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COUNTRY ENVIRONMENT PROFILE:

Bhutan

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ACRONYMS AND GLOSSARY OF TERMS USED

Acronyms

ADB	Asian Development Bank
BTF	Bhutan Trust Fund for Environmental Conservation
CBD	United Nations Convention on Biological Diversity
CITES	Convention on International Trade in Endangered Species
DADM	Department of Aid and Debt Management
Danida	Danish International Development Assistance
DFID	Department for International Development (United Kingdom)
DGIS	Dutch Aid Agency
FAO	United Nations Food and Agriculture Organization
EC	European Commission
FMU	Forest management unit
FYP	Five Year Plan
GEF	Global Environment Facility
Gtz	German Development Agency
ICDP	Integrated Conservation and Development Project
IDA	International Development Association
IFC	International Finance Corporation
MoF	Ministry of Finance
NCD	Nature Conservation Division
NES	National Environment Strategy
NGO	Non-government organisation
Nu.	*Ngultrum*, Bhutanese currency, pegged to Indian Rupee
PA	Protected Area
RGoB	Royal Government of Bhutan
RNR	Renewable natural resources
RSPN	Royal Society for the Protection of Nature
SDC	Swiss Agency for Development and Cooperation
SNV	Netherlands Development Organization
UNCCD	United Nations Convention on Combating Desertification
UNFCCC	United Nations Framework Convention on Climate Change
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
WWF	World-Wide Fund for Nature (in the USA, the World Wildlife Fund)

Glossary of Terms

Bukharis	Wood burning stoves
Chatrim	Act, rules and regulations of conduct
Chhu	River or rivulet
Dzongkha	Bhutanese language
Dzongkhag	District
Dzongkhag Yargye Tshogchung (DYT)	District Development Committee
Dzongdag	Head of a district
Geog	Block (made up of a few to several villages)
Geog Yargye Tshogchung (GYT)	Block Development Committee
Gup	Head of a block
Je Khenpo	Spiritual leader and Chief Abbot of Bhutan
Lhengye Zhungthsog	Council of Ministers
Tseri	Slash and burn cultivation

1. SUMMARY

This Country Environmental Profile for Bhutan was commissioned by the European Commission (EC) to identify and assess environmental issues to be considered in the preparation of the Country Strategy Paper for Bhutan. Its goal is to ensure that EC cooperation strategies systemically integrate environmental considerations into the selection of priority focal areas and establish necessary safeguards for all cooperation activities undertaken in the country. The information presented in this Profile is based on numerous in-country interviews, an extensive literature review, meetings with EU representatives, and an in-country debriefing, all completed in June and July 2005 (see Appendix 1 for more information).

Bhutan is endowed with a relatively pristine environment, boasting a high percentage of forest cover and very high levels of biological diversity at the ecosystem, species and genetic levels. To protect the country's forests and biodiversity, the RGoB has proclaimed over 26 percent of the land area protected, the highest percentage of protected area in the world. The country is governed by stringent environmental standards and a strong conservation ethic. Since the 1970s, the Royal Government of Bhutan (RGoB) has put in place a comprehensive environmental policy and regulatory framework. The country has adopted a "middle path" approach, balancing conservation and economic development and ensuring that the spiritual, cultural and social needs of the society are carefully considered.

Despite the country's unique environmental status, a number of factors threaten Bhutan's environment. The accelerating pace of Bhutan's own development, the high population growth rate, and the recent rise in rural-urban migration, which has led to challenges with urban waste management, air and water pollution, and urban planning. The main impacts of these threats include increasing loss of biological diversity, reduction of forest area, degradation of ecosystem services and reductions in air and water quality. Climate change and associated natural disasters compound these threats and present additional challenges for Bhutan's environment.

Since Bhutan opened to the outside world in the 1960s, the country has articulated its development plan in nine five-year plans (FYP). The Ninth Plan (July 2002-June 2007) is currently under implementation. Its goals revolve around hydropower development, increased food self-sufficiency and industrial development. Priorities include: (a) improving and expanding the road network to improve farmers' access to markets; (b) expanding power transmission lines to facilitate export of power and promote growth of power intensive industries; (c) improving urban infrastructure, particularly housing, and related demand for services; and (d) modernization of agriculture to enhance agricultural productivity.

If not carried out in a sustainable manner, some of the larger planned investments (e.g. road construction, industrial development, housing construction, rural electrification) in the Ninth Plan could result in serious short and long-term damage to the environment, as well as the economy. However, bigger impacts could result from the potential cumulative impacts of many smaller development proposals, as well as development projects that have not been articulated in the Plan.

Institutionally, the environment is strongly represented in Bhutan. The National Environment Commission Secretariat (NECS) is the focal agency for all environmental issues and its responsibilities include the overall formulation and monitoring of environmental policy and legislation. Line ministries, *dzongkhags* and *geogs*, and private companies are responsible for the implementation of environmental assessments and ensuring compliance to environmental regulations. However, environmental management tends to be "compartmentalized" within sectors, leading to incompatibilities between sector investments plans. Cross-sectoral planning with regard to environmental issues is key to overcoming this problem.

Bhutan is divided administratively into 20 *dzongkhags* (districts) and 201 *geogs* (blocks). A geog is the smallest administrative unit within a district. The Ninth FYP emphasizes shifting formerly national environmental policy tasks, such as development planning, allocation of resources, and framing and implementing rules and regulations to the *dzongkhag* and *geog* levels. This will empower officials at the local level, but will also provide both opportunities and constraints for effectively and efficiently protecting the environment.

Bhutan is unique in its outlook on the environment and its plans for balanced economic development. However, the country is faced with some key challenges to maintaining its pristine environment in the face of its rapidly developing economy and changing rural-urban environment. With hydropower as a major economic activity, it is critical that watersheds and forest cover are maintained. Key issues to achieving this include sharing the costs and benefits of conserving its environment and balancing development amongst rural and urban communities.

2. STATE OF THE ENVIRONMENT

2.1. OVERVIEW

Bhutan is a small Himalayan kingdom bordered by the Tibetan autonomous region of China (in the north) and the Indian states of Arunchal Pradesh (in the east), Sikkim (in the west) and West Bengal and Assam (in the south). Bhutan's population is estimated to be 700,000, with 79 percent of the population living in rural villages and dependant on agriculture for their livelihoods. The country covers approximately 38,394 square kilometres of mountainous terrain, varying in elevation from 97 metres to 7,553 metres and characterised by high-rising rugged mountains and an intricate network of deep valleys, ravines and depressions, glacial lakes and moraine. Climatic conditions vary considerably across the terrain.

The majority of the country's land mass is forest (72.5 percent), with the remaining territory split amongst agriculturally cultivable land (7.8 percent), urban areas, rugged mountains, open pastures and glaciers. The Renewable Natural Resources (RNR) sector covers agriculture, livestock and forestry and has historically been the single-most important economic sector, accounting for 35.9 percent of GDP in 2000 (Ministry of Agriculture, 2002). More than 26 percent of the total land area is formally protected and 9 percent is designated as biological corridors, protecting some of the richest biodiversity in the world.

Most of the country's natural resources are still in their natural form; however, Bhutan's rapid pace of development, including agricultural modernization, hydropower, mineral development, industrialisation, urbanisation, infrastructure development, and population growth (estimated at 2.12 percent in 2004) are increasing pressures on Bhutan's environment.

A summary of Bhutan's key environmental issues discussed in this report include:

- Land degradation, specifically soil erosion caused by human activities
- The migration of rural dwellers to urban centers increasing pressres on existing air and water pollution, improper waste disposal, inadequate clean drinking water, and unhygienic sewerage and drainage
- Air pollution in urban areas from rapidly increasing vehicle numbers, poor fuel quality, burning of wood in bukharis and open fires
- Water pollution, primarily in urban areas where a lack of waste water treatment facilities in municipalities and industrial areas contribute to deterioration of water quality
- Solid waste management in urban and rural areas resulting from increased consumerism and increasing populations in urban areas
- Climate change
- Road construction and transmission lines

2.2. BIOLOGICAL ENVIRONMENT

Bhutan has great biological and ecosystem diversity and a high percentage of forest cover. It also has valuable non-timber forest products, such as medicinal plants, mushrooms and potential pharmaceutical products. The most pressing threats to Bhutan's forests and biological diversity include overgrazing by livestock, cultivation on steep slopes, infrastructural development, over extraction of forest products, urban expansion and inadequate land management. Additional challenges associated with conservation include human-wildlife conflicts, conflicting policies and overlapping jurisdictions in protected areas, weak enforcement of existing legislation and lack of awareness.

2.2.1 Biological Diversity

Bhutan has been identified as part of the Himalaya Hotspot, one of the global biodiversity "hotspots"[1]. It ranks among the top 10 countries with the highest species density, with 3,281 plant species per 10,000 square kilometres and the highest proportion of forest cover of any country in Asia.[2] However, the country's steep and unstable terrain and relatively young mountain system make the country ecologically fragile.

The country has high levels of biological diversity at the ecosystem, species and genetic levels. Inventories conducted to date indicate that there are more than 5,400 species of vascular plants, 770 species of avifauna and 165 species of mammals, many of which are endemic to Bhutan. The diverse flora includes many economically valuable plantssuch as medicinal herbs, industrial plants and horticultural and agricultural crops.

More than 26 percent of Bhutan's land is formally protected in nine protected areas, giving it the world's highest percentage of land in protected areas. In addition, 9 percent of the land area is protected to a lesser degree as biological corridors.

According to Buddhist and pre-Buddhist philosophies, the mountains, rivers, streams, rocks and soils of Bhutan are believed to be the domain of spirits. The Buddhist respect for all living things has led to the development and adoption of ecologically friendly strategies. This coupled with the belief that acts of this life will be rewarded or punished in the next provides a powerful motivational principle at the individual and country levels for sustaining Bhutan's resources and biological diversity.

