24] in training programs, low literacy level of the farmers, and lack of appropriate training materials are some of the main reasons.

6.4.2 Steep Slope Agriculture

With the exception of a few wide valleys in the western and central regions and some strips of plains in the southern foothills, agriculture is practiced around human settlements located on mountain slopes. Ongoing analysis of slope data using GIS-based digital elevation model by the MoAF reveals that 31 percent of agriculture occurred on lands with more than 50% slope. Pemagatshel, Zhemgang, Mongar, Lhuentse, Trashigang, and Trashiyangste dzongkhags have the highest proportion of

Figure 6: Dzongkhag-wise Proportion of Agricultural Land on Terrain of >50% Slope



[23] Norbu C, 2008

[24] There is a general tendency among rural households in Bhutan to send proxy members, often children or old people, to community meetings and training programs and more especially when such events coincide with the farming season.

agricultural land on terrain with more than 50% slope while Bumthang, Punakha, Chukha, Thimphu and Paro dzongkhags have the smallest proportion of agricultural land on terrain with more than 50% slope (see Figure 6). Agriculture on steep slope is inherently risky, and where such cultivation is practiced without proper water and soil conservation measures, loss of physical stability and soil fertility becomes inevitable.

Recognizing the vulnerabilities of steep slope agriculture, the MoAF has been promoting soil conservation measures such as contour-bunding, kamzhing terracing and hedgerow plantation through targeted sustainable land management (SLM) campaigns. However, small farm landholdings, requirement of additional labor and inadequate monitoring and technical backstopping by RNR extension personnel are some key factors that constrain the progress of SLM activities in the field.

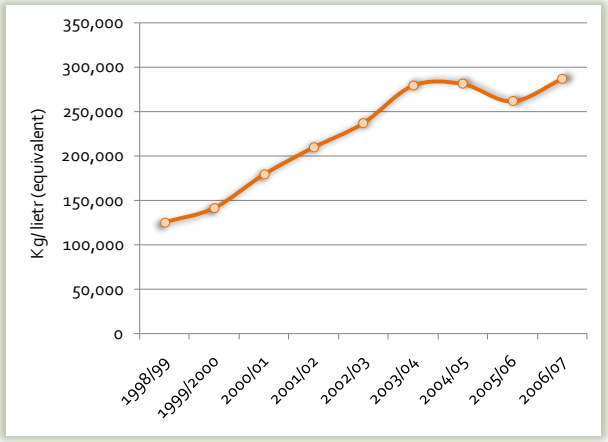
6.4.3 Tseri Cultivation

Slash-and-burn cultivation, known as tseri in Bhutan, is an age-old farming practice and has been prevalent among many farming communities of the country especially in the east and south-central regions. Tseri inherently does not cause major environmental degradation if carried out using traditional knowledge and practices. In fact it is said to be less damaging to the environment than more permanent but intense forms of agriculture[25]. However, changing agricultural trends, growing population and land fragmentation have led to a gradual break-down in the traditional knowledge and practices associated with tseri. Consequently, tseri has been considered environmentally-damaging and is being discouraged by the RGoB. A number of adverse environmental impacts can be associated with tseri in Bhutan. Prolonged practice of tseri and shortening of fallow cycles have led to decline in productivity and stability of the land. Occurrence of sheet, rill and gully erosion is common especially in lower altitude tseri land where there is high intensity rainfall just after clearing, burning and sowing. And tseri burning operations have been known to cause forest fire.

6.4.4 Increasing Use of Chemical Pesticides

The use of chemical pesticides is seen as an easy, inexpensive and quick solution for controlling insect pests and weeds. However, improper and prolonged use of chemical pesticides can pose significant environmental risks such as contamination of land and water (both ground and surface) and attrition of non-target organisms ranging from beneficial soil microorganisms to fish and birds. Presently, it is not properly known to what extent and in what ways have the use of chemical pesticides impacted land and environment in general in Bhutan. What is known is that the use of chemical pesticides in the country has increased over the years (see Figure 7). Agriculture statistics maintained by DoA show that the import of chemical pesticides for agriculture use has increased by more than double from 125,311 kg/liter (equivalent) in

Figure 7: Chemical Pesticide Use Trend 1998/99-2006/07



[25] Upadhyay K, 1991

1998/99 to 286,191 kg/liter (equivalent) in 2006/07. These figures are considerably lower than that of most countries in the world. Moreover, 94.6 percent of the total import between 1998/99-2006/07 were chemical pesticides classified as ones with no acute hazard according to World Health Organization classification. Butachlor, which is an extensively used herbicide in paddy cultivation, alone accounted for nearly 93.75 percent of the total pesticide import. Extremely hazardous (Class Ia), highly hazardous (Class Ib) and moderately hazardous (Class II) pesticides made up 2.13 percent. Nonetheless, there are two points we have to be conscious of: one, chemical pesticides even if with no acute hazard may pose cumulatively significant environmental risk when used in great quantity over the long term, and, two, extremely and highly hazardous pesticides even if used in very small quantities may cause disproportionately higher environmental hazards.

6.5 Poor Irrigation System Management

Going by the responses of local communities and dzongkhag officials during stakeholder consultations, poor management of irrigation systems is one of the biggest causes of soil erosion and mass movement of agricultural land in Bhutan. Most irrigation channels in the country are earthen and in places where the underlying soil is loose such irrigation channels cause high percolation of water and cutting of the soil, gradually causing gully erosion. The Phenday irrigation scheme in Talo geog (Punakha) is a striking case in point. The irrigation scheme, which is the largest in the country, covers about 600 acres of farm land and benefits around 200 farm households. The tertiary irrigation channels, which are all earthen, were originally about 10-12 inches deep but have now become 20-30 feet deep at a number of places as a result of heavy surface run-off on erodible soil. Another major weakness in existing management of irrigation systems is the lack of management of the tail section of irrigation channels resulting in overflow and consequent instability of lands beneath the irrigation systems. Many irrigation systems are also poorly maintained. The National Irrigation Policy requires that project beneficiaries constitute Water Users Associations (WUA) for community management of irrigation systems after their construction is completed by the RGoB and handed over to the project beneficiaries. However, many of the WUAs have become dysfunctional due to lack of guidance and support. A key reason for the lack of guidance and support to WUAs cited by dzongkhag officials was the ambiguity in the institutional mandate for support to WUA as a result of the merging of irrigation services with general engineering services[26] in the dzongkhags.

6.6 Infrastructure Development

6.6.1 Construction of Roads

As a landlocked country and with no domestic air transport infrastructure, Bhutan is currently fully dependent on the road network for travel and transportation of public goods and services. As of 2006, the country had a total motorable road network of 4,545 km[27]. For the Tenth FYP (2008-2013), more than 480 km of new roads, including farm roads, have been planned to improve access and connectivity to remote areas and to improve alignment of existing roads. In addition, during the same period, 508 km of existing roads will be upgraded, including widening

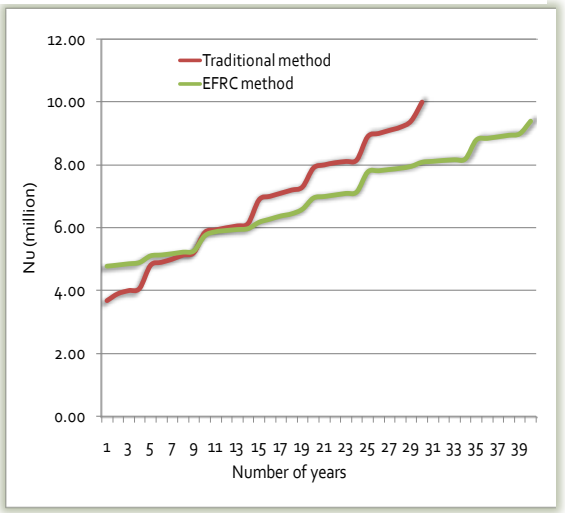
[26] Types of infrastructure served by engineering services at the *dzongkhag* level include farm roads, irrigation systems, schools, basic health units and outreach clinics, *geog* administrative buildings, *geog* RNR centers, and rural water supply schemes.

[27] Department of Roads, Ministry of Works and Human Settlements, cited in Statistical Yearbook of Bhutan 2007

works, to improve efficiency in road travel and transportation of public goods and services[28]. Considering the mountainous terrain and fragile geologic conditions, construction of roads in the country is enormously environmentally challenging. Use of heavy machineries and cutting of mountain slopes to build roads without proper environmental safeguards and mitigation measures inevitably cause problems such as slope failure, deforestation, disturbance to wildlife habitats, and sedimentation of water bodies. In addition to direct impacts, the mass influx of migrant road workers bring on additional demographic pressure to the surrounding natural resources, particularly forests and water.

While the DoR has developed ECOP for the design, construction and maintenance of roads using environment-friendly practices, it has not been able to adequately implement these practices due to constraints in budget and trained human resources. A preliminary study done by the SNV/ World Bank EFRC support project in 2004 revealed that initial cost of building roads using EFRC approach and techniques would be around 30-35 percent higher than building roads using traditional approach and techniques. However, the overall cost difference between EFRC roads and traditional road would balance out after 7-9 years and over the long term EFRC roads are expected to be significantly less expensive than traditional roads as a result of lower recurrent maintenance costs (see Figure 8).

Figure 8: Comparative Cost Trends between EFRC Roads and Traditional Roads



A major cause of concern is the quality of farm roads, which are basically earthen roads built at minimal cost to provide access to farmers for production and marketing of agricultural goods. Most of the farm roads in the country are poorly aligned, designed, built and maintained. They often lack basic structures such as drainage and breast/ retaining walls and, consequently, trigger landslides, gully formation, and sedimentation of water bodies and agricultural fields. One key reason for the poor condition of farm roads is that they are to be built at limited cost. As a thumb rule, the cost of a farm road used to be estimated at Nu 1 million per km. This figure has recently been raised to Nu. 1.2 million per km. Even this increased amount is not adequate to build proper farm roads especially given the rugged terrain and unstable geologic conditions of the country. According to the draft "Farm Road Development Guidelines", about Nu. 2.3 million would be required to build each km of farm road using EFRC approach and techniques. Other key reasons associated with poor quality of farm roads are lack of proper road survey equipment, dearth of trained engineers for planning, supervising and monitoring road construction works at the dzongkhag level, and lack of awareness and ethics among contractors for proper road construction.

6.6.2 Construction of Power Transmission Grids and Distribution Lines

Another key infrastructure development activity that affects land is the construction of power transmission grids and distribution lines. The commissioning of new hydroelectric projects such as Tala and Basochhu would necessitate installation of more power transmission lines. In the Tenth FYP, the RGoB plans to undertake inter-regional power

[28] Tenth Five Year Plan (2008-2013): Programme Profiles

transmission and distribution works to provide stable and adequate power supply for regionally balanced socio-economic development. In the past, in some instances, power transmission towers have been constructed on prime farmlands because of logistical convenience and associated reduction in costs. Local community consultations suggest that this has affected some farmers and forced them, especially those with small landholdings, to cultivate marginal agricultural lands such as on steep terrain or in forest fringes. Furthermore, the construction of power transmission grids through forests results in removal of forest vegetation, thus depriving soil of protective cover against erosion. Depending on site conditions, if clearance of forest vegetation is not accompanied with proper land rehabilitation measures, slope failure and land slips are likely to occur.

6.7 Unsustainable Mining

In recent years, mining has become one of the fastest growing economic sectors in the country. In particular, the production of gypsum, talc and dolomite has increased enormously – between 135 to 220 percent – during the period from 2002 to 2008 (see Table 5). The most significant adverse impacts of mining are land disturbance and fissure from drilling, blasting, excavation, and site clearing, destruction of natural vegetation, sedimentation and contamination of waters, and air pollution with dust particles affecting human health and local livelihoods such as agriculture production[29]. All these adverse impacts can be mitigated to a good extent, and in some cases avoided all together, by means of good mine planning and design, responsive environmental management practices, and timely implementation of effective land rehabilitation measures. In response to potential environmental risks from mining, the MoEA formulated the Mines and Mineral Management Act 1995 stipulating a comprehensive set of provisions for integration of environmental management principles and processes in mining operations. However, the law and supporting regulations have not been effectively enforced for a variety of reasons such as lack of inter-agency coordination, poor institutional mechanisms for enforcement, and inadequate technical capacity within the private mining companies to plan and implement environmental management measures and within the DGM to monitor and provide technical guidance.

Almost all the mines in the country are located along the southern belt because of abundance of mineral deposits and proximity to India and Bangladesh, which are the principal markets for Bhutanese minerals and mineral products. At the same time, the southern belt is extremely vulnerable to land degradation because of highly tectonised, fragile and unconsolidated geologic formation, very heavy rainfall, and enormous population pressure on the environment exerted by local Bhutanese communities as well as by Indian communities across the border. Illegal cross-border mining is prevalent in some areas because of a porous international border with India and lack of law enforcement capacity in terms of personnel, equipment and mobility. Another key issue pertains to the operation of small scale mines. Small-scale mining is mostly carried out on ad hoc deposits which are not studied well and are highly unpredictable in nature. Consequently, such mining resort to spontaneous removal of the deposit leading to unplanned mining operations.

Table 5: Mineral Production in Bhutan 2002-2006

Minerals	2002	2003	2004	2005	2006	2007	2008
Dolomite (metric tons)	388,056	367,402	452,336	388,711	476,516	578,552	1,247,568
Limestone (metric	506,268	551,525	560,807	536,030	581,333	543,964	583,707

[29] Local communities in Jemina and Pugli inferred that excessive dust from mining is the main cause of decrease in crop yields in their localities.

tons)							
Gypsum (metric tons)	105,658	122,829	131,236	150,585	204,198	189,198	248,445
Slate (square feet)	6,100	57,970	126,789	2,908	5,873	78,107	8,227
Coal (metric tons)	88,567	66,324	29,631	85,279	97,965	105,261	123,704
Marble (square feet)	3,207	6,228	3,385	4,005	3,813	12,071	12,301
Quartzite (metric tons)	47,464	52,058	42,599	52,694	40,198	64,049	94,688
Talc (metric tons)	23,118	23,101	39,797	42,791	54,208	62,015	56,077
Stone (metric tons)	319,702	316,068	252,207	146,767	232,187	388,721	408,943
Granite (square feet)	5,559	11,579	2,152	9,436	8,311	14,430	8,227

Source: Department of Geology and Mines

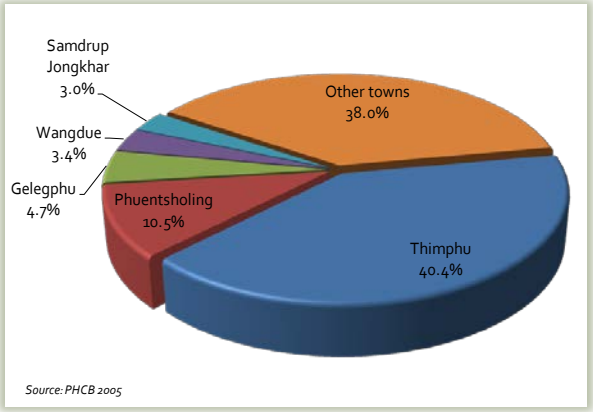
6.8 Industrial Activities

Many of the Bhutanese industries depend on extraction of raw materials, such as wood and minerals, from the natural environment. As of 2006, there were 470 forest-based and 91 mineral-based industries in the country. The volume of extraction and the technology used for extraction of these natural resources will have considerable bearing on the environmental quality of the lands from where they are extracted. Other major industrial activities that contribute to land degradation include dumping of industrial waste, discharge of harmful effluents[30], and conversion of forest and agricultural lands for development of industrial estates.

6.9 Urbanization

Urbanization has taken place at a very rapid pace over the last ten years or so. During the Eighth Five-Year Plan (July 1997-June 2002), the urban population was estimated to be only 15 percent of the country's total and at the onset of the Ninth Five Year Plan (July 2002-June 2007) it was estimated at 21 percent. By 2005, the proportion of Bhutanese urban population had grown to 31 percent. There were 61 towns with a total population of 196,111, accounting for 31 percent of the country's total population, according to Population and Housing Census of Bhutan 2005 (PHCB 2005). It is estimated that between 2000-2005 the country's urban population has grown at an annual rate of 7.3 percent. At this rate, the urban population is projected to grow from 196,111 in 2005 to 564,284 in 2020 and constitute 73 percent of the country's population by 2020. This is indeed a very disconcerting prospect given the country's geologically fragile mountainous ecosystem, rugged terrain and agrarian culture.

Figure 9: Urban Population Distribution 2005



What is also alarming is that more than half of the urban population is concentrated in just two towns – Thimphu and

[30] Interactions with local community members of Dala geog revealed that some farmers were experiencing decrease in crop yields in farms through which industrial wastewater from the Bhutan Board Products Limited flow.

Phuentsholing. Thimphu alone has more than 40 percent of the total urban population while Phuentsholing has more than 10 percent (see Figure 9). Burgeoning urban population has created several environmental problems such as air and water pollution, water shortage, municipal waste generation, congestion of traffic and buildings, and land degradation. In order to accommodate surplus population and develop concomitant infrastructure, urban centers have consumed prime agricultural lands in the valleys and encroached on hill slopes which were once forested. In the smaller urban centers, the lack of proper infrastructure and facilities for drainage, sanitation and waste disposal will have cumulative adverse impacts on land and water resources. Furthermore, there is increased extraction of sand and stones from the river banks and roadsides, and harvesting of timber from adjacent forests to cater to the growing construction demands in the urban centers. Rural-urban migration and the influx of expatriate workforce for construction work in the urban centers have spawned squatting populations in and around the urban centers and exacerbated illicit collection of fuelwood and small timber from adjacent forests. At the same time, rural-urban migration deprives villages of the farm labor required for sustainable management of agricultural lands. Shortage of farm labor was cited by local communities and RNR field staff as one of the main impediments to adoption of SLM technology in the field.

6.10 Solid Waste

Rapid urbanization, growing affluence, changing consumption patterns, low level of awareness and poor civic sense among the Bhutanese public are the key factors that have led to increased generation and improper disposal of soil waste. The solid waste problem is growing exponentially in the urban centers. Municipal solid waste generation has been estimated at a total of 43,697 tons per year according to the first national solid waste survey in the urban areas of Bhutan carried out by the DUDES between November 2007 and January 2008. Per capita household waste generation is highest in Paro and Phuentsholing and while per unit commercial waste generation is highest in Bumthang and Paro. However, because of significantly larger population, the problem of solid waste is most severely felt in Thimphu and Phuentsholing.

What adds further to the problem is that there is no proper system of waste segregation at source and the landfills are poorly managed with basically no regular measures to control pollutant emission, leaching and scavenging. This leads to overfilling, stench, contamination of land and water, and aesthetic dilapidation of the landscape.

Table 6: Average solid waste generation in major urban centers

Urban Center	Population (2005)	Household waste (mean) kg/person/day	Commercial waste (mean) kg/unit/day	Office waste (mean) kg/staff/day
Bumthang	3,246	0.285	3.123	-
Damphu	1,666	0.185	2.849	0.211
Gelephu	9,199	0.238	1.641	0.159
Mongar	3,502	0.281	2.856	0.379
Paro	2,362	0.361	3.105	-
Phuentsholing	20,537	0.340	1.663	0.212
Samdrup Jongkhar	5,952	0.210	1.891	0.191
Samtse	4,981	0.195	2.753	0.171
Thimphu	79,185	0.228	2.479	0.221
Trashigang	2,383	0.187	2.856	0.286

Source: Phuntsho S et al, 2008, Department of Urban Development and Engineering Services

7. Additional Factors

7.1 Population Growth and Structure

The Population and Housing Census of Bhutan (PHCB) 2005 had put the country's population at 634,982 with a growth rate of 1.3 percent per annum in 2005. For 2009, the projected population of the country is 683,407[31].

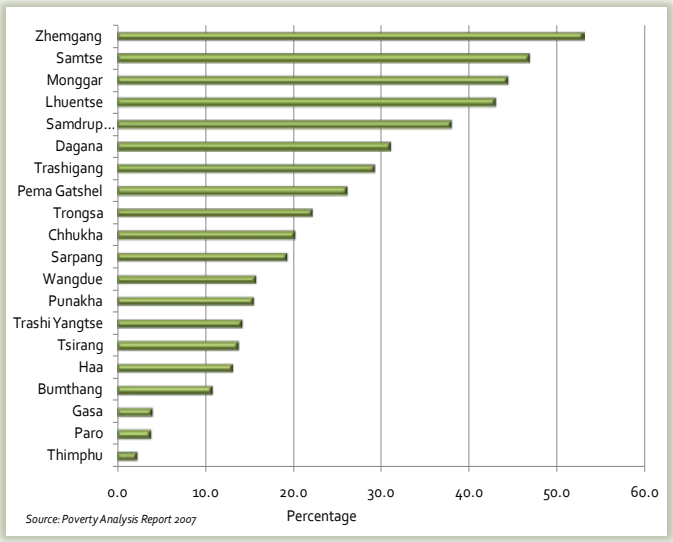
Although the country's population in general does not pose a major problem, there are a couple of existing demographic attributes that concern us. One is the geographically-skewed distribution of the population. On one hand Gasa dzongkhag has a population of only 3,116 people at a density of less than one people per km^2, on the other Thimphu dzongkhag has a population of 98,676 people at a density of 51 people per km^2. Such population imbalances between dzongkhags and between regions have created localized pressures on the natural environment. The other cause of concern is the young age structure of our population with nearly 45 percent of the population being under the age of 20 years. This implies that the population is likely to increase at a higher rate in the near future as a result of growing section of individuals nearing their prime fertility age. Add to this the fact that the current Total Fertility Rate is high, at approximately 2.9, while the Contraceptive Prevalence Rate is quite low, at 31 percent[32].

