NATURAL RESOURCES AND ENVIRONMENT

PRIORITIES AND PROPOSED SECTOR INVESTMENT PROGRAM

MINISTRY OF DEVELOPMENT AND ENVIRONMENT

ENERGY AND MINERALS DIRECTORATE

ENVIRONMENT DIRECTORATE

MINISTRY OF AGRICULTURE, FORESTRY AND FISHERIES

MINISTRY OF TRANSPORT, COMMUNICATIONS AND PUBLIC WORKS

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PREFACE

This final version of the Sector Investment Program (SIP) for the Natural Resources and Environment Sector has been prepared under the direction and guidance of the Ministry of Development and Environment and other agencies that have responsibilities for aspects of the sector, in close collaboration with the Ministry of Planning and Finance.

The document is part of a larger exercise undertaken by the Government of Timor-Leste. Final versions of the SIP have been prepared for the following sectors:

A. Basic Service Sectors
- Education and Training
- Health Care

B. Production-related Sectors
- Agriculture, Forestry and Fisheries
- Natural Resources and Environment
- Private Sector Development

C. Basic Infrastructure and Housing Sectors
- Communications
- Power
- Transport
- Water Supply and Sanitation
- Housing and Urban Development

D. Governance-related Sectors
- Public Sector Management
- Local Government and Civil Society
- Rights, Equality and Justice
- Security, Peacebuilding and Reconciliation
- External Relations and Cooperation

Supporting expenditure data and analysis has been provided by the Ministry of Planning and Finance. Unless otherwise specified, these data are drawn from two sources: CFET budget appropriations data has been provided by the Budget Office of the Ministry of Planning and Finance for FY2001/02 onwards. CFET data for FY1999/00 and FY2000/01 are rough estimates based on aggregate data for CFET expenditures included in the National Development Plan. Information about external assistance to Timor-Leste that is included in the reports is obtained from the Registry of External Assistance (REA) database of the Ministry of Planning and Finance. Data for external assistance are as of December 31, 2004. These data have been made available through the generous cooperation of Timor-Leste's Development Partners. Donor data has been supplemented with information provided by individual government agencies that have responsibilities for particular donor-funded projects and programs. The information about these programs includes assistance channeled by donors through international and local NGOs, as well as programs implemented directly by individual donors. Some data provided by donors is provisional and subject to change as work on individual projects and programs progresses.

The data presented in these reports covers capital and recurrent expenditures and therefore aims to present a total picture of development spending in Timor-Leste. However, as the report indicates, information on these two categories is incomplete in a number of areas. Estimates have been made on the basis of information that is available.

This report reflects policies and programs for this sector as of February 2005.

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ABBREVIATIONS AND ACRONYMS

ADB	Asian Development Bank
ALGIS	Agricutural Land Use & Geographical Information System
AMCAP	Ainaro And Manatutu Community Activation Project
ARP	Agriculture Rehabilitation Project of the World Bank
ATSEF	Arafura and Timor Sea Environmental Forum
BOD	Biological Oxygen Demand
CDCF	Community Carbon Development Fund
CDM	Clean Development Mechanism
CFET	Consolidated Fund for East Timor
DE	Division of Environment (of MDE)
DEMR	Division of Energy and Mineral Resources (of MDE)
EIA	Environmental impact assessment
ESCAP	Economic & Social Commission for Asia and the Pacific
FDI	Foreign direct investment
FMCBP	Fisheries Management Capacity Building Project
GDP	Gross domestic product
GEF	Global Environment Facility
GHG	Greenhouse gases
GIS	Geographical information systems
IUCN	World Conservation Union
JPDA	Joint Petroleum Development Area
kW	Kilowatt
LPG	Liquefied Petroleum Gas
MAFF	Ministry Of Agriculture, Forestry and Fisheries
MDE	Ministry Of Development and Environment
MEA	Multilateral Environment Agreement
MEYC	Ministry of Education, Youth and Culture
MTCPW	Ministry Of Transportation, Communications and Public Works
NDP	National Development Plan
NDP	Norwegian Petroleum Directorate
NGO	Non-Governmental organization
NORAD	Norwegian Aid for Development
PDO	Plan for development and organization
POP	Persistent organic pollutants
SIP	Sectoral investment program
TSDA	Timor Sea Designated Authority
UN	United Nations
UNCBD	United Nations Convention on Biological Diversity
UNCCD	United Nations Convention on Combating Desertification and Land Degradation
UNDP	United Nations Development Program
UNFCCC	United Nations Framework Convention on Climate Change
UNMISET	United Nations Mission in East Timor
UNTAET	United Nations
USAID	United States Agency for International Development
WSS	Department of Water Supply and Sanitation (of MTCPW)
WWF	Worldwide Fund for Nature

EXECUTIVE SUMMARY

Timor-Leste's economy is highly dependent on its natural resource base. Land, water, forests and coastal zones provide a livelihood, or are the major source of income, for at least three-quarters of the population. They are the basis for social and economic security and growth. Mineral and petroleum deposits are expected to provide a significant source of income and foreign revenue for many years to come. Finally, many of Timor-Leste's resources – for example, its pristine coastal ecosystems, its stands of sandalwood and its remaining primary forests – are a world heritage and deserved to be protected as such.

These resources can certainly be exploited to a far greater extent – if well managed. However, as with other countries throughout the region, some of Timor-Leste's natural resources have been degraded through over-harvesting during the periods of colonialisation and occupation. Forests have suffered in particular. These threats are currently on the increase. Natural resource degradation – for example, of water and of productive land – is already limiting economic opportunities in many areas. It is also leading to significant direct economic costs, for example, by damaging infrastructure, increasing floods and contributing to health problems. Finally, there are localized threats to Timor-Leste's air, coasts and remaining biodiversity.

The further development of the country's natural resources will depend primarily on private sector initiatives and investment. The opportunities will be available for diverse groups, including: local communities and farmers; small and medium-sized, locally owned businesses; and international investors, including large multinationals, especially in oil and gas. The key role for the Government is to create, as soon as possible, the enabling conditions for this investment and to manage and regulate the activities of the private sector in a way that protects the environment, the resource base and the heritage of the country.

The Government is well aware of the potential trade-offs in this sector. Short- and medium-term social and economic gains can be made at the expense of medium and long-term environmental degradation, thereby limiting social and economic possibilities in future years. The Government further recognizes that in the past years of colonization and occupation, this trade-off was badly managed and, as a result, the natural resource base of the country has been depleted; the degradation is now imposing substantial additional costs on the country, contributing to widespread poverty and food insecurity. Finally, the Government is aware of the equity issues involved - growth and prosperity for one section of the community should not come at the expense of decreased environmental security and poverty for other sections of the community.

In the short time since Independence, the Government of Timor-Leste has made progress on the overall strategies to manage natural resources and the environment. These are described in some detail in this document. For the petroleum and minerals sectors, this means creating a strong governing framework and promoting private sector investment. In agriculture, forestry and fisheries, these approaches are complemented by efforts to develop joint and community management mechanisms in rural and isolated areas. The Government has also made a start on establishing a strong regulatory and management framework for environmental protection. Until now, efforts have focused on developing laws and policies, establishing and strengthening institutions, training and capacity building. Some efforts have been undertaken to develop information databases and to develop a cross-sectoral mechanism for management of natural resources.

Despite these ongoing efforts, many weaknesses still remain across the natural resources sectors. Some of the more notable ones include the overall absence of reliable, comprehensive up-to-date information, the lack of technical and management capacity, and difficulties in empowering local

communities and in implementing participatory approaches. Lack of funds, working laws and equipment exacerbate these weaknesses.

In preparing this document, the concerned Government agencies have each developed programs of prioritized and sequenced measures that, if implemented over the next four years, will establish a strong governance framework for the natural resources sector. These programs will facilitate and promote private sector and community development, whilst at the same time assuring the long-term protection of Timor-Leste's land, forests, waters, air, urban areas and biodiversity. Details of these programs are provided in the document and in the Annex tables.

Some of the proposed investments are relatively high cost. Many are not, and will have high social returns for small investments. One example of the latter is the proposal for $100,000 over four years to support the technical and coordination activities of the newly created, high-level, inter-sectoral resource management working group. This can help Timor-Leste avoid the costly sector-specific approaches that have led to many problems in other countries in the Region.

A number of themes are common to the programs in each sector. Capacity building is one. Despite the many recent training programs, there is still a very serious shortage of trained individuals with the necessary knowledge and technical and managerial skills in each of these sectors. Another theme common to the entire program for the sector is further development of institutional capacities. There has been progress in strengthening institutions, but more must be done. Each agency now has a clear statement of its mission and objectives. There has also been progress, albeit uneven, in developing the policy framework required to pursue these objectives. In almost all areas of natural resource and environmental management, agency staff must work closely with officials in other agencies, with local communities, with the private sector, the media and other members of civil society. Much work remains to be done in building the skills of staff in these important areas. A particular concern is building capacities at the district and local level to ensure that there are effective mechanisms for collaboration with local communities in the management of local resources and the environment.

A third important theme running through these programs is the urgency attached to building a better understanding of the resource base of the country. The development of appropriate plans, policies and legislation ultimately relies on reliable, comprehensive and up-to-date information. There is a severe lack of reliable information in the natural resources and environment sector.

The fourth area common to these programs is the creation of an enabling environment for the private investment that will be needed for commercial development of natural resources in a sustainable manner. Apart from building basic information about the resource base and the opportunities, support will be needed for investment promotion programs, for negotiations with investors regarding licensing and other arrangements, and for increased capacities to complete assessments of proposed new investments in a timely and expeditious manner.

Over the five year period ending FY2003/04, a total of $10.4 million of public funds was spent on programs in the natural resources and environment sector, 90 percent of which was funded by donors. Two-thirds of spending in the sector has gone to support for the development of the petroleum sector. The policies and programs set out in this document call for total expenditures of about $21 million during FY2004/05 through FY2008/09, not including private investment by the domestic and international business community. Some $11 million is proposed for continued support for development of the petroleum and minerals industry; the program also includes proposals for building capacities for management of the environment, for assessments of water resources and watersheds, as well as support for current initiatives by the Government to strengthen capacities for integrated management of the country's resources.

Funding for the program includes the $5 million of donor support already ongoing and under preparation, and the currently proposed CFET allocations for FY2004/05 through FY2008/09, which amount to about $1.7 million. A total of about $14 million in new funding would therefore be needed. Some additional revenues may also be available from licenses and other fees associated with the investment expected to flow to the natural resources sector. Accession to various international mechanisms may provide Timor-Leste with additional funding for some of these programs, including GEF and the carbon fund managed by the World Bank. A balance of about $11 million of new support may be needed from Timor-Leste's established Development Partners.

An emerging concern is the sustainability of funding arrangements. Recurrent spending over the past five years has accounted for almost three-quarters of total outlays in the sector, with donors financing almost 90 percent of these expenditures. An equally high share of capital expenditures was funded by donors. Over the next five years, recurrent outlays account for two-thirds of total spending. This includes an additional $6 million of new recurrent expenditures proposed for donor funding. CFET continues to fund less than 10 percent of total outlays and of recurrent expenditures. The Government recognizes that continued heavy dependence on donor support for recurrent outlays is not sustainable in the longer-term and that over time, the share of CFET funding for recurrent outlays will need to rise.

I. ASSESSMENT OF THE NATURAL RESOURCE BASE AND ENVIRONMENT

Land Resources

Land resources and land types. The land area of Timor-Leste is approximately 14,609 km, including Oecussi and Atauro and Jaco Islands. The country has a dramatic topography, dominated by the Ramelau Mountains stretching across the middle of the island from the eastern to the western tip. The highest point, Mount Tatamailau, is 2,963 meters above sea level and less than 20 km from the sea. Relatively short and steep slopes run down from the Ramelau Mountains to the island's North and South coasts. Generally, as one moves from the high areas to the low areas, the land can be conveniently divided into the following six ecological zones: mountainous areas; highland plains; moist lowland areas (along the southern coast); arid lowland areas (along the northern coasts); marine and coastal areas; and, urban areas.[1]

Table 1: Areas of Land Use by Category, 2001 (hectares)

Land Use	Area (hectares)	Distribution (percent)
Forest		
Lowland	761,486	51.0
Highland, coastal & other	92,768	6.2
Agricultural land		
Estate crops	74,578	5.0
Food & other	336,400	22.5
Non-productive land	203,152	13.6
Cities, towns villages	19,934	1.3
Lakes	5,080	0.3
Total	1,493,398	100.0

Source: MAFF, Agricultural Land Use & GIS Unit

Unlike many neighboring islands that are derived from volcanic rock, Timor-Leste is derived from limestone and metamorphosed marine clays. This means the island has relatively unproductive, low fertility, fragile soils. In most areas, this low fertility is compounded by the rapid decomposition of organic matter due to the tropical climate.

The topography of the island has a profound effect on the vegetation and contributes to high levels of erosion. Almost half the land has a slope of 40 percent or more. The steep slopes - with shallow soils - are very susceptible to erosion. The rainfall pattern – particularly in the north with long dry periods followed by intensive, short rainfalls – is also conducive to erosion. Deforestation and over-grazing is thought to have further increased the susceptibility to erosion in many areas. Deforestation has been ongoing for centuries, but increased dramatically during the Indonesian occupation. The geographical location of the island of Timor has also meant that the vegetation is subject to frequent fire, in nature caused by lightning, and with human occupation for perhaps 40,000 years, also by man. This means that the native vegetation is adapted to fire, although the tolerance of fire varies greatly in the flora.