2.2.2 Ecosystem Diversity

Bhutan has highly diverse ecosystems due to the country's geological relief and climatic heterogeneity and its location at the juncture of the palearctic realm of the temperate Eurasi and the Indo-Malayan realm of the Indian sub-continent. The country includes a range of climatic variations, including great variations in rainfall. The northern high mountain region receives only about 40 mm of annual precipitation, primarily in the form of snow. In the temperate central regions, a yearly average of around 1,000 mm is

[1] To qualify as a hotspot, a region must meet two strict criteria: it must contain at least 1,500 species of vascular plants as endemics, and it has to have lost at least 70 percent of its original habitat.
[2] Royal Government of Bhutan, *Biodiversity Action Plan 2002*

common and in the humid south, up to 7,800 mm. It also boasts a wide range of ecosystems from sub-tropical in the south at an elevation of 150 metres to mid-elevation temperate zones to northern alpine zone above 7,000 metres.

2.2.3 Forests

Bhutan's pristine forests cover approximately 72 percent of Bhutan's land area. Nine broad forest types are found in Bhutan, including *fir* on the highest ridges between 2,700 m and 3,800 m; *mixed conifer* in the sub-alpine regions between 2,000 m and 2,700 m; *blue pine* in the temperate regions between 1,800 m and 3,000 m; *chir forests* at lower altitudes of 900 m to 1,800 m; *broadleaved mixed with conifer* consisting of oak mixed with blue pine or upper hill forest mixed with spruce of hemlock; *broadleaved hardwood forest*, including upland, lowland and tropical hardwood; and *forest scrub*, including alpine and temperate scrub naturally between the limits of the tree line and barren rocks.

Forests cover over 72 percent of Bhutan's land area.

2.2.4 Non-Timber Forest Products

Bhutan has more than 300 species in the alpine zone that are used in Chinese and Tibetan traditional medicine. In 2003, the government legalised exploitation of medicinal plants in order to better manage the products by involving people in their protection. One person per household is allowed to extract the product. Niche products include cordyseps (Chinese market) and matsutakes (Japanese market). Communities are collaborating with government (the Institute of Traditional Medicine and the Ministry of Agriculture) for sustainable harvesting and marketing of traditional medicinal plants.

2.2.5 Socioeconomic Issues

Forests provide critical support to rural livelihoods for fuel, fodder and construction materials. They are also a source for non-timber products such as medicinal and aromatic plants. Additionally, forests reduce erosion that could threaten Bhutan's most important export - hydroelectricity.

Bhutan's intact biodiversity could provide opportunities in the form of bioprospecting and growing markets for non-timber forest products, such as mushrooms, medicinal products, bamboo and local handicrafts. Furthermore, eco-tourism and nature based tourism are becoming increasingly popular in the global tourism market which Bhutan has enormous potential to benefit. These markets all rely on sustainable management of Bhutan's natural resources.

Human-wildlife conflicts are a major issue, particularly in and around protected areas. Many poor rural farmers suffer serious damage to their crops from wild boar, monkeys, elephants, and deer, as well as livestock depredation by tigers, leopards, and wild dogs.

2.2.6 Challenges to Conservation

Although Bhutan has a strong conservation ethic and the country's biological diversity is mostly intact, there are a number of challenges to conserving the country's biological resources. Table 1 below provides a brief summary of the impacts and causes of these challenges.

TABLE 1: Summary of Impacts to Bhutan's Biological Environment

IMPACTS	CAUSES
Loss of biodiversity	• Overgrazing by livestock (yak & cattle) • Encroachment on steep sloes by *tseri* cultivation • Forest fires • Poaching of endangered species of plants and animals • Construction of roads & transmission lines • Population pressures
Reduction of forest area	• Deforestation for cropland expansion • Forest fires • Illegal extraction of timber • Construction of roads, transmission lines & large-scale infrastructure • Population pressures
Degradation of ecosystem services	• Unsustainable cropping • Encroachment on steep slopes by *tseri* cultivation • Overgrazing by livestock
Weak governance	• Conflicting policies and overlapping jurisdiction in protected areas • Weak enforcement of existing legislation (due to lack of capacity and unclear legislation) • Lack of awareness • Lack of communication between stakeholders

2.2.7 Challenges for Sustainable Forest Management

A central goal of Bhutan's government, and the international development community, is to ensure the majority of the country's pristine primary forest cover remains intact. The

central challenge in managing the country's forests is balancing the needs of a growing population while supporting economic growth.

Currently, the main threat to forest resources is the over consumption of forest resources by rural populations who consume over 85 percent of total consumed forest products. This is through unsustainable harvesting of fuel wood, shifting cultivation, overgrazing by livestock, over harvesting of small timber and medicinal plants, and poaching.

Domestic demand for wood is fueled by the rapidly growing construction sector and local energy needs. Currently there are few substitutes for wood as a fuel source. Currently, more than 80 percent of the rural population depends on fuel wood for their daily energy requirements (mainly cooking and heating) which explains why Bhutan's per capita fuel wood consumption is one of the highest in the world at an estimated 2.5 m^3 per annum. At the village level, the demand for fuel wood often exceeds supply due to the dense concentration of settlements. As the population continues to grow, pressures on forests close to villages will increase, making fuel wood a scarce commodity and increasing forest fragmentation and land degradation.

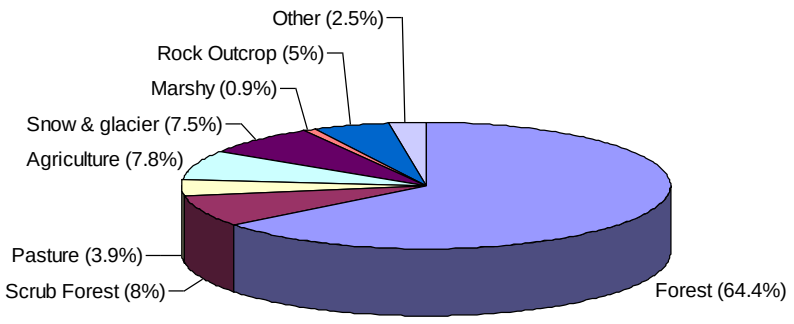
Local governments have strict rules for felling trees, but have weak enforcement. In addition, the Forest Department does not have sufficient capacity to regulate cutting, and therefore illegal extraction of firewood is common. A 1991 study indicated that about 90 percent of total firewood extraction in Bhutan is unregulated (FAO, 1999).

Human-induced forest fires are a growing concern causing large-scale degradation of forests. Forest fires are more prevalent in the dryer and steeper areas of the east, where slash and burn practices are more common. A new forest fire management program is being implemented with assistance from the New South Wales government in Australia focusing on awareness raising and incentive mechanisms for local leaders.

2.3. PHYSICAL ENVIRONMENT

The majority of Bhutan's physical resources—forests, air, water and soil--are still in pristine condition. The country is comprised of nine major watersheds containing significant water flow providing enormous hyrdropower potential critical to the country's economic development plans.

Figure 1: Land Cover in Bhutan



Adapted from FAO (1999)

2.3.1 Land Use and Land Degradation

Agriculture

Agriculture is the foundation of Bhutan's economy. Over 79 percent of the population depends on it for their livelihoods, although its contribution to GDP has declined in recent years with the rise of the manufacturing and power sectors and rural-urban migration trends. Currently, all Bhutan's cultivable land, estimated at 7.8 percent of the country's land mass, is being utilized. Steep slopes limit the potential for expanding agriculture and increase the probability of landslides, and therefore good vegetative cover and careful use of soils is necessary to avoid erosion and landslides. Farming is not allowed on slopes greater than 45 degrees. Some agricultural land is being lost to urbanization (about 1,000 ha to date), although conversion of paddy fields has been stopped because rice is considered a staple.

The Ninth FYP prioritizes has national food security as a primary objective with a goal of reaching 70 percent food self-sufficiency, emphasizing modernisation of the agricultural sector to increase output. The agricultural sector is expected to benefit from improved rural development activities, which will result in improved access to agricultural inputs, services and markets. Rural development is an important link with the agricultural sector since most agriculture is subsistence based. In the Tenth FYP, a focus will be on expansion of commercialised horticultural crops (apples, oranges, potatoes) and small-scale farmers' co-operations.

Cropping patterns vary across the country. High altitude rice is grown in the west, wheat and buckwheat in Central Bhutan, and maize (which is generally not terraced or irrigated) in the east. Farmers typically own their own land and tend to have lower than usual output yields and also require fewer inputs to production. Current inputs include regular application of organic manure developed through recycling animal bedding with dung.

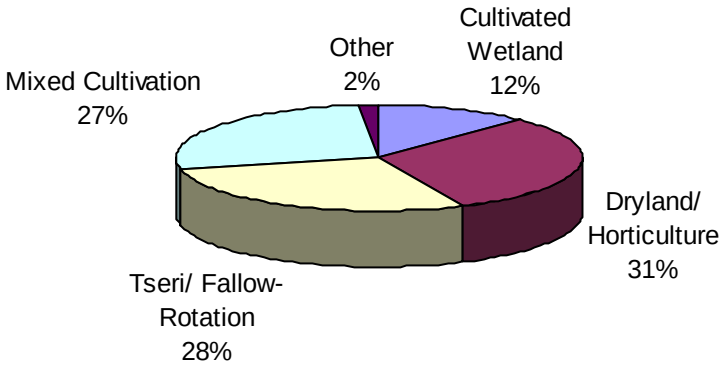
Agriculture fields in Central Bhutan

Recent market opportunities are beginning to change agriculture patterns in Bhutan. For example, improved export markets are increasing demand for horticulture crop land (apples, oranges and cardamom) and cash crops like potatoes in central and eastern Bhutan. Markets for organic produce are also being explored by several companies, but access to international markets and certification issues has proven difficult.