Furthermore, the country's rugged topography and severe climatic conditions limit arable and habitable conditions to only a small proportion of the country, consequentially exacerbating demographic pressure on land and natural resources than the overall population density may suggest. There are also evidences of population growth and gradual transformation from joint family system to nuclear families[33] leading to fragmentation of farms lands, which has a bearing on how lands are used and managed.

7.2 Poverty

There is relatively a high level of poverty in the country. According to the Poverty Analysis Report 2007 prepared by NSB, an estimated 23.2 percent of the country's total population live below the national poverty line. Poverty in the country is comparatively a rural phenomenon, with 30.9 percent of the rural population living below the total poverty line compared to 1.7 percent of the urban population. Poverty incidences are highest in Zhemgang, Samtse, Mongar, Lhuentse, and Samdrup

Figure 10: Poverty Incidence by Dzongkhags, 2007



[31] Statistical Yearbook 2007, National Statistics Bureau.

[32] Cited from Population Reference Bureau (www.prb.org)

[33] This transformation is more noticeable among urban families but is also becoming common among rural communities.

Jongkhar dzongkhags and lowest in Thimphu, Paro, Gasa, Bumthang, and Haa dzongkhags (see Figure 10).

Poverty and land degradation are inextricably linked. Impoverished communities if not provided with livelihood and income-generating opportunities are prone to engage in activities, such as illegal extraction of forest resources, that contribute to land degradation. On the other side, sustainable land management activities – for instance, agro-forestry – can help the poor to enhance their livelihoods and break away from the poverty cycle. Furthermore, the poor are directly dependent on a wide range of natural resources and ecosystem services for their survival and well-being. Environmental commons (such as grazing lands, waters and forests) contribute significantly to poor people's income but they are also very vulnerable to unsustainable use. When soil erosion, forest degradation, and decline in biodiversity occur, it is generally the poor who are most severely affected.

7.3 Climate Change

People and the natural environment are becoming increasingly vulnerable to the vagaries of climate change. Although ecosystems have adapted to changing climates in the past, current changes in climate are occurring at rates not experienced historically. In general, the faster the climate changes, the greater the impact on people and their natural environment. The impacts of climate change to Bhutan's natural environment have not yet been properly assessed. Nonetheless, the country has experienced in the recent past a number of incidents that have brought to the fore the dangers of climate change (see box).

Recent Climate-related Natural Disasters in Bhutan

- The winter of 1998/99 was characterized by a prolonged spell of dry (snowless) weather. This exacerbated incidents of forest fires that winter, even occurring in places where they were earlier not known. That year, a record number of 112 forest fire incidents took place; the highest ever since forest fire occurrence began to be officially recorded.
- Subsequently, the summer of 2000 was witness to the unprecedented monsoon rains in the country's recent history. The heavy rains triggered off unprecedented number of floods and landslides, causing loss of dozens of human lives and damage to infrastructures and natural resources.
- In 1994, there was a major glacial lake outburst flood emanating from Lugge Tsho, in Lunana area, northwestern Bhutan. This caused extensive damage to agricultural lands and pastures, and loss of several human lives and livestock along Pho Chhu. There are about 2674 glacial lakes existing in the country, of which 24 were classified as potentially dangerous lakes[1]. Of these, the most immediate threat comes from the Raphstreng and Thor Thormi lakes in the headwaters of Puna Tsang Chhu. These lakes are adjacent to each other separated by just a moraine wall. The combined discharge of outbursts of these two lakes is estimated at 53 million cubic meters – three times more than 1994 Lugge Tsho glacial lake outburst flood.
- Most recently, in May 2009, just three days of incessant rain, in the aftermath of Cyclone Aila, left nine people dead, washed away bridges, damaged or destroyed government buildings, private houses, and irrigation and drinking water supply lines, blocked or washed away several highways, feeder roads and farm roads, and inundated forest plantations and agricultural fields. The Department of Disaster Management has estimated that restoration works would cost the government more than Nu 719 million (US$ 15.6 million).

The relationship between climate change and land degradation is complex. Climate change affects land potentials through drought, flooding and other impacts. Yet when the land is degraded, it emits more greenhouse gases and in turn worsens climate change. Soils are an important carbon sink and immediate source of removing atmospheric carbon dioxide and slowing global warming and climate change. Organically managed soils can convert carbon dioxide from a greenhouse gas into a food-producing asset. Soils contain more carbon than is contained in vegetation and the atmosphere combined. Non-agricultural soils carbon sequestration has the potential to substantially mitigate global warming and climate change. Furthermore, well-managed landscapes can moderate the impacts of climate change while degraded landscapes are extremely vulnerable to climate change impacts such as storms and floods and more so in a country such as Bhutan which is characterized by rugged terrain, fragile geology, and erratic climatic conditions. The impact of climate change on the hydrological cycle is a major concern for Bhutan as regional predictions foresee through an initial increase of glacial discharge

followed by a considerable fall in discharge due to ongoing glacial retreat. This will affect the country's hydropower potential and reduce the scope for irrigation.

7.4 Policy and Institutional Issues

7.4.1 Lack of National Land Use and Management Policy

At the macro-level and as a cross-sectoral issue, a well-defined policy perspective on national land use and management is presently lacking. Land degradation impacts several sectors and land use conflicts between various sectors have become frequent. Urban expansion has led to loss of prime agricultural lands and depletion of forests, road construction in geologically fragile areas has caused and exacerbated landslides, agriculture on steep terrain have led to soil erosion, several mining operations have reportedly caused health and environmental hazards, and townships have been developed or planned along riversides which are vulnerable to GLOF or at risk from other natural hazards. Furthermore, programs and activities to address land degradation have remained compartmentalized within various sectors. Green sectors such as agriculture and forestry feature SLM more prominently in their policies and programs whereas brown sectors, especially those concerning infrastructure and urban development, have only cursory or no reference to SLM in their policy and programmatic frameworks. This suggests the tendency to relate SLM closely as an environmental issue rather than a development issue.

7.4.2 Weak Enforcement of Environmental Laws and Regulations

Bhutan has very strong laws and regulations for the conservation of environment and mitigation of adverse environmental impacts from development plans, programs and projects. The Environment Assessment Act 2000, Forest and Nature Conservation Act 1995, Mines and Mineral Management Act 1995, and the National Environmental Protection Act 2007 are some of the key laws that provide immense scope for pursuing environmentally sustainable development and pre-empting environmental degradation at a far-reaching scale. However, our environmental laws and regulations have not been effectively implemented. Dearth of law enforcement personnel, ambiguity in institutional mechanisms, and lack of technical and financial resources to implement environment-friendly technology are some of the key reasons for weak law enforcement but at the same time there is also the acknowledgement that there is some degree of public and professional apathy towards existing laws. Effective environmental law enforcement will also depend on the awareness and education of the public of their environmental rights and responsibilities. Local community consultations during the course of NAP preparation revealed that a large majority of the local people were not aware of various environmental laws and regulations.

7.4.3 Institutional Lacuna for National Land Use and Management

At the present, there is a lacuna in the institutional setting for overall technical coordination of national land use and management policies, plans and programs. There are two relevant non-ministerial, inter-agency bodies that can potentially function as the overall technical agency for national land use and management. One is the NEC, but it currently does neither have the institutional structure nor the professional capacity to deal with land use and management effectively. The other is the NLC but its current mandate and institutional structure is restricted to the administration of the Land Act of Bhutan 2007 and has very little to do with the technical aspects of land use and management. The current institutional scenario is that the NSSC under MoAF is the focal agency for the UNCCD and the main implementing agency for the Sustainable Land Management Project, the largest project specifically dedicated

to combating land degradation. However, the institutional makeup of NSSC as a soil management referral and research facility within the MoAF is such that it can have only limited influence on other agencies, especially those outside the MoAF. This lessens its efficacy to oversee and coordinate sustainable land management in a cross-sectoral manner.

Part D
Action Program

8. Basic Premise and Guiding Principles

This Action Program draws its fundamental essence from the country's overarching development philosophy of Gross National Happiness. It shall first and foremost contribute to the objective of environmental sustainability whilst also directly or indirectly contributing to poverty alleviation, food security, economic growth and human safety.

In implementing this Action Program, the following guiding principles shall apply:

- **Interdisciplinarity and Partnerships.** Land degradation is an issue that cuts across several sectors and disciplines. Compartmentalized development of one sector may create adverse environmental conditions that affect another sector. Therefore, the approach to combat land degradation will need to be inter-disciplinary. Emphasis will need to be given to eliciting knowledge, perceptions and interests of various sectors and using them in synergy to effectively deal with land degradation. Furthermore, in Bhutan, there is a small but highly effective fraternity of non-governmental organizations (NGOs) that work in the field of environmental management and community development. Given their ability to function with less administrative burden than government agencies, NGOs will need to be engaged through effective partnerships especially in areas that concern livelihood-based land use and management issues.

- **Adaptive Management.** Activities to address land degradation will have to be flexible to adapt to changing circumstances and new insights. This approach is particularly important to manage complex land use practices and vulnerable landscapes, characterized by a high level of unpredictability. Adaptive management will ensure that sustainable land management measures are not static but rather dynamic and sufficiently resilient to respond to fast-changing and immediate needs, and take advantage of new opportunities. This is particularly important because of the country's diverse landscapes and micro-environments.

- **Knowledge Management.** Consistent monitoring and organizational learning are important components of an adaptive management approach. So, emphasis will be given on learning from past successes as well as failures to continuously evolve activities to address land degradation in evolving circumstances. This will involve proper documentation of methodologies, approaches and techniques developed in order to combat land degradation and to make this knowledge available to all stakeholders at all levels.

- **Sustainability.** The ability to continue and sustain activities that deal with land degradation over the long term will be crucial. To be sustainable, activities will have to be financially viable, technically feasible, socially beneficial and environmentally non-damaging to the extent possible. A key to enhance sustainability will be to generate and nurture community ownership of sustainable land management initiatives. Participatory planning of SLM activities is seen as a core element to ensure sustainability at the grassroots level.

9. Overall Goal and Objectives

The overall goal of the Action Program is to "prevent and mitigate land degradation and its impacts through systems and practices of sustainable land management that protects and maintains the economic, ecological and aesthetic values of our landscapes."

To pursue the aforesaid goal, the following specific objectives have been set:

1. Conservation, rehabilitation and sustainable use of forest resources to maintain well-functioning forest landscapes;

2. Development and promotion of sustainable agricultural practices that enhances local livelihoods whilst maintaining the productivity and stability of agricultural lands;

3. Integration of environmental management measures in development activities that pose significant risks of land degradation;

4. Strengthening of systemic[34] and institutional capacity to combat land degradation and its impacts;

5. Information, advocacy and education to create increased policy and public support for sustainable land management.

10. Program Components and Recommended Actions

10.1 Conservation, Rehabilitation and Sustainable Use of Forest Resources

10.1.1 Forest Fire Management

Action 1: Fully assess the occurrence, trends and causes of forest fires. Concurrently, carry out a nation-wide public attitude and behavior survey to assess public perception and outlook towards forest fire and its impacts. *(Responsible Agency: DoF in coordination with CoRRB)*

Action 2: Carry out in-depth research on forest fire ecology in various forest ecosystems. Such research would need to take into account the results of prescribed burning trials carried out in easten Bhutan. *(Responsible Agency: DoF in coordination with CoRRB)*

Action 3: Based on the results of Actions 1 and 2, develop forest fire management strategies for various fire-vulnerable forest ecosystems. *(Responsible Agency: DoF)*

Action 4: Develop and implement public education and awareness programs using innovative avenues such as rural theatre, folk music, school cultural events, religious festivals, and painting/ quiz/ debate

[34] Systemic capacity would include policies and legislations.

competitions. It is desirable that the awareness programs are developed based on public perception and outlook towards forest fire and its impacts assessed through public attitude and behavior survey (refer Action 1). *(Responsible Agency: DoF in coordination with MoAF's Information and Communication Services, Dzongkhag Administrations, and RSPN)*

Action 5: Develop and implement community-based forest fire management schemes targeting specific groups of local communities, such as lemon grass oil producers and graziers. *(Responsible Agency: DoF in coordination with Dzongkhag Administrations)*

Action 6: Review and rationalize existing forest fire penalties to make them enforceable. *(Responsible Agency: DoF)*

Action 7: Review and strengthen institutional arrangements for networking, reporting and forest fire suppression. Institutional strengthening would among other things include procurement and management of forest fire fighting equipment such as helmets, fire-proof gear, fire fighting tools, walkie-talkie, first-aid kit, and binoculars. It would also entail identification of focal persons in various agencies for mobilization of fire fighters and strengthening a network of community fire watchers and volunteers for expeditious reporting and suppression of forest fires. *(Responsible Agency: DoF in coordination with Dzongkhag Administrations)*

10.1.2 Sustainable Production and Utilization of Forest Resources

Action 1: Develop the capacity of the territorial forestry divisions to effectively implement the planning guidelines for management of forest areas outside the FMU system for sustainable production and utilization of forest resources. Capacity development would include staff training backed up with necessary computers, customized software and field instruments required for implementation of the planning guidelines. *(Responsible Agency: FRDD, DoF)*

Action 2: Implement the planning guidelines in at least one forest area in each territorial forestry division and evaluate the applicability and effectiveness of the guidelines in these forest areas. The results of the evaluation will be used for improving the planning guidelines for more widespread use. *(Responsible Agency: FRDD, DoF)*

Action 3: Carry out a detailed evaluation of the effectiveness of FMUs through out the country in the context of environmental sustainability and socio-economic development, and use the results of the evaluation in enhancing the planning and management of FMUs. It is recommended that the evaluation be done using a multi-disciplinary approach involving representation from various relevant agencies. *(Responsible Agency: MoAF)*

Action 4: Develop and promote alternative fuels and construction materials to reduce dependence on forest resources. For instance, the NRDCL has introduced production and sale of sawdust briquettes in Thimphu in the recent years. This initiative could be scaled-up to other dzongkhags such as Bumthang, Haa and Paro where there is a huge demand for fuelwood especially during winters. The possibility of using paper waste for production of briquettes could also be examined especially

considering that paper waste constitutes the second highest proportion – 17.2 percent[35] – of the total municipal solid waste generated in the country. *(Responsible Agency: NRDCL in coordination with MoAF and MoWHS).*

Action 5: Promote bio-digester (biogas) at household level and stall feeding livestock for collection of manure. This intervention would address two problems: reduction in fuelwood consumption as well as uncontrolled grazing of livestock in forests. (*Responsible Agency: NRDCL in coordination with MoAF)*

10.1.3 Rehabilitation of Degraded and Barren Forest Lands

Action 1: Assess the extent of degraded and barren forest lands, map these areas, and prioritize them for re-afforestation taking into consideration a number of factors such as socio-economic benefits to the local communities, ecological risks (both immediate and long-term) of not rehabilitating the forest land, and contribution to global environmental needs such as carbon sequestration and adaptation to climate change. *(Responsible Agency: DoF)*

Action 2: Re-afforest prioritized degraded and barren forest lands using species and methods that are environmentally appropriate to local conditions. *(Responsible Agency: DoF)*

Action 3: Lease out degraded and barren forest lands to private parties for plantation and commercial forestry based on a public-private partnership model through which DoF provides technical support and guidance to ensure that such enterprises are economically beneficial as well as ecologically sound. *(Responsible Agency: DoF)*

Action 4: Establish a fully-functional system for developing plans for the establishment and long-term management of forest plantations. Such plans would need to include detailed activities related to site survey, species selection, planting methods, thinning, weeding, pruning, harvesting, fire management, and control of pests and diseases. This is recommended because many forest plantations are established without clear management objectives and suffer from paucity of resources for proper maintenance[36]. *(Responsible Agency: DoF)*

10.1.4 Participatory Forest Management

Action 1: Design and impart participatory training to develop community skills for community and private forestry focusing on activities such as community organization, conflict resolution, benefit-sharing and community fund management. This is recommended because community forestry has evolved into a major program since the first community forest was established in 1997. As of April 2009, there were 131 community forests covering about 16,380 hectares of forest land. By the end of the Tenth FYP, the DoF has planned to establish a total of 400 community forests covering at least four percent of forest land. For the sustainability of the fast-spreading community forestry program, it is

[35] Phuntsho S, 2008

[36] DoF, 2009

very crucial to equip the local communities with adequate technical and social skills to establish and manage community forests. *(Responsible Agency: SFD, DoF, in coordination with Dzongkhag Administrations and RDTC)*

Action 2: Train dzongkhag and geog forestry staff in communications and extension approaches and techniques to effectively provide guidance and technical backstopping to community forest user groups and private forest owners. *(Responsible Agency: SFD, DoF, in coordination with CNR and MoAF's Information and Communication Services)*

Action 3: Integrate sustainable use of various types of non-wood forest products, based on community priorities, in the community forestry schemes. Such schemes will also need to include strategies for marketing NWFPS. *(Responsible Agency: SFD, DoF, in coordination with Dzongkhag Administrations)*

Action 4: Develop and promote agro-forestry models as part of the private forestry program with special attention to soil and water conservation, and maintenance of soil fertility. *(Responsible Agency: SFD, DoF, in coordination with NSSC, DoA)*

10.1.5 Livestock and Grazing Management

Action 1: Carry out carrying capacity studies and based on these, develop a taxation scheme to discourage the rearing of livestock in excess of the carrying capacity. *(Responsible Agency: DoL in coordination with CoRRB and MoAF's Policy and Planning Division)*

Action 2: Provide effective animal health coverage to give livestock farmers the security to keep smaller but more productive herds of livestock. *(Responsible Agency: DoL in coordination with Dzongkhag Administrations)*

Action 3: Establish farmer cooperatives that will among other things oversee proper utilization of forage resources through monitoring of stock numbers, grazing pattern, nutrient management, and control of weeds. *(Responsible Agency: DoL in coordination with Dzongkhag Administrations)*

Action 4: Develop hay meadows with high-yielding fodder legumes and grasses under high nutrient supply conditions to reduce grazing pressure on forests. *(Responsible Agency: DoL in coordination with Dzongkhag Administrations and CoRRB)*

Action 5: Promote homestead forests of species with high forage and soil conservation values. *(Responsible Agency: DoL in coordination with Dzongkhag Administrations)*

Action 6: Where overgrazing is a problem but livestock rearing is the primary source of livelihood, develop and promote improved pasture management and forage development. Concurrently, promote alternative livelihoods that are environmentally sustainable. *(Responsible Agency: DoL in coordination with CoRRB and Dzongkhag Administrations)*

Action 7: Identify barren/degraded government lands that can be potentially leased for pasture management as per the provision of the Land Act of Bhutan 2007. Prepare and implement pasture management

plans for the leased barren/degraded government lands. *(Responsible Agencies: DoF and DoL in coordination with Dzongkhag Administrations)*

10.2 Development and Promotion of Sustainable Agricultural Practices

10.2.1 Integrated Soil Fertility Management

Action 1: Develop toolkits for training of farmers on integrated soil fertility management. The toolkits may include training handbook (for the agriculture extension staff), posters, flipchart, video, pictorial manual and other materials that may be necessary for farmer-friendly training. *(Responsible Agency: NSSC in coordination with MoAF's Information and Communication Services, CNR and CoRRB)*

Action 2: Train agriculture extension staff in the use of farmer training toolkit for integrated soil fertility management. *(Responsible Agency: NSSC in coordination with MoAF's Information and Communication Services and CNR)*

Action 3: Conduct farmer training on integrated soil fertility management in a phased manner, first focusing on dzongkhags where use of inorganic fertilizers is most excessive. *(Responsible Agency: NSSC in coordination with RDTC and Dzongkhag Administrations)*

Action 4: Disseminate through television and radio the advantages of integrated soil fertility management and the disadvantages of disproportionate and prolonged use of inorganic fertilizers. Innovative TV and radio scripting, for instance developing TV and radio programs around the story of a Bhutanese farmer, may have more impact than run-of-the-mill programs. *(Responsible Agencies: NSSC and MoAF's Information and Communication Services in collaboration with Bhutan Broadcasting Service Corporation)*