High levels of erosion greatly decrease fertility, damage natural and man-made waterways and water storage facilities, and damage the hydrological cycle. The climate and geological conditions mean that localized flash floods and landslides are common throughout the country. The extent to which man-enhanced degradation contributes to the floods and landslides is unknown.

Land use. There is no comprehensive, up-to-date information available on land use and land cover in Timor-Leste. The Royal Australian Air Force completed an aerial photographic survey in 2001. The material has been made available to the Land and Property Unit of the Justice Ministry. The information will provide a basis for a detailed database, after photos have been analyzed and

[1] UNDP/NORAD, *Assessing Environmental Needs and Priorities in Timor-Leste*, 2002.

ground-truthing completed. The analysis has already been completed in many urban areas and a small number of rural areas.

The latest comprehensive information, as provided in Table 1, is based on an assessment utilizing Indonesian aerial photography carried out in 1993. This information suggests that, in 1993, lowland forest covered as much as half of the total area. Highland, coastal and other forests covered another six percent. However, more recent evidence suggests that much of the land that was classified as forest was actually grassland, savanna or secondary forest. Anecdotal evidence suggests that there has been further degradation of forests since 1993 and that the area covered by grassland, savannah and secondary forest has increased. There are also scattered, non-productive grasslands on many of the interior steeper slopes of the country, probably as a result of past burning. Urban areas probably continue to account for around one percent of the land area.

Land devoted to agricultural uses is believed to be around 450,000 hectares, or about 30 percent of the country. Approximately, one sixth of agricultural land is for industrial production of food and cash crops. The Agriculture, Forestry and Fisheries SIP estimates that approximately 600,000 hectares of land are suitable for crop and livestock production, 230,000 of which are suitable for rainfed or irrigated cropping.[2]

Petroleum and Mineral Resources

Petroleum. Petroleum deposits can generally be divided into off-shore deposits, and on- and near-shore deposits. The principal off-shore deposits lie off the South Coast in the Timor Sea in the Joint Petroleum Development Area (JPDA). Explorations undertaken prior to the Indonesian occupation indicate that the Bayu-Undan field has an estimated oil reserve of 500 million barrels and a gas reserve of three trillion cubic feet. Commercial production of this field started in February 2004. The Greater Sunrise field has an estimated potential gas reserve of seven trillion cubic feet, and is currently under suspension, pending resolution of the ongoing maritime border negotiations between Timor-Leste and Australia.[3] There are several smaller oil and gas fields in the Timor Sea that may have potential for development as well.

Much less is known about on-shore and near-shore petroleum resources, although there does appear to be potential for further development, at least as a source of energy for power generation, if not for export. Wells were drilled in the Alimbata area as early as 1900-1914. The next generation of wells was spudded in 1961 – the main target being Viqueque sandstone in the Viqueque basin located partly on and partly off the southern shore. The Timor Oil Company exploited 21 wells during the period 1910 – 1975. Non-commercial quantities of oil and gas were recovered from several wells that were drilled (in Covalima, Viqueque, Ossulari, Matai, Clara Ullo, Suia Loro, Cota Taci, Ranuc and Mola and others). Little information is available, but four of the wells are thought to have produced between 3 and 111 barrels per day. All the wells were subsequently re-capped. One capped well at Suai is adjacent to a generating station, suggesting reserves could be provided directly to the station to generate power. In addition, over 30 oil or gas seepages have been documented along the southern coast, suggesting further reserves in the area.

[2] Agricultural production is dominated by subsistence farming based on low input and low technology; it is likely to remain this way for some years to come. See the SIP for Agriculture, Forestry and Fisheries for further discussion of agricultural potential and development strategies.

[3] Woodside Petroleum suspended further development of its liquefied natural gas project after talks between Australia and Timor-Leste were suspended last September. For a further discussion of the maritime border issue see the SIP for External Relations and Cooperation.

Prior to the Indonesian invasion, international oil companies undertook a series of explorations, using seismic investigations and gravity lines and prepared surface maps. Unfortunately, data from these previous programs is not available to the Government. In 2001, Timor Oil submitted a new proposal for $67 million of on- and near-shore exploration and development work. An unsolicited proposal was also submitted by the Independent Oil and Gas Joint Venture on the seeps. Since some of these investors had access to the results of earlier exploration work, their willingness to make additional sizeable investments in exploration suggests that the country may have important on- and near-shore oil and gas reserves.

New surveys have been commissioned to fill the information gap. Several oil companies have recently completed surface mapping including gravimetric and magnetic survey of the southern side of Timor-Leste which is most prospective for petroleum exploration. The results of the surveys, which are now being evaluated, will begin to yield additional information on the potential for on-shore and near-shore resources. In addition, efforts have been made to identify data and information existing prior to the Indonesian invasion with regards to onshore petroleum (and mineral resources), in order to further complete the data-base. The Government is also preparing detailed maps (district level) and databases on petroleum (and minerals).

Minerals. The country is also blessed with rich mineral resources, both on and near-shore. The most attractive potential is in base metals, mainly copper and associated gold and silver. Important known copper deposits are located in the north and central parts of the country in Ambeno, Baucau and Viqueque districts. There are also lesser occurrences of chromite, bentonite, manganese, phosphate, gypsum, clay, limestone, sand, gravel and marble. The technical and commercial feasibility of exploiting these reserves is unknown. At present, the only explorations are small-scale sand and gravel operations (for the building and construction industry). In the future, the majority of mineral activities is likely to be small scale, generating local income and employment, but not necessarily attracting significant foreign direct investment (FDI) or making large contributions to GDP.

To improve the information on the known mineral reserves, an initial inventory of the on-shore potential for Timor-Leste was prepared with assistance from UN-ESCAP.[4] This provided general information for the overall sector – covering both hydrocarbons and other mineral resources.

The Forests of Timor-Leste

Forests have always been important to the economy of Timor-Leste. Very valuable sandalwood has been harvested for centuries and, at other times, honey, beeswax and other timbers such as teak and kayu merah have been significant. There is no up-to-date and comprehensive information of the forests of the country. Maps for forest cover produced by the Australian Government funded ALGIS project continue to rely on information collected during the Indonesian period for the 1993 inventory. While accurate data are not available, it is generally believed that the forests have been severely over harvested and degraded in recent times. It is likely that not all the open and poor quality forests now to be seen have actually been badly degraded, especially in steep land. Skeletal soils and poor moisture relations have produced extensive areas of natural savannah formations.[5]

A very simplified grouping of the main natural forest types of Timor Leste is as follows:

[4] ESCAP and UNDP, *Exploring Timor-Leste: Mineral and Hydrocarbon Potential*. United Nations, New York, 2003.
[5] Davidson, J., *Final Report of the International Upland Reforestation Consultant*, AMCAP, 2003.

- Savannah formations dominated by *Eucalyptus alba*, where the tree component has value only for fuel wood.
- Open or moderately dense forest dominated by *Eucalyptus urophylla*, but with several associated species. This eucalypt is used for fuel wood and for poles.
- Tropical dry monsoon forest carrying a mixture of species, some with timber production potential, the most important of which is kayu merah (*Pterocarpus indicus*).

Two species of native trees produce very valuable timber: suren (*Toona sureni*) and sandalwood (*Santalum album*). Teak is also an important timber tree. It is not native to Timor but has been planted for more than 100 years. Suren was only ever available in small quantities, but is a keenly sought after furniture timber, with export potential. Sandalwood is one of the most valuable of timbers, with a strong overseas market. It is so valuable that control of its harvest is a major problem wherever it occurs. Sandalwood has been harvested from Timor for about 1,000 years. Of all the forest products of Timor-Leste, sandalwood offers the best prospect for profitable commercial activity. Currently, the resource is said to be in a very poor state, but its re-establishment would provide rural employment in the short term and good financial returns in 20-40 years. Sandalwood was found widely distributed in the more favored savannah sites and especially in old gardens and ladang in the other types. Key resources like sandalwood are much reduced, and illegal harvesting remains a problem. In recent years Siam weed (*Chromolaena*) has become a widespread nuisance in Timor Leste, causing difficulties with plantation establishment and for agriculture generally.

Other important forest products include:

- Honey, which has long been important, although declining recently. Reports indicate that the level of technology for honey production is low, being largely based on collection of honey from wild hives.
- Rattan. There is a small cottage industry producing rattan furniture for local use, but its development is said to be inhibited by restricted resources. Suitable forest conditions exist for the cultivation of rattan as an under storey.
- Bamboo grows widely in Timor-Leste and is used for a multitude of purposes, although it appears that varieties of bamboo yielding edible shoots are not yet cultivated.

Watershed protection. Upstream forests and land naturally regulate the hydrological cycle, releasing water to aquifers and rivers over a period of time, thereby avoiding floods and providing water in dry season. Destruction of forests and the related land degradation damages the hydrological cycle, leading to an increased incidence of floods and droughts. The forest estate is said to be degraded. Undoubtedly, there has been a decline over the past quarter century, but whether this is continuing is debatable. Fuel wood collection, land-clearance, high levels of shifting cultivation and over-grazing are thought to be the source of the problem.

Demand for wood. Within Timor-Leste there is a strong demand for fuel wood for household use.[6] Anecdotal evidence suggests that small industries also use large amounts of fuel wood. These demands are met from local sources in rural areas and there seems no supply deficiency at this time. The main deficiency in fuel wood supplies is in the urban centers, especially over the last few years. Reliance on fuel wood, especially in urban areas, has increased substantially since

[6] The Government does not have detailed information on energy consumption in the country. Five types of fuel are currently used to meet energy demand – fuel wood, diesel, gasoline, kerosene and small amounts of LPG. Diesel is used mainly for power generation, transport and fishing; gasoline is used for transportation. Fuel wood, kerosene and LPG are used mainly for domestic cooking and by small businesses.

the removal of the kerosene subsidy in 1999. Some indications are that this is putting pressure on the forests adjacent to towns and cities.

There is also a requirement for sawn timber for construction purposes and for value-added products such as local furniture manufacture. Imports of sawn timber are said to be meeting most of the local demand at the present time.[7] Local resources of suitable timber trees, especially teak and kayu merah, are reported to have been severely over harvested in the past, so that relatively little is currently available. There appears to be little prospect for local timber supplies meeting local demand in the near future. However, the proposed national forest inventory will clarify this situation. One potential source of sawlogs in the short term is salvage of Albizzia (*Paraserianthes falcataria*) trees in coffee plantations that have been killed or severely damaged by the rust disease, or where coffee plantations are to be rehabilitated. Any such salvage would need to be carefully planned in cooperation with the local people affected. Albizzia is poor quality timber, but could be useful for some purposes, such as the manufacture of pallets and for rough construction.

Water Resources

Water resources. Generally speaking, areas north of the central mountain range are in a rain shadow, with a short rainy season that begins around November and extends to March-April, usually accompanied by a westerly monsoon. Total annual rainfall ranges from under 1,000 mm to 1,500 mm in the drier coastal areas. The rainy season is short and intensive. Dili, for example, may receive up to 30 percent of its annual rainfall (900 mm) in one day. The steep slopes and geological conditions mean that many northern areas are unable to store water effectively.[8] Given the long dry season, many northern areas, particularly in the uplands, traditionally experience seasonal water shortages. This is a limiting factor in agricultural production and a source of food insecurity and poverty.

To the east and south of the central mountain range the rainy season is at its peak in April. The dry season occurs during May and the rainy season returns at the beginning of June until August. Along and near the southern coast, annual rainfall ranges up to 2,000 mm.

There are over 100 rivers that, in general, are short and fast-flowing, taking water efficiently to the lowlands and onto the sea. The longest river, the Loes is only 80 km long, flowing into the sea at Atabae. Given the temporal variations in rainfall, and the low capacity of upland areas to hold water, very few rivers flow all year round. Timor-Leste has only one large *lake*, Lake Iralalaru, lying on the eastern edge of the island covering approximately 22 km^2. The level of this lake has been observed to vary dramatically over the past decades, and great variations can be observed from season to season. This is considered to be a natural phenomenon. Initial observations suggest that the lake and the surrounding primary forest is a unique ecosystem, until now exceptionally well-preserved. Groundwater is an important source of water for domestic use across the island, including upland and urban areas, but little is known about either the quantity or quality of the resource, let alone the extent of changes in these attributes.

Water uses, services and functions. As in all countries, water performs many economic and social functions in Timor-Leste. At present, the principal uses of water are for agriculture (both irrigated and rain-fed), domestic use, and for transporting domestic waste away from homes.

[7] Timber harvesting to meet construction and local furniture manufacturing needs is prohibited by UNTAET decree, but illegal harvesting still occurs. Unfortunately, such harvesting leads to inefficient sawing as it is reported to be largely done with chainsaws, not in a sawmill.

[8] Some areas are based on limestone, and benefit from perennial springs.

Water is also the basis for the small inland fisheries sector, for transporting pollution and solid waste (both away from and towards water users). Water also provides a habitat for diseases and pests, and it plays a major role in floods and landslides. In the future, water will be a necessary input into the tourism and leisure industry.