Shifting cultivation, or *Tseri* (a system of subsistence agriculture that involves clearing forests, cultivating the land for several years, and then leaving the land fallow) is concentrated in the sub-tropical and upland broadleaf forest areas, but has been banned

by the government through the Forest and Nature Conservation Act 1995.

Figure 2: Agricultural Land by Use



Adapted from FAO (1999)

Livestock

Livestock are an integral part of the Bhutanese farming system, supporting agriculture through draught power and provision of manure for fertilizer. About 90 percent of rural households own livestock at an average of 5-10 cattle per family (though migrating herds can number 50 to 100 cattle/yaks). These livestock depend on forests for grazing, which has an adverse effect on forests. In many instances, farmers have to take their animals further and further away from human settlements for grazing.

The trampling of forest soil by livestock has created gully formations across the country. Ravine erosion has resulted from nomadic herders overgrazing ridges, causing serious erosion problems. General loss of vegetation from overgrazing has contributed substantially to land degradation, particularly in areas that are grazed year round by cattle in the summer months and yak in the winter months.

The Department of Livestock is trying to reduce pressure from cattle by introducing better cattle breeds and offering to trade these breeds for less productive cattle. Fewer 'trades" have occurred, due largely to newer breeds needing more infrastructure. However, this is expected to change as the better cattle breeds continue to provide better butter, cheese and meat and higher prices offered for milk products.

Rural Development and the Environment

In rural areas, Bhutan is promising better access to basic services in order to enhance the quality of life. The main interventions include improved maintenance of existing roads and building rural roads based on environmentally friendly road construction. During the Ninth FYP, over 272 km of national highway, feeder road, realignment and expressway construction is planned.

Problems associated with construction of roads are both short-term (happening during construction) and long-term. Threats include: loss of vegetative cover; changes of land

use nearby the roads; change of natural drainage patterns; changes in ground water elevation; landslides; soil erosion; stream and lake sedimentation; interference to wildlife migration and livestock; destruction of habitat; air, soil noise and water pollution; increased diseases and accidents; and poaching by workers. To overcome or reduce some of these threats, the government is designing and implementing environmentally sensitive feeder roads through financing from the World Bank and ADB.

Development projects such as roads and electricity tend to take precedence over the environment in geogs, which could eventually accelerate environmental degradation.

TABLE 2: Summary of Impacts to Bhutan's Physical Environment and their Causes

IMPACTS	CAUSES
Land degradation and subsequent loss of agricultural land	• Improper land management & cultivation practices • Shifting cultivation • Encroachment into forest land • Forest fires • High rainfall coupled with poor land management practices • Farming on steep slopes • Farming in areas where topsoil layer is thin • Natural disasters (e.g. floods of 2004) coupled with poor cultivation practices and overgrazing
Landslides	• Underlying geology, exacerbated by overgrazing and cultivation • Urbanisation
Loss of land for agriculture	
Reduced labour forces	• Rural-urban migration

2.3.2 Water Resources

Water quality

The orientation, structure and nature of Bhutan's nine major watersheds have influenced human settlement and land use patterns. The watersheds are divided into 42 sub-watersheds and 406 mini-watersheds and consist of major river systems, ground water aquifers and springs. All watersheds drain towards the south, except one, which drains towards the north. Rainfall within the watersheds is mostly from the southwest monsoon (June to September). The mountainous terrain of the country makes it vulnerable to ecological degradation, including accelerated soil erosion, landslides and rapid loss of habitat and genetic diversity because of forestry, agriculture, urban development and other human interventions.

A second challenge is related to water quantity. Flood management is an increasing concern in India and bilateral discussions are focusing more and more on mitigation measures. A forewarning system is already in place.

Energy

Bhutan's steep elevations and river systems give the country enormous potential for hydroelectric power generation, currently estimated at 30,000 MW. Watershed conservation, and particularly maintenance of forest cover, is critical to hydroelectric power generation, providing a national incentive to conserve forest cover. One of the priorities of the Ninth FYP is expanding power transmission lines and national grid(s) to facilitate export of power and to promote growth and development of power intensive industries in the country.

The country's hydropower capacity is 468 MW. The completion of two medium sized hydropower projects at Kurichhu and Basochhu and the 1,020 MW Tala hydropower project (expected to be completed in 2005) will increase Bhutan's power production to an estimated 1500 MW. The RGoB has set an ambitious goal of attaining a capacity of 4,000 MW by 2020 mixed with its plan of rural electrification for the entire country. A full environmental impact assessment has been completed for each hydropower project and a percentage of revenues from each project will go towards environmental restoration.

All Hydropower in Bhutan is "run-of-the-river" (only a portion of the river is diverted for power, rather than being dammed) causing less impact to the environment than typical energy sources. Short-term and indirect construction impacts will result from the mentioned Tala Hydropower project, including air and water pollution from construction and waste disposal, soil erosion from removal of vegetation, as well as some long-term changes in the upstream and downstream watershed characteristics of the Wangchhu River. Wangchhu impacts are expected to include loss of habitat, increased eutrophication, sedimentation and deterioration of water quality in the reservoir, loss of storage capacity, scouring of the riverbed below the dam, blocking of fish migration, changing the climatic conditions and creating favourable habitat for insect disease vectors (Yangzom, 2003).

The construction of power transmission lines will provide noticeable impacts including the loss of forest from clearing of trees, substations and access roads, introduction of exotic species, habitat fragmentation, disruption of wildlife migratory routes, increased access to wildlands, loss of scenic beauty, soil erosion and excess stream/river sedimentation, disruption of other utility services, human and animal hazards from snapped electric wires and fallen poles, and changes in land value (Yangzom, 2003).

Rural electrification priorities include expansion of the grid, micro-hydro projects and solar power (in that order, as defined in the 9th YP). Although sunlight is readily available, solar power is expensive compared to existing energy costs.

The recently implemented Chendebje Micro Hydropower Project near Tongsa. The 70 KW hydropower project will electrify 50 households and was financed through a group of G8 companies as a pilot Clean Development Mechanism (CDM) project.

2.3.4 Climate Change and Natural Disasters

Climate Change

Bhutan's First National Inventory of Greenhouse Gas Sources and Sinks to the United Nations Framework Convention on Climate Change showed Bhutan sequestered 3,321 kilotonnes *more* carbon than emitted (1994 baseline). Despite the country's healthy climate mitigation development path, global climate could have serious potential threats to the country. Currently, a National Adaptation Plan of Action is being developed to understand how to better prepare for both short and long-term impacts from climate change.

Natural Disasters

Bhutan's main natural disasters are from heavy rainstorms, flash floods, and frequent landslides during rainy seasons. The heavy monsoons in 2004 showed the true force of these disasters with significant loss of life and property and amplified land degradation problems. Flash floods from glacial lakes provide an added risk in terms of both climate change and natural disasters. A study completed in 2003 concluded that 24 glacial lakes in Bhutan are at risk of bursting soon resulting from increased glacier melt related to global warming (Agrawala et al, 2003). Examples of adaptation include engineering work to reduce water levels in glacial lakes, and early warning systems to alert people of impending floods.

2.3.5 Urban Environment

Urban environmental issues in Bhutan are becoming a growing concern as rural-urban migration increases and the population continues to grow. The main environmental concerns revolve around air quality, solid and liquid waste issues, infrastructure development and available land. Additionally, urbanization results in decreased forest, increased pressure on agricultural land and increased risk of erosion, floods and landslides.

Air Quality

Air pollution is emerging as a significant issue in urban centres and industrial and mining sites. Major emission sources include automobile emissions, wood burning in *bukharis* (wood stoves), and unregulated fires. Vehicle emissions are due to the continued use of low grade fuel and increasing total fuel use. Wood stoves are slowly being phased out in

urban centers and replaced with electric heaters. In addition, fuel wood is becoming more expensive due to the requirement it must be bought from a licensed supplier.

Solid Waste

Solid waste disposal is a major issue in urban areas, and a less pressing issue in rural villages. Higher levels of consumption and imports of plastic goods from Thailand and India are increasing pressures on land fills. The current land fill in Thimphu, for example, has almost reached capacity with no other options but to cut into the mountain side.

There is currently no waste segregation in Bhutan despite 70 to 80 percent of the waste generated being biodegradable. A composting plant is being built that will alleviate some of the pressures on the landfill. There is no recycling facility in the country as recycling is not economically viable for such a small populace.

A relatively new development in Thimphu is waste removal by truck where there is road access. Trucks pick up waste two to three times per week in residential areas and six times per week in commercial areas. However, the level of awareness about waste management is generally low and people are typically unwilling to pay for the service.

Liquid Waste

Wastewater in Bhutan's major towns is typically treated in a primary treatment facility and then released directly into local rivers. However the treatment plant in Thimphu is at over capacity and needs a significant expansion. In other cities, many households are not connected to the water treatment facilities creating cess pools and health hazards. Storm drainage and roadside runoff is also an issue with little or no current treatment.

Urban Development

Urban development and planning has not been able to keep up with the rapid development taking place in the country causing a gradual encroachment on already strained agricultural lands. In the Ninth Plan the RGoB is focusing on growth centres around smaller towns to discourage uncontrolled urban growth in the larger cities, but thus far there is little impact and the incentive to migrate to the main urban centres remains high.

Industry and the Environment

Most industry in Bhutan is found in small clusters along the country's southern border. Industrial pollution is not a big issue at the national scale. However, local and cross-boundary air pollution at industrial and mining sites can be attributed to the absence of or inadequate pollution control equipment and lack of awareness. Occupational health and safety standards are also generally low or non-existent. As a result, air pollution can have a negative impact on human health with an increase in respiratory diseases observed in industrial areas. The main pollution problems are related to particulate matter from cement, steel smelting and rolling mills and food-based industries. New industries need environmental clearance before getting their business licenses. Old industries have problems with compliance as it is costly to make the changes once they are set up.