Action 5: Carry out comparative studies on various soil fertility management techniques and practices, both indigenous and introduced, and based on the results improve soil fertility management techniques and practices. *(Responsible Agency: NSSC in coordination with CoRRB)*

Action 6: Establish soil testing labs within RNR-RCs to provide more expeditious information on soil quality and guidance for soil improvement to extension staff and farmers. This is being recommended because currently there is only one soil testing lab, located at NSSC Semtokha, and this inadvertently leads to inconveniences and longer duration in delivery of soil samples and test results. *(Responsible Agency: NSSC in coordination with CoRRB)*

Action 7: Develop and promote cropping systems and practices that help soil nutrient management. *(Responsible Agency: DoA and CoRRB in coordination with Dzongkhag Administrations)*

10.2.2 Sustainable Land Management for Steep Slope Agriculture

Action 1: Conduct and complete land capability studies. Based on these studies, develop agricultural land capability classification and formulate management guidelines for agricultural land use as per land capability. *(Responsible Agencies: NSSC and MoAF's Policy and Planning Division)*

Action 2: Develop and promote low-cost SLM technology for steep slope agriculture. An option would be to examine existing external SLM technology, such as Sloping Agriculture Land Technology (SALT) practiced in the Philippines[37], and adapt it to Bhutanese conditions. Such technology must be backed up by development of farmer-friendly training and extension materials followed by training of farmers in a phased manner. *(Responsible Agency: NSSC in coordination with CoRRB and Dzongkhag Administrations)*

Action 3: Develop and promote SLM-based farm enterprises, linking SLM with poverty alleviation/ income generation, and thus making SLM more attractive for farmers. *(Responsible Agency: NSSC in coordination with CoRRB and Dzongkhag Administrations)*

Action 4: Mainstream SLM in RNR-Research programs and translate SLM research results and recommendations into farmer-friendly extension materials on SLM. *(Responsible Agencies: CoRRB and MoAF's Policy and Planning Division)*

10.2.3 Phasing Out of Tseri and Promotion of Suitable Alternatives

Action 1: Review all existing reports of studies on tseri cultivation and alternatives, analyze the findings and recommendations, and consolidate them into a succinctly well-analyzed document for discussion and decision at the National Assembly and National Council. *(Responsible Agencies: CoRRB and MoAF's Policy and Planning Division)*

Action 2: Depending on the resolutions of the parliament, carry out policy, legislative and administrative reforms to phase-out tseri cultivation and/or promote suitable alternatives which are more environmentally sound and economically viable than tseri. *(Responsible Agency: MoAF's Policy and Planning Division in coordination with DoA, DoF and CoRRB))*

10.2.4 Integrated Pest Management

Action 1: Building upon past work and with additional research, consolidate integrated pest management technology integrating biological measures and good crop management practices to control agricultural pests and diseases. *(Responsible Agency: National Plant Protection Center in coordination with CoRRB)*

[37] SALT is a system in which dense hedgerows of fast growing perennial nitrogen-fixing tree or shrub species are planted along contour lines thus creating a living barrier that traps sediments and gradually transforms the sloping land to terraced land. The hedgerows both markedly reduce soil erosion and contribute to improving and/or maintaining soil fertility.

Action 2: Carry out an inventory of agricultural pests and diseases that includes an assessment of the severity and prevalence scale of various pests and diseases, control measures applied on them, and the effectiveness of these measures. Based on the results of this inventory, develop research and extension packages for integrated pest management giving priority to pests and diseases which are most widespread and problematic to the farmers. *(Responsible Agency: National Plant Protection Center in coordination with CoRRB and Dzongkhag Administrations)*

Action 3: Develop extension and communication packages for integrated pest management and disseminate them through farmer training and radio/ television programs. *(Responsible Agencies: National Plant Protection Center and MoAF's Information and Communication Services in collaboration with Bhutan Broadcasting Service Corporation)*

Action 4: Discourage the use of pesticides that belong to Class Ia (extremely hazardous), Class Ib (highly hazardous), and Class II (moderately hazardous), and gradually phase them out if possible. *(Responsible Agencies: National Plant Protection Center and MoAF's Policy and Planning Division)*

10.2.5 Improvement of Irrigation System Management

Action 1: Review and revise existing irrigation development guidelines, especially examining ways in which management of the tertiary irrigation channels and tail sections of the irrigation channels can be improved. *(Responsible Agency: DoA in coordination with CoRRB and MoAF's Policy and Planning Division)*

Action 2: Review the functionality of WUAs and invigorate dysfunctional WUAs with community training, extension services and financial support. *(Responsible Agency: DoA in coordination with CoRRB and MoAF's Policy and Planning Division)*

Action 3: Train dzongkhag engineers to provide irrigation-related services and backstopping to WUAs using irrigation development guidelines as the basis *(Responsible Agency: DoA in coordination with CNR)*.

Action 4: Rectify existing irrigation schemes that have become highly risky from the land degradation point of view. One such irrigation scheme could be the Phenday Irrigation Scheme in Talo geog (Punakha), which is reportedly the largest in the country. Tertiary earthen irrigation channels of this irrigation scheme have cut deep into the soil and created gullies as deep as 20-30 feet in a number of places. *(Responsible Agency: DoA in coordination with Dzongkhag Administrations)*

10.3 Environmental Management of Development Activities that pose Land Degradation Risks

10.3.1 Environment-friendly Road Construction

Action 1: Make adoption of existing environmental codes of practices for road construction mandatory for all types of roads by enhancing legal provisions for EFRC in the Roads Act of Bhutan. *(Responsible Agency: MoWHS in coordination with other agencies involved in road construction, e.g. MoAF for farm roads, NRDCL for logging roads, and MoEA for mining roads and access roads to hydropower projects)*

Action 2: Adopt the existing farm road development guidelines, including budgetary enhancement, as early as possible. *(Responsible Agency: MoAF)*

Action 3: Train DoR engineers, dzongkhag engineers, private road contractors and contract engineers in EFRC approach and techniques based on existing ECOP and (approved) farm road development guidelines. *(Responsible Agencies: MoWHS and MoAF in coordination with CST and JNP)*

Action 4: Carry out cost-benefit analysis between roads built with EFRC techniques and traditional techniques. Such analysis will need to look at economic (cost of road construction and maintenance), environmental (e.g. soil erosion, loss of vegetative cover, sedimentation of rivers) and social costs (e.g. disruption to human activities as a result of frequent road blocks). The results of the analysis would come useful in policy-making. *(Responsible Agencies: MoWHS for highways, district roads and feeder roads, and MoAF for farm woads)*

Action 5: Review and rationalize existing farm road targets vis a vis existing technical and financial capacity for EFRC. *(Responsible Agency: MoAF in coordination with Dzongkhag Administrations)*

Action 6: Provide all dzongkhag engineering sectors the full range of road survey equipment necessary for alignment of roads in ways that can minimize adverse environmental impacts whilst optimizing socio-economic benefits. *(Responsible Agencies: MoWHS and MoAF)*

Action 7: Integrate EFRC as a module in the engineering courses provided by the Jigme Namgyel Polytechnic and CST. Logically, such integration will have to precede with capacity development of faculty for teaching EFRC and concurrent preparation of course materials. *(Responsible Agency: MoWHS in coordination with CST and JNP)*

10.3.2 Sustainable Mining

Action 1: Review existing institutional mechanisms for the implementation of mining law and regulations, and strengthen/ revamp them to enhance law enforcement. *(Responsible Agency: MoEA)*

Action 2: Provide training support to private mining companies to develop their technical capacity for environmental management of mining operations and restoration of mined areas. *(Responsible Agency: MoEA)*

Action 3: Develop ECOP for mining activities and make its application mandatory through incorporation in mining law and regulations. This will have to be backed up with capacity development in terms of staff training and equipment for application of mining ECOP. *(Responsible Agency: MoEA)*

Action 4: In keeping with the Mines and Mineral Management Act 1995 and Mines and Mineral Management Regulations 2002, ensure all existing and new mining operations have mine plan, environmental management plan, and mine restoration plan as per acceptable standard stipulated by law, regulations and ECOP, and that these plans are being effectively implemented. *(Responsible Agencies: MoEA and NECS)*

Action 5: Develop the capacity of the DGM and collaborating agencies, in terms of technical knowhow and skills as well as equipment and mobility, for monitoring, inspection, regulation and technical backstopping of environmental management activities of mining operations. *(Responsible Agency: MoEA)*

Action 6: Carry out cost-benefit analysis of various mining operations in the geologically fragile southern foothills fully taking into account factors of environmental sustainability, immediate, medium- and long-term social and environmental costs, and potential trans-boundary repercussions. *(Responsible Agencies: MoEA and NECS)*

Action 7: Through the existing Annual Border District Coordination Meeting, pursue dialogue with West Bengal (India) state government authorities to operationalize an effective bilateral mechanism to curb illegal mining along border areas[38]. *(Responsible Agency: MoEA in coordination with MoHCA and Ministry of Foreign Affairs)*

10.3.3 Sustainable Urban Development

Action 1: Identify regional growth centers in central and eastern regions, where proportion of urban population is significantly less, and promote urban development in those areas for regionally-balanced urban development. *(Responsible Agency: MoWHS)*

Action 2: Decelerate the growth of Thimphu and Phuentsholing urban centers and enhance environmental management of these centers, including beautification of urban lands and development of public amenities for recreation, drainage, sanitation, and waste disposal. *(Responsible Agency: MoWHS in coordination with Thimphu and Phuentsholing City Corporations)*

Action 3: Improve municipal governance and strengthen municipal capacity to effectively manage urban environments and deliver public services. *(Responsible Agency: MoWHS in coordination with Thimphu and Phuentsholing City Corporations)*

Action 4: Integrate rural-urban planning to address rural-urban migration and bring about balanced development of rural and urban areas with particularly emphasis on social welfare infrastructure such as schools, health care facilities, roads, and markets. *(Responsible Agency: GNHC Secretariat in coordination with line ministries)*

Action 5: Carry out ecological mapping and zoning of all major urban centers and their peripheries, identifying areas that are vulnerable to land degradation and areas that possess special natural and cultural values. Classify such areas as protected zones and restrict intrusive human activities in these zones. Where such areas have already become degraded, carry out rehabilitation activities. *(Responsible Agency: MoWHS with technical and planning support from NEC and MoAF)*

[38] Such a mechanism could also cover the issue of illegal collection of forest products along the border areas.

10.3.4 Solid Waste Management

Action 1: Improve solid waste management by introducing a system for waste segregation at source and adoption of proper landfill management practices. *(Responsible Agency: MoWHS with technical support from NEC)*

Action 2: Establish waste recycling hubs in major towns. In establishing such hubs, examine the possibility of introducing models of community-based entrepreneurship and public-private partnership for waste management. With greater access to Indian markets, bordering towns such as Phuentsholing, Gelephu and Samdrup Jongkhar may be more viable options. *(Responsible Agencies: MoWHS and MoEA in coordination with NECS and Bhutan Chamber of Commerce and Industry)*

Action 3: Create appropriate implementation mechanisms and develop bye-laws and technical norms/guidelines, backed up with capacity development, for the implementation of the newly ratified Waste Prevention and Management Act 2009. *(Responsible Agency: NECS in coordination with line ministry agencies and civil society organizations)*

Action 4: Conduct public attitude/ behavior survey with regards to solid waste and littering and, based on the results of this survey, develop and carry out public awareness campaigns to change public attitude and inculcate healthy habits (e.g. reduce, reuse and recycle). *(Responsible Agency: NECS in coordination with RSPN and other relevant civil society organizations)*

10.4 Strengthening of Systemic and Institutional Capacity

10.4.1 Policy and Legislation Development

Action 1: Develop a National Land Use and Management Policy (this could be possibly addressed through the soon-to-be developed National Land Policy/ National Spatial Policy). *(Responsible Agency: NLCS in coordination with NECS and relevant line ministry agencies)*

Action 2: Formulate a National Mining and Mineral Development Policy laying out Bhutan's fundamental position and principles for mining to ensure equitable allocation and access to mineral resources, sustainable management of non-renewable mineral resources, long-term sustainability of mineral-based industries, and mitigation of adverse environmental impacts. *(Responsible Agency: MoEA in coordination with NECS and Bhutan Chamber of Commerce and Industry)*

Action 3: Finalize the long due Grazing Management Policy and Act. Such a policy and law have been in discussion for a long time. Draft versions exist but they need to be expeditiously carried forward, refined, consolidated, finalized and enacted. *(Responsible Agency: MoAF)*

10.4.2 Strengthening Enforcement of Environmental Laws and Regulations

Action 1: Assess the institutional capacity and identify capacity needs, including clear delineation of inter-institutional roles and responsibilities, for the enforcement of various environmental laws and

regulations. Strengthen institutional capacities based on the assessment. *(Responsible Agency: NECS in coordination with relevant line ministry agencies)*

Action 2: Enforce the full range of procedures and processes for environmental assessment and clearance on projects which inherently have very high potential of adverse environmental impacts. These would essentially include infrastructure development that involves use of heavy machinery, industries and mines. *(Responsible Agencies: NECS, MoEA, MoWHS and MoAF)*

Action 3: Develop the technical capacity of Dzongkhag Environment Officers and other members of DEC to more effectively implement the EA process. *(Responsible Agency: NECS)*

Action 4: Develop the technical capacity of Competent Authorities within the line Ministries to more effectively implement the EA process. *(Responsible Agency: NECS)*

Action 5: Develop NECS's capacity to carry out compliance monitoring of EA Act and Regulations, and provide technical backstopping to the Competent Authorities and DECs. *(Responsible Agency: NECS)*

Action 6: Create public awareness of environmental laws and regulations, including their rights and responsibilities, to foster active public participation and support to law enforcement. *(Responsible Agency: NECS in coordination with relevant line ministry agencies)*

Action 7: Make all environmental laws and regulations accessible to the public. This could be among other things done by means of posting them on the internet as well as making them available for sale in bookshops. *(Responsible Agency: NECS in coordination with relevant line ministry agencies)*

10.4.3 Institutional Development

Action 1: Create a cross-sectoral agency, within NLCS or NECS, for overall technical coordination of national land use and management. *(Responsible Body: National Cabinet)*

Action 2: Strengthen the institutional capacity of the Department of Disaster Management and Dzongkhag Administrations to effectively deal with natural disasters. *(Responsible Agency: MoHCA)*

Action 3: Upgrade NSSC into an independent MoAF institution to enable it to coordinate and provide soil conservation and land management services across the three RNR sub-sectors of agriculture, livestock development and forestry. *(Responsible Agency: MoAF)*

Action 4: Establish a central weather organization supported by regional real-time weather stations for weather monitoring and forecasting[39]. This will enable better preparedness for climate-induced natural disasters. In addition, creation of such an organization would improve management of hydrological and meteorological data which can be used for a wide range of purposes, including

[39] At the present, basic meteorological data collection and weather forecasting is being done by the Hydromet Division under DoE. This facility is, however, primarily meant for hydropower development and operates on observed data. There is a need to upgrade this facility into a national weather organization which caters to the needs of various sectors and is equipped with real-time weather monitoring and forecasting capability.

planning of roads and irrigation systems and monitoring of river sedimentation levels. *(Responsible Body: National Cabinet)*

10.5 Information, Advocacy and Education for Policy and Public Support

Action 1: Carry out a country-wide quantitative survey of land degradation using Geographic Information System technology. This survey would need to assess the nature, extent and scale of land degradation and generate quantitative information to primarily inform decision-making, provide baseline for monitoring land degradation trends, support awareness raising programs, and aid planning of geographically-targeted actions to combat land degradation. Information derived from the survey could be fed into mainstream information systems such as the NECS's Environment Information Management System and Dynamic Information Framework for Bhutan (DrukDIF). *(Responsible Agency: NECS/MoAF)*

Action 2: Create a national website dedicated to land degradation issues, through which information views and solutions on land degradation can be exchanged. This website could also contain a "Bhutan-Land Degradation Information System", which could be developed using the data accrued from the land degradation survey (refer Action 1). *(Responsible Agency: NECS/MoAF)*

Action 3: Develop and use public information documents such as the Bhutan Environment Outlook/ State of the Environment Reports for advocacy and public education on environmental trends and issues. Produce and disseminate these reports in advance of the next FYP(s) to aid informed their formulation. *(Responsible Agency: NECS in coordination with relevant line ministry agencies)*

Action 4: Produce and broadcast a TV documentary series, highlighting land degradation trends and issues in the country, to create increased public awareness. *((Responsible Agency: NECS in coordination with relevant line ministry agencies)*

11. NAP Implementation Mechanism

11.1 Management Bodies

A three-tier mechanism is proposed for the implementation of the NAP. At the highest level, it is proposed that a NAP Steering Board (NAP-SB) be constituted for overall supervision and guidance in the implementation of the NAP and to resolve policy and coordination issues if and when they emerge. The following composition is proposed for the NAP-SB:

1. Hon'ble Minister, Ministry of Agriculture (Chair)
2. Hon'ble Deputy Minister, National Environment Commission Secretariat (Co-Chair)
3. Hon'ble Secretary, National Land Commission Secretariat (Member)
4. Hon'ble Secretary, GNH Commission Secretariat (Member)
5. Hon'ble Secretary, Ministry of Finance (Member)

6. Representative, Ministry of Works and Human Settlement (Member)
7. Representative, Ministry of Economic Affairs (Member)
8. Representative, Ministry of Home and Cultural Affairs (Member)
9. Representative, Royal Society for Protection of Nature (NGO member)
10. Representative, Bhutan Chamber of Commerce and Industry (Private sector member)
11. Representative, United Nations Development Program (International organization member)
12. Director, Department of Agriculture, Ministry of Agriculture (Member Secretary)

The NAP-SB would meet at least once a year to review the progress of the implementation of the NAP and to discuss and resolve any policy or coordination issues that may have emerged during the coordination of the NAP process.

At the next level, a NAP Monitoring and Coordination Committee (NAP-MCC) is proposed for monitoring and coordinating the implementation of the NAP. The composition of the NAP-MCC is proposed as following:

1. Director, Department of Agriculture, Ministry of Agriculture (Chair)
2. Representative, Department of Forests, Ministry of Agriculture (Member)
3. Representative, Department of Livestock, Ministry of Agriculture (Member)
4. Representative, Department of Geology and Mines, Ministry of Economic Affairs (Member)
5. Representative, Department of Energy, Ministry of Economic Affairs (Member)
6. Representative, Department of Industry, Ministry of Economic Affairs (Member)
7. Representative, Department of Roads, Ministry of Works and Human Settlement (Member)
8. Representative, Department of Urban Development and Engineering Services, Ministry of Works and Human Settlement (Member)
9. Representative, Department of Disaster Management, Ministry of Home and Cultural Affairs (Member)
10. Representative, National Commission Secretariat
11. Representative, National Environment Commission Secretariat (Member)
12. Representative, GNH Commission Secretariat (Member)
13. Representative, Ministry of Finance (Member)
14. Program Director, National Soil Services Center, Ministry of Agriculture (Member Secretary)

The NAP-MCC would meet at least once in every six months to review the progress of the activities implemented as part of the NAP, discuss the status of implementation of the NAP, and identify issues, constraints and lessons learnt.

At the third level, it is proposed that focal persons be identified in each of the agencies that will have a role in the implementation of NAP. These focal persons will be responsible for submitting progress reports on the implementation of NAP activities belonging to their agencies to the NAP-MCC on a half-yearly basis. The agencies that would need to nominate NAP focal persons include:

1. Department of Agriculture, Ministry of Agriculture
2. Department of Forests, Ministry of Agriculture
3. Department of Livestock, Ministry of Agriculture
4. Council for RNR Research of Bhutan, Ministry of Agriculture
5. Policy and Planning Division, Ministry of Agriculture
6. National Soil Services Center, Ministry of Agriculture
7. Department of Geology and Mines, Ministry of Economic Affairs
8. Department of Energy, Ministry of Economic Affairs
9. Department of Industry, Ministry of Economic Affairs
10. Department of Roads, Ministry of Works and Human Settlement
11. Department of Urban Development and Engineering Services, Ministry of Works and Human Settlement
12. Department of Disaster Management, Ministry of Home and Cultural Affairs
13. National Land Commission Secretariat
14. National Environment Commission Secretariat
15. GNH Commission Secretariat
16. Thimphu City Corporation
17. Phuentsholing City Corporation

11.2 Reporting and Evaluation

It is proposed that the NAP-MCC produce annual reports on NAP implementation and these reports be presented at the meeting of the NAP-SB. Upon approval by the NAP-SB, these reports be published and circulated to all relevant agencies within and outside the government.