The many uses of water in Timor-Leste are in potential conflict (as in other countries). For example, its waste transportation function conflicts with its function to provide drinking water. Increasing population growth and economic development will tend to increase these conflicts, notably between rural and urban users, and between upland and lowland uses. Traditionally, in rural areas, river water is used for irrigation whereas groundwater (from springs and wells) is used for domestic purposes. Disagreement and conflicts, for example, between upstream and downstream users, have been settled through traditional systems, although this may involve violence. As the population grows and as economic activities increase this system may come under greater strain.[9]

Water quality. There are two principal threats to water quality. First is the high level of erosion. The resulting high levels of sedimentation and turbidity mean that water treatment costs are high. Moreover, the sedimentation can damage water infrastructure and so increase costs in the water supply sector. Second, urban and domestic waste is leading to biological, chemical and physical pollution of water. In a recent survey, only 22 percent and 25 percent of water samples met district standards in Viqueque and Manututo respectively. Very low standards of water quality in these and other locations create substantial burdens for local populations.[10]

Fishery Resources

Timor-Leste is surrounded by sea on three sides, has a coastline of about 700 km and a potential exclusive economic ocean zone of approximately 75,000 km², although the precise boundaries of this zone have not yet been determined. Fisheries resources may be considered in four zones or styles of fishing operation. These zones are not exclusive as there is some overlapping of resource use. The offshore zone supports a level of industrial fishing using large vessels (length 15 m or more) operating over an extended period of time. The near shore zone, 1-12 km from the coast, has been exploited by motorized (outboard motors) vessels with a capacity to hold catches suitable for local markets. The inshore zone is dominated by smaller boats operating close to shore with the catch either being sold or used for family consumption. Finally, subsistence fishery is focused on the utilization of the reef flats or beach areas, but sometimes from small vessels off the beach or reefs.

The present state of the fisheries resources is unknown. Offshore fisheries include pelagic and demersal stocks. The extent and abundance of species of coastal fish is known to include tuna, billfish and deepwater crustaceans as well as a snapper resource around the Sahul Banks area. The inshore and near shore marine ecology is not well documented. The demersal biological marine resources are characterized by low species abundance but high species diversity. The AusAID supported Fisheries Management Capacity Building Project (FMCBP) is undertaking a preliminary survey of the country's fish resources.

There is also a relatively small scale, but locally significant, aquaculture activities. These facilities are in the process of being refurbished. Production is concentrated on carp and tilapia.

[9] For example, the country's largest coffee processing factory shares its water supply with a local village. It is very important economically in the village. As a result of the bumper coffee harvest in 2002, the factory took more water and there was not enough for the villagers.

[10] The SIP for the Water Supply and Sanitation Sector provides greater details on these issues.

Coastal and Marine Resources

The majority of the people live on or near the coast, and all significant urban areas are located in the coastal zone. The coastal zone, including marine, inter-tidal and shorelines areas, contains a vast diversity of inter-connected ecosystems including coral reefs, deep-sea bottoms, mangrove forests, beaches and river estuaries. The inter-connectedness of these systems is demonstrated by the essential roles played by mangroves and reefs in the life and feeding cycles of most marine fish species.

The available information suggests that the coastal zone resources are largely unspoiled, compared to other countries in the region. The mangrove ecosystems on the northern coast are in good condition and provide habitat for several species of sea birds, bats and fish. Many beaches are fringed with coral reefs that are a source of food and shelter for various sea organisms. The surrounding seas are thought to be inhabited by healthy populations of many species of fish, including tuna, skipjack, mackerel and snapper that have high economic value. They also play host to large seasonal populations of whales and dolphins.

Timor-Leste's coastal resources already make a significant contribution to the economy in the forms of nutrition (from fish and other sea products), tourism and recreation, waste disposal transport, fuel and construction materials. Available information indicates that, currently, coastal and marine resources are being harvested within their capacity and there may be scope for increased levels of harvesting. The possible exceptions are localized mangrove and reef destruction, and illegal over-fishing in the off-shore territorial waters by foreign-based industrial operators. The known threats are over-harvesting, inappropriate harvesting technologies and processes, pollution from shipping and petroleum exploitation, and land and sea-based pollution.

As throughout Asia, coastal zone resources can contribute significantly to economic development and poverty reduction. However, as the economy grows, usage of each resource is likely to grow, and the potential for conflict amongst users of the coastal zone will rise. The Government recognizes that coastal zones are very fragile and is cognizant of the fact that in other East Asian countries these zones have suffered rapid, irreversible damage.

In the longer term, the greatest threat to the coastal zone may come from climate change. The best accepted forecasts suggest that sea level rise could have devastating impacts. The corals could be almost entirely destroyed, many mangroves would not survive, and large areas of agricultural and residential land could be inundated with sea water. At present, there is little information and analysis on the likely impacts of climate change in Timor Leste.

Biodiversity

Biodiversity is broadly defined as the diversity of ecosystems, of species and of genetic material within species. The Government recognizes the contribution biodiversity makes to the socio-economy, in areas as diverse as climate regulation, soil generation, food production, medicine and cultural and aesthetic areas.

From a biodiversity perspective, the island of Timor has considerable significance, lying as it does in the "Wallace Zone", where the Indo-Malaysian and Australasian flora and fauna overlap. Consequently, the biodiversity is large and unique. The biodiversity of Timor-Leste is poorly documented and poorly studied. The country is known to have good quality, rare and possibly unique terrestrial, lake and marine ecosystems – these stem from the unique geological and meteorological conditions. Many important terrestrial animals are found, including deer, cuscus, wild pigs, monkeys, crocodiles, snakes and lizards. A recent survey tentatively identified eight

Important Bird Areas using globally recognized criteria.[11] This indicates a high level of both ecosystem and species diversity.

The marine biodiversity is also thought to be valuable. The marine and coastal ecosystems are in good condition and are thought to have healthy populations of several globally important species (for example, turtles). Timor-Leste contains many species of direct benefit to man, for medicinal and commercial uses.

A significant aspect of genetic biodiversity arises when commercial crops have unique characteristics that, at some time in the future, may have important implications (for example, resistance to pests, disease or climate changes). Little is known of Timor Leste's genetic biodiversity, although the probability that Timor Island is the center of origin of the sandalwood tree – an important commercial species – indicates that the island's sandalwood, at least, may contain valuable genetic characteristics.

General observations indicate that the status of much of Timor-Leste's biodiversity is better than many places in the region. The most likely exception is the forest biodiversity, which has suffered due to the high levels of primary forest loss.

Other Environmental Issues

The quality of the natural resource base and the quality of life in Timor-Leste is also affected by a range of other environmental concerns.

Solid waste and sewerage. Solid waste, mostly associated with increased consumption, is a major concern in urban areas, particularly Dili.[12] The consumption patterns of the large international community based in Dili are believed to influence both the scale and nature of the solid waste. The size of this community is expected to decline in the coming years and that may result in some reduction in the problems of solid waste disposal. Solid waste contains a mixture of organic, non-degradable and hazardous waste, each posing specific threats, and each requiring specific management or treatment. In Dili, waste is collected by the formal system and taken to the Tibar landfill site. As with other landfills in Timor-Leste, Tibar is inadequately designed and poorly managed, and the site may be a pollution threat to nearby waterways and groundwater. There are no formal systems for collecting and disposing of waste outside of Dili - most waste ultimately finds its way into the rivers and the sea, and so is a source of pollution. Even in Dili, much waste is not collected, lying on the streets and in dried up streams, before being carried to the sea with the rains. This waste provides a breeding ground for pests and disease.

There is no sewage system in Timor-Leste. Only 33 percent of the rural population and 70 percent of the urban population have access to toilet facilities. However, the waste in toilets is generally untreated. In populated areas this is a health risk that is exacerbated at times of floods.

Air and industrial pollution. Air pollution is of some concern in both rural and urban areas. Indoor pollution from fires for cooking probably represents a major source of respiratory diseases. This is notably an issue for women and children, especially in rural areas. Outdoor pollution is limited to small areas of Dili, from the growing number of vehicles.

Industrial pollution is not a widespread problem in Timor-Leste. Some localized examples exist, such as waste from a coffee processing plant, and waste associated with the international peace

[11] See "A Preliminary List of Important Bird Areas in East Timor," *Bird Life International*, May 2002.
[12] Solid Waste is addressed more thoroughly in the SIP for Water Supply and Sanitation.

keeping force and related military operations. Many small-scale unregulated workshops also generate industrial waste. The current low level of activities in the minerals and petroleum sectors means that the environmental impact of the sector is localized and not significant. However, as the economy grows, and some industries take off, the associated threat from industrial pollution will grow. Shipping, petroleum exploitation, and energy generation are the likely to be the main large-scale sources of industrial pollution.

Climate change is a global phenomenon whereby emissions of certain gases, largely from industrial processes in industrialized countries, are leading to changes in the atmosphere and hence to changes in global, regional and local climates. In Timor-Leste, this is likely to lead to changes in the length and intensity of the rainy seasons, to changes in the number and intensity of storms and other climatic events (for example, floods, fires), to changes in the maximum and minimum temperatures and to sea level rise. These climatic changes are likely to affect all economic sectors, most notably agriculture, forestry and health.

Economic Impact of Resource Degradation

Environmental degradation is a major concern because of its impacts on economic growth and poverty. There is not sufficient information available to determine the costs of these impacts in Timor-Leste and their ultimate impact on GDP. The following are believed to be among the more important costs:

- Land degradation leads to losses of agricultural production, to damaged waterways, and to increased costs of water treatment and water supply systems.
- Water pollution leads to health costs, and to reductions in productivity in the fishery, agriculture and tourism sectors.
- Air pollution leads to health costs and associated economic losses.
- Biodiversity loss leads to short-terms losses in the health and food sector, and possibly huge long-term losses covering many sectors.
- Floods, landslides and fires cause severe economic damage, and are in part a result of environmental degradation.
- Climate change may have significant implications on economic development in Timor-Leste.

II. DEVELOPMENT OF THE PETROLEUM AND MINERALS SECTOR

Goals and Strategic Objectives

As set out in the National Development Plan (NDP), the goal is to manage minerals, energy and extractive activities in a consistent, fair, environmentally sustainable, transparent and timely fashion. The guiding principles to this are sustainability, efficiency of resource use and equity.

The Government has set out its strategy for achieving these objectives in the NDP, in its Strategic Plan[13] and in the Annual Action Plans of the Division of Energy and Mineral Resources (EMR) in the Ministry of Development and Environment (MDE). The approach, *for both minerals and petroleum*, is to create as quickly as possible an enabling environment that will encourage the domestic and foreign private sector to invest. With successful creation of an environment conducive to private investment, the role of the Government will then be limited to oversight and regulation and to continued investment promotion.

[13] *Strategic Planning for the Development of Natural & Mineral Resources Sector in Timor-Leste,* Industry, Mineral and Tourism Division, October 2001.

In formulating its strategy for offshore development of resources, the Government decided to proceed immediately to invite investors to bid on exploration and revenue sharing contracts based on existing information. Partnerships have been established with international private companies to initiate the exploration and exploitation of these resources.

In the JPDA, contractual arrangements have been established with Conoco-Phillips (operator for the Bayu-Undan field) and with Woodside (operator for the Greater Sunrise field). As a result of the off-shore program, the petroleum sector is expected to be the main source of revenues for Timor-Leste within the next five years, generating $80-120 million of revenues annually during the decade 2005 to 2014. In addition to these revenues, careful management and development of this sector can bring other benefits, including job creation, skills development, institution building and foreign direct investment.

In the case of the on-shore and near-shore resources, the Government has decided to adopt a phased approached, first investing in more sophisticated seismic/exploration information, the results of which, if promising, could be shared with potential private investors. The judgment of the Government was that better information would reduce commercial risks for the investors and would enhance the prospects for revenue sharing arrangements with investors that would be favorable to the country.

The Enabling Environment for Investment

Priority is being given to the creation of an enabling environment for private investment. The main elements of the environment rest on three pillars:

- Establishing the legal and regulatory framework.
- Strengthening institutional and individual capacities to manage the sectors. This is primarily to ensure that the government departments have the skills and competence necessary to implement the legislation, to promote development in the sector, and to oversee management of all activities and investors in the sector.
- Strengthening the institutions responsible for managing and promoting investment in the sector. This includes collecting information in order to reduce the risks faced by investors.

Table 2: Legislation in the Petroleum and Mining Sector

Name of Initiative	Objective	Status
Sustainable Mining Law	Sustainable management of minerals	Drafted during 2002. Pending Cabinet approval.
Petroleum Law	Comprehensive code for on-shore and off-shore exploration and development	Drafted in 2003/04. Scheduled to be promulgated by early 2005
Mining system and procedures	To clarify operating systems and procedures under the new Mining Law. Covers license, job creation, royalties, responsibilities, etc.	Largely completed by MDE. Implementation awaits promulgation of the Law.
Petroleum system and procedures	To clarify systems and procedures for implementing the Petroleum Law. Covers license, job creation, royalties, responsibilities, etc.	Largely prepared by MDE and the Timor Sea Designated Authority (TSDA). Implementation awaits promulgation of the Law.