Solid industrial waste disposal tends to be more of a problem than liquid waste disposal because liquid waste must be cleaned before being released and therefore is easier to monitor. Solid waste is not generated on a regular basis and therefore can be dumped anonymously. The main types of solid waste include slag from the steel industry, sludge from beverage manufacturing, fine particulates like calcium carbonate, feral alloys and marble cutting waste.

Mining

Less than one percent of Bhutan's land area is dedicated to mining and is concentrated in the southern part of the country. Most mining activities have minimal impact on the environment. The main impacts include scarring of the surface (all mining activities involve quarries), dust and sedimentation. The main minerals that are mined are construction material (quartzite), dolomite, limestone, talc, coal and gypsum. The Ninth Plan states there will be limited scope for growth in the mining sector.

2.4. POVERTY AND THE ENVIRONMENT

Poverty in Bhutan is concentrated in rural areas where incomes have remained low due to limited cultivable land holdings, low productivity of land, poor access to markets and lack of technical know-how. A survey undertaken in 2000 showed the average per capita income at less than US$ 1 per day. A separate study conducted in 2001 indicated the relative incidences of poverty in the different parts of the country and the striking correlation between income levels and development facilities. Over 65 percent of *geogs* have no access to electricity and one-third of *geogs* are not connected to feeder roads.

Landlessness or limited size of land holdings is one of the main causes (and main indicators) of poverty. Yak herding pastoralists and agro-pastoralists in high alpine regions are considered relatively poor because of hardship with their non-sedentary occupations and poor yields from their lands. People living on maize are considered better off than pastoralists but worse off than rice farmers. However, an increase in the price of dairy products has improved the economic status of pastoralists, in some cases making them better off than maize farmers.

Lack of proper road infrastructure has been identified as most critical for increasing agricultural production. Improved rural road infrastructure will also increase the reach and efficiency of extension services as well as reduce transaction costs related to supply of inputs. The potential environmental impacts of feeder roads have been discussed in a previous section. This highlights the importance of a balanced "middle path" approach, trying to minimize the impacts on the environment while providing opportunities for the poorest, most remote villages to access markets. Furthermore, in rural settings where physical labour is necessary for livelihood, a lack of a sufficient workforce in the family for extended periods of time can mean a rapid decline into poverty. A farm labour shortage is already an issue throughout the country due to rural-urban migration. Access to roads and electricity could reduce this trend.

Natural disasters can amplify negative impacts on livelihoods through natural disasters. Climate induced disasters like floods and landslides can instigate poverty. Agricultural land and houses have been lost among some communities to floods and landslides. Other causes include wildlife depredation of crops and livestock, pest outbreak, and crop failure on small holdings.

3. ENVIRONMENTAL POLICY, LEGISLATIVE AND INSTITUTIONAL FRAMEWORK

3.1. ENVIRONMENTAL POLICY AND LEGISLATION

3.1.1. Environmental Policy

The Royal Government of Bhutan has gradually developed a strong environmental policy framework since the 1970's that includes progressive environmental assessments, the highest percentage of protected land per total land mass in the world, and a strong set of environmental institutions to govern national environmental policy. However, with these strengths, some weaknesses include difficulties in implementing environmental policies at the local level, poor urban planning and little or no efforts in managing key watersheds.

The National Environment Strategy (NES), also known as "The Middle Path" is the main policy document for the environment sector. The Strategy was designed to balance economic development and environmental conservation in Bhutan. Formulated during the Eighth FYP and finalized in 1998, the NES aims to "ensure the careful stewardship and sustained use of natural resources" (NEC, 1998) and to guide environmental conservation in Bhutan. The concept of a "Middle Path" for development combines development planning with natural resource management and traditional values. It outlines three main avenues for sustainable economic development: expanding hydropower; increasing agriculture; and expanding the industrial base. The NES is further supported by policies, strategies and action plans of other sectors in the government, such as the Ministry of Agriculture (MoA), Ministry of Trade and Industry (MTI) and the Ministry of Works and Human Settlements (MWHS).

Bhutan's Eighth FYP was very influential in guiding the country's current environmental policy framework by: developing a policy and regulatory structure; institutionalizing the environmental assessment process, strengthening relevant environmental organizations such as the National Environment Commission Secretariat (NECS) and the Nature Conservation Division; and establishing the National Biodiversity Centre. In July 1998, under the Eigth FYP, an Environment Sector Programme Support (ESPS) was initiated with a focus on biodiversity conservation, pollution abatement and cleaner technology, environmental management and communication and the development of a policy and regulatory framework for the environment sector. Through this programme, the Environmental Assessment Act (2000) was drafted and approved by the National Assembly.

The main goals for the environment of the current Ninth FYP focuses on: strengthening overall environmental management and coordination within the environment sector; establishing an adequate legal framework for environmental management; strengthening professional environmental management; strengthening district and line ministries in basic environmental monitoring of agricultural and mining/industrial activities; increasing environmental awareness; implementing pollution control and environmental management initiatives in pilot enterprises within the mining and industrial sector; and working towards a dialogue with private sector and financial institutions to support clean environmental activities and promote clean technology where possible. Formulation of

the National Environmental Action Plan (NEAP) and the National Environmental Protection Act (NEPA) is also currently underway. The NEAP will guide the implementation of the National Environment Strategy, providing Bhutan with a combination of regulatory mechanisms and fiscal incentives to encourage the public and private sectors to develop economically without unnecessarily compromising the country's natural resource base.

Bhutan's focal environmental protection agency is the NECS which is responsible for the overall formulation and monitoring of environmental policy and legislation. The NEC also coordinates all environmental policy with the 20 *Dzongkhags*, the line ministries and the private sector. Much of the NEC's current work is in coordinating, planning, and implementing all national environmental policy, however their implementation activities will be significantly reduced under the Tenth FYP.

The MoA, MTI and MoWHS are responsible for the implementation of environmental policy related to their respective mandates. Additionally, large private industries are required to have environmental units for environmental impact assessments and monitoring. Decentralization of implementation is also being devolved to the Dzongkhag level, where Dzongkhag Environmental Committees are being set up.

3.1.2. Environmental Legislation

Bhutan's only current environmental law is the Environmental Assessment Act of 2000. As can be seen in Table 3.1 below, a number of laws/acts/policies have been approved over the last 30 years with a focus on decentralized policy and decision-making in matters related to environmental management. The Table below is not an exhaustive list, but simply highlights the most relevant laws concerning environmental management in Bhutan.

Table 3.1: Bhutanese Environmental Acts and Policies

YEAR	ACT/POLICY	SUMMARY
1969	Bhutan Forest Act	Brought all forest resources under state control with the intent to curb exploitation and rationalise use
1972	Tourism Act	
1974	National Forest Policy	National Assembly mandated the country to maintain forest cover at more than 60% at all times; Policy guides the planning and management of forest resources in Bhutan
1978	Land Act	Covers land entitlement, registration, possession, encroachment, grazing land, and compensation for crops
1993	Plant Quarantine Act	Prevents the introduction into Bhutan of pests not already present or widespread in the country, controls those pests already in the country by restricting their spread and by endeavouring to eradicate them, and provides facilities for services for import and export of plants and plant products
1995	Forest and Nature Conservation Act	Repealed the Bhutan Forest Act of 1969; Provides adequate protection for the maintenance of the ecological integrity of protected areas, including

		conservation of wildlife, soil and water conservation matters, enforcement and penalties
1995	Mines and Minerals Management Act	Ensures efficient use of resources, protection of the environment and worker and public health and safety
1995	Ratified United National Framework Convention on Climate Change (UNFCC) 1992	
1995	Ratified Convention on Biological Diversity (CBD) 1992	
1998	National Environment Strategy (NES)	Policy document designed to guide environmental conservation in Bhutan
1998	Biodiversity Action Plan	Plan was updated in 2002
2000	Environmental Assessment Act	Key act governing the environment; Ensures that environmental assessments will be implemented for all activities that have potentially significant environmental impacts; Provides clearances required to reduce adverse affects caused through development
2000	Seeds Act of Bhutan	Regulates the seeds of notified kinds and varieties and certification is optional; system is voluntary
2000	Pesticides Act of Bhutan	Regulates safe use and handling of pesticides and prevents public health and environmental hazards; does not cover all aspects of hazardous wastes
2001	Livestock Act of Bhutan	Regulates livestock breeding, health and production aimed at enhancing their productivity and preventing diseases so as to enhance rural income and livelihood.
2002	*Dzongkhag Yargye Tshogchung Chathrim (DYT) & Geog Yargye Tshogchung Chathrim (GYT)*	Legal provisions for decentralised policy and decision-making in matters related to environmental management, including those concerning protection of forests and associated resources, control of environmental pollution and prevention of land degradation at the local level
2002	Regulation for the environmental clearance of projects	Defines responsibilities and procedures for the implementation of the Environmental Assessment Act concerning the issuance and enforcement of environmental clearances for individual projects
2002	Regulation on strategic environmental assessment	(a) 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; (b) ensure that the cumulative and large-scale environmental effects are taken into consideration while formulating, renewing, modifying or implementing any policy, plan or program; (c) complement project specific environmental reviews as per Regulation for Environmental Clearance and encourage early identification of environmental objectives and impacts of all governmental proposals at appropriate planning levels; (d) promote the design of environmentally sustainable proposals that encourage use of renewable resources and clean technologies and practices; (e) promote and encourage development of comprehensive natural resource land use plans at the local, Dzongkhag and national levels.
2003	National Biodiversity Act	Asserts the sovereignty of the country over its genetic resources and the need to promote the conservation and sustainable use of the resources as well as the fair

		and equitable sharing of benefits arising from the use of the resources.
2003	Ratified United Nations Convention to Combat Desertification (UNCCD)	
2003	Ratified Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	
2003	Ratified Basil Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their disposal by the conference of Plenipotentiaries 1989	

3.1.3. Protected Areas Management

Bhutan's protected area system was established in 1966 with the declaration of Royal Manas National Park in the southern part of the country. In 1983, the government designated a network of protected areas and in 1993, this network was revised to make it more representative of the various major ecosystems in the country, resulting in the present nine representative protected areas covering a total area of 10,513 square kilometres. Current protected areas include: four national parks, four wildlife sanctuaries, a strict nature reserve and 12 biological corridors. Five of the nine protected areas currently have scientific management plans, including Royal Manas National Park, Jigme Dorji National Park, Jigme Singye Wangchuck National Park, Thrumshingla National Park and Bomdiling Wildlife Sanctuary. Major commercial activities are prohibited within all protected areas including large hotels and any commercial logging (limited logging is allowed for local populations).