Three years after the date of approval of NAP, it is proposed that a review of the NAP be conducted to assess the progress of the NAP document. It is proposed that the NAP be evaluated and updated before the formulation of the next FYP. This would enable NAP proponents to integrate NAP activities in the mainstream development plans and programs which are defined through the FYP process.

Part E
Integrated Financing Strategy

12. Introduction

The United Nations Convention to Combat Desertification (UNCCD) emphasizes the need to mobilize resources through all existing channels, to strengthen financing, and explore new sources in order to respond to the Convention's integrated, bottom-up approach. The Convention set up the Global Mechanism (GM) to increase the effectiveness and efficiency of existing financial mechanisms for tackling land degradation. The GM acts as a hub for a dynamic network of partners committed to focusing their energies, resources and knowledge on combating desertification. The GM has elaborated the IFS as an instrument to support governments in mobilizing financial resources for UNCCD implementation at the country level. As stated in the GM's report to COP7, IFSs are meant to "contribute to broadening the scope of planning processes beyond specific sectors and include comprehensive coordinating arrangements between different financing sources, instruments and mechanisms". Their objective is to improve the investment climate and create a stable, predictable and enabling environment for increasing investments in SLM. The IFS approach is adjusted to each country's specific characteristics.

With the experiences and initiatives of GM in resource mobilization for SLM activities including mainstreaming of National Action Programme (NAP) into the National Planning Process (NPP) and overarching development frameworks, Bhutan is impelled to design own IFS to support resource mobilization for implementation of NAP in the context of Bhutanese topography and economy. The financing mechanism for SLM in Bhutan today is "as is available and project bound" in light of the limited national budget against more pressing need for budget allocation to other activities perceived to yield quicker responses and benefit.

This part of the document describes the IFS for NAP. The IFS determines the financial flows for implementation of the NAP, including funding sources. Financing for NAP can be sourced from internal funding sources within national, dzongkhag and geog budgets and from other internal sources like the private sector or NGOs. In addition, funding can be mobilized externally from development partners, such as multilateral and bilateral donors and/or international private investment and NGOs. Another important source of financing is the innovative financing mechanisms which include, among others, the Clean Development Mechanism, Payments for Ecosystem Services and a mechanism for Reducing Emissions from Deforestation (and Degradation). The following section describes the possible funding sources to implement the NAP.

12.1. Internal Sources of Funding

12.1.1. Bhutan's fiscal situation

The policy of the RGoB is to maintain the fiscal deficit to a sustainable level of the GDP. The fiscal deficit for FY09/10 is currently projected at about 6.91 %. The domestic revenue is projected to increase substantially by almost 50% of the total revenue coming from Corporate Income Tax and dividends from the corporate sector boosted by investment in hydro-power projects.

The external debt outstanding for the FY09/10 is projected at Nu. 40,217.43 million based on the projected disbursements of committed loans and scheduled repayments. It accounts for 57.80 % of the estimated GDP. Although the percentage of external debt outstanding is quite high, looking at the composition of the external debt

stock, 60.86% comprises of bilateral loans for hydropower projects which are self liquidating. The non-hydropower loans account for about 39.14 % of the estimated GDP and are borrowed from International Financial Institutions at highly concessionary terms. Debt service ratio for the FY09/10 is estimated at about 9.20 %.

12.1.2. Legal Framework for Budgeting

The Constitution of Bhutan 2008, Public Finance Act 2007, Financial Rules and Regulation 2001, mandates the Ministry of Finance for preparation of annual budget including preparation of Budget Policy and Fiscal Framework Statement (BPFFS), the Appropriation Bill and budget management and output monitoring.

12.1.3. Budgeting and internal sources of financing

The Department of National Budget within the Ministry of Finance is the agency responsible for: (i) preparation of annual budget; (ii) proposing budgetary allocations for implementation of the general policy set by the Cabinet; (iii) assessing government agencies' requests for budgetary allocations through comparisons, reductions and revisions; (iv) examining all programs, work and projects; and (v) verifying that requests for allocations are compatible with RGOB's fiscal policies. The DNB examines, coordinates and approves requests for funds before these requests are submitted for authorization, to the Cabinet through MoF and then to the National Assembly in June session. The DNB reviews the annual funding request and interacts with budgetary agencies for discussion and negotiation. It also has special role in of carrying out monitoring of the budget execution where appropriate introduce change in the budgeting process to improve the service delivery.

12.1.4. Budget preparation process

The budget is formulated within the overall Plan outlay and Budget Policy Fiscal Framework Statement, which is an indicative planning figure of the Sectors, Dzongkhags, Gewogs. The plans and programs should remain within the Government's available resources. As a basis for the formulation of the budget, the DNB prepares an estimate of the expected receipts and a forecast of expenditure based on the estimate of the internal receipts from tax and non-tax sources prepared by the DRC, and the estimates of receipts of external grants and loans, loan recoveries and estimates of counterpart fund and the debt servicing requirements prepared by the GNHC and the DPA.

Table 7: Budget process

Activity	Timeline	Agency Responsible
1. Policy guidelines from Cabinet		
2. Forecasts of receipts and Expenditures	Nov & Mar	DNB
3. Budget call	Dec/Jan	DNB
4. Preparation and submission of budget proposals	Feb & Mar	Sectors
5. Budget discussion	Mar & Apr	DNB, GNHC & Sectors
6. Submission of budget report to Cabinet	May	MoF
7. Discussion of the budget report	May/June	Cabinet & Parliament

8. Discussion and approval of national budget	June	Parliament
9. Budget Notification	July	DNB
10. Release of funds	July-May	DPA
11. Implementation of budgeted activities	Year round	Sectors
12. Submission of monthly accounts to DPA	Monthly	Sectors
13. Financial/Physical progress reports to DNB & GNHC	Quarterly	Sectors
14. Mid Year Budget Review	Feb/March	DNB
15. Monitoring of Financial/Physical Progress	Year round	DNB & GNHC
16. Auditing	Year round	RAA
Re-appropriation of funds	As per the Delegation of Powers	DNB, GNHC/DPA & Sectors
Supplementary Budgets	Cabinet & MoF	DNB, GNHC/DPA & Sectors

12.2. RNR Budget and Expenditure

A budget is an annual proposal outlining anticipated government revenues and designating program expenditures for the upcoming fiscal year. It is based on estimated expenditures for the year and the proposed means of financing. RGoB's budget consists of: (i) current expenditures; and (ii) capital expenditures. The capital expenditure is the productive component that generates economic growth and spurs economic cycle.

Since the Ministry of Agriculture is the main agency involved in SLM activities in Bhutan, an analysis of RNR sector budget allocation and actual outcome was carried out to look at its share of financing and for that matter SLM programs. The sector-wise allocation for FY09/10 and a comparison of budget allocation (FY03/04-08/09) and actual outcome (FY03/04-07/08) presented below:

Table 8: Sector allocation of the FY09/10 (Nu. in million)

Sectors	**Current**	**Capital**	**Total**	***Percent***
Social Services	**4,409.630**	**3,210.080**	**7,619.710**	*25.1%*
Health	1,396.266	914.059	2,310.325	*7.6%*
Education	3,013.364	2,296.021	5,309.385	*17.5%*
Economic and Public Services	**2,728.738**	**6,994.595**	**9,723.333**	*32.0%*

Agriculture	1,445.722	1,946.521	3,392.243	*11.2%*
Mining & Manufacturing Industries	223.974	313.147	537.121	*1.8%*
Roads	252.316	2,470.545	2,722.861	*9.0%*
Housing & Community Amenities	371.767	909.433	1,281.200	*4.3%*
Communications	380.087	635.483	1,015.570	*3.3%*
Energy	54.872	719.466	774.338	*2.5%*
Religion & Cultural Services	**485.546**	**584.561**	**1,070.107**	*3.5%*
Law and Order Services	**1,419.535**	**830.067**	**2,249.602**	*7.4%*

General Public Services		**2,789.156**	**2,208.009**	**4,997.165**	*16.4%*
National Debt Services		**1,761.529**	**2,980.890**	**4,742.419**	*15.6%*
Repayment		1,761.529	2,287.223	4,048.752	*13.3%*
Lending		0.000	693.667	693.667	*2.3%*
	Total	**13,594.134**	**16,808.202**	**30,402.336**	*100.0%*

Source: National Budget Report 2009(the figures include both internal and external sources of financing)

The approved allocation for MoAF in FY09/10 is Nu. 3,392.243 representing 11.2% of the RGoB's total budget.

Table 9: Budget/Actual outcome - Overall vs. RNR

Description	**FY03/04**	**FY04/05**	**FY05/06**	**FY06/07**	**FY07/08**	**FY08/09**
Budget allocation:						
Total RNR budget allocation	1,771.10	1,497.62	2,094.23	2,427.62	2,673.70	3,589.02
Total RGoB budget allocation	12,829.26	15,853.53	16,132.33	19,983.35	24,824.16	27,016.52
% of RNR budget	14%	9%	13%	12%	11%	13%
Actual outcome:						
Total RNR spending	988.959	869.97	1,228.48	1709.383	1,600.14	
Total RGoB spending	9,802.28	12,785.86	13,314.63	15,166.11	19,693.03	
% of RNR spending	10%	7%	9%	11%	8%	
Source: Dept. of Public Accounts and Dept. of National Budget (the figures includes both internal and external sources of financing)						

The total budget allocated to RNR sector varied between 9-14% of the RGoB's total budget during past six years.

Likewise, the share of the RNR spending ranged from 7-11% of the total RGoB's spending.

12.2.1. Comparison of Budget allocation and actual expenditure

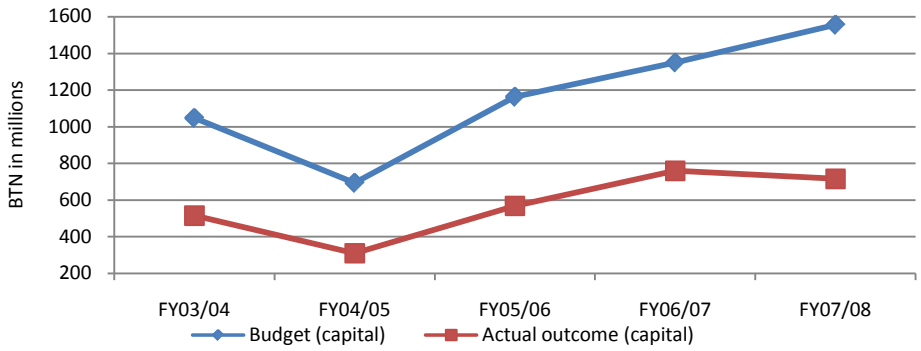
The following sections provide a breakdown of MoAF's budget allocation and actual outcome during the past five years as presented below:

Table 10: Comparison of RNR allocation vs. actual outcome

Details	FY03/04	FY04/05	FY05/06	FY06/07	FY07/08
Total RNR allocation	1,771.10	1,497.62	2,094.23	2,427.62	2,673.70
Total RNR actual outcome	988.96	869.97	1,228.48	1,709.38	1,600.14
Variance (%)	44	42	41	30	40
Utilization Rate (%)	56	58	59	70	60
Capital component					
RNR allocation	1,048.41	693.047	1,162.43	1,349.51	1,555.21
RNR actual outcome	515.121	310.34	568.055	759.477	715.919
Variance (%)	51	55	51	44	54
Utilization Rate (%)	49	45	49	56	46

Source: Dept. of Public Accounts and Dept. of National Budget(the figures includes both internal and external sources of financing)

Figure 11: RNR allocation Vs. Expenditure (capital)



Comparison between the budget allocations and the actual outcome during the FY03/04 through

FY07/08, show that:

- The actual expenditures were consistently below the allocated budget;
- The budget utilization rate for RNR is about 56-70% on the overall and for capital component is only about 45-49% through FY03/04 to FY078/08;
- The actual expenditures for RNR sectors showed gradual increase over the past five years.

Some of the possible reasons that contributed to the under-utilization of budget are:

- Occasional late approval of the appropriation bill by National Assembly, resulting delayed releases;
- Delays in the tendering process due to ambiguous procurement rules resulting in implementation delays;
- Non-compliance of contractors with contract implementing schedule;
- Capacity constraints: both in terms of quality and number in MoAF ;
- Delays in disbursement for the programs/project funded through external sources (grants or loans); and
- MoAF preparing overestimated and unrealistic budget in anticipation of budget cuts

Table 11 proposes actions to enhance the mobilization of resources from internal sources.

Table 11: Entry poitns to enhace mobilization of internal resources

Entry point	Description	Actor/Level of Action	Measures to be undertaken
Formulation of National FYP	National FYP is a comprehensive national development plan laying out expenditure plan for five years.	• MoAF, Dzongkhags, and Geogs	• Ensure that all SLM related program is included in the FYPs thereby becoming regular program for the annual budget purposes.
Budget proposal	There is a noted gap between the funds allocated and that are actually spent. As result, the credibility of the MoAF in spending their budget is question and with it their bargaining power for additional budget in jeopardy.	• MoAF, Dzongkhags, and Geogs	• The MoAF assess their capacity to implement their planned SLM programs • Increase MoAF's implementation capacity • Prepare realistic budget and with sound justification
Political Lobby	The preparation of budget involves several phases of negotiation which provides room for justifying budget for SLM-related program, Lobbying for land management issues can happen during budget discussions, Cabinet	• MoAF • Members of Parliament • General Public	• Pro-environment MPs should lobby at the Parliamentary committees to bring on board land management issues on the national agenda

	meetings, and Parliamentary sessions.		

13. External Sources of Funding

13.1. Overview

Since the start of the planned economic development in early 1960s, Bhutan had relied heavily on the external resources to finance its development activities. Overtime, Bhutan graduated from the stage when the entire recurrent and capital expenditures were financed by external assistance to a stage where it is able to cover the entire recurrent and some part of the capital cost from its internal resources. The steady progress in the mobilization of the domestic resources has enabled Bhutan to make significant stride towards its goal of economic self reliance. Despite such progress, as can be noted from Table 12, the country still remains extensively dependent on the external assistance to finance its major development projects and programs. While fiscal reforms were initiated to increase domestic revenues, the prospects for enhanced revenue through domestic taxation are limited because of the weak private sector and the existence of the large share of non-monetized economy. The reliance on the external assistance to finance its development activities is therefore expected to continue in the foreseeable future.

Table 12: Trends in External Financing over the Plan Periods (Nu. in Millions)

Five Year Plan	Outlay*	Internal*	External*	% of External Resource to Outlay
I (1962 -1966)	174.7	0.00	174.70 (GoI)	100
II (1966 – 1972)	220.00	9.80	210.20 (GoI)	95.55
III (1972 – 1977)	355.00	25.00	330.00 (GoI)	92.96
IV (1977 -1982)	900.89	94.00	806.69**	89.54
V (1982 – 1987)	4338.10	942.00	3396.10	78.29
VI (1987 -1992)	9559.20	3632.49	5926.70	61.99
VII (1992 – 1997)	15590.70	5489.00	10101.70	64.79
VIII (1997 – 2002)	39523.82	13000.00	26523. 82	67.11
IX (2002 -2008)	70000.00	32000.00	38000.00	54.29
X (2008 – 2013)	148074.72	75390.56	72684.16	49.09

(*Source: Good Governance for Development, Ninth Round Table Meeting, 2006*)

** Figures are indicative only.*

*** Start of UN agencies assistance to Bhutan with an indicative commitment of Nu. 103.69 million. Source Five Year Plan Documents.*

The Government of India had been traditionally the main source of external assistance to Bhutan. Its assistance to Bhutan dates back to as early as 1960s when it financed the entire portion of the Bhutan's First Five Year Plan (1961 – 1966). Since then, the assistance from the Government of India has increased incrementally to the successive plans and it continues to be the largest bilateral donor to Bhutan.

The assistance from other bilateral and multilateral agencies including from the international financial institutions started to take shape after Bhutan joined the UN in 1972. Thereafter, there has been an all round interest to Bhutan from international agencies and, consequently assistance from the UN and other agencies began to increase. From the third plan onwards, assistance from the Government of India has been increasingly augmented by assistance from other bilateral and multi-lateral sources. At present, Bhutan received external assistance from as many as 15 multilateral organizations, 19 bilateral donor, 4 Financial Institutions (ADB, World Bank, IFAD and KFAD) and

some nongovernmental organizations (NGOs)/foundations such as Helvetas, GTZ,WWF, Save the children USA and other foundations.

13.1.2. The Donor Community in Bhutan

External finances has underpinned Bhutan's development efforts, both by financing successive development Plans and by improving the skills of Bhutanese through training and technical assistance. Aid will continue to be important in the coming years. Table 13 presents the main bilateral, multilateral and other aid agencies currently active in Bhutan and their indicative commitment in the 10th FYP (2008-2013).

Table 13: Active Donors in Bhutan and their Indicative Commitment for the 10th FYP -2008-2012 (Nu. in Millions)

Sl. No.	Donor	Grant	Loan	Total
Bilateral Donor				
1	Austria	536.90		536.90
2	Australia	581.00		581.00
3	Denmark	2,369.17		2,369.17
4	India	34,000.00		34,000.00
5	Japan	1,351.55		1,351.55
6	Netherlands	600.00		600.00
7	Norway	252.00		252.00
8	Switzerland (SDC)	100.00		100.00
9	Thailand	123.00		123.00
Sub-Total		**39,913.62**		**39,913.62**
Multilateral Agencies				
1	Asian Development Bank		2,071.61	2,071.61
2	European Union	873.23		873.23
3	GEF	328.39		328.39
4	IFAD	820.00		820.00
5	UN Agencies*	3,220.69		3,220.69
6	World Bank		1,739.42	1,739.42

7	JBIC		1,475.67	1,475.67
Sub-Total		**5,242.31**		**10,529.01**
NGOs and Foundations**		**1,206.73**		**1,206.73**
Total		**46,362.66**	**5,286.70**	**51,649. 36**

** Active UN Agencies in Bhutan include FAO,UNCDF, UNESCO, UNFPA, UNICEF, UNDP, WFP, WHO and GFATM.*

***** NOGs/Foundations include Helvetas,SCF and WWF. Source: Preliminary resource projection, GNHC.*** **13.1.3. Development Cooperation Policy/Aid Policy.**

The fact that the process of development in Bhutan was initiated and to a large extent still sustained by external assistance has been fully recognized by the Government. Therefore, the aid policy of the Government of Bhutan had been to continue to cover the recurrent expenditures through internal revenue while at the same time working on the ways of increasing the domestic revenue to reduce donor dependency. Untill such time, Bhutan will continue to seek developmental assistance till its internal resources are adequate to finance its development programs.

As regards the execution of external assistance, the policy of the Royal Government of Bhutan had been and will be, to use the development assistance for capital investment programs/projects prioritized by Bhutan and, the preferred choice of assistance will be in the form of grants. Loan financing had and shall be sought only where grant financing for high priority program/projects are not available and where the investment is of relatively commercial in nature. Donor's engagement in a particular sector shall be on the basis of their expertise and comparative advantage and the assistance shall be aligned and harmonized with the priorities of the Royal Government of Bhutan, with core/predictable aid resources channelled to high priority programmes/projects and vice-versa.

Technical Assistance (TA) has been an important aid component that has helped Bhutan built its local capacity – human resource as well as institutional capacity. Here too, the policy of the Government will be to continue to seek TA in areas where Bhutan either lack or have inadequate capacity and simultaneously to built and improve skills of the Bhutanese people.

13.1.4. Development Cooperation Strategy.

The broad strategies of the Government has been to concentrate the efforts of donors in particular fields or sectors where their experience or technology has been preferred within the context of Bhutan's development. As the attainment of economic self-reliance remains the major objective of the country's development process, continuous efforts have been made to harness and utilize the available resources in the most productive and judicious manner.

Nonetheless, untill the time the Government is not in a position to finance its entire development program from its domestic resources, grant financing will still be a very important source of financing for the Government. The Government had taken a very cautious strategy to loan financing and had been resorted to only if grant financing is not forthcoming and, only for revenue generating projects in the economic sectors.

As external assistance forms a substantial component of Government financing, the Government has put in place institutions and systems to ensure effective coordination and management of external resources. This has resulted in

improvements in utilization and accountability of the external resources. The Government is committed to placing the highest priority on efficient management of external assistance and to further strengthening and improving the systems.

With significant improvements in financial reporting and accountability systems made over the years, the Government is emphasizing a shift in aid modality. The funding modality that the Government proposes to advance in the coming years will be a shift from the project mode to program financing and gradually to budget support modality. This strategy is motivated by the fact that the approach provides opportunity for both the parties to focus on larger goals and objectives and benefit from economies of scale and scope. The strategy will also contribute to reducing the transaction cost of the aid by aligning and harmonizing aid to Government priorities and systems.

Further, with aim of dovetailing the development assistance with the overall plan of the country, the Government emphasized the need for all the major donors to develop a long-term Assistance program/partnership strategy. Such a partnership strategy also gives a certain level of predictability in resource forecasting and helps the in better planning of development interventions.