The legal and regulatory framework. Work on the legal and regulatory framework is well advanced (Table 2). Priority was given to the development of the mining law because of its

potential impact on job creation in the economy (and therefore stability and poverty reduction). There has also been steady progress on the petroleum laws. As a result, all the basic legislation has been prepared and current expectations are that this legislative package will be promulgated by mid-2004.

Development of institutional capacities. The expectation is that the environment for private investment can be established within the next few years. The Government's role would then be limited to oversight, regulation and investment promotion. The respective roles of various government agencies in the development of the petroleum and minerals sector, along with related downstream responsibilities for energy use, are set out in Table 3. The Division of Energy and Mineral Resources (DEMR) in the Ministry of Development and Environment (MDE) has primary responsibility for regulation and promotion of on-shore petroleum and minerals. The DEMR is now fully functional, although limited in terms of staff numbers and capacity.

Table 3: Key Roles in the Petroleum and Mining Sector

Role/function	Ministry/department	Division	Sub-Division	Private sector or NGO
Preparations of treaties, international law, boundaries	Timor Sea Office			
Management of off-shore petroleum	Timor Sea Designated Authority for the JPDA			All exploitation will be with private sector
	MDE for Timor Leste waters only	EMR		
On-shore petroleum management	MDE	EMR	Energy	All exploitation will be with private sector
Minerals management	MDE	EMR	Minerals	All exploitation will be with private sector
Groundwater protection and management	MDE	EMR	Minerals	
Renewable energies – excluding hydropower	MDE	EMR	Energy	Role for private sector to be determined
Power generation sector management	MTCPW			Generation will be by private sector

Individual capacity building in the petroleum and minerals sectors. Initially with support from the UN and USAID, the Government has launched an intensive program to build individual capacities within the agencies responsible for the petroleum and mining sector. This program has been supplemented and implemented with help from UNTAET and UNMISET in placing of two full-time international advisers. Most capacity has been built through formal training courses, much of it outside of the country.

Currently the NORAD assisted project is intensely involved in developing the management capability of the petroleum sector in Timor-Leste over the next six years. The capacity building activity is conducted through institutional cooperation between the Ministry of Development & Environment (MDE) and the Norwegian Petroleum Directorate (NPD). The goal is to assist in developing the institutional capacity over the period of next six years such that the Timor-Leste will be capable of managing the upstream petroleum activity independently without significant foreign assistance.

Development of On-shore Oil and Gas in the Medium-Term

For the immediate future, priority is being given to the above-mentioned initiatives aimed at consolidating capacity building and institutional development at the national level to improve technical and managerial supervision of the on-shore petroleum sector. The Government has

opted to not enter into any mid- or long-term oil or gas production contracts until the Petroleum Law is in force. It will use the intervening period to increase its capacity and knowledge and implement several demonstration projects. The proposed program for the medium term centers on the following:

- Developing a National Energy Policy for Timor-Leste
- Strengthening capacities to enforce and disseminate the Petroleum Law, through a demonstration project and associated training.
- Pilot projects to exploit and utilize hydrocarbon reserves (capped wells and seeps) in order to demonstrate the technical and economic feasibility of this exploitation.
- Additional seismic surveys of on-shore petroleum deposits.
- Improved resource inventories, and data and information management systems, based on GIS and computer mapping.
- Preparation of a sectoral investment promotional package (giving details on known reserves; clarifying the roles, responsibilities of investors; clarifying protection of investors; and clarifying royalty agreements) and an associated promotional event.

National energy policy for Timor-Leste. At the present time, Timor-Leste is almost totally dependent on imported petroleum products and domestically produced firewood to meet its energy requirements. Petroleum products are the single largest import of the country. According to the trade data released by the National Statistics Directorate, Timor-Leste imported some $36.8 million of petroleum-related products in 2004 – equal to a quarter of all merchandise imports. Informal estimates indicate that the power sector now consumes the equivalent of 450 barrels of oil a day, while the transport sector uses the equivalent of 600 barrels a day. The commercial development of domestic petroleum sources could therefore have a significant economic impact that, among other things, could result in a substantially lower merchandise trade deficit, which was almost $140 million last year.

At present there is no National Energy Policy for Timor-Leste. It is essential for the country to have an energy policy that provides the basic Road Map for movement towards the objective of stable and secure sources of energy. The National Energy Policy will ultimately be the economic engine to achieve the energy-related goals prescribed in the National Development Plan. Such a Policy will address the principal goal of balancing the energy, economy and the environmental (3Es) requirements of the country in order to maintain an acceptable degree of socio-economic sustainability. It is relatively a high priority item and needs to be developed within a short timeframe to provide direction at the national level for energy development. It is an important national blueprint that will include pertinent information such as Timor-Leste's energy resources and reserves; primary energy demands and supplies and forecasts for short- term and long-term periods; energy export and import; energy pricing and for development of renewable energy.

Petroleum law demonstration project. The regulatory framework that will allow investors to apply for licenses to investigate an onshore exploration will not be in place until the Petroleum Law is promulgated (currently scheduled for early 2005).[14] The challenge in this process is to develop legislation, rules, state participation and fiscal packages that will maximize the economic rent while at the same time attracting venture capital for the exploration and exploitation of valuable resources. Work is in progress on the formulation of efficient concession rules and fiscal packages suited for both onshore and offshore exploration; and it is important that this proceeds

[14] In the Joint Petroleum Development Area (JPDA) a temporary arrangement has been established while a new Petroleum Mining code and model production sharing contract is being finalised in early 2005.

at a deliberate pace to establish an efficient and competent capacity to facilitate development of the industry. The process will obviously take some time, but in view of the urgency to obtain some onshore production to support power generation a Petroleum Law Demonstration Project is proposed. This would basically have three objectives: (a) test the draft Petroleum Law and associated regulations to determine whether it will achieve the objectives of attracting venture capital and maximizing economic rent; (b) generate further exploration and exploitation which will provide better indication of prospects to potential investors in later exploration areas; and (c) produce oil for power generation substituting for costly oil imports.

In a short timeframe, a "pilot" license can be used to test a business model for each phase of development, including: prospecting, exploration, field development, transportation, cessation and clean-up. The Government believes that acreage that includes an "old" discovery well will probably be sufficiently attractive that an oil company will accept a reasonable work program to initiate production as well as firming up exploration prospects within a limited time frame.

In the licensing phase the most appropriate type of commercial and fiscal arrangements can be tested. These include the bidding system, cash payment up front, resource rent taxes, royalties and production taxes, corporate income tax and production sharing. Other aspects can also be tested during the initial license period, including: the structure and length of exploration phase; the structure on the work commitments both for seismic and drilling work programs; exploration drilling permits; relinquishment rules; area fees; data acquisition and sharing; and safety and environmental issues. Other issues that may be examined under the proposed program include: commercial declarations; up-front plan for development and operation (PDO); annual production permits; extended studies at mid-life of the field; plan for cessation of the field prior to the shut-down; and the plan for clean up and removal of installations.

Expansion of the seismic exploration program. The Government recognizes that firming up drillable prospects will require modern seismic surveys that can be costly and time consuming. Assuming that the results of the on-going studies are favorable, the Government would carry out further exploration in parallel with the development of the Petroleum Law and associated licensing procedures. This process will reduce the time needed to develop identifiable sources of on-shore oil and gas. Improved data would also enhance the response to an initial licensing round. The Government is therefore proposing to build on the existing studies and data with further data collection, including retaining consultants to assist with: (a) design of a 2D seismic acquisition program to firm up prospectivity; (b) soliciting bids for seismic exploration; (c) supervision and quality control during seismic acquisition; (c) seismic interpretation; (d) selection of prospective areas for promotion; and (e) reporting and analysis.

A seismic survey of near-shore potential is being undertaken along the south coast by a consortium that involves PetroChina and a Norwegian group. The planned survey will cover 20,000 square km. As part of the contract, the group will also establish a training centre in Dili. Results of the seismic shoot are expected to be available to prospective developers by April. International interest in the further development of Timor-Leste's petroleum resources is high. Timor-Leste attended a major international oil and gas exhibition in Singapore late last year, marking its debut in promoting the petroleum potential of the country. Representatives from more than 20 countries have visited Timor-Leste in the past year ahead of the first round of bidding on exploration blocks, expected to start soon after the seismic survey results are available later this year. To further promote the industry, the Government will launch a two-month roadshow from April this year, with visits to key centers in the United States, Singapore, United Kingdom and Japan.

Petroleum data management contract. As noted earlier, primary responsibility for development of on-shore oil and gas resources rests with the Oil and Gas Directorate within the Ministry of Development and Environment. Capacities for effective management of the on-shore program are very limited at this time; the Government attaches a high priority to the further development of these capacities. This program is built around the following components: institutional development consisting of the establishment of a Petroleum Resource Management system and a GIS, complete with map digitizing and computer hardware and software and associated training and technical assistance.

Gas seep harvest demonstration project. As noted earlier, gas resources are not yet clearly established through exploitation surveys; however, there are several well-known, and apparently prolific, gas seeps that have been burning for decades. There is some confidence they will continue to produce gas for many years. There are many others that are known about, but have not been separately identified in the various overview studies. If a seep is harvested, 1 cu ft/second of gas produced could usefully support 250 kW of generation plant for a period at least equivalent to its service life of up to 25 years. Gas seeps represent a valuable local resource that fits the scale of energy consumption in Timor-Leste. Any use of seep gas also has an environmental benefit. If it can be used in a generator to substitute for diesel, the particulates and greenhouse gas (GHG) emissions are reduced.[15] Energy can be extracted for secondary use as electricity or process use. Gas seeps that are not burning are venting methane directly. Converting methane to CO2 reduces GHG emissions. The proposed demonstration project would attempt to harvest a gas seep and use the gas for power generation on a very small scale.[16] The indicative cost of Phase I of the project is $274,000. A suitable location for this is the Aliambata area, where gas seeps are well-known and have been burning with flames between a half and one meter long for many decades. The project activities would comprise a simple test to assess flowing gas volumes of the seeps that are currently burning at Aliambata and a permanent vessel for seep harvest can be constructed and set up on more permanent foundations with a separator.

Even if on- and near-shore resources are not considered to be commercial for export purposes, the above projects would help determine the feasibility of using modest quantities of oil and gas for power generation, particularly for load centers on the South coast located close to the resources and where transportation costs from the Dili oil import terminal are high. This would reduce import costs and save foreign currency reserves. If the fugitive methane gas seeps can be successfully captured, then the Timor-Leste has the greatest potential of being eligible for the Community Development Carbon Fund (CDCF). It is estimated that Timor-Leste may be eligible to receive approximately $200,000 per year through the World Bank's CDCF funding mechanism with the capturing of the methane gas and transforming it to electricity for rural development. Over a period of 10 years of operation this will amount to about $2 million, most of which may be accessible in the front end of the operation of the project.

Oil well rehabilitation demonstration project. The risk involved in rehabilitating wells that have produced oil and gas in the past, or drilling a well close by the existing wells, to reproduce their original success, is significantly lower than a wild cat exploration well. There is one well in the Suai district which has continued to leak oil and gas since it was capped in 1975. This well is equipped with wellhead facilities. The continuing oil leakage is a strong indication of possible

[15] Such a program may qualify Timor-Leste for significant cash payments from the Carbon Fund managed by the World Bank. See Chapter III for more details.

[16] A power plant associated with the seep harvest at Aliambata could be installed to generate power with gas harvested from the site. Preliminary survey indicates the seep harvest could support a power plant of 300 kW. See the SIP for the Power Sector for more information.

production. This may be tapped by re-engineering the wellhead and passing the oil into a separator. Consultants have prepared a project proposal to rehabilitate this well and use the oil locally for power generation substituting for costly diesel fuel. The indicative cost of the project is about $ 220,000. The rehabilitation would also eliminate the current environmental pollution resulting from the current leaks, and help to establish the profile of the onshore oil and gas status of Timor-Leste.[17] The scope of the proposed project includes:

- A field survey by oil field production technicians to measure and assess the engineering requirements for wellhead replacement.
- Installation of a new wellhead, separator and ancillaries and flow test the well.
- Assessment of the subsurface geology and reservoir.[18]

Further Development of the Minerals Industry

Although the petroleum sector has been given priority, the Government recognizes that the minerals sector is important for income and job generation, and its further development cannot be delayed indefinitely. Government support for this sector will therefore start up in FY2005/06. The proposed capacity building program in the minerals sector focuses on the following areas:

- Further strengthening of the legal/regulatory framework.
- Capacity building of MDE officials in the areas of basic geology, resource management and resource registration systems.
- Strengthened capacity to enforce and disseminate the Mining Law, through a demonstration project and associated training.
- Establishment of required institutions, including a geological survey department, GIS and library systems, health and safety standards, and geological museum.

Management and Promotion of Private Investment

Once the data collection and analysis is complete, and an improved operating environment is in place, the Government will be in a stronger position to attract private sector investment on favorable terms. The Government intends to promote private investment through a series of sectoral development programs, including investment packages and promotion events, for example, targeting the entire minerals sector, or targeting a specific mineral. The investment packages will provide information on reserves, the legal and regulatory environment including protection for investors, royalties and taxation and on the roles and responsibilities of the private investor. In carrying out this program, steps will be taken to optimize technology and knowledge transfer, and to create local employment.