The Nature Conservation Division (NCD) under the Department of Forestry Services is the focal agency of the government for the management of the country's biodiversity and protected areas. The management of protected areas is mandated by the Forest and Nature Conservation Act of 1995 and the Forest and Nature Conservation Rules volume I and II. The NCD was established in 1992 under the Division of Forestry Services. The mandate of the NCD is to manage the wild biodiversity and the protected areas of Bhutan, including: (a) the formulation of a nature conservation policy; (b) the development and implementation of management plans for protected areas; (c) the identification of potential protected areas; and (d) the prioritisation of inputs from conservation related agencies.

In 1999, an additional nine percent of the country's land mass was set aside as "biological corridors" to link paths between the national parks to provide an integrated protected areas system. Development in biological corridors is restricted, although they are not managed at the level of other protected areas. For instance, in biological corridors, restricted commercial logging is permitted.

Protected area management in Bhutan is complex because all nine of Bhutan's protected areas have an average of 4,000 people living in them and national roads run through a number of protected areas. The people living in protected areas are highly dependent on the natural resources within the parks. Most are farmers or pastoralists. This raises some questions about the sustainability of these protected areas. To address this challenge, the NCD has emphasised awareness raising and an integrated conservation and development approach within the protected areas.

In 1999, the NDC adopted a landscape approach to conservation, enabling the country to prioritize its conservation needs. Key characteristics of this approach include:

- A focus on biodiversity conservation in protected areas
- A commitment to positive human-nature interactions
- Promotion of public environmental education
- Encouraging partnerships in conservation programmes to address a wider range of issues
- Optimising the use of limited resources

Tourism in protected areas is of growing interest. As of June 2005, a permit is required by tourists to enter any protected area. Community tourism is being promoted as a way of sharing the benefits of tourism with local villages. The types of activities involve local accommodations (campsites, etc.) owned by the villages, local guides, and amphitheatres for performances.

3.1.4. Forest Management

Traditionally, forests were communally owned with unlimited access for firewood, timber and food. In order to maintain forests and protected watersheds, the government assumed full authority and control of forests through the Forest Act of 1969. In 1970, the government imposed a logging ban, taking over all commercial logging activities. In 1974, the first National Forest Policy was adopted, ensuring forest cover of at least 60 percent of Bhutan's land into perpetuity. In 1979 the RGoB nationalised logging operations.

The RGoB has developed a cost-effective framework for monitoring and evaluating forest management units across the country to ensure the long-term sustainability of Bhutan's forests. The Forestry Department is the forest regulatory body and the Forestry Development Corporation is responsible for all logging activities. Management plans are produced within the Forestry Department through consultation with relevant *DYT* and *GYT*. All plans must be endorsed at the *Dzongkhag* and *Geog* levels. At the national level, consultation with NEC and MA are required.

The management plan process takes about 2 years. The first six to eight months are spent inventorying the forest area. EIA's take approximately one month and look at a range of issues from impacts of infrastructural development, like roads, and impacts on biological diversity. Finally a socioeconomic survey is conducted. Management plans cover 10 years and include annual monitoring and two evaluations (at year five and year 10), which look at species, water, soil, and other impacts. The system for management plans began in the 1990s and some areas are already in their second management cycle. Management planning only covers areas used for commercial purposes. A new methodology is being developed for other areas.

Trees on private lands need to be registered before cutting. All trees are authenticated and tracked from their source. Allowable cut is calculated by the Department of Forestry and regulated at the Dzongkhag level. Wood processing is heavily regulated.

3.2. INSTITUTIONAL FRAMEWORK

3.2.1. The National Environment Commission Secretariat (NECS)

The NEC was established as the National Environment Committee in 1989 as part of the Planning Commission. In 1992, the National Environment Secretariat was de-linked from the Planning Commission and thereafter functioned as an independent organization under the overall guidance of the National Environment Commission (NEC). At that time, the NEC was given the mandate of coordinating all environmental activities and monitoring the environmental impact of development.

The NEC now reports directly to the Cabinet. Its mandate is first as a national policy making body, and second as a regulatory agency to preserve and sustain the country's natural resources. Its long-term objective is to promote and ensure the sustainability of Bhutan's natural resources. The Commission is comprised of seven members from different ministries and autonomous agencies. The mandate of the NEC is implemented through the National Environment Commission Secretariat (NECS). NECS will remain a policy making body and implementation of its policies will be delegated to line ministries and organizations.

Immediate policy objectives include:

- Serve as an environmental adviser to the government on matters related to sustainable development
- Implement a National Environmental Strategy through the National Environmental Action Plan
- Institutionalize Environmental Impact Assessments as an integral part of the development process
- Enhance knowledge, understanding and awareness of environmental issues and sustainability in Bhutanese society
- Strength the institutional and professional capacity of NECS
- Develop an adequate policy and legal framework with an emphasis on preparation of the National Environmental Protection Act
- Meet national environmental obligations to international environmental conventions which includes obligations to the United Nations Framework Convention on Climate Change and the Convention on Biological Diversity
- Establish environmental baseline data with an emphasis on water and air quality standards
- Strengthen compliance monitoring of industries, urbanization processes, infrastructure development, mining processes and natural resource activities
- Enforce the Environmental Assessment Act, 2000
- Build the operational capacity at Dzongkhag level for EIAs

3.2.2. Ministry of Agriculture (MOA)

The MOA includes the Departments of Forestry, Agriculture and Livestock, as well as non-departmental agencies and affiliated corporations.

The Policy and Planning Division is responsible for providing policy and planning services and monitoring and evaluation of various programmes and projects within the ministry and for liaising with donor agencies to mobilize funding with other ministries. This PPD is also responsible for the EC Wang Watershed Project. Its information Section is responsible for collecting and compiling all land use cover related data in the country and hence is an important source of information for land use change.

The Department of Agriculture is responsible for sustainable agriculture development in the country. It plans, coordinates, administers, supervises and monitors the overall agriculture and RNR infrastructure development in the country. It has three divisions, including the Field Crops Division, the Engineering Division and Horticulture division. The National Plant Protection Center falls under the Field Crops Division and is the national referral and coordinating authority for any information and activities related to plant protection from diseases and pests

The Department of Forestry Services is responsible for management of forest resources and biodiversity, including maintaining at least 60 percent of forest cover in the country. The Department of Forestry Services has four functional divisions:

- The *Forest Protection and Utilization Division* is responsible for monitoring and assessing the supply of forest products for rural use, the allotment of stone, sand and quarry, the impacts of poaching/hunting and other illegal activities and timber transactions; as well as carrying out forest demarcation and supporting resettlement programs

- The *Forest Resources development Division* is responsible for carrying out all forest resource inventory in and outside the forest management units (FMUs), excluding protected areas, identifying potential FMUs, developing management plans for FMUs and providing technical expertise and monitoring for FMU implementation, as well as developing national non-wood forest product management strategy

- The *Nature Conservation Division's* main functions are to manage the biodiversity of Bhutan, develop and implement management plans for protected areas, formulate nature conservation policy, identify potential additional protected areas, and prioritise inputs from conservation related agencies

- The *Social Forestry Division* monitors private and community forestry, school forestry programs, reforestation and afforestation programs of territorial divisions, dzongkhag's industrial firms and the Forestry Development Corporation. It is responsible for improving degraded forests, carrying out critical watershed assessments, developing the national Forest Fire Prevention Strategy and technical guidelines and manuals in support of the Forest Act and Rules.

3.2.3. Ministry of Trade and Industry (MTI)

The MTI includes the Departments of Energy, Geology and Mines, Industries, Trade and Tourism. The MTI is currently the only ministry with an Environment Unit, contained within its Policy and Planning Division. The Environment Unit, established in 2003, is

responsible for compliance and monitoring in industries and mines, including environmental clearance for listed industries, strategic environmental assessments of policy strategies developed by the ministry, implementation and enforcement of the EA Act 2000 for the industrial sector, advising industries and mines on low cost Cleaner Technology and Environmental Management (CTEM)solutions, including conducting sector studies, research and test existing CTEM solutions and information strategies.

3.2.4. Ministry of Works and Human Settlements (MoWHS)

MoWHS is responsible for provision of adequate road, transport, and human settlement infrastructure and services throughout the country. This includes economic assessment of projects and facilitating balanced regional development through establishment of infrastructure in an equitable manner. The MoWHS does not yet have an Environment Unit.

3.2.5. Department of Planning (Ministry of Finance) – Since 2003

The Department of Planning within the Ministry of Finance is responsible for proposing socio-economic policy guidelines to the government, directing the formulation of all development plans (including five year plans), monitoring and evaluating five year plans (including mid-term reviews), ensuring efficient and judicious allocation of resources, directing socio-economic relevant studies, and appraising the government on the progress of development plans for necessary policy adjustments. It also plays an important role with the implementation of strategic environmental assessment. The *Dzongkhag* planning offices all fall directly under the Department of Planning. Coordination for FYPs is undertaken by the Department of Planning. The process starts at the *geog* level. *Geogs* pass their development priorities to the *dzongkhag* level. *Dzongkhag* plans are then integrated into the draft FYP, which is developed at the central government level.