13.1.5. Future Trends.

The focus areas for each major international donor are expected to remain unchanged for the foreseeable future. Table 14 summarizes key SLM-related areas of donor support and development partners' preferences.

Table 14: Development partners preferred areas of support to SLM and its related activities

Sector/Thematic Area	Development Partner's Ongoing and Planned Programs
Natural Resources Management, Watershed Management and Environment	Austria: ACB • Forest Research; Australia: • Research on fruit flies (ACIAR); • Mandarin production. Denmark: DANIDA • Environment and climate change; • Decentralized natural resource management. India: • Sustainable livestock development. Japan: JICA • Horticulture research and development; • Farm Mechanization; • Rural development.

	The Netherlands: SNV &SDS • Agro-biodiversity conservation; • Environment friendly road construction; • Community based natural resource management. Swiss/Helvetas: SDC • RNR research and training; • Participatory forest management; • Support to college of natural resources. Asian Development Bank (ADB): • Environment and climate change. European Union (EU): • Sustainable livestock development; • Sustainable agriculture. Global Environment Facility (GEF): • Livestock and crop conservation; • Sustainable land management; • Bio-safety; • Biodiversity conservation. International Fund for Agriculture Development (IFAD); • Agriculture production; • Rural development. United Nations Agencies:*** • Environment and climate change; • Agriculture production; • Bio-diversity conservation; • Disaster management. Food and Agriculture Organization: • Review of forest policy; • Land management and Soil Conservation; • River basin and watershed management.

	World Wildlife Fund (WWF): • Bio-diversity conservation; • Species research and monitoring;

*** UN Agencies include UNDP & UNEP. The complete donor matrix is presented as Annex 1. The matrix is expected to provide a good basis for exploring and identifying donor support to SLM related activities.

Thanks to the wisdom of the Monarchs, the commitment and dedication of the Government and generous support from the development partners, Bhutan has achieved remarkable progress in the socio-economic field. This is evident from the improvements in the GDP per capita of the Bhutanese from a mere US$ 66 in 1960s to about US$ 1800 in 2008. Bhutan has now graduated from the category of LDCs to the category of middle income countries (HDR 2009). While such an achievement in a short span of time is highly appreciable, the side effect of this would be that Bhutan will not be able to enjoy the generosity of the development partners as it had enjoyed in the past – implying that it would be difficult for Bhutan to access grants and that it will have to increasingly resort to either domestic revenues or borrowings to finance its future development plans. The ongoing discussion by some of the development partners to gradually phase out their support in the coming years does substantiate this imminent situation. This is expected to have implication to the financing of the SLM activities and, thus calls for a greater need to mainstream SLM activities into the national plans and policies and to explore innovative financing windows to supplement the traditional financing option to sustain SLM activities.

13.1.6. Recommendations for improving the mobilization of resources from external financing Sources:

The following recommendations are proposed to enhance external sources of financing for the SLM activities. These recommendations are based on the synthesis of the information presented above, available reports and observations:

1. Bhutan has impressive track records in terms of utilization of the resources – both internal as well as external resources. All the donors that have support and supporting Bhutan has expressed satisfaction over the outcome of their assistance. It will therefore be in the interest of Bhutan to continue to build on this foundation to motivate the existing donors for continuation of their assistance and to attract new donors.

2. Recently the the RGoB and the World Bank has jointly carried out the Public Financial Management assessment for Bhutan to determine the the strength and weakness of the RGoB's PFM system and to articulate reform program in the context of RGoB's harmonaization strategy with the ultimate goal of achieving increased reliance on country systems. Although the report is in the draft stage, it indicated that RGoB's PFM system is adequate move from project-tide to more of sector-wide and general budget support approaches. This would not only help in reducing the administrative cost associated with projects but also help Bhutan align aid resources to national priorities.

3. While donor coordination has not been a serious issue in Bhutan, it would be meaningful to organize donor coordination at the sectoral level as this will help to reduce duplication of resources through harmonizing assistance within the donors as well as with the donors and the sectors. Such a process would specifically ensure financing for cross-sectoral issues such as SLM.

4. Bhutan's clear procedures/protocol for seeking donor assistance – both grant and concessional loans has helped in coordination of external resources to a large extent. Nonetheless, resource mobilization efforts have largely remained limited with the existing donors and only few initiatives were undertaken to exploring new financing

sources. It will therefore be worthwhile to extend the efforts of the resource mobilization work to identifying potential and new financing sources to supplement the existing source.

5. Climate change issues offers tremendous opportunity and potential to enhancing the inflow of external resources, particularly for the activities related to SLM. Since such financing schemes are relatively new, It would be important for Bhutan to built capacity of the stakeholders in exploring the financing schemes and its modalities. These could be advanced both from the convention approach as well as from the innovative approach. Some of the innovative sources relevant to Bhutan are presented in the next chapter.

14. Innovative Sources of funding

14.1 Introduction

Innovative sources of financing mechanisms are non-traditional funding sources intended to supplement 'traditional' funding for development that normally come from national government treasuries, official development assistance (ODA), or support from multilateral and bilateral donors. This non-traditional financing mechanism focuses on generating new and innovative financial sources and aims to implement financing mechanisms that would not require consensus of multilateral actors or bilateral donors. Such additional financial sources are needed to finance long-term programs in developing countries as financial support from developed countries cannot guarantee predictable and stable ODA. Against such scenario, international agencies, national governments and special groups have devised several innovative financing mechanisms and instruments which are at varying levels of implementation in different countries.

Bhutan has received most of its development aid through multilateral and bilateral donors. Considering the global economic meltdown, it is worthwhile to explore other forms of financing mechanisms to supplement internal government funds, multilateral and bilateral aid for development. Several innovative financing mechanisms developed and practiced elsewhere, are described below.

14.1.1. Examples of innovative financing schemes in practice or proposed at the international level

There are several innovative financing mechanisms and instruments that are already in practice worldwide such as payment for environmental services (PES), Carbon Finance, Clean Development Mechanism, and many others. There are also several new ones proposed at the international level, some of which are being implemented by certain groups of countries as many of these instruments do not require international consensus. Given, enabling legal frameworks and agreement amongst developed countries, these innovations could help generate a large amount of funds that will go into supporting the countries in the Global South in attaining the Millennium Development Goals (MDGs) including sustainable land management. A few of these innovative mechanisms that may be applicable to Bhutan are presented in Table 15.

Table 15: Potential for revenue generation by innovative sources of finance

Sources	What it is	Implementation	Potential Revenue (USD)
Air-ticket tax	Taxing air transport. France levies taxes on all air tickets issued in France. The 13 member countries party to this tax from the developing countries only tax on international travel.	2006	400 million
Tackling tax evasion	Tax evasion at the international level accounts for as high as all the funds necessary for attaining MDGs.		50 billion p.a

	UN based committee to oversee payment of taxes would contribute and make funds available for development		
Carbon tax	A tax on the carbon content of fuels – effectively a tax on the CO2 emissions from burning fossil fuels. Taxing fuels according to their carbon content will infuse incentives at every chain of decision and action – from individuals' choices of new product design, capital investment and facilities location, and governments' choices in regulatory policy, land use and taxation. A global tax on the use of carbon at a rate equivalent to a tax on gasoline of 4.8 cents per gallon levied only on high income countries could raise some US$ 50 billion a year		60-130 billion p.a
Global lottery or global premium bond	Global lottery operated through national state-operated and state licensed lotteries, with proceeds shared between national participants and independent foundation established in conjunction with UN. Global premium bond, parallel to national bonds with lottery prizes		126 billion
Assigned Amount Unit (AAU) Auction	A portion of the international emissions allowances allocated to Annex I countries should be set aside and auctioned off. The best approach for generating new climate change adaptation financing is that links directly to a fundamental emissions reduction system as part of the post 2012 global agreement. It is estimated that billions of $ could be generated through this auction. If a 7.5% of the AAUs are auctioned , the fund generated could yield more than US$ 50 billion by 20115		50 billion

Source: Oxfam 2008; Frank Schroeder 2006; A.B Atkinson 2004; Tony Addison and Abdur R. Chowdhury 2003

14.2 Innovative financing mechanisms and instruments for Bhutan

While many of the innovative financing mechanisms proposed or are in practice at the international level may not be effective in Bhutan due to complex legal framework, technicalities so on and so forth, there are some that can be applicable to Bhutan and make it work.

14.2.1. Environmental Trust Fund

Bhutan is one of the earliest among developing countries to establish environment trust fund. The Bhutan Trust Fund for Environmental Conservation (BTFEC) was established in 1993 with a Royal Charter. The trust fund started with an initial capital of USD 20 million of which USD 10 million was contributed by GEF/UNDP through grant and the rest were raised through contributions from WWF-US and bilateral donors. Currently, BTFEC has a capital of nearly USD 40 million from which the interest generated is annually given as grants to various agencies and non-governmental agencies for conservation programs.

Today more than 50% of Bhutan's land area is within the national system of protected areas, conservation areas and biological corridors. The interest generated from the BTFEC capital fund is not adequate to support conservation and management programs in the protected areas. Therefore, concerted efforts are required to increase the endowment

fund to at least USD 70-80 million to effectively support conservation programs including watershed management. If the BTFEC's endowment can be raised considerably the Royal Government will not need to provide budgetary support to the parks and conservation programs which could be used for other programs such as the land management programs.

14.2.2. Environmental Revolving Fund (ERF)

Currently Bhutan does not have a single environmental revolving fund (ERF) but a modest one could be established from collection of nominal fees from tourists visiting Bhutan. Donations from individuals and businesses can also be undertaken. Public corporations could also be solicited to contribute to such environmental revolving funds as part of corporate-social responsibility.

The first step towards such a venture could be to assess how much funds can be raised. A total of 27,636 tourists visited Bhutan in 2008 an increase of 6952 over 2007 arrival and brought in USD 38.82 million (MoEA, 2009). For instance, if a nominal fee of USD 5 each is charged per tourist, going by 2008 tourist arrival figures, the fund collected would amount to USD 138,180 which is equivalent to Nu. 6.63 million. If DPT government's visioning of bringing in 200,000 tourists annually can be materialized, ERF could generate as high as USD 10 million annually. Considering different kind of collection mechanisms and instruments, environmental revolving funds can supplement sustainable livelihood programs in protected areas.

14.2.3. Watershed Management Fund (WSMF)

Establishment of Watershed Management Fund is also feasible. Bhutan has one of the highest per capita water availability in the world (DoE, 2003). It is estimated that Bhutan has a long-term mean annual water flow of 73,000 million m3/year and the capita mean annual flow availability is estimated at114,964 m3/year. It is also estimated that Bhutan has a hydropower potential of 30,000 MW out of which 23,760 MW has been identified and assessed to be technically feasible (MoEA, 2009). The Royal Government has signed a memorandum of understanding (MOU) with the government of India to develop 10,000 MW of hydropower potential by 2020. This would help realize over 33% of the total hydropower potential (MEA, 2009). There is a clear link between hydropower generation-economic development-watershed management. Considering this important economic link between sustainable hydropower generation and the importance of watershed management, the hydropower policy of the Royal Government has a clearly stated policy objective to provide 1% of the royalty from hydropower to watershed management programs. Future watershed management programs will greatly benefit from such funds.

The Ministry of Agriculture and the Ministry of Economic Affairs must realize the establishment of WSMF at the earliest.

14.2.4. Payment for Ecosystem Services

Payment for ecosystem services is a program where payments are exchanged for the delivery of ecosystem or environmental services. It is a voluntary transaction where a well defined environmental service is being bought by an environmental service (ES) buyer from an ES provider. Environmental services can be understood to be nonmaterial, non-extractive benefits from natural resources, such as watershed protection, carbon sequestration, biodiversity conservation and landscape preservation.

Payment of Ecosystem Services in Vietnam

A pilot project in southern Vietnam aims to emulate the success of the Payment for Ecosystem Services (PES) as is widespread in Latin America. Over 200 households in Lam Dong Province in the Dong Nai river basin have just received their first quarterly payments – a total of 12 billion dong (around US $ 680,000) from two hydropower plants- for protecting 188,000 hectares of forest. By the end of the year, more than 2000 households will share US $ 2.8 million pledged by the Da Nhim and Dai Ninh hydropower plants. The payment excluding the money committed by water and tourism companies will raise each household's annual income by US $ 730 or 350%.

The Lam Dong Project, which started in April 2008, is first PES scheme in Southeast Asia.

Source: http://www.alertnet.org

Currently, the Department of Forests is implementing a five-year afforestation program along the Wangchhu river basin with financial support from the Tala Hydropower Project Authority (THPA) with a total contribution of Nu. 24 million. This is some kind of PES program between the Department of Forests (service provider) for ensuring supply of clean and steady water to the Tala Hydro Power Project (service buyer) for running the power plant.

PES program in the near future is expected to grow and not only in the water sector, but also in other sectors – biodiversity, nature tourism, carbon sequestration etc. The scale of PES can also be at various levels – between public agencies, between public and communities and between national government and international agencies. With proper policy guidelines and technical capacity there are tremendous scope for PES implementation in Bhutan.

14.2.5. Carbon Market

The United Nations Framework Convention on Climate Change (UNFCCC) provides opportunities for the Non Annex I countries to trade carbon offset in the form of certified emissions reductions (CERs) to Annex I countries through the creation of carbon market. Through this instrument an emission trading system is established wherein an international or national regulator establishes an overall cap on emissions, issues emission units or rights, and allows the transfer and acquisition of such rights. International agencies such as the World Bank, GEF, and UNEP oversee these trading systems in order to reduce GHG emissions. Clean Development Mechanism (CDM), Voluntary Market and Reducing Emission from forest Degradation and Deforestation (REDD) are the main carbon markets either established or are in the process of being refined for implementation.

14.2.6. Clean Development Mechanism (CDM) for reforestation and reforestation

The Clean Development Mechanism (CDM) is a mechanism established in Article 12 of the Kyoto Protocol designed to assist developing countries to take up emission reduction projects to earn certified emission reductions (CERs) credits, each equivalent to one tonne of CO_2. CERS can be traded and sold, and used by industrialized countries to meet a part of their emission reduction targets under the Kyoto Protocol. The CDM assists countries in achieving sustainable development and emission reductions, while giving industrialized countries some flexibility in how they meet their emission targets. However, as of March 2009 only two afforestation and reforestation (A/R) projects have been approved under CDM within the forestry sector (Simula, 2009). There are several limitations to this mechanism – there is a lengthy process of 1-2 years in getting CDM projects fully formulated, validated and approved; transaction costs are so high that smaller projects are not viable; and tedious monitoring procedures.

In the context of Bhutan, CDM may have limited benefits as it only deals with afforestation and reforestation. However, future changes in the whole climate and carbon policy, situations may change and Bhutan may stand to benefit from carbon trade including CDM.

14.2.7. Reducing Emissions from land Degradation and Deforestation (REDD)

Reducing emissions from forest degradation and deforestation (REDD) is another mechanism for carbon trade. Countries that are willing and are able to reduce emissions from deforestation should be financially compensated for doing so. In addition to CDM carbon market, REDD provides opportunities to simultaneously address climate change and rural poverty, while conserving biodiversity and sustaining vital ecosystem services. This new mechanism tries to consider avoided deforestation of existing forests such as conservation areas, protected areas,

catchments, and sustainably managed forests etc as part of the carbon trade dialogue. If amendments to the current protocol is effected through inclusion of existing forest cover as part of avoided deforestation as part of REDD, Bhutan will benefit as large part of Bhutan is already protected under the network of protected areas, biological corridors, conservation areas, catchments, community forests and forest management units. These forests would provide multiple benefits as they will not only contribute to reducing GHG, but also contribute to protection of watersheds, clean and steady water supply and hydrological systems, control of soil erosion and landslides, biodiversity conservation and sustainable use of forest resources for socio-economic development.

Current rates of carbon ($_tCO_2$) in the international market ranges between US$ 5 – US$20 depending upon different trading arrangements. Taking the lower end of the market price at US $ 5/ $_tCO_2$ per ha unit area per year, Bhutan could bring in a total of US $ 1725 million annually for socio-economic development including sustainable land management and poverty alleviation. However, the above calculation is based on the forest biomass of the entire country. If we at all go for REDD programme in the future, much smaller portions of our forest may be put under REDD as we would also depend on forest for economic development. Protected areas, catchments, conservation areas could very well be included for REDD programme. Community forests under REDD programme would benefit communities directly.

Table 16: Carbon Biomass for Bhutan and South Asia

Country	**Growing Stock**			**Biomass**		**Carbon in biomass**	
	Per Ha	**Total**	**Commercial**	**Per Ha**	**Total**	**Per Ha**	**Total**
	(m2/ha)	*(million m3)*	*(%)*	*(tonnes/ha)*	*(million tonnes)*	*(tonnes/ha)*	*(million tonnes)*
Afghanistan	16	14	40	15	13	7	6
Bangladesh	34	30	75	72	63	36	31
Bhutan	194	621	40	216	690	108	345
India	69	4698	40	76	5178	35	2343
Maldives							
Nepal	178	647	40	267	969	133	485
Pakistan	97	185	43	271	516	136	259
Sri Lanka	22	42	40	41	79	21	40

Source: FAO, 2009

14.2.8. Voluntary Carbon Markets

Besides the conventional carbon trade through CDM and REDD, there are also voluntary markets. Polluting companies in developed countries need to reduce carbon emissions and for this they can buy carbon credits through plantation projects in developing countries in collaboration with private companies in the host country. Such arrangements cost less than developing technologies to reduce carbon emission at home. While there are many

carbon trading schemes in the voluntary markets, there is none in Bhutan yet. Eco Tara, a Thimphu-based private company has developed proposals to venture into carbon trading with a UK-based company. The Department of Forests is conducting surveys to allocate 1000 ha of degraded forest lands for this purpose. Eco Tara will fund the plantation of these designated degraded lands until the plantation is fully established within 4-5 years after which the Department of Forests will take over for sustainable management. Eco Tara and the UK-based company will monitor, measure and conduct carbon credit sales. Such ventures will reduce the cost of plantations to the national government. Or the funds allocated for plantation programs could be allocated for other programs such as sustainable land management and agriculture development.

14.3. Support to SLM through public-private partnership programs

Several different forms of public-private partnership programs are developed to support SLM. In the Bhutanese context there are few that can be explored to support SLM.

14.3.1. Foreign Direct Investment (FDI)

FDI is a means to bring in hard currency to support investment projects through private public partnership (ppp). The Ministry of Agriculture is currently formalizing hazelnut plantation in eastern Bhutan with a Chinese company. The ministry will facilitate leasing of degraded government land for hazelnut growing and also facilitate individual farmers to grow hazelnuts on their farmlands with technical support from the FDI project. This FDI hazelnut project, besides having the potential to bring in substantial amount of income to the farming communities in eastern Bhutan, employment will be generated and there will be a big contribution to SLM as the degraded lands will brought under SLM.

14.3.2. Private investment

Besides FDI, government can also facilitate leasing of barren and degraded government forest lands for sustainable commercial agriculture to Bhutanese firms and individuals. The Land Act of Bhutan 2007 allows leasing of GRF for commercial agriculture and other economic development activities. The MOAF is currently facilitating leasing of GRF land commercial cultivation of coffee in Samtse. Similarly, land could be leased for other economic activities and through these degraded forest lands can be sustainably and productively managed.

There are over 600 NWFP species that have medicinal values and there are scope for both FDI and private investment in the management and use of medicinal plants and other NWFPs for bio-prospecting, value addition through processing, product development and enterprise development and eco-labelling and certification. These ventures will ensure sustainable management of NWFP and medicinal plant resources and bring in income to the local communities if investors and local communities could form partnerships. Bio Bhutan has pioneered eco-labeling and product certification for lemon grass oil and they are into other product development. Such arrangements in the case of lemon grass oil extraction fetch better prices for the harvesters in eastern Bhutan.

Some examples of these partnerships include Bio Bhutan buying lemon grass oil from the community forest management groups of Dozam Community Forest in Dremetse (Mongar) and Domkhar-Umling Community Forest Management Group in Lhuentse.

Considering donor fatigue and limited scope of increasing internal financial resources, it is prudent to develop innovative financial mechanisms to support SLM in the long run. Bhutan could take advantage of international Carbon Finance and the host of instruments that are available for carbon trading in the form of REDD plus, CDM, PES etc. Besides, other mechanisms such as FDI and private investments and PE, environmental funds within country could generate millions of ngultrums to support SLM and poverty alleviation.