Program Linkages and Priorities

Depending on the nature of operations, the Petroleum and Minerals Sector will have varying degree of linkages with one or more of the other sectors. It is important to identify these intersectoral linkages for efficient and effective integrated resource management as well as suitably coordinated implementation of ongoing and new programs. For petroleum and minerals the cross-sectoral linkages and impacts extend to the following sectors:

- Power Sector *(for cost-effective & secured fuel supply)*

[17] If the oil well proves to be productive, a power plant associated with the rehabilitation of the well could be installed to generate power with oil and gas produced from the well. Preliminary surveys indicate the output from the oil well rehabilitation could support a power plant of 400 kW that would be sufficient to serve the surrounding community. See the SIP for the Power Sector for further discussion.

[18] Since the original well records and subsurface reservoir information are missing, the project would include relevant expertise for this work. From piecemeal information in UN reports, surface geology and interviews with local people, it may be possible to restore the geological model that led to the drilling of the well. This may have important implications for further exploration in the area.

- Water Sector *(for energy supply by Hydros and Groundwater management)*
- Environment Sector *(for all environmental impacts management)*
- Forestry Sector *(for replacement of firewood as fuel)*
- Land & Property Sector *(for utilization of land and sea)*
- Health & Safety and Labour Sector *(for protection, training & employment of Timorese labour force)*

The Government agencies responsible for the Petroleum and Minerals Sector have established a clear set of priorities for the proposed new program. The high priority program involves new commitments of some $5.5 million. Projects that would come up for consideration over the medium-term amount to $3.3 million. Formulation of a national energy policy is accorded a very high priority and discussions have started with USAID about possible support, along with the next phase of the onshore and nearshore seismic exploration. The Government has entered into ***an agreement*** with NORAD about support for the high priority capacity building programs: the petroleum data management system and capacity building. The USAID has expressed possible interest in the Legal, Regulatory Framework and Investment Promotion Project.

Table 4: Priorities for Proposed New Program for Energy and Minerals
(In US$)

Priority Ranking	Start Date	Proposed Total Amount for Program					Total
		FY2004/05	FY2005/06	FY2006/07	FY2007/08	FY2008/09	
A. High Priority Programs							
National energy policy	FY2004/05	275,000					275,000
Onshore oil and gas seismic exploration	FY2004/05	2,560,000					2,560,000
Petroleum data management system	FY2004/05	650,000					650,000
Capacity building for resource survey & management	FY2004/05	500,000					500,000
Legal, regulatory framework & investment promotion	FY2004/05	500,000					500,000
Participatory rural energy development	FY2004/05	410,000					410,000
Solar energy demonstration project	FY2004/05		625,000				625,000
Total proposed		4,895,000	625,000	-	-	-	5,520,000
Disbursements		2,115,000	3,080,000	325,000			5,520,000
B. Programs for the Medium Term							
Establish & implementation of national oil company	FY2005/06		825,000				825,000
Capacity building admin. & licensing of mining law	FY2005/06		500,000				500,000
Geological survey capacity building	FY2005/06		1,000,000				1,000,000
Geological museum	FY2006/07			500,000			500,000
Wind resource assessment	FY2006/07			500,000			500,000
Total proposed		-	2,325,000	1,000,000	-	-	3,325,000
Disbursements			1,575,000	1,250,000	500,000		3,325,000
C. Total proposed		4,895,000	2,950,000	1,000,000	-	-	8,845,000
Total disbursements		2,115,000	4,655,000	1,575,000	500,000	-	8,845,000

Source : Annex Table 5

Detailed descriptions of these proposed new programs are contained in the companion publication entitled "Sector Investment Program: Profiles of Proposed New Projects."

III. ENVIRONMENTAL PROTECTION AND MANAGEMENT

Goals and Objectives

As recognized in the National Development Plan, "real lasting poverty reduction is only possible if the environment is able to provide the service people depend on, and if natural resources are used in a manner that does not undermine long-term development". Accordingly, the Government's main goals for protecting and managing the environment are t:

- Manage extractive activities in an environmentally appropriate fashion.
- Protect and enhance the natural environment.
- Raise community awareness about the importance of protecting the environment.

- Integrate environmental considerations into policies, programs and plans.
- Ensure accountability to the government and the community for environmental aspects of the extractive industries.

As the earlier discussion indicates, the main environmental issues are air/water pollution, land degradation and biodiversity loss, together with a growing threat to the marine and coastal ecosystems. An upturn in economic activity and increase in private investment has the potential to exacerbate these threats. For example, there are some 600 investment projects waiting to start up after the new Investment Law is promulgated. An important challenge for the Government is to build capacities for quick approval of these proposed investments, while at the same time ensuring that they are consistent with the environmental laws and regulations and that they do not have adverse social and economic impact.

Millennium Development Goals for the Sector

Following a workshop on the Millennium Development Goals (MDG) in 2003, the first country report on the Timor-Leste's MDGs was published by the Government and UNDP in February 2004. Three indicators have been identified as being especially relevant for the sustainable development of the natural resources of Timor-Leste and sound management of the environment.[19] These are:

- Energy use per unit of GDP
- Carbon dioxide emissions per capita
- Population using solid fuels

No specific targets have been set for these indicators as yet. A start is being made in developing capacities for periodic monitoring of these aspects of environmental management.

Table 5: Estimated CO_2 Emissions in Timor-Leste

Fuel Type	Consumption (tonnes/year)	CO_2 Emissions (tonnes/year)
Firewood	800,000	672,000
Diesel	50,000	160,000
Gasolene	22,000	66,000
LPG	500	1,500
Kerosene	200	500
Total	872,700	900,000

Source: Ministry of Development & Environment

Firewood is the major source of fuel for about 80 percent of the households. This compares with an average of 75 percent of households in all developing countries that use solid fuels. Approximately 1.6 million cubic meters (JAICA-Report) of fuel wood is consumed each year in Timor-Leste. With the elimination of fuel subsidies the use of firewood is growing. No reliable data is available on commercial energy use in Timor-Leste. Commercial energy consumption for Timor-Leste may range between 300 and 400 kg of oil equivalent per $1,000 of GDP, which is similar to many other developing countries.

There is a direct relation between the amount of energy use and the CO_2 emissions.[20] Carbon dioxide (CO_2) is mainly generated from the burning of the fossil fuels, which include fire wood,

[19] For further discussion of MDGs related to land use and forest cover, see the SIP for Agriculture, Forestry and Fisheries, May 2004.

[20] High income countries with 15 percent of population use 50 percent of the energy in the world and produce 50 percent of the global CO2 emissions. Global emission of CO2 on per capita basis has hardly changed over the last decade and remained at an average level of 1.14 metric tons of CO2 per capita. However, the per capita CO2 emissions range from a value of 10 tonnes CO2 or higher in industrialized economies, such as the USA and Australia, to a value of 1 tonne or less in the developing countries in Africa and Asia.

diesel, gasoline, kerosene, LPG and natural gas. It is the largest component of greenhouse emissions throughout the world. For Timor-Leste per capita CO_2 emissions is estimated to be about 1.03 metric ton. Total CO_2 emissions in Timor-Leste are estimated at about 900,000 tonnes per year. This is equivalent to about one tonne per capita per year, which is very close to the global average and comparable to many other developing countries. More than two-thirds of these emissions come from burning firewood.

Existing Governance Framework

To date, the main focus of the Ministry of Development and Environment (MDE) has been on establishing the framework for effective environmental governance, on developing capacity at the national level, and on pollution or the 'brown side' of environmental management.

Table 6: Status of Environmental Legislation

Law/regulation	Promulgator	Status
Law on Protected Areas	UNTAET	Issued in 2000
Law banning logging	UNTAET	Issued in 2000
Law on Environmental Impact Assessment	National Parliament	Draft prepared by MDE and ready to present to COM
Law on Pollution Control	National Parliament	Draft prepared by MDE and ready to present to COM
Implementation Guidelines addressing: requirements for development proposals; sand and gravel extraction; small land-fills; Tibar landfill; polluting activities; screening; and fuel storage	MDE	Under final review. Promulgation will follow adoption of the laws of EIA and pollution control
Protected areas	Undecided	Possibilities being discussed
Endangered species	Undecided	Possibilities being discussed
Catchment protection	Undecided	Possibilities being discussed

Legal and regulatory framework. The Government has taken important steps to establishing a legal framework for management of the environment. The current status of the relevant laws and regulations is summarized in Table 6. The UNTAET administration issued laws to address **emergency** issues, resulting in protection of eight areas with known value in terms of forests, catchments, or biodiversity; and also a ban on large-scale logging to protect against further deforestation. As Table 5 indicates, since Independence, the Government has focused its attention on the environmental impact of large-scale projects through the proposed Law on Environmental Impact Assessment (EIA) and on controlling pollution from facilities being operated.

Although there has been some progress, much remains to be done on the legal and regulatory side. The proposed laws have not yet been adopted, but the Division of Environment (DE) within the MDE is already using them to guide its daily activities, and is striving to enforce them (and the related guidelines) on a pilot basis with willing enterprises. If adopted and enforced, these laws could address pollution associated with large development projects and would address large point sources of pollution in sectors such as petroleum, transport and energy as well as larger

industrial plants funded by domestic or foreign investors. They would be less effective for addressing medium and small sources and workshops.

Administrative framework and responsibilities. The Division of Environment has the leading and coordinating role in environmental protection and management. The DE grew out of the Environment Protection Unit under UNTAET. In the past two years it has grown from 4 to 12 national staff, it now has a basic library, office facilities and laboratory. It has six sections addressing environmental impact assessment, pollution control, natural resources, environmental awareness, environmental laboratory and an information management system. The laboratory is functioning to a very limited extent, given the need for more training and equipment. The Division works with a range of other government and non-government agencies in order to achieve its aims (Table 7). Initially, the staff of DE had no background in environmental policies and management. A training and capacity building program has been launched focusing on EIA and pollution control, so that DE can respond to immediate challenges. In addition, skills related to environmental awareness, project management and resource mobilization have been developed.

Table 7: Key Roles in Management of the Environment

Role/Function	Ministry	Division	Private Sector/NGO
EIA	MDE	DE	Enterprises will have to follow regulations
Pollution Control (air and water)	MDE	DE	Enterprises will have to follow regulations
Solid waste – overall collection and management	MTCPW Local governments	WSS	
Solid waste – pollution control	MDE	DE	
Hazardous waste	MDE	DE	
Resource management (forests, fisheries, minerals, etc)	MAFF MDE	Concerned division DEMR	Enterprises will have to follow regulations
Biodiversity Conservation	MDE and MAFF	DE DF, DFM	
Environmental Awareness and Education	MDE And MEYC	DE	NGO's are active in environmental awareness
Catchment protection	Undecided – although there is a high level, inter-agency working group with related responsibilities		

Inter-Ministerial coordination and the role of DE. As noted earlier, an inter-ministerial working group on natural resources has recently been established. DE is increasingly contacted by other agencies, notably WSS and DEMR, to help redress small-scale environmental incidents, such as oil spills or landfill leakages. These contacts indicate the growing credibility of DE.

Policies and Programs for the Medium-Term

Although progress has been made in establishing policies and programs for management of the environment, weaknesses remain in the overall preparation of policies, in the system of planning and setting priorities, in the outreach and coverage of districts and villages, in the systems of reporting and indicators, and in the capacity to enforce existing legislation. Additional legislative measures are also necessary. A governance framework able to utilize voluntary measures and market based incentives will eventually be needed. And most importantly, the scale of on-the-ground activities to prevent environmental degradation needs greatly increasing.

To date, the approach has, to some extent, been driven by reaction to events. The Government recognizes the need for a more proactive and strategic approach. The program for the medium-term therefore emphasizes strategic action across three related fronts.

- Strengthening the environmental governance framework and capacity;
- Mobilizing broad support for environmental protection and developing productive partnerships to protect the environment;
- Launching key on-the-ground initiatives to protect the environment and the natural resources.

Strengthening the environmental governance framework In the immediate future, DE needs to modestly expand its capacities in order to respond to the most pressing needs. For this, DE requires additional training on EIA and pollution control, urgent support to the development of environmental standards and associated training, urgent laboratory supplies, development of a basic database and management information system, and the launching of small scale awareness raising activities. Next, the Government seeks solid institutional support from the international community over the medium term. This support will the strengthen planning and policy making capacity, consolidate the legislative and regulatory framework, help develop environmental reporting capacity and indicators and assist in the design and establishment of a comprehensive environmental database/management information system. A significant proportion of this medium-term support will focus on district level environmental managers.

Mobilizing broad support for environmental protection and developing productive partnerships to protect the environment Overall support for and concern over the environment remains very low in Timor-Leste, principally for the following reasons:

- Predominance of the “grow first, clean-up later” paradigm, as experienced across Asia. The Government wishes to avoid this approach and is committed to environmentally sustainable economic growth, social stability and job creation. However, translating these objectives into operational terms is challenging, despite the goodwill and intentions of all public sector managers. Given the short-term pressures to generate growth and jobs, there is a danger that environmental protection will be inadvertently given a low priority. These short-term pressures apply to national government agencies, to local governments, to large and small-scale private sector, to traditional governance mechanisms, and notably to most households.
- Low understanding among the populace that economic development can pose a threat to environmental resources. And, in turn, that a degraded environment threatens economic development and can impose high economic costs. Some policy makers may not be fully aware of this trade-off. Moreover, some environmental measures may cause short-term local hardships. For example, the establishment of a marine or terrestrial protected area may limit traditional activities. Over the long term, this will preserve natural resources, and may lead

to other economic advantages (through eco-tourism, for example), but may cause difficulties and opposition in the short-term.