3.2.6. National Biodiversity Centre (NBC)

The NBC is responsible for: (a) coordinating Bhutan's biodiversity related activities and serving as a national focal institute; (b) facilitating national decision making on biodiversity concerns, across sectors, divisions and institutions; (c) guaranteeing a national balance between conservation and sustainable utilization of biological resources in general, and between *in situ* and *ex situ* conservation in particular; (c) assuring a participatory approach to building national consensus on biodiversity around complex issues and resolving conflicting situations; (d) facilitating sub-regional, regional and international cooperation; and (e) assuring continuity of biodiversity related activities over time.

3.2.7. Ugen Wangchuck Institute for Forestry and Environmental Studies

This Institute will open in 2007 initially offering a diploma in forestry and environmental studies and later upgrading to a full degree college attracting students from all over South Asia. The Institute has signed a memorandum of understanding with Yale University's School of Forestry and Environmental Studies for collaboration on curriculum development, fundraising and faculty exchange and training resources.

3.2.8. Bhutan Trust Fund for Environmental Conservation (BTF)

The BTF, the world's first environmental trust fund, was established in 1992 as a collaborative venture between the RGoB, UNDP and WWF. An endowment of US$20 million was set up as a mechanism to finance conservation programs in Bhutan. Donors to the trust fund include WWF, GEF, RGoB, and the governments of Denmark, Finland, the Netherlands, Norway and Switzerland. Today it is an effective conservation grantmaking organisation autonomous of the government. The trust fund is governed by the Royal Charter of 1996 and a high-level management board.

The Trust Fund uses its annual investment income to finance conservation activities of Bhutanese individuals and institutions, based on the following objectives:

- Support *in-situ* and *ex-situ* conservation initiatives in the entire green sector, including sustainable utilization of genetic and species resources
- Strengthen integrated conservation and development planning through applied conservation research and monitoring of biodiversity change
- Promote conservation education and awareness of conservation policies and issues

Over 20 years, the BTFEC aims to support (a) the establishment of a fully functional management system in the existing nine protected areas; (b) building a conservation information management system; and (c) incorporating environmental awareness and education into the educational system. The organization plans to expand its area of support to include issues within the brown sector.

3.2.9. Royal Society for the Protection of Nature (RSPN)

RSPN is the only environmental non-governmental organization in Bhutan. Founded in 1987, RSPN's work focuses on environmental education among school children, integrated conservation and development and advocacy on emerging environmental problems in Bhutan.

3.3. INTEGRATION OF ENVIRONMENTAL CONCERNS

3.3.1. Decentralisation of Environmental Management

Plans have been laid by the NEC and the MOF Department of Planning for decentralizing environmental activities through: (a) the establishment of environmental units in each line ministry (to date, environmental units have been established only in the MTI. However the MoA's Environment Unit is expected to be established later this year); and (b) the establishment of environmental units in each district administrative office. The NECS prepared an Environmental Implementation Plan outlining the process for decentralizing environmental assessment activities. Targets include the establishment and operation of a comprehensive institutional set up, with MTI playing a key role by 2008. Included in this plan is the establishment of District Environmental Committees in all dzongkhags and their designation as a competent authority.

The policy framework for decentralized formulation and implementation of environmental regulations and programs already exists within the Regulations of the District Development Committee (*Dzongkhag Yargay Tshogchhung Chathrim*) and Regulations of the Geog Development Committee (*Geog Yargay Tshogchhung Chathrim*). Environmental awareness and training workshops have been conducted in all 202 geogs by the NECS, resulting in 1025 Micro Environmental Action Plans by the GYT members.

3.3.2. Sectoral Support

Departments under the MTI, MoA and MoWHS have been designated as competent authorities for issuing environmental clearances for relevant programs and projects. Environmental clearances must also have the administrative approval of the concerned *dzongkhag*. All hydropower projects, transmission lines, feeder roads and other infrastructure must go through the environmental clearance process. Lack of capacity is an issue to achieving clearances. NEC is currently building skills within large industries, ministries and *dzongkhags.*

The NES is supported by sectoral policies, strategies and action plans in the MoA, MTI and MoWHS.

3.3.3. Environmental Conservation and the Ninth Development Plan

An assessment of the Ninth FYP indicates that a small number of the larger planned investments in the Ninth Plan could result in significant environmental impact. These include:

- 300kms of new road construction;
- two new industrial estates;
- electrification of 15,000 households (with associated electricity corridors); and
- construction of new public housing and planned expansion of existing towns and satellite towns

A bigger cause for concern is the potential cumulative impact of many smaller development proposals. Most of these are ultimately driven by general population increase, ongoing rural-urban migration, and increases in per capita consumption levels. In particular, developments that were not included in the Ninth FYP, such as small roads, expansion of agricultural land, solid and liquid waste management and tree felling, could have a significant cumulative impact.

A further conclusion of this assessment is that none of the investments outlined in the Ninth FYP appear to have been subject to serious prior environmental appraisal. Although these investments may be subject to EIA under the *Environmental Assessment Act 2000* once they become 'firm' proposals, this law will not require EIA for all investments. Furthermore, waiting to do environmental assessments could result in inefficiencies when proposals are found to be environmentally unacceptable.

In the Ninth Plan, environmental management tends to be 'compartmentalized' within sectors. This lack of cross-sectoral attention to environmental management can lead to incompatibilities between sector investments plans. Additionally, there is no direct attempt in the Ninth Plan document to assess its possible environmental impact.

Preliminary results from a Mid-Term Review of the Ninth Plan highlighted the following issues:

- Human-wildlife conflicts: the problems of wildlife animals destroying crops and concerns that there is too much conservation policy
- Land management: degradation is a major concern
- Tourism: the indirect impacts of building infrastructure
- Available arable land
- Water quantity and quality: there is no proper planning in major growth towns

The final results of the Mid-Term Review of the Ninth Plan were not available at the time of writing this report.

4. EU AND OTHER DONOR COOPERATION

Bhutan has been very successful in securing donor assistance for implementing national infrastructure and policy related projects, including in the environmental sector. Currently, almost 50% of the national budget is provided through donor assistance. This represents a high dependence on foreign assistance, particularly for institutional strengthening, capacity building and enforcement of environmental regulations.

The European Commission (EC) has been providing donor assistance to Bhutan since 1982 providing a total of 57 million euros equivalent. Currently, the EC is focusing its support in three areas: renewable natural resources (livestock production, agricultural production, extension); health (traditional medicine systems); and trade and export diversification.

Two observations can be made about donor assistance in Bhutan: (1) there tends to be a lack of collaboration at the planning and process levels amongst donors; and (2) donor assistance is most often restricted to five years or less – in many instances it takes at least 15 years of secure funding focused on implementation to have a real impact.

A summary of donor assistance is provided below.

Table 4.1: Summary of Bhutan's Donor Assistance (not comprehensive)

DONOR	ASSISTANCE
European Union (EU)	• Management of the Wang watershed • Cultivation of medicinal plants for traditional medicine • Trade Diversification
Asian Development Bank (ADB)— Member since 1982	• Development of impact assessment law • Decentralization of environmental assessment (current) through NEC • Road improvement work • Expansion of rural electrification network
Austria	• Major support to the new Basochhu hydropower project • Support to Department of Tourism
Danida	• Support to land use and statistics, Bomdiling Wildlife Sanctuary, soil surveys and reduction in industrial pollution • Support to NEC for Environment and Urban Sector Programme Support
UN Food & Ag. Organization (FAO)	• Technical assistance in food security, food quality control and safety, rural energy and feeder roads, agricultural productivity, marketing and statistics, and nutrition and rural development
Global Environment Facility (GEF)	• $10 million for the Bhutan Trust Fund for Environmental Conservation to help the government in conserving its forests and preserving its rich biological diversity • $1.855 million for linking and enhancing protected areas in the

	temperate broadleaf forest ecoregion of Bhutan – focused in Thrumshingla National Park and two Biological Corridors – to ensure conservation and sustainable management of the temperate forest mountain ecosystem in the newly established Thrumshingla National Park and two critical biological corridors linking the Royal Manas and Jigme Singye Wangchuck National Parks – focus of the project is on local environmental management and sustainable use of natural resources • Support the RgoB Nature Conservation Division (NCD) to plan and implement integrated approaches to environmental management by bringing technical expertise, experiences and financial resources for these activities • Support for a Micro-Hydropower project (upcoming) • Support to the NEC
German Development Organization (Gtz)	• Watershed management • Inter-sectoral planning and coordination • RNR extension services, social/community forestry, crop and livestock activities and construction of RNR infrastructure such as feeder roads and storage facilities
India	• Support to major new hydropower projects, including Tala, Kurichhu and Bunakha • Support to infrastructure development, particularly roads
Japan	• Japanese Volunteers • Support to micro-hydro plants • Japanese assistance for farm mechanisation – moved to semi-subsistence • Provision of garbage collection truck
Norway	• Updating the Power Master Plan
Sustainable Development Secretariat	• Assistance in biodiversity conservation and rural energy
SDC (Swiss) / Helvitas	• Rural development (Bumthang); extension • Development Cooperation through assistance to forestry extension and wood-based industries, as well as RNR research and vocational training
SNV	• Assistance to biodiversity conservation, Bhutan Trust Fund for Environmental Conservation, and solar power • Environmentally friendly road construction?? • Dutch support to NEC through government
UNDP	• UNDP assistance in the area of environment and renewable energy dates from the 1970s, when it helped to formulate and implement the nation's first project to effectively utilize and manage forest resources. Since then, several projects have been implemented in the forestry sector in partnership with FAO. In partnership with GEF, UNDP also has supported the RGoB in implementing projects that both help to protect the global environment and at the same time meet local people's needs. Future UNDP assistance under the Ninth FYP Plan will focus on strengthening the institutional