15. Partnership building

Although land degradation is an important issue that results from the activities of many sectors, addressing land degradation problems or mainstreaming of SLM within the sectors' plans and policies remain rather weak. Mainstreaming of SLM remains very much sector based with green sectors putting in more efforts than others that may equally be responsible for the cause of land degradation and affected by it. While it is necessary for partnership building among the sectors within the country, it is also necessary to build partners with external organizations in order to source funds and technical assistances. According to the Global Mechanism (GM), "partnership building is central to resource mobilization due to the cross sectoral nature of combating land degradation and sustainable land management, and multitude of actors involved in it. Based on the strong understanding of internal and external financing procedures, partnership optimizes the contribution of each party to the integrated process. A partnership is the collaboration of two or more parties working towards a common goal. Partnerships are meant to foster comprehensive and widespread cross sector collaboration to ensure that sustainable development initiatives are imaginative, coherent and integrated to face the most intractable problems. Partnerships provide an opportunity for improving activities by recognizing the qualities and competences of each sector and finding new ways of harnessing them for common good."

The aim of this section is to assess the range of existing partners and to look into potential partnership building at various levels including national, international and development partners for resource mobilization. Thus an attempt has been made to list all the existing and potential partners and assess the resource mobilization capacity of these partners.

15.1. Stakeholders with a role in combating desertification can be divided into following categories

1. Government agencies
2. Semi-governmental agencies
3. Research institutes
4. NGOs
5. Donor/Funding agencies
6. Private Sector and
7. Local Governments

Table 17: Stakeholder category

Stakeholder Category	Stakeholders
Key government agencies	MoA (DoA, DoF, DoL, CoRRB & NBC), MoWHS (DoR, DUDES, Municipals), MoEA (DGM, DoE, DoI, TCB), MoF (DPA, DNB), MoFA (BD, MD), MoHCA (DDM, DLG, LG), MoE
Semi-governmental agencies	NRDCL, DGPCL, NHDC
Research Institutes (CoRRB)	RC Yusipang, RC Bajo, RC Jakar, RC Wengkhar

NGOs (Local, Regional & International)	RSPN, Tarayana, SNV, WWF, ICIMOD
Donor / Funding agencies	EU (ML), WB (ML), UNDP(ML), UNEP(ML), GEF(ML), FAO (ML), IFAD (ML), Danida (BL), SDC (L), JICA (BL), TICA (BL), KOICA (BL), ACIAR (BL), GoI (BL)
Autonomous Agencies	NLC (DSLR), NEC, GNHC

Table 18: Potential Partners

Levels	**Partners**
Local	• Private companies (BCCL, BFAL, TMT Steels, Druk Ferro-alloy Limited, Bhutan Marble Ltd, Royal Bhutan Cables, Penden Cement Factory, Lhaki Cement Factory, • All "A" and "B" Construction Companies • All Mining Companies • Local NGOs • WUA • NRM Groups • Cooperatives • Farmers' group
National	Municipalities, MoH
Regional	SAARC
International	ICRAF, CIFOR, CGIAR, GM, ICARDA, ICRISAT

Table 19: Roles of key stakeholders in SLM and resource mobilization

Institution	Role in combating land degradation & ensuring SLM	Role in Resource Mobilization for SLM
	Ministry	
MoA	Responsible for formulating and implementing national policies and programs aimed at ensuring SLM in the country; to develop the RNR sector (agriculture, forest and livestock) through research and development processes; raise the living standards of the rural communities and ensure food security of the country through sustainable farming practices. It is the focal point for UNCCD.	• Sourcing of internal and external sources of funding • Building institutional and human capacity in SLM • Dissemination and playing a leading role in implementing resource mobilization strategy • Leading and coordinating SLM activities to combat land degradation • Ensuring linkage between SLM & poverty alleviation strategy
MoWHS	Responsible for formulating and implementing policies and strategies such as the National Urbanization Strategy, which recognises various adverse environmental impacts, including conversion of agriculture and forest land for infrastructure development. The strategy outlines the need for zoning of ecologically vulnerable lands and institutional strengthening of the municipal environmental units.	• Sourcing of internal and external sources of funding • Building institutional and human capacity in eco-friendly infrastructure principles and developments
MoEA	Responsible for formulating and implementing national policies such as the Bhutan Sustainable Hydropower Development policy to ensure a clean energy; and creation of Renewable Energy Development Fund for environmental services in the form of upstream catchment protection and for renewable energy initiatives.	• Sourcing of internal and external sources of funding • Promotion of innovative financing resources
MoE	Incorporate SLM into school curriculum to enhance the SLM knowledge of the younger generation. Create awareness on the importance of SLM through campaigns and exhibitions led by schools.	• Sourcing of internal and external sources of funding
MoF	NA	• Mobilization and allocation of internal source of funding

Institution	Role in combating land degradation & ensuring SLM	Role in Resource Mobilization for SLM
		• Link with donors (financial institutions)
MoFA	NA	• Sourcing of internal and external sources of funding • Link with donors
MoHCA	Responsible for formulating and implementing national disaster risk management framework for promoting disaster risk management approach; and recognize the respective roles of different organizations in disaster risk management.	• Sourcing of internal and external sources of funding • Strengthening of institutional mechanisms at various levels and capacity development at Dzongkhag and geog levels, knowledge management and partnership and mainstreaming of disaster risk management in development programs and plans
	Autonomous Agencies	
NLC	Responsible for implementing the National Land Act for sustainable management of land based resources. It formulated land rules and regulations for Bhutan. It spells out rights, responsibilities and legal condition for the management, regulation and administration of the ownership and use of land.	• Sourcing of internal and external sources of funding
NEC	Responsible for formulating and implementing the national policies, strategies and Acts for environment protection. The national environment strategy titled "The Middle Path" which enshrines the concept of sustainable development through three main avenues: hydropower development based on integrated watershed management; agriculture development based on sustainable practices and industrial development based on effective pollution control measures and environmental legislation. The Environmental Assessment Act 2000 to ensure that environmental concerns are fully taken into account. It makes environment clearance mandatory for any project or activity that may have adverse impact on the	• Sourcing of internal and external sources of funding • Promotion of innovative financing resources

Institution	Role in combating land degradation & ensuring SLM	Role in Resource Mobilization for SLM
	environment. The National Environment and Protection Act to specify the principles and directives for the protection of environmental quality and the maintenance of forest, biodiversity and ecosystem integrity.	
GNHC	Mainstream SLM into national planning process	• Sourcing of internal and external sources of funding • Allocation of funds • Link with donors
	Semi-Governmental Agencies	
NRDCL	Ensures sustainable harvesting of FMUs according to the approved forest management plans and cater to the market demands for timber and timber products. It also has the mandate to cater to the market demands for other natural resources (e.g. sand and stone) in a sustainable manner.	• Sourcing internal source of funding
DGPCL	NA	• Sourcing internal source of fund to do payment for environment services (PES)
NHDC	NA	• Sourcing internal source of fund to combat land degradation caused by construction of infrastructure
CoRRB (RNR-RCs)	Coordinates RNR research and carries out research programs and activities in forestry, field crops, livestock development, horticulture, plant protection, soil fertility, water management and farming system.	• Sourcing internal and external sources of funding • Institutional and human capacity building
	Civil Societies (NGOs)	•
RSPN	Carries out nature conservation programs and activities such as endangered species conservation, sustainable livelihoods, environment education and conservation areas management.	• Sourcing internal and external sources of funding • Human capacity building

Institution	Role in combating land degradation & ensuring SLM	Role in Resource Mobilization for SLM
Tarayana Foundation	No direct link to SLM but works closely with rural communities to enhance their livelihoods e.g. regenerate bamboo and cane species for use of artisan and crafts. Has the potential to promote SLM among the rural communities.	• Sourcing internal and external sources of funding • Human capacity building
SNV	Supports programs and projects for collaborative forestry management, development of rural enterprises based on sustainable natural resource use. It also supports environment friendly road construction and watershed management activities through support of Technical Assistance (TAs)	• Sourcing external source of funding • Human capacity building
WWF	Provide support to protected areas such as national parks, wildlife sanctuary and endangered species.	• Sourcing external source of funding
ICIMOD	Integrated watershed management, rangeland management and documentation of SLM techniques and approaches	• Sourcing external source of funding • Capacity building on low cost soil and water conservation and documentation of SLM techniques and approaches
	Local Institutes	
Dzongkhag	Dzongkhag administration as an executing agency of development programs and activities at the Dzongkhag level has the responsibility to ensure integration of environmental concerns in dzongkhag plans. It is also responsible to implement environmental assessment and clearance procedures for Dzongkhag and geog level projects and activities.	• Mobilise local resources
Geog	Responsible for geog level planning, management and implementation of development programs and activities related to SLM activities.	• Mobilise local resources e.g. labour
	Potential partners	

Institution	Role in combating land degradation & ensuring SLM	Role in Resource Mobilization for SLM
Industrial Companies	NA (Pollutes the environment)	Mobilise internal source of funding to reduce environment pollution
Construction Companies	NA (Cause land degradation due to construction works)	Mobilise internal source of funding to combat land degradation in the construction sites
Mining Companies	NA (Cause land degradation due to mining activities)	Mobilise internal source of funding to combat land degradation in the mining areas
WUA	Efficient use of water resources through proper maintenance of irrigation channels and regulation of irrigation water use	Mobilise community for maintenance of irrigation channels
NRM Group	Carryout SLM activities to combat land degradation	Generate NRM group fund to carryout SLM activities
Cooperatives	NA	Mobilise internal resources to fund SLM activities in the community
Municipalities	NA	Mobilise internal and external sources of fund to carryout SLM activities in the municipal areas
	International	
CRAFT	Generate science-based knowledge about the diverse roles that trees play in agricultural landscapes and to use its research to advance policies and practices that benefit the poor and the environment. Partner with range of scientific and development institutions in their efforts to generate tree-based solutions to the global problems of rural poverty, hunger and environmental degradation.	Mobilise internal and external sources of funding
CIFOR	Improves scientific basis that underpins balanced management of forests and	Mobilise internal and external sources of funding. Assist

Institution	Role in combating land degradation & ensuring SLM	Role in Resource Mobilization for SLM
	forest land. Develops policies and technologies for sustainable use and management of forest goods and services	partner governments improve their capacity to research and support the optimal use of forests and forestlands
CGIAR	Generates cutting-edge science to foster sustainable agricultural growth that benefits the poor through stronger food security, better human nutrition and health, higher incomes and improved management of natural resources	Mobilise internal & external sources of funding
GM	NA	Provides advisory services and capacity building support • Strengthening National Action Programs and other UNCCD processes • Supporting domestic approaches to financing SLM • Partnership building with IFIs, GEF & bilateral organizations
ICARDA	NA (improves the welfare of poor people and alleviate poverty through research and training in dry areas of the developing world, by increasing the production, productive and nutritional quality of food, while preserving and enhancing the natural resource	NA

15.2. Recommendations in building partners

1. Land degradation is a rather complex cross cutting issue that requires the involvement of many stakeholders to address it. Therefore, building partnerships among the relevant stakeholders within the country is very necessary not only to address land degradation problems efficiently and effectively but also to avoid duplication of resources and efforts.

2. Partnership building among the stakeholders within the country would be useful in mobilizing the limited resources efficiently. Some stakeholders like the mining companies can make funds available to promote SLM interventions.

3. Partnership building with stakeholders at all levels i.e. local, regional, and national levels is necessary in order to enable mainstreaming of SLM.

4. Linking with international partners would be useful in providing financial and technical supports. While some international partners are well-known in the country others like CRAFT, CIFOR, CGAIR, ICARDA, ICRISAT, etc. can be potential partners that could assist the country with SLM interventions financially and or technically.

16. Conclusion

The Integrated Financing Strategy is a guiding framework for locating and developing a mix of financial resources to fund programs and projects related to Combating Desertification/Degradation and Sustainable Land Management. An attempt has been made to analyze in the national context, the political, legislative and institutional frameworks that are necessary to understand the conditions that influence the mobilization of resources. The current situation in Bhutan has been described under the various topics: Environmental factors – an overview with focus on land degradation; International conventions with focus on the UNCCD; NAP elaboration process; Institutional framework; Coordination framework; Legal framework; Planning framework; National policy development process. Based on the national context analysis, recommendations and suggestions for environmental protection and conservation are made, the main shortcomings, limitations and gaps in the policy development framework which in turn hinder the integration of SLM into the policy agenda are indicated. Based on these shortcomings, recommendations for the policy development framework are made. Finally, the financial flows into programs, plans and projects for combating desertification/degradation were analyzed.

An attempt has also been made to look into various sources of funding the sustainable land management (SLM) activities specified in the National Action program (NAP). As of now, the majority of finance to address the land degradation problems comes from internal and external resources, while the innovative sources are slowly picking up.

The internal source of funding analyses the country's capacity to raise financial resources internally and proposes ways for improving the mobilization of internal resources. The analysis of internal sources of funding included looking at the Bhutan's fiscal situation; legal framework for budgeting; budgeting and internal sources of financing; budget preparation process; RNR budget and expenditure. It also involved comparing budget allocation and actual expenditure for the RNR sector; some reasons contributing to the under utilization of the allocated RNR budget and finally indicated some entry points to enhance

mobilization of internal resources for SLM. Under the internal sources of financing, the main recommendations are:

1. Ensuring that all SLM related programs are included in the FYPs to make SLM a regular program for the annual budget purposes;
2. Assessing the capacity of the implementing agency(ies) to implement its/their planned SLM programs;
3. Increasing the implementing agency(ies) implementation capacity; preparing realistic budget and with sound justifications; and
4. Getting SLM on the national agenda by promoting SLM within the political bodies.

The external sources of funding analyses the international donor communities and proposes ways for increasing the mobilization of funding from external sources. The analysis of external sources of funding included looking at the trends in external financing over at about ten plan periods; the donor community; development cooperation policy/aid policy; development cooperation strategy; and future trends. Based on these analyses, recommendations have been made to improve the mobilization of resources from external financing sources for SLM. The recommendations include:

1. Maintaining its good track records in terms of utilization of its internal and external resources in order to motivate the existing donors to continue their assistance and to attract new donors;
2. Taking advantage of its good public financial management system to graduate from project tied mode to more of sector-wide and general budget support approaches to reduce the administrative cost associated with projects and help align aid resources to national priorities easily;
3. Organizing donor coordination at the sectroal level to help reduce duplication of resources through harmonizing assistance within the donors as well as with the donor and the sectors. Such a process would ensure financing for corss-sectoral issues such as SLM;
4. Extending the efforts of the resource mobilization work to identifying potential new financing sources to supplement the existing sources; and
5. Finally to take advantage of the climate change issues that offer huge opportunity and potential to enhance the inflow of external resources, particularly for the activities related to SLM.

The innovative sources of funding analyses the range of suitable innovative financing mechanisms available that could complement the traditional funding sources i.e. the external and internal funding sources. This analysis involved looking at the examples of innovative financing schemes in practice and or proposed at the international level; and innovative financing mechanisms and instruments for Bhutan. Some innovative financing mechanisms being implemented internationally have been explained and specified how they can also be applicable to Bhutan. Some potential mechanisms that Bhutan could try out are:

1. Environmental trust fund;
2. Environmental revolving fund;
3. Watershed management fund;
4. Payment for ecosystem services; carbon market;
5. Clean development mechanism (CDM) for reforestation and aforestration (???);
6. Reducing emission from land degradation and deforestation;
7. Voluntary carbon markets; and
8. Public-private partnership programs (i.e. foreign direct investment and Private investment)

With the limited resources both in terms of financial and technical resources, it is necessary for Bhutan to build partnerships among its various agencies and with international organizations involved in sustainable land management. While some stakeholders are already in partnership, many more could link with each other in combating land degradation problems.

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www.mohca.gov.bt. Website of the Ministry of Home and Cultural Affairs

www.mowhs.gov.bt. Website of the Ministry of Works and Human Settlement

www.nec.gov.bt. Website of the National Environment Commission

www.nsb.gov.bt Website of the National Statistics Bureau

www.pbr.org. Population Reference Bureau – a web resource for data on population and demographic trends for countries across the globe

www.rspnbhutan.org. Website of the Royal Society for the Protection of Nature, Bhutanese NGO dedicated to nature conservation

www.tarayanafoundation.org. Website of the Tarayana Foundation, Bhutanese NGO dedicated to socio-economic upliftment of poor and vulnerable communities

www.unccd.int. Website on the United Nations Convention to Combat Desertification

www.wikipedia.org. An on-line encyclopedia

Appendix 1
Acronyms and Abbreviations

ADB	Asian Development Bank
BAP	Biodiversity Action Plan
BEO	Bhutan Environment Outlook
BTFEC	Bhutan Trust Fund for Environmental Conservation
CNR	College of Natural Resources, formerly Natural Resources Training Institute
CoRRB	Council for RNR Research of Bhutan (Ministry of Agriculture)
CST	College of Science and Technology
Danida	Danish International Development Agency
DDM	Department of Disaster Management (Ministry of Home & Cultural Affairs)
DEC	Dzongkhag Environmental Committee
DGM	Department of Geology and Mines (Ministry of Economic Affairs)
DGPCL	Druk Green Power Corporation Limited
DHI	Druk Holding and Investments
DoA	Department of Agriculture (Ministry of Agriculture)
DoE	Department of Energy (Ministry of Economic Affairs)
DoF	Department of Forests (Ministry of Agrculture)
DoI	Department of Industry (Ministry of Economic Affairs)
DoL	Department of Livestock (Ministry of Agriculture)
DoR	Department of Roads (Ministry of Works and Human Settlement)
DUDES	Department of Urban Development and Engineering Services (Ministry of Works and Human Settlement)
DT	Dzongkhag Tshogde
EA	Environmental Assessment
EC	Environmental Clearance
ECOP	Environmental Codes of Practice
EFRC	Environment Friendly Road Construction
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan

FAO	Food and Agriculture Organization of the United Nations
FMU	Forest Management Unit
FYP	Five Year Plan
GDP	Gross Domestic Product
GEF	Global Environment Facility
GLOF	Glacial Lake Outburst Flood
GNH	Gross National Happiness
GNHC	Gross National Happiness Commission
GT	Geog Tshogde
ICIMOD	International Centre for Integrated Mountain Development
JICA	Japan International Cooperation Agency
MoAF	Ministry of Agriculture
MoEA	Ministry of Economic Affairs
MoHCA	Ministry of Home and Cultural Affairs
MoWHS	Ministry of Works and Human Settlement
NAP	National Action Program to Combat Land Degradation
NAPA	National Adaptation Program of Action for Climate Change
NDRMF	Natural Disaster Risk Management Framework
NEC	National Environment Commission
NECS	National Environment Commission Secretariat
NLC	National Land Commission
NGO	Non Governmental Organization
NRDCL	Natural Resources Development Corporation Limited
NSB	National Statistics Bureau
NSSC	National Soil Services Center (Department of Agriculture)
NWFP	Non-wood Forest Product
PHCB	Population and Housing Census of Bhutan
RDTC	Rural Development Training Center
RGoB	Royal Government of Bhutan
RNR	Renewable Natural Resources
RNR-RC	Renewable Natural Resources Research Centre

RSPN	Royal Society for the Protection of Nature
RUB	Royal University of Bhutan
SLM	Sustainable Land Management
SNV	Netherlands Development Organization
UN	United Nations
UNCCD	United Nations Convention to Combat Desertification
UNCED	United Nations Conference on Environment and Development
UNCOD	United Nations Conference on Desertification
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UWICE	Ugyen Wangchuck Institute for Conservation and Environment
WFP	World Food Programme of the United Nations
WuA	Water Users Association
WWF	World Wildlife Fund

Appendix 2
Glossary of Bhutanese Terms

Chathrim	Act, statute
Chhuzhing	Wetland cultivation
Dungkhag	Sub-district
Dungpa	Sub-district Administrator
Dzongdag	District Administrator
Dzongkhag	District
Dzongkhag Tshogde	District Committee
Gaydrung	Geog clerk
Geog	Smallest geographic unit of public administration made up of a block of villages
Geog Tshogde	Block Committee
Gup	Head of a geog, elected by the local community
Gyalpoi Zimpon	Royal Chamberlain
Kamzhing	Dryland cultivation
Lhakhang	Monastery
Sokshing	Government reserved forest land leased out for leaf litter production and collection for use in farm yard manure
Thromde Tshogdu	Municipal Committee
Tsamdro	Government reserved forest land leased out for grazing and improved pasture management
Tseri	Slash-and-burn cultivation, shifting cultivation

Appendix 3
NAP Preparation Team

Ugen P. Norbu, Consultant, Norbu Samyul Consulting for Environment and Development (*Data collection and analysis, stakeholder consultations, and report writing)*

Karma Dema Dorji, Program Director, NSSC, MoAF *(Coordination and management of the NAP process, supervision of logistical support, and organization of stakeholder consultation workshops/ meetings)*

Chencho Norbu, Director, Department of Agriculture *(Overall direction and advisory support to the NAP process)*

Ngawang Tenzin, Junior Soil Fertility Extension Officer, NSSC, MoAF *(Coordination of field logistics for community consultations)*