Even if all concerned national government agencies were to cooperate fully and prioritize environmental protection, the government alone cannot assure environmental sustainability. Accordingly, one of DE's key programs is to generate the support of other stakeholder groups such as local governments, NGOs and community organizations, private sector and ordinary people. To achieve this, the Government is to launch a comprehensive outreach program and develop sensible partnerships for environmental protection. The support of Development Partners is being sort for this outreach program. The Outreach Program consists of:

- *Wide-scale awareness and educational campaigns.* Effective environmental protection and management requires the support of all elements of society. Educational campaigns have been run in Dili and other urban centers, often jointly with NGOs such as Habeuras. The judgment is that overall environmental awareness has increased slightly, but is still low. Hence these campaigns remain a high priority in the Government's medium-term program.
- *Targeted advocacy.* In addition to raising general awareness, it is necessary to influence decision-makers through targeted advocacy campaigns. This program would prepare and deliver a series of targeted products aiming at decision-makers in government, in the large and medium-scale private sector, in local governments, and with key people such as schoolteachers.
- *Developing productive partnerships.* The challenge is for the DE to work effectively with all sectors and all stakeholder groups to influence behavior and establish an incentive framework conducive to environmentally sustainable development. The DE will work closely with all concerned national government agencies. Moreover, Government policy is to encourage civil society to play a role in technical support and information exchange, in monitoring the environmental situation and in calling attention to possible problems before they occur. Micro-grants for environmental activities would be a part of this program. Key partners would be line ministries and NGOs. Academic institutions will also be supported.

Environmental and natural resource protection. The above programs will help to create the overall capacity and incentive framework for environmental sustainability in Timor-Leste. The Government recognizes that these measures have to be complemented by sizeable on-the-ground, site specific measures. In the medium term, the Government aims to step up its activities addressing industry related pollution and start activities to reverse biodiversity loss.

Apart from the longer-term benefits for society that stem from the pursuit of environmentally sustainable development, there can also be more immediate benefits in the form of job creation. In some countries environmental improvement schemes can create jobs and provide a boost to the economy. This is usually in the form of clean-up schemes, but can take the form of prevention. Environmental improvement in Timor-Leste that would create jobs, increase ownership and pride, and improve health and living conditions include: large-scale litter and garbage collection in towns and along the coasts, land restoration and reforestation. Development of an environmental industry is to be explored over the medium term.

Joining the Global Environmental Community

The Government recognizes the global nature of some environmental issues, including biodiversity loss and climate change. Others may not be of a global nature, but occur throughout

the world (for example, desertification), cross national borders (pollution) or may benefit from the support of global networks (such as UNEP, or the leading international NGOs). The Government is aware of the growing international legislative framework for environmental management and is actively considering membership in a number of these conventions and protocols. Timor-Leste expects to draw support from this management system as well as make contributions to the global process. Timor-Leste may also participate in various regional environmental agreements and initiatives, and is already active in the Arafura and Timor Sea Environmental Forum (ATSEF).

Table 8: List of Main Global Conventions to which Timor-Leste is Considering Accession

Convention	Objective	Status in Timor-Leste	Funding Arrangement
UN Convention on Combating Desertification	Control land degradation and desertification, with focus on participatory mechanisms	Acceded in November 2003	Dedicated Global Mechanism; The Global Environment Facility (GEF)
UN Framework Convention on Climate Change and its Kyoto Protocol	Understanding, mitigating and adapting to climate change due to emissions of greenhouse gases	Under consideration by the Council of Ministers	GEF; 'Kyoto Protocol mechanisms, such as the Carbon Credit Fund
UN Convention on Biodiversity Conservation	Conservation, sustainable use and equitable benefit sharing of biodiversity	Under consideration by the Council of Ministers	GEF
Montreal Protocol	To restore and protect the ozone layer	Pending	Dedicated Multilateral Fund
Stockholm Convention	To manage and control persistent organic pollutants (POPs)	Pending	Limited funding available through GEF

By integrating more fully into the global community, Timor-Leste has an opportunity to benefit from financial, technical and moral support to protect its environment. However, some of this support may be conditional (for example, focused on biodiversity) or may not be government-to-government (many NGOs provide support directly to local communities). The challenge for the Government is to make effective use of these global opportunities in the pursuit of national goals for the environment. As the next section indicates, expanded involvement with the global community also offers an important avenue for additional funding for a number of the high priority programs discussed earlier in this report.

In order to launch the optimal approach to participating in the international Conventions, the Government is to first assess its capacity needs to implement the global Conventions and raise critical awareness. These activities are to be supported by UNDP and GEF with a program of assistance amounting to $300,000.

Priorities for the Proposed Program

The Government has set clear priorities for the environmental sector program, which are summarized in Table 9. Five of the proposed programs, involving new commitments of about $4 million, are accorded a high priority. The UNDP and WHO have indicated a willingness to support the proposed program that will promote more efficient use of household fuel. The UNDP

with other partners has also expressed interest in helping the Government assess the implications of joining additional international conventions, as well as providing capacity building for land management. Discussions are underway with the ADB about support for the groundwater survey program.

Table 9: Priorities for Proposed New Environment Program
(In US$)

Priority Ranking	Start Date	Proposed Total Amount for Program					Total
		FY2004/05	FY2005/06	FY2006/07	FY2007/08	FY2008/09	
A. High Priority Programs							
Environment Division capacity building	FY2004/05	390,000					390,000
Environment governance with MEA focus	FY2004/05	200,000					200,000
Institutional development in environment sector	FY2004/05	600,000					600,000
Environmental outreach program	FY2004/05	600,000					600,000
Timor-Leste pollution control	FY2004/05	540,000					540,000
Biodiversity conservation	FY2004/05	500,000					500,000
Groundwater survey	FY2004/05	1,000,000					1,000,000
Total proposed		3,830,000	-	-			3,830,000
Disbursements		1,050,000	1,630,000	1,150,000			3,830,000
B. Programs for the Medium Term							
Intersectoral management mechanisms	FY2005/06		100,000				100,000
Capacity building for sustainable land management	FY2005/06		400,000				400,000
Total proposed		-	500,000	-			500,000
Disbursements			250,000	250,000			500,000
C. Total proposed		3,830,000	500,000	-			4,330,000
Total disbursements		1,050,000	1,880,000	1,400,000			4,330,000

Source : Annex Table 5

Detailed descriptions of these proposed new programs are contained in the companion publication entitled "Sector Investment Program: Profiles of Proposed New Projects."[21]

IV. INTEGRATED MANAGEMENT OF LAND, WATER AND COASTAL ZONES

Emerging Strategies for Integrated Management of Resources

Land, water and coastal zones provide many functions for many users, across many socio-economic sectors and in many geographical areas. Historically, the allocation of these resources is on a 'first-come, first served' basis. Conflicts have been settled by traditional management systems, and sometimes by violence. As the population and the economy grow, these traditional allocation systems can become increasingly inapt. A sectoral approach, based on first-come first served, has led to significant social and economic problems in other countries in Asia. Although not yet causing large or wide-scale problems in Timor-Leste, the Government recognizes that an integrated approach to managing these resources will soon become essential in Timor-Leste.

Some of the more obvious examples of potential conflict and environmental degradation include the following:

- Upstream agriculture may take a disproportionate share of water resources to the detriment of downstream agricultural and industrial users and urban and rural households.
- Pollution from urban waste may damage the coastal zone, causing great damage to fish-stocks, destroying local economies and livelihoods.

[21] See Ministry of Planning and Finance, *Sector Investment Program: Profiles of Proposed New Projects*, March 2005.

- Degradation of upstream forests and watersheds for short term gains may lead to soil loss and disruption of the hydrological cycle, causing downstream damage, floods and droughts.

Without more effective mechanisms for conflict resolution, the national goal of sustainable development and protection of the natural resource base of the country may be jeopardized. The Government aims to act *before* serious problems and conflicts arise by building an integrated approach to management of the natural resource base and environment. The integrated approach will reduce conflicts among sectors and users, it will also help identify cost-cutting, inter-sectoral measures and synergies and lead to a more optimal economic allocation of resources. Building such a system will require further action in three areas: policy, legislation and the administrative framework.

Administrative and Legal Framework

At present, Timor-Leste does not yet have an integrated management system for land, water or coastal zones. There is no single legislation or administrative agency with overall responsibility for any of these three resources. However, the NDP lays the foundation for adopting an integrated approach by stating many of the principles and the conceptual approach of integrated management. An effective mechanism for managing this interaction is necessary.

Water resource and watershed management. Some of the challenges for a more integrated approach to resource management are illustrated by water and watershed management issues. Timor-Leste is poorly endowed with water and increasing competition for this scarce resource is inevitable. The Constitution places ownership of water resources with the State. However, there is no single "owner/manager" of water resources and there are no formal mechanisms for resolving disputes among competing water users. Conflicts between water users have been common in the past; they can be expected to increase in the future as demand grows. Responsibility for water resource management is currently spread among three principal ministries: MTCPW, MAFF and MDE. Likewise, forest management can rarely be undertaken without close cooperation with other sectors that interact in some way with forests. This is especially true of Timor-Leste, where there are strong interactions, and interdependencies, with water resources, agriculture, biodiversity management and sometimes fishery management.

The Ministries concerned are already taking a number of initiatives related to both land and water. Notable is the ongoing water resources sector study, led by WSS, and involving MAFF and MDE, supported by the ADB. This proposes to establish an inter-sectoral institution for water management. Other initiatives include:

- The draft 'Water Resources Decree' prepared by WSS. This addresses the basic control of water quality and quantity, but specifically excludes irrigation.
- The draft laws on EIA and pollution control prepared by DE, which cover water quality and licenses for discharge.
- The proposed water resources study covering agriculture and irrigation proposed by MAFF, which will lead to the development of legislation.
- The proposed initiative to develop a catchment policy by MDE.
- The proposed approach to catchment management led by MAFF.

As with other natural resource sectors, data and information is incomplete, out-of date and unreliable in the water resources sector. The proposed national survey of groundwater resources would help address this problem.

The choice of management mechanisms at the national level. An approach that has worked well elsewhere is to form a natural resources management council, comprising the senior representatives of each stakeholder agency. These persons are able to communicate on a technical level and can commit agency resources to achieve common goals. Such a council can provide a forum for interchange of ideas on potential water resource developments, or other developments that may impact on water resources, biodiversity, etc. They should have a responsibility to provide advice to Ministers as necessary and to set up working groups to study particular issues, or district coordination committees to work on matters of mutual concern.

In the case of watershed management, international experience suggests that the agency responsible for water resources assessment and planning should ideally identify needs for improved management as part of planning for both irrigation and potable water supplies. Where the principal land use in a catchment is agriculture, the responsible government agency should take the lead in promoting activities that will assist in the achievement of the desired planning objectives. In other cases, the forestry agency might be the lead agency, with assistance from both agriculture and water supply.

The Government has already taken certain steps along these lines to develop a more integrated approach to land and water management. At the Vice-Minister level, an inter-ministerial natural resources working group has recently been established. The group is to be accompanied by a technical working group at the expert level. At present, the group is not operational. The Government intends to activate this group by developing its procedures and mandate, establishing a permanent secretariat and a supportive technical working group, and undertaking the necessary studies so that the group can discuss key policy issues in an informed manner.[22] The Government is seeking the support of Development Partners for the development of these mechanisms.

Timor-Leste recently acceded to the United Nations Convention on Desertification and Land Degradation (UNCCD). This provides a unique opportunity for Timor-Leste to develop integrated, participatory approaches to sustainable land management with the support of the international community. Initially, the Government is to request the support UNDP/GEF to develop capacity for sustainable land management (see Annex 2). This support should mainstream land management into national development and it should strengthen participatory and integrated approaches.

Mechanisms at the local level. With the assistance of donors, the Government is also experimenting with systems of integrated land management at the district and community level. For example, as described previously, the AMCAP and ARP II projects are piloting efforts to take an integrated approach to natural resource management among communities. An effective and sustainable formula has not yet evolved from these efforts. What is already clear from experience with agriculture and forestry is that a partnership model based on long-term relationships between the relevant government agency and local communities will be central to these efforts. Such a model project would aim to advance the development of flexible, yet effective and durable partnerships between Government agencies and rural communities in the post-donor project situation. This is especially important where an integrated approach to management of a natural resource is necessary.

[22] The group intends to review relevant experience in the Southeast Asia region, and identify alternative approaches to integrated management. A paper summarizing the issues that are relevant for Timor-Leste is to be submitted to the Office of the Prime Minister. The medium-term plan consists of undertaking a more detailed assessment of the existing situation and determining the feasibility of integrated management, at national and progressively local levels. These assessments will cover land, water and coastal zones.