	framework for environmental management and energy development, particularly in Jigme Dorji and Thrumshingla National Parks, through development and implementation of *geog*/community natural resource management plans and community-based exotourism; assistance for the preparation of national reports and action plans; and building the RgoB's capacity to meet its obligations to global environmental conventions."
World Bank	• To date, Bhutan has received 11 World Bank credits through the Bank's International Development Assistance program totalling $101.1. million. • The IDA Forestry Development Project, approved in FY84 with a credit of $3.9 million, helped build capacity within the government to plan and operate an effective logging and reforestation program. The Second Forestry Development Project, approved in FY88 with a credit of $1.81 million, built upon these improvements in addition to strengthening managerial capacity for forest pest management. The Third Forestry Development Project, approved in FY93 with a credit of $5.4 million, helped make forest development activities in eastern Bhutan financially self-sustaining through beneficiary participation in village forest management. This project closed on June 30, 2002. • IDA is actively supporting the government's plan to improve urban and road infrastructure. Approved in FY99 with a credit of $10.8 million, the Urban Development Project supports Bhutan's policy of decentralization and balanced regional development by strengthening urban planning and management capacity at the national and local levels. The project also finances investments in high priority urban services, such as water supply, urban roads and other civil works in the 10 project towns. The Rural Roads Access project, also approved I FY99 with a credit of $11.6 million, is improving rural access in four districts to improve basic access to health and education services. The project has supported the development and adoption of the Environmental Code of Practice for Rural road construction, which is now being adopted in other sectors in the country. • The World Bank is working with the government to broaden the training of government officials.
World Wide Fund for Nature (WWF)	• Support to the development of biological corridors, integrated biodiversity information system, conservation education and nature-based tourism. • pushed the landscape approach – protected areas and corridors – endorsed by government on 2004 • have project based work in some areas – focus in parks and corridors – management plans and implementation • Implementing through partners – • Nature Conservation Division (in Forest Department) for work inside protected areas • 9 territorial Divisions (in Forest Department) for work outside protected areas • RNR Resource Centres (in Ministry of Agriculture) • ICDPs/Alternative energies • Work with institutes – schools, etc. where there is a common kitchen (e.g. Use of firewood) – looking at substituting electric power in kitchens • In all projects, staff and operational costs are paid by government

	• WWF Involved in development of national ecotourism strategy – involved in training of tourist guides on environmental and cultural aspects • Implementation of management plan • Infrastructure and surveys of Protected Areas • General funding under landscape approach
SDS (Netherlands Government)	• Supporting implementation of management plans • ICDP work
DGIS	• Integrated Conservation and Development

5. CONCLUSIONS AND RECOMMENDATIONS

There is no doubt that Bhutan is well placed to maintain its uniquely intact environment over the coming decades. However, keeping the country's environment at current levels will be a challenge as the country continues along its path of rapid development.

The main threats to Bhutan's environment at the current time include:

- Land degradation, specifically soil erosion resulting from human activities such as livestock herding, cultivation and over extraction of forest resouces
- Air pollution in urban areas from rapidly increasing vehicle numbers, poor fuel quality, burning of wood in bukharis and open fires
- Water pollution, primarily in urban areas where a lack of waste water treatment facilities in municipalities and industrial areas contribute to deterioration of water quality
- Solid waste management in urban and rural areas resulting from growing consumerism and increasing populations
- Climate change and natural disasters
- Road construction and transmission lines

Recommendations for addressing current environment issues include.

1. Annual or bi-annual State of the Environment Report

- There is a need for a comprehensive assessment at regular intervals of the environmental changes taking place. This could be done at the watershed or river basin level (particularly as pristine watersheds are important for hydropower projects and therefore critical to the economy).
- A State of the Environment Report should also assess whether environmental policies are actually working. How much is being conserved and what impacts is that having on the country's economy? What works and what doesn't work? In order to do this effectively, the country needs to increase its inventorying to come up with a comprehensive baseline.
- Additionally, the impacts of infrastructural development need to be assessed. For instance, there are varying opinions about the impacts of transmission lines, but no hard data to accurately assess environmental change. Furthermore, the indirect impacts of rural electrification need to be better understood to answer the question as to whether access to electricity (either solar or hydropower) reduces fuelwood consumption.
- As Bhutan continues along the process of decentralisation, there should be a programme to assess the Impacts of decentralization on the environment. And when Bhutan joins the World Trade Organization (WTO), the impacts of further trade

diversification, possible increased manufacturing, more intensive agriculture and other implication for the environment should be studies.

2. Urban Environment

- Storm drainage and roadside runoff is an issue that is currently not adequately addressed. As populations and urban areas grow, it will be critical to address these issues in order to keep water quality high and maintain the health of river systems.

- Land use policy and urban development should look at land conversion from the perspective of the people as well as the environment. Does it make more sense economically and environmentally to expand urban development up the slopes or into agricultural land?

3. Paying the Costs and Benefits of Conservation

- The National Biodiversity Act has been highlighted as an obstacle to development in the mid-term review from the *dzongkhag* level, although from the RGoB's perspective it is a success. More scrutiny should be paid to whether national level policies for conservation negatively impact local development and if so, how can this be overcome.

- Revenue from hydropower goes towards universal health, education and agricultural extension. However, communities in affected areas should see more direct benefits (i.e. they should be directly compensated) from hydropower if they are expected to contribute to conservation of the watershed. It could be feasible to set up a system for ecosystem services in order to ensure the long-term conservation of important watersheds.

- Mechanisms need to be in place for directing the benefits of conservation towards rural people- particularly those who currently pay the costs of conservation, providing lasting incentives for conservation

4. Land degradation

- An overall land management strategy is needed, with a more organized approach to water management and other issues.

5. Carbon trading

- Bhutan's large forest cover gives little scope for gaining from carbon trade. However, future development of large hydropower plants presents an area in which Bhutan could benefit from carbon trading -- in particular, the export of clean electricity to India, displacing coal-fired power plants and reducing greenhouse gas emissions.

- Additionally, Bhutan's image to the outside world is a great asset. Small projects, such as providing solar or micro-hydropower to remote communities or introducing

fuel-efficient stoves, have the potential to provide appeal to companies that have a public image to keep up.

6. Donor assistance

- Donor agencies should look more closely at how best to make aid more effective across sectors
- Donors agencies should focus on collaborating with their processes and not just on implementation. Donors need to work together more effectively and integrate processes already used by RGoB (e.g. EIA)

Capacity building

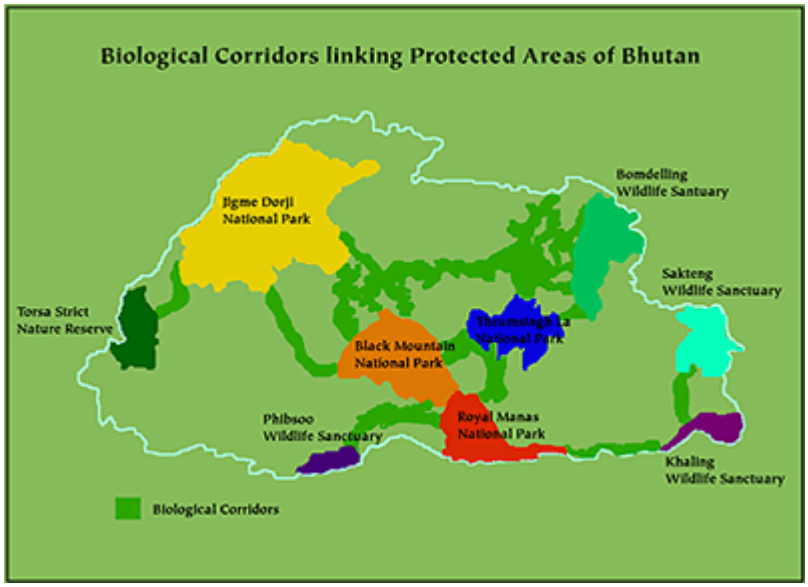
- Capacity strengthening is an ongoing need across all levels. It should be consistent and able to adapt to change and progress

Collaboration

- Government sector barriers need to be overcome in order to allow environmental management to be more effective and efficient. Technical collaboration, e.g. in EIAs and achievement of food security, is an area where collaboration can be improved with the most ease.
- Collaboration around a specific problem will help to address environmental issues more effectively and efficiently.
- Rules and regulations in individual sectors need to comply with those in other sectors

TECHNICAL APPENDICES

I. ENVIRONMENTAL MAP



II. REFERENCES

Agrawala, S., V. Rakasakulthai, M. van Aalst, P. Larsen, J. Smith, J. Reynolds. (2003) "Development and Climate Change in Nepal: Focus on Water Resources and Hydropwer." OECD Environment Directorate Development Co-operation Directorate

Department of Tourism, Ministry of Trade and Indusry, Royal Government of Bhutan. 2001. *Bhutan National Ecotourism Strategy*. Keen Publishing. Thailand.

Department of Agriculture, Ministry of Agriculture, RGoB. 2005. *Land Management Campaign Brochure*. Bhutan.

FAO. 1999. *Forest Resources of Bhutan – Country Report*. Forest Resources Assessment Programme, Forest Department. Rome.

Ministry of Agriculture, RGoB. 2002. *Biodiversity Action Plan.* Keen Publishing, Thailand.

Ministry of Agriculture, RGoB. 2003. *The Biodiversity Act of Bhutan: Water Sheep Year 2003.* Bhutan.

Ministry of Agriculture, RGoB. 2005. *The Renewable and Natural Resources Sector 9th 5-year plan*. Bhutan.