Pelzang Wangchuk, Lab Technician, NSSC, MoAF *(Coordination of field logistics for community consultations)*

Appendix 4
List of Participants at Central-level Workshops/ Meetings

NAP Inception Workshop

Chencho Norbu, Director, Department of Agriculture, MoAF

Koinchok Wangdi, Joint Director, Department of Livestock, MoAF

Dr. Lungten Norbu, Program Director, RNR Research Center, Yusipang, MoAF

M.R. Moktan, Deputy Chief Research Officer, RNR Research Center, Bajo, MoAF

Tirtha Bahadur Katwal, Deputy Chief Research Officer, RNR Research Center, Wengkhar, MoAF

Karma Doma Tshering, Senior Program Officer, Department of Disaster Management, MoHCA

Rinchen Wangmo, Coordinator, Royal Society for Protection of Nature

Tsheten Dorji, Field Officer, Royal Society for Protection of Nature

Dorji Wangchuk, Principal Research Officer, RNR Research Center, Jakar, MoAF

Norbu Wangchuk, Planning Officer, GNH Commission

S.N. Rai, Project Manager, Department Of Roads, MoWHS

M.N. Lamichaney, Chief Engineer, Department of Urban Development & Engineering Services, MoWHS

Jamyang, Chief Chemist, SPAL, National Soil Services Center, MoAF

Karma L Rapten, Head, Environment Unit, UNDP Bhutan Country Office

Thinley Gyamtsho, Research Officer, RNR Research Center, Bajo, MoAF

Tshering Phuntsho, Chief Urban Planner, Thimphu City Corporation

G Karma Chhopel, Senior Environment Officer, National Environment Commission

Passang, Engineer, Department Of Energy, MoEA

D.B. Chhetri, Program Officer, RNR Research Center, Yusipang, MoAF

Chencho Dukpa, Senior Research Officer, CoRRB, MoAF

Pema Wangda, NFFDP, Department of Livestock, MoAF

Gungsang Wangdi, Asst Program Officer, PPD, National Land Commission Secretariat

Ruth Urben, Participatory Planning Specialist, Sustainable Land Management Project, NSSC, MoAF

K.S. Ghalley, Geologist, Department of Geology & Mines, MoEA

Nidup Peljor, Deputy Chief Planning Officer, Policy and Planning Division, MoAF

Yeshey Dema, Senior Soil & Plant Nutrient Officer, NSSC, MoAF

NAP Process Framework Workshop

Chencho Norbu, Director, Department of Agriculture, MoAF

Dr. Lungten Norbu, Program Director, Regional RNR Research Centre, Yusipang, MoAF

D.B. Chhetri, Program Officer, Regional RNR Research Centre, Yusipang, MoAF

Karma Doma Tshering, Senior Program Officer, Department of Disaster Management, MoHCA

Nidup Peljor, Planning Officer, Policy & Planning Division, MoAF

N.K. Pradhan, Chief Research Officer, Council for RNR Research of Bhutan, MoAF

Hans van Noord, Land Management Specialist, Sustainable Land Management Project, NSSC, MoAF

Tshering Dorji, Project Manager, Sustainable Land Management Project, NSSC, MoAF

Norbu Wangchuk, Planning Officer, Gross National Happiness Commission Secretariat

Gungsang Wangdi, Assistant Program Officer, National Land Commission Secretariat

Sonam Tashi, Urban Planner, Thimphu City Corporation

Presentation of NAP Draft on World Day to Combat Desertification

Chencho Norbu, Director, Department of Agriculture, MoAF

S.N. Rai, Project Manager, Department Of Roads, MoWHS

Yeshey Nidup, Executive Engineer, Department of Roads, MoWHS

N.K. Pradhan, Chief Research Officer, Council for RNR Research of Bhutan, MoAF

Chencho Dukpa, Deputy Chief Research Officer, Council for RNR Research of Bhutan, MoAF

Manju Giri, Program and Development Officer, Royal Society for Protection of Nature

Karma Dupchu, Senior Hydrologist, Department of Energy, MoEA

Tashi Tenzin, Geologist, Department of Geology and Mines, MoEA

Kharnanda Ghimirey, Assistant Forest Officer, Social Forestry Division, Department of Forests, MoAF

Sangay Dorji, Senior Environment Officer, Environment Unit, MoEA

Asta Tamang, Deputy Chief Biodiversity Officer, National Biodiversity Center, MoAF

Tashi Dorji, Program Officer, UNDP Bhutan Country Office

Sonam Pem, Officiating Director of Program, Târâyana Foundation

Tshering Doma, Information and Communication Officer, Information and Communication Section, MoAF

Pema Singye, Program Officer, Department of Disaster Management, MoHCA

Tashi Choden, Assistant Soil Fertility and Plant Nutrition Officer, NSSC, MoAF

Tshering Tenzin, Department of Public Accounts, Ministry of Finance

NAP Final Review Workshop

Lyonpo (Dr) Pema Gyamtsho, Honorable Minister of Agriculture

Claire der Van Vairens, Honorable Resident Coordinator, United Nations System

Dasho Sherap Gyeltshen, Honorable Secretary, Ministry of Agriculture

Tenzin Dhendup, Director General, Department of Livestock, MoAF

Karma Dukpa, Director, Department of Forests, MoAF

Karma Dema, Program Director, NSSC, MoAF

Ugen P. Norbu, Consultant, Norbu Samyul Consulting for Environment and Development

Karma L. Rapten, Head, Environment and Energy Unit, UNDP Bhutan Country Office

B.N. Bhattarai, Deputy Chief Agriculture Officer, Department of Agriculture, MoAF

S.N. Rai, Project Manager, Department Of Roads, MoWHS

Ugen Tenzin, Chief Program Officer, Department of Debt Management, Ministry of Finance

K.N. Ghimirey, Forest Officer, Department of Forests, MoAF

Karma Dupchu, Senior Hydrology Officer, Department of Energy, MoEA

Peldon Tshering, Environment Officer, NECS

Chencho, Deputy Chief Research Officer, Council for RNR Research of Bhutan, MoAF

Dr. Karma Tenzing, Chief Livestock Officer, Department of Livestock, MoAF

Asta Tamang, Deputy Chief Biodiversity Officer, National Biodiversity Centre, MoAF

Sangay Dorji, Senior Environment Officer, Environment Unit, MoEA

Chime P. Wangdi, Secretary General, Tarayana Foundation

Tashi Tenzin, Geologist, Department of Geology and Mines, MoEA

Thinley Palden, Planning Officer, Policy and Planning Division, Ministry of Finance

Nidup Peljor, Planning Officer, Policy and Planning Division, MoAF

Yeshey Dema, Soil Fertility and Plant Nutrient Officer, NSSC, MoAF

Tshering Dorji, Sustainable Land Management Project, NSSC, MoAF

Additional Meetings

S.N. Rai, Project Manager, Department of Roads, MoWHS

Yeshey Nidup, Executive Engineer, Department of Roads, MoWHS

Chimi Peden Wangdi, Secretary General, Târâyana Foundation

Dr. Lam Dorji, Executive Director, Royal Society for Protection of Nature

Manju Giri, Program and Development Officer, Royal Society for Protection of Nature

Karma Drupchu, Senior Hydrologist, Department of Energy, MoEA

Tashi Tenzin, Geologist, Department of Geology and Mines, MoEA

B.B. Chhetri, Chief Forest Officer, Social Forestry Division, Department of Forests, MoAF

Kharnanda Ghimirey, Assistant Forest Officer, Social Forestry Division, Department of Forests, MoAF

Kinley, Social Forestry Division, Department of Forests, MoAF

Dorji Tshering, Chief Survey Engineer, National Land Commission Secretariat

B.N. Bhattarai, Deputy Chief Agriculture Officer, Department of Agriculture, MoAF

Thinley Paldon, Planning Officer, Policy and Planning Division, Ministry of Finance

Appendix 5
List of Participants at Regional Consultative Workshops

Eastern Region (RNR-RC Wengkhar)

Jigme Tshering, Senior Forest Ranger, Trashigang Dzongkhag

Tandin Dorji, Dzongkhag Environment Officer, Trashigang Dzongkhag

Dr. Tshering Dorji, Dzongkhag Livestock Officer, Trashigang Dzongkhag

Peldon Norgay, Dzongkhag Engineer, Trashigang Dzongkhag

Dorji Wangdi, Forest Officer, Trashigang Dzongkhag

Dhendup Dukpa, Dzongkhag Agriculture Officer, Trashigang Dzongkhag

Phuntsho Tobgay, Dzongkhag Forest Officer, Trashiyangtse Dzongkhag

N.S. Tamang, Assistant Dzongkhag Livestock Officer, Trashiyangtse Dzongkhag

N.B. Tamang, Senior Planning Officer, Trashiyangtse Dzongkhag

Tshering Yangzom, Dzongkhag Environment Officer, Trashiyangtse Dzongkhag

Tandin Dorji, Dzongkhag Agriculture Officer, Trashiyangtse Dzongkhag

Yadunath Baigai, Dzongkhag Agriculture Officer, Pemagatshel Dzongkhag

B.N. Sharma, Dzongkhag Livestock Officer, Pemagatshel Dzongkhag

Lungten Thinley, Dzongkhag Engineer, Pemagatshel Dzongkhag

Namgayla, Dzongkhag Forest Officer, Pemagatshel Dzongkhag

Choki Wangmo, Dzongkhag Environment Officer, Lhuentse Dzongkhag

Pema Tshewang, Dzongkhag Forest Officer, Lhuentse Dzongkhag

Loday Gyeltshen, Dzongkhag Livestock Officer, Lhuentse Dzongkhag

Kaka Tshering, Chief Forest Officer, Samdrup Jongkhar Forest Division

Pema Sherab, Dzongkhag Livestock Officer, Samdrup Jongkhar Dzongkhag

Cheten Wangda, Assistant Forest Officer, Samdrup Jongkhar Dzongkhag

Pema Thinley, Dzongkhag Engineer, Samdrup Jongkhar Dzongkhag

Tshering Dorji, Dzongkhag Environment Officer, Samdrup Jongkhar Dzongkhag

Tshetrim, Dzongkhag Agriculture Officer, Samdrup Jongkhar Dzongkhag

Tashi, Assistant Dzongkhag Planning Officer, Samdrup Jongkhar Dzongkhag

Sithar Dorji, Divisional Forest Officer, Mongar Forest Division

Tshering Nidup, Dzongkhag Engineer, Mongar Dzongkhag

B.P. Rai, Chief Planning Officer, Mongar Dzongkhag

Norbu Wangdi, Dzongkhag Forest Officer, Mongar Dzongkhag

Jigme Tenzin, Dzongkhag Agriculture Officer, Mongar Dzongkhag

East Central Region (RNR-RC Jakar)

Kezang Penjor, Dzongkhag Engineer, Zhemgang Dzongkhag

Deepak Rai, Dzongkhag Agriculture Officer, Zhemgang Dzongkhag

Thinley Cheden, Dzongkhag Planning Officer, Zhemgang Dzongkhag

Pankey Dukpa, Dzongkhag Forest Officer, Zhemgang Dzongkhag

Tshering Penjor, Dzongkhag Livestock Officer, Zhemgang Dzongkhag

Dorji Dukpa, Assistant Divisional Forest Officer, Zhemgang Forest Division

Dawa Tshering, Forest Ranger, Sarpang Forest Division

Karma Phuntsho, Geog Administrative Officer, Sarpang Dzongkhag

Gyembo Namgyal, Agriculture Extension Officer, Sarpang Dzongkhag

Kado Tshering, Divisional Forest Officer, Sarpang Forest Division

N. Chhetri, Assistant Dzongkhag Livestock Officer, Sarpang Dzongkhag

B.P. Adhikari, Assistant Dzongkhag Agriculture Officer, Trongsa Dzongkhag

Sherab Tenzin, Dzongkhag Livestock Officer, Trongsa Dzongkhag

Sangay Khandu, Dzongkhag Environment Officer, Trongsa Dzongkhag

Passang Dorji, Dzongkhag Planning Officer, Trongsa Dzongkhag

Sonam Wangchuk, Dzongkhag Forest Officer, Trongsa Dzongkhag

M.B. Mongar, Dzongkhag Engineer, Trongsa Dzongkhag

Jambay Dorji, Assistant Dzongkhag Livestock Officer, Bumthang Dzongkhag

Ratu Wangchuk, Divisional Forest Officer, Bumthang Forest Division

Y.K. Pradhan, Dzongkhag Planning Officer, Bumthang Dzongkhag

Tshering, Assistant Forest Officer, Bumthang Dzongkhag

Langa Dorji, Dzongkhag Engineer, Bumthang Dzongkhag

Kinley Dorji, Dzongkhag Agriculture Officer, Bumthang Dzongkhag

Chhimi Wangchuk, Dzongkhag Environment Officer, Bumthang Dzongkhag

Dorji Wangchuk, Principal Research Officer, RNR-RC Jakar

Dr. Jambay Dorjee, Program Director, RNR-RC Jakar

Samten Nidup, Research Assistant, RNR-RC Jakar

Tshering Dendup, Research Assistant, RNR-RC Jakar

Rabgyel Dukpa, RNR-RC Jakar

West Central Region (College of Natural Resources Lobesa)

Kin Gyeltshen, Chief Forest Officer, Wangdue Dzongkhag

Thinley, Dzongkhag Engineer, Wangdue Dzongkhag

Shahadev Thapa, Dzongkhag Planning Officer, Wangdue Dzongkhag

H.P. Adhikari, Dzongkhag Agriculture Officer, Wangdue Dzongkhag

Thukten, Forest Ranger, Wangdue Dzongkhag

K.B. Gurung, Assistant Dzongkhag Livestock Officer, Wangdue Dzongkhag

Tshering Choden, Dzongkhag Environment Officer, Wangdue Dzongkhag

Tashi Tobgyel, Chief Forest Officer, Tsirang Forest Division

I.P. Phugel, Assistant Engineer, Tsirang Dzongkhag

Tashi Dhendup, Dzongkhag Environment Officer, Tsirang Dzongkhag

Ngawang Chophel, Dzongkhag Planning Officer, Tsirang Dzongkhag

Dorji Gyeltshen, Assistant Forest Officer, Tsirang Dzongkhag

Chhoeda, Dzongkhag Planning Officer, Tsirang Dzongkhag

Dorji Wangchuk, Livestock Officer, Tsirang Dzongkhag

Namgang Tshering, Dzongkhag Engineer, Dagana Dzongkhag

Dr. D.B. Rai, Dzongkhag Livestock Officer, Dagana Dzongkhag

Sonam Tobgay, Dzongkhag Forest Officer, Dagana Dzongkhag

Jigme Dorji, Dzongkhag Agriculture Officer, Dagana Dzongkhag

Sachin Limbu, Dzongkhag Environment Officer, Dagana Dzongkhag

Chedup Dorji, Assistant Planning Officer, Gasa Dzongkhag

Samser Rai, Dzongkhag Engineer, Gasa Dzongkhag

Sangay Dorji, Dzongkhag Forest Officer, Gasa Dzongkhag

Thinley Rabten, Dzongkhag Livestock Officer, Gasa Dzongkhag

Chencho Dorji, Dzongkhag Environment Officer, Gasa Dzongkhag

Leki Tenzin, Dzongkhag Agriculture Officer, Gasa Dzongkhag

Jigme Choki, Dzongkhag Environment Officer, Punakha Dzongkhag

Yonten Gyamtsho, Dzongkhag Agriculture Officer, Punakha Dzongkhag

Ugyen, Dzongkhag Livestock Officer, Punakha Dzongkhag

Kinga Dorji, Dzongkhag Engineer, Punakha Dzongkhag

Tashi Wangchuk, Dzongkhag Forest Officer, Punakha Dzongkhag

Sangay Wangdi, Deputy Chief Research Officer, RNR-RC Bajo

Sangay Duba, Program Director, RNR-RC Bajo

Rinzin Dorji, Research Assistant, RNR-RC Bajo

Western Region (NSSC Semtokha)

Pema Dorji, Dzongkhag Agriculture Officer, Paro Dzongkhag

Phurpa Tenzing, Chief Livestock Officer, Paro Dzongkhag

Sangay Tenzin, Dzongkhag Engineer, Paro Dzongkhag

Tenzin Wangdi, Assistant Forest Officer, Paro Dzongkhag

Akey Dorji, Dzongkhag Forest Officer, Paro Dzongkhag

Kinzang, Dzongkhag Engineer, Chhukha Dzongkhag

K.B. Rai, Deputy Chief Planning Officer, Chhukha Dzongkhag

Thinley Phuntsho, Assistant Dzongkhag Livestock Officer, Chhukha Dzongkhag

Singye Wangchuk, Officiating Dzongkhag Forest Officer, Chhukha Dzongkhag

Jambay Ugen, Assistant Dzongkhag Agriculture Officer, Chhukha Dzongkhag

Tandin, Agriculture Extension Officer, Haa Dzongkhag

Kado Drukpa, Senior Forest Ranger, Haa Dzongkhag

Tshering N Penjor, Officiating Dzongkhag Agriculture, Samtse Dzongkhag

Dorji Wangdi, Dzongkhag Environment Officer, Samtse Dzongkhag

Wangchuk, Dzongkhag Planning Officer, Samtse Dzongkhag

Tshewang Jamtsho, Assistant Dzongkhag Livestock Officer, Samtse Dzongkhag

S.R. Gurung, Dzongkhag Forest Officer, Thimphu Dzongkhag

G.B. Chhetri, Dzongkhag Planning Officer, Thimphu Dzongkhag

Tashi Gyeltshen, Deputy Executive Engineer, Thimphu Dzongkhag

Dr. Lungten Norbu, Program Director, RNR-RC Yusipang

Kinley Tshering, Deputy Chief Research Officer, RNR-RC Yusipang

Appendix 6
List of Participants at Local Community Consultations

Bjena Geog, Wangduephodrang Dzongkhag

Local Community Members

Ugyen Dorji, 32 years, male, Ngawang village

Kunzang Wangdi, 27 years, male, Wachey Gom village

Namgay Dorji, 53 years, male, Ensakha village

Gyeltshen Wangchuk, 51 years, male, Omchegang village

Kinley Gyeltshen, 52 years, male, Ngawang village

Kumbu, 48 years, male, Wachey Wom village

Lham, 68 years, male, Wachey Gom village

Dorji Penjor, 58 years, male, Themekha village

Tsagay Dorji, 52 years, male, Gauzhikha village

Lhawang Tshering, 54 years, male, Jagarligchu village

Penjor, 72 years, male, Kokokha village

Choden, 31 years, female, Tekizingkha village

Dorji, 57 years, male, Gauzhikha village

Kelzang Dema, 68 years, female, Wachey Gom village

Tshewang, 47 years, male, Tokha village

Nimta, 74 years, male, Phuntshogang village

Dophu, 47 years, male, Themekha village

Kumbu, 53 years, male, Tashitokha village

Sonam Lhamu, 42 years, female, Tekikha village

Passang, 40 years, male, Tekikha village

Lhaden, 40 years, female, Ngawang village

Wangchuk, 28 years, male, Sijuna village

Lhendu, 47 years, male, Tokha village

Local Government Staff

H.P. Adhikari, Dzongkhag Agriculture Officer

Sherab Tenzin, Dzongkhag Livestock Officer

Kelzang Dawa, Assistant Dzongkhag Forest Officer

Karma Chewang, Assistant Dzongkhag Agriculture Officer

Jigme Zangmo, Senior Forest Ranger

Choney Zangmo, Junior Extension Officer

Sonam Norbu, Livestock Production Supervisor-II

Sonam Jamtsho, College of Natural Resources Trainee (Agriculture)

Rinchen Dorji, College of Natural Resources Trainee (Forestry)

Sonam Wangmo, College of Natural Resources Trainee (Forestry)

Karma Tshomo, College of Natural Resources Trainee (Animal Husbandry)