One key aspect of integrated resources management is the use of fuel-wood for energy, which impacts the energy, forestry, water and health sectors. More data is needed on this, and the government is to work with the World Bank and ESMAP to develop a suco by suco assessment of the most suitable energy sources.[23] In line with this, with support from UNDP, the government is to assess, test and introduce appropriate technologies for household fuel wood utilization.

The Government sees the need for a more integrated approach to resources management as both a challenge and an opportunity. The challenge is that the demands – notably on legislation, governmental administrative capacities, and local governance – are high in comparison to existing capacity. The opportunity is for the Government to take early action on integrated legislative and management mechanisms and thereby avoid the heavy costs other countries have incurred in trying to establish integrated mechanisms *after* having relied for many years on traditional sector approaches to resource management.

V. PROPOSED EXPENDITURE PROGRAMS AND FUNDING

Current Levels of Expenditure

Spending on natural resource and environmental programs accounted for only a small share of total outlays by the Government and donors during FY1999/00 through FY2003/04. Total spending in the sector amounted to about $10.4 million, equivalent to less than one percent of the total Government and donor funded program (Table 10). Donors accounted for about 90 percent of these outlays.

Table 10: Government and Donor Spending in Natural Resources and Environment Sector, FY1999/00 Through FY2003/04, (In US$)

Funding Source	Disbursements					Total	
	FY1999/00	FY2000/01	FY2001/02	FY2002/03	FY2003/04	Amount	Percent
Donor programs	1,297,500	390,643	1,082,880	3,003,094	3,551,746	9,325,863	89.4
CFET appropriations	35,000	125,000	159,000	394,000	388,550	1,101,550	10.6
Total	1,332,500	515,643	1,241,880	3,397,094	3,940,296	10,427,413	100.0

Source: Annex Table 1.

The petroleum sector accounted for almost two-thirds of total spending in natural resources and environment sector over the past five years (Table 11). This was due to a large increase in support from the United States, China and Norway in FY2002/03 that included capacity building for the Timor Sea development program and the launch of the survey of onshore and near shore resources by PetroChina.

[23] More information on this initiative is provided in the SIP for the Power Sector.

Table 11: Expenditures Classified by Program Category, FY1999/00 Through FY2003/04
(In US$)

Program	Funding		Total	
	CFET	Donors	Amount	Percent
Environment	267,400	1,127,746	1,395,146	13.4
Minerals	101,898	325,956	427,854	4.1
Petroleum	355,898	6,215,449	6,571,347	63.0
Integrated resource management*	376,354	1,656,712	2,033,066	19.5
Total	1,101,550	9,325,863	10,427,413	100.0

Source: Annex Table 1.

* Includes CFET allocations for policy, planning and management.

Support for integrated approaches to policy development and planning has been a minor part of the overall program for the sector. Modest amounts of funds were allocated for environmental programs and integrated resource management programs. Resource management programs were primarily topographic mapping funded by Japan and support from the ADB for water resource management.

Proposed Expenditure Program

The Government is proposing a significant increase in spending on natural resources and the environment over the next four years. Most of these outlays are aimed at laying the foundations for an increase in private investment in resource related industries by improving the enabling conditions for this investment, improving the understanding of the resource base of the country and its prudent management, and strengthening the legal, regulatory and environmental management capacities of the Government. The proposed level of expenditures is $21 million during FY2004/05 through FY2008/09, some $7 million of which is related to donor programs ongoing and under preparation and currently planned CFET allocations (Table 12). Disbursements from proposed new projects and programs amount to $13 million over the same period, along with a small amount of additional CFET counterpart funding for the environment program.

About 36 percent of the proposed expenditure program would be allocated for development of the onshore and near shore petroleum sector. As discussed earlier in this report, the proposed expenditures of $7.6 million are mainly for further investigation of the resource base, demonstration of the new petroleum law and development of information systems for more effective management of the resource base. Proposed spending in the minerals sector would amount to $3.2 million, most of which would be for capacity building in geological survey work, establishing the legal and regulatory framework for private investment in the sector and attracting investment. Some $5 million is proposed for completion of ongoing work on the legal and regulatory framework for the environment, improvements in environmental management and assessment capacities, and expansion of public awareness campaigns. A comprehensive assessment of the groundwater resources of the country is also proposed.

A number of themes are common to the programs in each sector. Capacity building is one. Despite the many recent training programs, there is still a serious shortage of trained individuals with the necessary knowledge and technical and managerial skills in each of these sectors. The Government recognizes that it will not be cost effective to train people in some of the highly specialized areas that will be needed from time to time. These skills can be acquired in the international market as needed. Another theme common to the entire program for the sector is further development of institutional capacities. There has been progress in strengthening

institutions, but more must be done. Each agency now has a clear statement of its mission and objectives. There has also been progress, albeit uneven, in developing the policy framework required to pursue these objectives. In almost all areas of natural resource and environmental management, agency staff must work closely with officials in other agencies, with local communities, with the private sector, the media and other members of civil society. Much work remains to be done in building the skills of staff in these important areas. A particular concern is building these capacities at the district and local level to ensure that there are effective mechanisms for collaboration with local communities in the management of local resources and the environment.

Table 12: Proposed Expenditure Program for Natural Resources and Environment, FY2004/05 Through FY2008/09
(In US$ thousands)

Program	Disbursements					Total	
	FY2004/05	FY2005/06	FY2006/07	FY2007/08	FY2008/09	Amount	Percent
Minerals							
Ongoing & currently approved	28,971	32,634	36,297	36,630	38,961	173,493	0.8
Proposed new	750,000	1,000,000	1,000,000	250,000	-	3,000,000	14.2
Sub-total	778,971	1,032,634	1,036,297	286,630	38,961	3,173,493	15.1
Petroleum							
Ongoing & currently approved	1,717,283	935,826	554,909	62,630	68,961	3,339,609	15.8
Proposed new	1,160,000	3,150,000	-	-	-	4,310,000	20.5
Sub-total	2,877,283	4,085,826	554,909	62,630	68,961	7,649,609	36.3
Renewable energy							
Proposed new programs	205,000	505,000	575,000	250,000	-	1,535,000	7.3
Environment							
Ongoing & currently approved	550,500	359,500	83,000	90,000	100,000	1,183,000	5.6
Proposed new CFET allocations	250,000	400,000	250,000	50,000	-	950,000	4.5
Proposed new	550,000	1,130,000	1,150,000	-	-	2,830,000	13.4
Sub-total	1,350,500	1,889,500	1,483,000	140,000	100,000	4,963,000	23.6
Integrated resource management							
Ongoing & currently approved	513,132	424,303	451,977	444,811	418,649	2,252,872	10.7
Proposed new	500,000	750,000	250,000	-	-	1,500,000	7.1
Sub-total	1,013,132	1,174,303	701,977	444,811	418,649	3,752,872	17.8
Total							
Ongoing & currently approved	2,809,886	1,752,263	1,126,183	634,071	626,571	6,948,974	33.0
Proposed new CFET	250,000	400,000	250,000	50,000	-	950,000	4.5
Proposed new donor programs	3,165,000	6,535,000	2,975,000	500,000	-	13,175,000	62.5
Grand total	6,224,886	8,687,263	4,351,183	1,184,071	626,571	21,073,974	100.0

Source: Annex Table 1.

A third important theme running through these programs is the urgency attached to building a better understanding of the resource base of the country. The point has been made elsewhere in the SIP that the development of appropriate plans, policies and legislation ultimately relies on reliable, comprehensive and up-to-date information. There is a severe lack of reliable information in the natural resources and environment sector.

The fourth area common to these programs is the creation of an enabling environment for the private investment that will be needed for commercial development of natural resources in a sustainable manner. Apart from building basic information about the resource base and the opportunities, support will be needed for investment promotion programs, for negotiations with investors regarding licensing and other arrangements, and for increased capacities to complete assessments of proposed new investments in a timely and expeditious manner.

Recurrent and Capital Expenditures

Donor and Government expenditures in the natural resources and environment sector have been disaggregated into those that are "on-budget" and those that are "off-budget". [24] Estimates have also been made for the capital and recurrent components of the "on-budget" expenditures. The results of these estimations are summarized in Table 13.

During the past five years, almost all expenditures in the sector have been "on-budget". Two-thirds of the outlays have been for recurrent expenditures, with donors providing almost 90 percent of the recurrent funding. Capital outlays amounted to less than $3 million, equivalent to only 0.1 percent of GDP in this five year period. Donors funded almost all the capital outlays as well.

Table 13: Classification of Natural Resources and Environment Sector Expenditures by Type of Expenditure (US$)

Category	FY1999/00-FY20003/04		FY2004/05-FY2008/09		Total	
	Amount	Percent	Amount	Percent	Amount	Percent
On-budget expenditures						
Recurrent spending						
Donors	6,664,722	63.9	5,786,974	27.5	12,451,696	39.5
CFET	972,050	9.3	1,491,500	7.1	2,463,550	7.8
Proposed new	-	-	6,105,000	29.0	6,105,000	19.4
Sub-total	7,636,772	73.2	13,383,474	63.5	21,020,246	66.7
Capital spending						
Donors	2,642,909	25.3	394,000	1.9	3,036,909	9.6
CFET	129,500	1.2	226,500	1.1	356,000	1.1
Proposed new	-	-	7,070,000	33.5	7,070,000	22.4
Sub-total	2,772,409	26.6	7,690,500	36.5	10,462,909	33.2
Total on-budget expenditures						
Donors	9,325,863	89.4	5,230,974	24.8	14,556,837	46.2
CFET	1,101,550	10.6	1,718,000	8.2	2,819,550	9.0
Proposed new	-	-	13,175,000	62.5	13,175,000	41.8
Total	10,409,181	99.8	21,073,974	100.0	31,483,155	99.9
Off-budget donor expenditures	18,232	0.2	-	-	18,232	0.1
Total expenditures	10,427,413	100.0	21,073,974	100.0	31,501,387	100.0

Source: Annex Table 6.

This heavy dependence on donor support for both recurrent and capital spending is clearly not sustainable over the medium- and longer-term. As things currently stand, the pattern of the past five years continues during FY2004/05 through FY2008/09. Recurrent spending accounts for two-thirds of total outlays, with donors continuing to fund almost 90 percent of these proposed outlays. The amount of capital spending in ongoing donor programs and planned CFET allocations is about $0.6 million, but the program includes $7 million of proposals for new capital spending by donors. If the latter were realized, it would lift public capital spending in the sector to about 0.3 percent of GDP during these five years.

[24] On-budget expenditures include all CFET expenditures and those expenditures by donors that are executed in cooperation with government agencies to provide public services or create or maintain government-owned assets. Off-budget expenditures are those donor-funded expenditures that are channeled direct to local communities or the private sector that create no ongoing or future financial obligation for the government budget.

Sources of Funding

As noted above, bilateral and multilateral donors funded about 90 percent of the program for natural resources and the environment sector in the past five years. With very limited allocations of CFET funds for the sector, continued strong donor support would be required for the next five years if the proposed $21 million program is to move ahead as planned. As Table 14 indicates, there is approximately $5 million of donor funding available for the program under projects and programs that are ongoing or under preparation. After allowing for other possible sources of funding as outlined in the Table, the Government would need additional support from existing bilateral and multilateral partners in the amount of $11 million.

An important feature of the program is the prospect of broadening the sources of potential support for the program. There are a number of possibilities. First, the proposed program for the environment may attract new funding and support from the international NGO community. There are a number of large NGOs specializing in environmental projects (for example, the WWF, Conservation International, The Nature Conservancy) that may be interested in supporting parts of these proposed programs. Other large NGOs (such as the Ford Foundation and McArthur International) allocate significant shares of their programs to environmental management. The Government intends to prepare proposals for consideration by some of these NGOs with the understanding that these new partners would work closely with the relevant government agencies in developing and implementing the proposed programs.

Table 14: Sources of Funding for the Natural Resources and Environment Sector, FY1999/00 Through FY2008/09
(In US$)

Source of Funding	FY1999/00-FY2003/04		FY2004/05-FY2008/09		Total	
	Amount	Percent	Amount	Percent	Amount	Percent
Donor programs approved						
Norway	2,452,993	23.5	1,936,116	9.2	4,389,109	13.9
TFET	1,336,000	12.8	1,098,000	5.2	2,434,000	7.7
United States	1,372,480	13.2	250,000	1.2	1,622,480	5.2
China	1,400,000	13.4	-	-	1,400,000	4.4
Japan	1,099,862	10.5	-	-	1,099,862	3.5
Other donors	1,664,528	16.0	1,946,858	9.2	3,611,386	11.5
Sub-total	9,325,863	89.4	5,230,974	24.8	14,556,837	46.2
CFET current planned appropriation	1,101,550	10.6	1,718,000	8.2	2,819,550	9.0
Total available funding	10,427,413	100.0	6,948,974	33.0	17,376,387	55.2
Potential sources of funding						
GEF (new donor)		-	200,000	0.9	200,000	0.6
Carbon Fund (new donor)		-	1,000,000	4.7	1,000,000	3.2
International NGOs		-	1,000,000	4.7	1,000,000	3.2
Other donors		-	10,975,000	52.1	10,975,000	34.8
Additional CFET counterpart		-	950,000	4.5	950,000	3.0
Sub-total	-	-	14,125,000	67.0	14,125,000	44.8
Total funding	10,427,413	100.0	21,073,974	100.0	31,501,387	100.0

Source: Annex Tables 1, 4 and 5.