National Environment Commission Secretariat, RGoB. 1998. *National Environment Strategy: The Middle Path.* Bhutan..

National Environment Commission Secretariat, RGoB. 2000. *Environmental Assessment Act, 2000.* Tashichho Dzong, Bhutan..

National Environment Commission Secretariat, RGoB. 2000. *Initial National Communication Under the United Nations Framework Convention on Climate Change.* Bhutan.

National Environment Commission Secretariat, RGoB. 2000. *First Greenhouse Gas Inventory. Bhutan.*

National Environment Commission Secretariat, RGoB. 2002. *Bhutan—the Road from Rio: National Assessment of Agenda 21 in Bhutan.* Thai Graphic and Print, Thailand.

National Environment Commission Secretariat, RGoB. 2002. *Regulation for the Environmental Clearance of Projects and Regulation on Strategic Environmental Assessment.* Thimphu, Bhutan.

National Environment Commission Secretariat, RGoB. 2002. *Bhutan—the Road from Rio: National Assessment of Agenda 21 in Bhutan.* Thai Graphic and Print, Thailand.

National Environment Commission, RGoB. 2002. *Bhutan: Trading the Middle Path to Sustainable Development Brochure.* Bhutan.

National Environment Commission Secretariat, RGoB. 2004. *Component 1: Environmental Regulation and Management – at national and local level.* Ref. No. 104. Bhutan.817-1. Bhutan.

National Environment Commission Secretariat, RGoB. 2004. *Sector Programme Support Document: Environment and Urban Sector 2004-2008.* Ref. No. 104. Bhutan.817. Bhutan.

National Environment Commission Secretariat, RGoB. 2005. *A Brief Report on Bhutan's State of Environment for Fiscal Year 2004-2005.* Thimphu, Bhutan.

Planning Commission, RGoB. 1999. *Bhutan 2020: A Vision for Peace, Prosperity and Happiness.* Keen Publishing. Thailand.

Planning Commission, RGoB. 2002. *Ninth Plan Main Document: 2002-2007.* Bhutan.

RGoB. 1995. *Forest and Nature Conservation Act of Bhutan.* Bhutan.

RGoB, Ministry of Foreign Affairs, Denmakr. 2004. *Sector Programme Support Document: Environment and Urban Sector(2004-2008).* Bhutan.

RGoB. 2005. *The Constitution of the Kingdom of Bhutan: Draft of the Tsa Thrim Chennmo as on 26th of March, 2005.* Bhutan.

European Commission. 2003. *Country Strategy Paper: Bhutan and the European Union.* C(2003)826 - E/309/2003.

United Nations Development Programme. 2003. Discussion Paper: Energy and the Environment.

UNDP. 2005. *Project Brief: WWF and UNDP/GEF Join Forces to Conserve Nature and Reduce Poverty.* Bhutan.

The World Bank. 2002. Memorandum of the President of the International Development Association to the Executive Directors on a Country Assistance Strategy of the International Development Association for Bhutan. Bhutan Country Unit, South Asia Region. Washington DC.

The World Bank. 2004. Bhutan Country Brief. Washington DC.

Yangzom, K. 2003. *A Literature Review for the Strategic Environmental Assessment of the Ninth Five Year Plan*. The World Bank

ADMINISTRATIVE APPENDICES

I. CONSULTANT'S ITINERARY

DATE	Activity
21-22 June	Travel to Brussels
23 June	Meetings with EC desk officers in Brussels
24 June	Obtain Indian Visa / Literature review
25-26 June	Travel to Delhi
27-28 June	Meetings with EC Delegation in Delhi / Literature review
30 June	Travel to Bhutan
1 July	Meetings with WWF and consultants in Thimphu
3 July	Literature review & preparation for meetings
4-7 July	Meetings with government officials in Thimphu
8 July	Meetings with non-government individuals & donor organizations
9-15 July	Field visit
17-18 July	Preparation for debriefing presentation & discussion forum
19 July	Debriefing presentation and discussion forum
21 July	Travel to Delhi and meet with EC Delegation
23-24 July	Travel home
26 July-15 August	Report writing & revision (4 days)

II. LIST OF PERSONS/ORGANISATIONS CONSULTED

Name	Organisational Affiliation
Ms. Leki Wangmo	Department of Aid and Debt Management, MoF (DADM)
Ms. Kesang Choden	DADM
Mr. Pema Chewang	DADM
Mr. David Annandale	NEC (Danida)
Dr. Dechen Tshering	NEC
Mr. Tenzim	Ministry of Agriculture
Mr. Nidup	Ministry of Agriculture
	Department of Forestry
Mr. Karma Tshering	Nature Conservation Division
Dr. Tash Samdup	Department of Livestock
	Department of Planning, MoF
Mr. Ganesh Chettri	Department of Agriculture
Mr. Chengay	Thimphu Municipal Corporation
Mr. Bruce Bunting	WWF US
Mr. Kinzang Namgay	WWF Bhutan
Mr. Chadzo Tenzin	WWF Bhutan
Mr. Ugen Norbu	Consultant
Mr. Sonam Tshering	Department of Energy, MTI
Mr. Dorji Wangda	Department of Geology and Mines, MTI
Mr. Thuki Nadik	Department of Tourism, MTI
Mr. Phuntsho Wangdi	Department of Roads, MWHS
Mr. Rinchen Dorji	Department of Urban development, MWHS
Mr. Lim Dorji	Sustainable Development Secretariat
Mr. Lam Dorji	RSPN
Mr. Tshewang Wangchuk	Tiger Conservation Programme, WWF International
Mr. Kinley Dorji	*Keunsel*
Mr. Sangay W..	NCD, MoA
Ms. Karma Yangzom	BioBhutan
Mr. Frank Jensen	Wang Watershed Project
Education Officer	Thrumshingla National Park
Mr. Kingsang Wangdi	RNR Research Centre, Jakar
Mr. Tashi Dorji	RNR Research Centre, Jakar
Mr. Fritz Maurer	Bumthang Cheese Factory
Mr. Dorji Wangdu	Ugen Wangchuk Institute for Forestry & Environmental Studies
Manager	?? Mini-hydropower Project
Head of Construction	Chendebje Micro-hydropower Project
Director	Basochhu Hydropower Project
Mr. Richard Geier	NEC (Danida)

III. STUDY METHODOLOGY/WORK PLAN

Introduction

The Country Environmental Profile of Bhutan will provide the Bhutanese government and the European Commission with concise information on the country's key environmental challenges and will recommend policies, strategies and programmes to address these challenges. In particular, the profile will: (a) provide sufficient information to ensure that EC cooperation strategies integrate environmental considerations into the selection of priority focal areas and to establish the necessary environmental safeguards for all cooperation activities undertaken in Bhutan; (b) establish the key linkages between the environment and poverty reduction; (c) provide important baseline information; and (d) contribute to focusing political dialogue and cooperation with Bhutan on key areas of concern.

Approach

The work will include:

- Assessment of Bhutan's environment, identifying: (a) key environmental factors influencing Bhutan's development and responses to these factors, (b) environmental pressures, current status and trends (social, economic and other); (c) problems with the physical and biological environment; and (d) consequences of the above on human well-being and sustainable development

- Assessment of national environmental policy and legislation (including strengths and weaknesses), institutional structures and capacity, and the involvement of civil society in environmental issues – in particular, an examination of how environmental conservation has been integrated into Bhutan's development policy & what the impact of this has been (as per the mid-term review of the 9th 5-year plan) and how it till be addressed in the 10th 5-year plan, within the context of the socio-economic impact of migration, urbanization, etc.

- Overview of the environmental impacts of an increasing focus on resource extraction industries, such as mining

- Overview of the role of hydroelectric power in biodiversity conservation

- Assessment of deforestation and reforestation targets

- Assessment of the impact on the environment following the emphasis on promoting economic self-reliance and increasing the production of cash crops such as apples, oranges, potatoes and cardamom for export markets

- Assessment of past and anticipated future trends of environmental indicators, including references to local and internationally recognized environmental indicators to facilitate future monitoring and evaluation

- Overview and assessment of environmental institutional framework, including cooperation between sectoral institutions/ministries, involvement of NGOs, extent of protected areas, and integration of environmental concerns into mainstream sectors
- An overview of past and ongoing international cooperation (EU and other international agencies) in Bhutan's environment sector
- Recommendations and guidelines or criteria for mainstreaming environmental concerns in priority development areas
- Recommendations to support the preparation of the Country Strategy Paper, including guidelines or criteria for mainstreaming the environment

Work Plan

Briefing in Brussels – consultation with country desk officers and other relevant officials (5 days)

Briefing by the EC Delegation in New Delhi (2 days)

Bhutan – field work (15 days)

- Consultation with EC Delegation in Bhutan
- Review of previous Country Environmental Profiles and Country Strategy Papers and relevant evaluation reports produced by the government, the EC or other agencies
- Review of environmental literature, evaluation reports, environmental policy and legislation framework, legislation and regulations and enforcement relating to environmental issues, action plans and progress in implementation
- Consultation with national and local authorities in key ministries and institutions
- Consultation with key international funding agencies operating in Bhutan
- Consultation with key national and international civil society actors, such as WWF and RSPN, operating in the environmental field
- Consultation with relevant actors in the tourism, agriculture, hydro-power, and mining sectors, as appropriate
- Possible site visits to Bumthang, Chukha and a protected area
- Possible half day workshop with representatives from government sectoral ministries to map collaboration among ministries and other institutions

Debriefing in EC Delegation in New Delhi (2 days)

Reporting

- An initial overview of the report will be presented to the EC Delegation in New Delhi, following the field work in Bhutan
- A draft report, incorporating comments from the ECD in New Delhi, will be submitted upon return from Bhutan and New Delhi
- A final report, incorporating all comments and suggestions from the draft report, will be submitted by August 15, 2005