Bumdeling Geog, Trashiyangtse Dzongkhag

Local Community Members

Sonam Choeda, 55 years, male, Betshamang village

Yeshi Choden, 47 years, female, Betshamang village

Pema Gyalpo, 29 years, male, Betshamang village

Lunzang Tshogay, 49 years, female, Betshamang village

Tshering Wangchuk, 27 years, male, Betshamang village

Ngawang Gyeltshen, 58 years, male, Ngalimang village

Passangla, 20 years, male, Ngalimang village

Pema Namgay, 53 years, male, Tharphel village

Tshogay Wangmo, 29 years, female, Tharphel village

Jamba, 49 years, male, Tharphel village

Tshering Dupchu, 33 years, male, Phenteng village

Nima Chhodar, 46 years, male, Gangkhardung village

Chhimi, 36 years, female, Gangkhardung village

Chorten Tshering, 36 years, male, Tshaling village

Sumchung, 24 years, male, Tshaling village

Norbu Wangdi, 40 years, male, Bumdir village

Chador Wangmo, 22 years, female, Bumdir village

Domang Tshering, 26 years, male, Tharphel village

Choki Lhamo, 24 years, female, Tharphel village

Nima Tshering, 40 years, male, Tharphel village

Yeshila, 70 years, male, Betshamang village

Tshetrim Dorji, 40 years, male, Betshamang village

Ngeotong, 66 years, male, Betshamang village

Sangay Dorji, 37 years, male, Betshamang village

Local Government Staff

Tshudu Zangpo, Livestock sector, Geog RNR Centre

Yeshi Peldon (forest ranger), Forestry sector, Geog RNR Centre

Neten Dorji, Principal, Bumdeling Lower Secondary School

Darla Geog, Chukha Dzongkhag

Local Community Members

Chatra Bahadur Mongar, 35 years, male, Gurung-gaon village

Kumar Allay, 29 years, male, Gamdara village

Deoraj Chhetri, 48 years, male, Lower Soureni village

Khila Rama Thapa, 52 years, male, Upper Soureni village

Prem Bahadur Mongar, 40 years, male, Bich Soureni village

Nar Bahadur Kharki, 34 years, male, Gamdara village

Kesar Nath Kharka, 23 years, male, Barkhey village

Chandra Bahadur Mongar, 40 years, male, Tabji village

Damber Singh Chhetri, 58 years, male, Silli village

Karma Dukpa, 45 years, male, Gengu village

Tauchu, 45 years, male, Samachin village

Nidup, 26 years, male, Samachin village

Dhan Kumar Mongar, 21 years, male, Tabji village

Sahib Singh Rai, 45 years, male, Sangkhu village

Kalu Ram Gurung, 47 years, male, Sangkhu village

Harka Bahadur Rai, 25 years, male, Sangkhu village

Januka Dev Basnet, 21 years, female, Lower Soureni village

Dil Maya Sunwar, 47 years, female, Dorjeyanchey village

Ratra Maya Mongar, 25 years, female, Bich Soureni village

Man Maya Pradhan, 23 years, female, Bich Soureni village

Meel Kumar Mongar, 16 years, male, Upper Soureni village

Damber Singh Chhetri, 57 years, male, Yagoen village

Wangche, 43 years, male, Kemalakha village

Singye Dorji, 42 years, male, Kemalakha village

Phuntsho, 48 years, male, Dorjeyanchey village

Damber Singh Limbu, 52 years, male, Pakchina village

Krishna Bahadur Mandal, 66 years, male, Bich Darla village

Nima Gyeltshen, 30 years, male, Gamana village

Tashi, 43 years, male, Sinchula village

Abir Man Rai, 44 years, male, Sinchula village

Phub Tshering, 53 years, male, Gamana village

Local Government Staff

Tashi Tshering, Forest Ranger

Ugyen Tshering, Gaydrung

Yeshi Tshering, AEO, Darla

Dadi Ram Sharma, BHS/AIT, Darla

Tshewang Jamtsho, Assistant Dzongkhag Livestock Officer

Jambay Ugyen, Assistant Dzongkhag Agriculture Officer

Choni Lhamo, Agri Trainee, College of Natural Resources

Jamyang Choden, Agri Trainee, College of Natural Resources

Namgay Tshering

Ugyen Tshering, Assistant Dzongkhag Forest Officer

Kinlay Wangmo, AEO, Darla

Yonten Phuntsho, Forestry Trainee, College of Natural Resources

Drujeyganag Geog, Dagana Dzongkhag

Local Community Members

Sonam Khandu, 43 years, male, Pangna village

Lhakpa, 32 years, male, Pangserpo village

Kezang, 57 years, male, Pangserpo village

Phenchu, 69 years, male, Pangna village

Sangay Pemo, 22 years, female, Patala village

Dema, 25 years, female, Thangna village

Zangmo, 47 years, female, Pangserpo village

Pema Dema, 40 years, female, Pangna village

Tuku, 41 years, female, Menchuna village

Namgaymo, 30 years, female, Pangserpo village

Tashimo, 45 years, female, Patala village

Ugyen Zangmo, 30 years, female, Pangserpo village

Kadomo, 33 years, female, Thangna village

Karchamo, 21 years, female, Menchuna village

Jit Bahadur Basnet, 75 years, male, Thangna village

Phub Dorji, 35 years, male, Pangserpo village

Pemba, 35 years, male, Patala village

Namgay, 27 years, male, Thangna village

Dugchen, 55 years, male, Pangna village

Jigme Tshering, 32 years, Pangna village

Nakula, 45 years, male, Pangserpo village

Local Government Staff

Kinley Namgay, Assistant Dzongkhag Agriculture Officer

Gyelwang Phuntsho, Assistant Dzongkhag Forest Officer

Thinley Phuntsho, Assistant Dzongkhag Livestock Officer

Chimi Wangchuk, Assistant Extension Officer

Bagala Dukpa, AI Technician

Tenzin Dorji, Senior Forest Ranger

Yeshila, Assistant Extension Officer

Tshering Wangdi, Assistant Extension Officer

Dhan Bahadur Gurung, College of Natural Resources Trainee

Madan Kumar Ghalley, College of Natural Resources Trainee

Tika Ram Bhandari, College of Natural Resources Trainee

Gelephu Geog, Sarpang Dzongkhag

Local Community Members

Dophu Zangmo, 51 years, female, Pelrithang village

Bishnu Maya Katel, 24 years, female, Pelrithang village

Chandra Maya Kala, 33 years, female, Puranobusty village

Santi Ram Katel, 59 years, male, Pelrithang village

Dev Maya Pradhan, 48 years, female, Puranobusty village

Mokardhoj Gurung, 60 years, male, Dzomlingthang village

Ramlal Kumal, 38 years, male, Dzomlingthang village

Chandra Bahadur Pradhan, 62 years, male, Puranobusty village

Phurba Wangdi, 50 years, male, Pelrithang village

Karchung, 57 years, male, Puranobusty village

Tarabir Ghimirey, 53 years, male, Puranobusty village

Kharananda Khatiwara, 50 years, male, Pelrithang village

Rinzin Zangmo, 45 years, female, Dzomlingthang village

Nima, 30 years, female, Dzomlingthang village

Kinzang Choden, 35 years, female, Pelrithang village

Sangay Wangdi, 58 years, male, Pemathang village

L.B. Thapa (Gup), 64 years, male, Puranobusty village

Wangchuk Namgay (Mangmi), 63 years, male, Dzomlingthang village

Local Government Staff

Pema Rinzin, Senior Forest Ranger

Tshering Pelden, Junior Extension Officer

Hungrel Geog, Paro Dzongkhag

Local Community Members

Passang, 61 years, male, Jangsabu village

Tshering Lhamo, 45 years, female, Jangsabu village

Tazi, 74 years, male, Drugyeling village

Tandin Kinley, 18 years, female, Gaupey village

Tshering Penjor, 59 years, male, Gaupey village

Sangay, 44 years, male, Hungrelkha village

Dorji, 45 years, male, Chubjekha village

Sangay, 83 years, male, Goenkha village

Dorji Tshering, 68 years, male, Chubjekha village

Galem, 56 years, female, Goenkha village

Karma Dem, 36 years, female, Jangmeyna village

Nidup Dorji, 61 years, male, Goenkha village

Pema Tshomo, 33 years, female, Goenkha village

Sangay Dema, 17 years, female, Gaupey village

Local Government Staff

Tandin Dorji, Gaydrung (Geog Clerk)

Nidup Tshering, Geog RNR Sector – Livestock

Phub Thinley, Geog RNR Sector – Forestry

Karma Choki, Geog RNR Sector – Agriculture

Ugyen, Geog RNR Sector – Forestry

Langthel Geog, Trongsa Dzongkhag

Local Community Members

Tashi Rabgay (Gup), 36 years, male

Phuba (Mangmi), 36 years, male

Karma Tenzin (Gaydrung), 36 years, male

Phuntsho, 56 years, male, Namthel village

Namgay Wangdi, 33 years, male, Damdung village

Sonam Tobgay, 45 years, male, Enduchholing village

Karma Sonam, 41 years, male, Koshala village

Phurbala, 36 years, male, Beling village

Dorjila, 24 years, male, Ngormey village

Yeshi Nidup, 30 years, male, Wangling village

Tugpula, 64 years, male, Jangmen village

Thukten, 54 years, male, Beyzam village

Rinzin Wangchuk, 36 years, male, Baling village

Karma, 43 years, male, Pangzor village

Tshering Wangmo, 35 years, female, Ngadang village

Tandin Wangchuk, 28 years, male, Dangdung village

Ugyen Wangmo, 25 years, female, Dangdung village

Lotey, 25 years, male, Baling village

Ugyen, 63 years, male, Namthel village

Jambayla, 43 years, male, Namthel village

Nakari, 51 years, male, Jangmen village

Ugyen, 60 years, male, Namthel village

Lemo, 30 years, female, Enduchholing village

Pem Yuden, 22 years, female, Enduchholing village

Sonam Choden, 47 years, female, Namthel village

Phurbala, 45 years, male, Namthel village

Aum Yangka, 54 years, female, Ngadakay village

Local Government Staff

Sonam Wangchuk, Dzongkhag Forest Officer

Ngawang Chogyel, Dzongkhag Agriculture Officer

Kinley Rabgay, Assistant Livestock Officer

Luda Wangdi, Agriculture Extension Officer

Tshewang Namgay, Forest Range

Ugyen Phuntsho, Geog Administrative Officer

Mewang Geog, Thimphu Dzongkhag

Local Community Members

Gomtu, 68 years, male, Pullina village

Nim Dorji, 62 years, male, Dhalukha village

Tenzin, 45 years, male, Khariphug village

Tandin, 58 years, male, Khasadrapchu village

Kencho, 52 years, male, Semo village

Tshewang Dorji, 28 years, male, Dramesa village

Gyem Tenzin, 28 years, male, Tshaluna village

Phub Tshering, 44 years, male, Gida village

Tandin Dorji, 16 years, male, Dramesa village

Passang, 20 years, male, Dramesa village

Dorji, 26 years, male, Semo village

Pem, 75 years, male, Nysherkha village

Tshering Gyem, 60 years, female, Sigay village

Jowchu, 68 years, male, Jowchu village

Yangchen Dema, 51 years, female, Khasadrapchu village

Tandin, 48 years, male, female, Kharibjee village

Tshering Wangdi, 69 years, male, Gida village

Migma, 50 years, male, Woohina village

Sangchu, 57 years, male, Khasakha village

Gyeltshen, 53 years, male, Khasakha village

Passang Gokha, 73 years, male, Khasakha village

Kezang, 60 years, male, Khasakha village

Chencho Tenzin, 43 years, male, Bjemina village

Dorji Wangchuk, 55 years, male, Khasakha village

Local Government Staff

Kinley Om, Geog Agriculture Extension Officer

Chorten, Geog Forest Officer

Orong Geog, Samdrup Jongkhar Dzongkhag

Local Community Members

Phuntsho Wangdi, 64 years, male, Milum village

Cheki Dorji, 30 years, male, Jangchuk-ling village

Khowjay, 42 years, male, Wooling village

Dorji Norbu, 49 years, male, Remong village

Karchung, 45 years, male, Mandar village

Karma Jamtsho, 34 years, male, Mantshang village

Pema Tshering, 50 years, male, Tirsheri village

Jamtsho, 53 years, male, Wooling village

Jangchuk Dorji, 44 years, male, Morong village

Jigme Dorji, 39 years, male, Philuma village

Tenzin, 61 years, male, Milum village

Bumcho Wangdi, 35 years, male, Philuma village

Karma Tharchen, 20 year, male, Philuma village

Wangda Tshering, 63 years, male, Remong village

Yongba, 61 years, male, Remong village

Sonam Tobgay, 49 years, male, Remong village

Karma Dorji, 40 years, male, Remong village

Dechen Tshering, 46 years, male, Mandar village

Jigme Choden, 45 years, female, Dheldung village

Sangay Dema, 41 years, female, Dheldung village

Tshering Dorji, 55 years, male, Gonmining village

Honda, 64 years, male, Wooling village

Chelen, 52 years, male, Wooling village

Zangmo, 20 years, female, Wooling village

Gyelpo, 70 years, male, Batshung village

Tonmo, 60 years, female, Batshung village

Tashi Wangdi, 71 years, male, Jalam Woong village

Sangay Wangmo, 48 years, female, Nakzor village

Pema Yangzom, 24 years, female, Nakzor village

Sangay, 39 years, male, Jalam Woong village

Wangchuk, 77 years, male, Mantshang village

Ugyen Tshering, 51 years, male, Bilum village

Tshewang Rinzin, 49 years, male, Menchori village

Yongba, 52 years, male, Jangchuk-ling village

Sonam Zangmo, 40 years, female, Morong village

Dechen Zangmo, 20 years, female, Morong village

Mon Bahadur Tamang, 64 years, male, Layrong village

Karma, 18 years, female, Wooling village

Dema Tshomo, 17 years, female, Wooling village

Tshering Dorji, 66 years, male, Wooling village

Dawa Sermo, 49 years, female, Thongkhar Woong village

Thukten Tshering, 36 years, male, Remong village

Local Government Staff

Pema Sherub, Dzongkhag Livestock Officer

Karma Leki, Dzongkhag Forestry Officer

Ugyen Tshering, Agriculture sector, Orong RNR Centre

Tshering Choeda, Forestry sector, Orong RNR Centre

Cheten Choedup, Livestock sector, Orong RNR Centre

K.P. Sharma, Livestock sector, Orong RNR Centre

Jimba Dorji, Geog Administrative Officer

Pugli Geog, Samtse Dzongkhag

Local Community Members

Damber Singh Gurung, 36 years, male, Ratey village

Budhiman Gurung, 63 years, male, Thumkey village

Chogey Lepcha, 77 years, male, Gumbadara village

Bhakta Bahadur Gurung, 62 years, male, Uttarey village

Bhoj Bahadur Chhetri, 38 years, male, Kalapani village

Khamba Singh Ghalley, 51 years, male, Thotney village

Kharka Bahadur Gurung, 43 years, male, Dalamthang village

Sompa Lepcha, 29 years, male, Gayshinggaon village

Do Tshering Lepcha, 24 years, male, Lechi village

Migma Tshering Lepcha, 59 years, male, Gayshinggaon village

Damber Singh Gurung, 47 years, male, Nindalakha (Tadin) village

Mon Bahadur Gurung, 62 years, male, Dalamthang village

Dal Bahadur Chhetri, 65 years, male, Pugli village

Chakra Bahadur Sunwar, 70 years, male, Bhoteykharka village

Man Bir Sunwar, 60 years, male, Khanigaon village

Phauda Singh Bhujel, 79 years, male, Dholey village

Man Bahadur Sunwar, 58 years, male, Khanigaon village

Harka Bahadur Rai, 38 years, male, Lahatar village

Padam Bahadur Chhetri, 48 years, male, Kalapani village

Dhan Bahadur Gurung, 60 years, male, Tindharey village

Budhiman Rai, 63 years, male, Dumshidara village

Ratna Bahadur Rai, 25 years, male, Dalamthang village

Matangri Rai, 51 years, male, Lahatar village

Deshmaya Limboo, 31 years, female, Dumshidara village

Leela Prasad Chhetri, 40 years, female, Ratey village

Mani Kumar Rai, 37 years, male, Dumshidara village

Mina Kumari Bhujel, 35 years, female, Dumshidara village

Bahadur Tamang, 37 years, male, Titi village

Santa Bir Ghalley, 57 years, male, Titi village

Padam Bahadur Rai, 65 years, male, Dumshidara village

Lutey Rair, 38 years, male, Dumshidara village

Bhim Bahadur Chhetri, 36 years, male, Gayshinggaon village

Local Government Staff

Karma, RNR staff, forestry sector

Bhim Kumari Gurung, RNR staff, agriculture sector

D.B. Mongar, RNR staff, livestock sector

Yonten Dorji, DVH Samtse

Kinzang Chophel, Dzongkhag Agriculture Sector, Samtse

Sangay Dorji, Administration, Geog office

Ugyen, Dzongkhag forestry sector, Samtse

Semjong Geog, Tsirang Dzongkhag

Local Community Members

Purna Bahadur Pradhan, 70 years, male, Katikay village

Shing Bir Pradhan, 67 years, male, Katikay village

Gita Tamang, 36 years, female, Katikay village

Dawa Tamang, 21 years, male, Katikay village

Mon Bahadur Mongar, 54 years, male, Bararay village

Pulman Saru, 60 years, male, Bararay village

Khina Maya Lungali, 45 years, female, Bararay village

Man Singh Chhetri, 35 years, male, Bararay village

Lok Bahadur Rai, 37 years, male, Daragaon village

Kalpana Rai, 16 years, female, Daragaon village

Harka Maya Rai, 24 years, female, Daragaon village

Ananta Jogi, 55 years, male, Daragaon village

Shanta Kumar Jogi, 22 years, male, Daragaon village

K.B. Subba, 45 years, male, Gaydung village

T.B. Saru (Mangmi), 42 years, male, Bararay village

L.T. Tamang (Gup), 50 years, male, Katikay village

Amber Bahadur Pradhan, 27 years, male, Katikay village

Karna Bahadur Mongar, 50 years, male, Bararay village

Ram Bahadur Rai, 28 years, male, Kokray village

Lila Bahadur Rai, 32 years, male, Kokray village

Local Government Staff

Tshering Dorji, Geog Forest Extension Officer

Dorji Gyeltshen, Geog Administrative Officer

Birkha Bahadur Tamang, Junior Extension Officer

Chhoeda, Assistant Dzongkhag Agriculture Officer

Gyem Tshering, Dzongkhag Forest Officer

Talo Geog, Punakha Dzongkhag

Local Community Members

Yonten Gyeltshen, 50 years, male, Talo Gup

Dorji Wangchuk, 45 years, male, Talo Mange-Ap

Tshering Dem, 45 years, female, Donkokha village

Lhachey, 36 years, female, Soedangsa village

Tsheten Wangchuk, 67 years, male, Soedangsa village

Kinley Dorji, 42 years, male, Labtshakha village

Karma, 41 years, male, Labtshakha village

Sangay Dorji, 60 years, male, Nobgang village

Aum Hollem, 53 years, female, Labtshakha village

Gaypo, 76 years, male, Dongkokha village

Wangchukla, 58 years, male, Gangthramo village

Sangay Dorji, 52 years, male, Lunakha village

Karma Yeshi, 32 years, male, Lunakha village

Kezang Tenzin, 57 years, male, Soedangsa village

Wangchuk Namgay, 65 years, male, Gangthramo village

Sangay Dorji, 60 years, male, Dongkokha village

Pema, 49 years, male, Yungu village

Dorji Gyem, 57 years, female, Talo village

Jigme, 47 years, male, Talo village

Duba, 58 years, male, Gangthramo village

Local Government Staff

Tandin Tshewang, Assistant Extension Officer

Ten Dorji, Geog Administrative Officer

Zobel Geog, Pemagatshel Dzongkhag

Local Community Members

Sonam Choejay, 28 years, male, Tsheykhor village

Pema, 44 years, female, Tsheykhor village

Sangay Wangchuk, 16 years, male, Tsheykhor village

Chedup, 45 years, male, Resanang village

Tempa, 40 years, male, Resanang village

Leki Zangmo, 28 years, female, Zobel village

Tashi Lhamo, 26 years, female, Zobel village

Lama Dendup, 32 years, male, Zobel village

Tashi Penjor, 23 years, male, Zobel village

Dorji Dema, 24 years, female, Zobel village

Phurpa Wangdi, 52 years, male, Ngamalam village

Yourpo, 59 years, male, Ngamalam village

Dema, 60 years, female, Ngamalam village

Chonga, 19 years, male, Ngamalam village

Dorji, 50 years, male, Ngamalam village

Sangay, 56 years, male, Sunajug village

Permo, 40 years, female, Sunajug village

Changlu, 50 years, male, Sunajug village

Dorji Wangmo, 40 years, female, Sunajug village

Langki Zangmo, 45 years, female, Chegkhar village

Choden, 45 years, female, Chegkhar village

Lhaden, 50 years, female, Chegkhar village

Daya, 50 years, male, Pangthang village

Tshering Darjay, 38 years, male, Pangthang village

Tandi Wangmo, 24 years, female, Pangthang village

Gyeltshen, 48 years, male, Pangthang village

Phub Dorji, 26 years, male, Pangthang village

Gyeltshen, 55 years, male, Pangthang village

Norbu, 50 years, male, Goypa village

Dorji Wangdi, 60 years, male, Zobel village

Melo, 18 years, female, Zobel village

Local Government Staff

Yadunath Bagi, Dzongkhag Agriculture Officer

Lungten, Agriculture sector, Zobel Geog RNR Centre

Kinga Dorji, Livestock sector, Zobel Geog RNR Centre

Kezang Wangdi, Geog Administrative Officer