Official support may also be available from new sources over the next five years. Several possibilities are being considered. One is the GEF, which primarily supports programs in sustainable land management, biodiversity, conservation, climate change and protection of international waters. Given that Timor-Leste has already acceded to the UNCCD, early consideration is being given to GEF support to combat land degradation. Support to biodiversity conservation and climate change can start as soon as Timor-Leste accedes to the respective Convention. There are also ongoing GEF programs for protection of waters in Southeast Asia. Timor-Leste may simply be able to join these ongoing programs.

Another possibility is the "carbon credit fund" administered by the World Bank. Under the Kyoto Protocol, there is support for low income countries who wish to improve the environment. Projects that either lead to the sequestration of greenhouse gases (for example, planting trees to absorb carbon dioxide) or reducing greenhouse gas emissions (for example, through improved energy efficiency or the use of renewable energy) may qualify for funding through the Clean Development Mechanism (CDM). In the case of the proposed gas and oil seepage projects, flaring the gas or using it to generate electricity may qualify Timor-Leste for access to the carbon credit schemes managed by the World Bank.[25]

VI. MANAGING RISKS AND UNCERTAINTY

There are of course, uncertainties about this proposed program, some of which have been discussed in earlier Chapters. One major source of uncertainty is the availability of funding from the various sources as proposed and the continued very heavy reliance on donor funding for both recurrent and capital expenditures, a pattern that is not sustainable over the longer term. In the event that the required funding was not forthcoming, the Government would want to review priorities again and decide which programs would be postponed until the necessary funding was available, either from domestic or external sources.

Another major uncertainty is the extent of recoverable on-shore and near-shore oil and gas reserves. As discussed elsewhere in the report, a high priority is being given to the assessment of these reserves. The expectation is that reliable assessments of these resources will become available later this year. This will then allow for a reassessment of the options for power generation, for example. In the event that there are sufficient reserves on the south coast, their early development by the private sector would provide an important source of energy at substantially lower cost than the current diesel generated power. The construction of a transmission line from the south coast across country to Dili would then pave the way for more reliable and lower cost energy for a large section of the country's population that is concentrated in the Central and Western regions.

The third major uncertainty relates to the possible development of a gas pipeline from the off-shore oil and gas fields in the Timor Sea to facilities on the south coast for conversion of the gas to liquefied natural gas (LNG) for export to major Asian markets such as Japan, China and Korea. Such a project would involve a large amount of private investment, perhaps in the range of $3-5 billion, but substantive discussion about the prospects for such a project dependent on an in-depth study of the feasibility of such a project. Its development would have a major impact in the region and would open the possibility of developing a range of supporting industries along the south coast that would have significant implications for job creation and business development.

[25] By way of illustration, if the proposed gas seepage project at Suai were found to generate one hundred liters of gas per second and if the gas were captured and flared in an appropriate manner, this could translate into a carbon credit of about $500,000 a year. If the gas were used for power generation rather than being flared, the carbon credit would be larger. The key point of the gas seepage project is to determine as quickly as possible the gas flow so that a decision can be made about its disposition. This approach can then be extended to other gas seeps in the country.

VII. ANNEX TABLES

Annex Table 1: Actual and Proposed CFET Appropriations and Donor Expenditure Programs Completed, Ongoing and Under Preparation for the Natural Resources and Environment Sector
(In US$)

Budget Category	Annual Appropriations										Total			
	FY1999/00	FY2000/01	FY2001/02	FY2002/03	FY2003/04	FY2004/05	FY2005/06	FY2006/07	FY2007/08	FY2008/09	FY1999/00-FY20003/04		FY2004/05-FY2008/09	
											Amount	Percent	Amount	Percent
Policy, Planning & Management														
CFET appropriations	-	5,000	5,000	15,000	47,150	53,500	48,000	54,500	57,500	62,500	72,150	0.7	276,000	1.3
Environment														
Donor programs	237,500	275,489	148,588	138,501	327,668	499,500	294,500	-	-	-	1,127,746	10.8	794,000	3.8
CFET appropriations	15,000	60,000	74,000	65,000	53,400	51,000	65,000	83,000	90,000	100,000	267,400	2.6	389,000	1.8
Proposed new CFET						250,000	400,000	250,000	50,000	-	-	-	950,000	4.5
Proposed new programs						550,000	1,130,000	1,150,000	-	-	-	-	2,830,000	13.4
Sub-total	252,500	335,489	222,588	203,501	381,068	1,350,500	1,889,500	1,483,000	140,000	100,000	1,395,146	13.4	4,963,000	23.6
Minerals														
Donor programs	-	23,714	289,463	12,779	-	-	-	-	-	-	325,956	3.1	-	-
CFET appropriations	6,660	13,320	13,986	39,294	28,638	28,971	32,634	36,297	36,630	38,961	101,898	1.0	173,493	0.8
Proposed new programs						750,000	1,000,000	1,000,000	250,000	-	-	-	3,000,000	14.2
Sub-total	6,660	37,034	303,449	52,073	28,638	778,971	1,032,634	1,036,297	286,630	38,961	427,854	4.1	3,173,493	15.1
Petroleum														
Donor programs	-	91,440	626,597	2,553,334	2,944,078	1,670,312	868,192	495,612	-	-	6,215,449	59.6	3,034,116	14.4
CFET appropriations	6,660	13,320	13,986	169,294	152,638	46,971	67,634	59,297	62,630	68,961	355,898	3.4	305,493	1.4
Proposed new programs						1,160,000	3,150,000	-	-	-	-	-	4,310,000	20.5
Sub-total	6,660	104,760	640,583	2,722,628	3,096,716	2,877,283	4,085,826	554,909	62,630	68,961	6,571,347	63.0	7,649,609	36.3
Renewable energy														
Proposed new programs						205,000	505,000	575,000	250,000	-	-	-	1,535,000	7.3
Integrated resources management														
Donor programs	1,060,000	-	18,232	298,480	280,000	368,574	268,571	268,571	268,571	228,571	1,656,712	15.9	1,402,858	6.7
CFET appropriations	6,680	33,360	52,028	105,412	106,724	91,058	107,732	128,906	118,740	127,578	304,204	2.9	574,014	2.7
Proposed new programs						500,000	750,000	250,000	-	-	-	-	1,500,000	7.1
Sub-total	1,066,680	33,360	70,260	403,892	386,724	959,632	1,126,303	647,477	387,311	356,149	1,960,916	18.8	3,476,872	16.5
Grand total														
Donor programs	1,297,500	390,643	1,082,880	3,003,094	3,551,746	2,538,386	1,431,263	764,183	268,571	228,571	9,325,863	89.4	5,230,974	24.8
CFET appropriations	35,000	125,000	159,000	394,000	388,550	271,500	321,000	362,000	365,500	398,000	1,101,550	10.6	1,718,000	8.2
Proposed new CFET	-	-	-	-	-	250,000	400,000	250,000	50,000	-	-	-	950,000	4.5
Proposed new programs	-	-	-	-	-	3,165,000	6,535,000	2,975,000	500,000	-	-	-	13,175,000	62.5
Total	1,332,500	515,643	1,241,880	3,397,094	3,940,296	6,224,886	8,687,263	4,351,183	1,184,071	626,571	10,427,413	100.0	21,073,974	100.0

Source: Annex Tables 2 and 3.

Annex Table 2: Approved and Disbursed Amounts for Donor-Funded Projects Completed, Ongoing and Under Preparation in the Natural Resources and Environment Sector
(In US$)

Program and/or Activity	Donor	Annual Disbursements										Grand Total	
		FY1999/00	FY2000/01	FY2001/02	FY2002/03	FY2003/04	FY2004/05	FY2005/06	FY2006/07	FY2007/08	FY2008/09	Disbursed	Approved
ENVIRONMENTAL PROGRAMS													
Environmental policies and programs													
Assessment of environmental needs	Norway	200,000										200,000	200,000
Environment assessment capacity improvement	ADB		215,000	35,000								250,000	250,000
Urban environment management training	Japan				7,167							7,167	7,167
Environmental care for East Timor	Japan		8,170	24,525								32,695	32,695
Develop environment legislation	USA			49,989	49,989							99,978	99,778
Grants for environmental protection	USA		14,819	14,819	14,819							44,457	44,457
Grants for environmental programs	USA						125,000	125,000				250,000	250,000
Environment and energy	Norway			1,589								1,589	1,589
Sustainable development & environment	WHO			22,666	22,666	22,668						68,000	68,000
Sustainable development & environment	WHO						119,500	119,500				239,000	239,000
Environmental governance capacity building	UNDP					205,000	205,000					410,000	410,000
NSCA	UNDP					100,000	50,000	50,000				200,000	200,000
Environment Laboritory rehabilitation	Australia				43,860							43,860	41,468
Emergency preparedness and environment	Australia	22,500	22,500									45,000	45,000
Emergency preparedness and environment	Sweden	15,000	15,000									30,000	30,000
Sub-total		237,500	275,489	148,588	138,501	327,668	499,500	294,500	-	-	-	1,921,746	1,919,154
INTEGRATED RESOURCES MANAGEMENT													
Topographic mapping	Japan	1,060,000										1,060,000	1,060,000
Capacity building for natural resources	Australia				58,480							58,480	58,480
Oecussi community cachment management	Australia			18,232								18,232	18,713
Rural energy development	UNDP					40,000	40,000	40,000	40,000	40,000		200,000	200,000
Sustainable biodiversity & resource management	UNDP						228,574	228,571	228,571	228,571	228,571	1,142,858	1,600,000
Integrated water resources management TA	ADB				240,000	240,000	100,000					580,000	580,000
Sub-total		1,060,000	-	18,232	298,480	280,000	368,574	268,571	268,571	268,571	228,571	3,059,570	3,517,193
ENERGY AND MINERALS													
Petroleum													
Capacity Bldg in government for oil & gas	USA			123,250	123,250							246,500	246,500
Legal expertise & capacity bldg oil & gas	USA			23,350	60,241							83,591	83,591
Timor Sea governance & communication	USA			68,727	68,727							137,454	137,454
Timor Sea unitization agreement	USA			98,813	98,813							197,626	197,626
Investment law & commercial code for Timor Sea	USA			49,999	50,000							99,999	99,999
Petroleum sector technical assistance	USA				462,875							462,875	462,875
Non-seismic on-shore survey	China				700,000	700,000						1,400,000	1,400,000
Petroleum assistance project I	TFET				67,000	173,000						240,000	240,000
Petroleum assistance project II	TFET					996,000	685,000	19,000				1,700,000	1,700,000
Gas seep harvest project	TFET						124,000	150,000				274,000	274,000
Oil well demonstration project	TFET					100,000	120,000					220,000	220,000
Capacity Building for Petroleum	Norway		91,440	262,458	922,428	975,078	741,312	699,192	495,612			4,187,520	3,429,000
Sub-total		-	91,440	626,597	2,553,334	2,944,078	1,670,312	868,192	495,612	-	-	9,249,565	8,491,045
Minerals													
Mining management policy	Portugal		11,191									11,191	11,191
Geodestic network studies	Portugal		12,523	13,747	12,779							39,049	37,105
Study of East Timor geology	Portugal			78,358								78,358	78,358
Industrial mining policy & management	Portugal			78,358								78,358	78,358
Natural minerals resources study	UNDP			119,000								119,000	119,000
Sub-total		-	23,714	289,463	12,779	-	-	-	-	-	-	325,956	324,012
Total energy and minerals		-	115,154	916,060	2,566,113	2,944,078	1,670,312	868,192	495,612	-	-	9,575,521	8,815,057
GRAND TOTAL		1,297,500	390,643	1,082,880	3,003,094	3,551,746	2,538,386	1,431,263	764,183	268,571	228,571	14,556,837	14,251,404

Source: Registry of External Assistance.

Annex Table 3: Summary of CFET Budget Appropriations for Natural Resources and Environment Sector
(In US$)

Budget Category	Annual Appropriations										Total			
	FY1999-00	FY 2000-01	FY2001-02	FY2002-03	FY2003-04	FY2004-05	FY2005-06	FY2006-07	FY2007/08	FY2008/09	FY1999/00-FY2003/04		FY2004/05-FY2008/09	
											Amount	Percent	Amount	Percent
Office of Minister for MDE	-	5,000	5,000	9,000	17,500	17,500	17,500	18,000	18,500	19,000	36,500	3.3	90,500	5.3
Vice Minister for MDE	-	-	-	6,000	12,000	12,000	12,000	12,500	13,000	13,500	18,000	1.6	63,000	3.7
Directorate for Administration	-	-	-	-	17,650	24,000	18,500	24,000	26,000	30,000	17,650	1.6	122,500	7.1
Sec of State for Minerals & Natural Resources	-	-	-	17,000	24,000	24,000	24,000	25,000	26,000	27,000	41,000	3.7	126,000	7.3
Office of Minerals and Natural Resources	20,000	40,000	42,000	101,000	62,000	63,000	74,000	84,000	84,000	90,000	265,000	24.1	395,000	23.0
Timor Sea Office	-	-	-	130,000	124,000	18,000	35,000	23,000	26,000	30,000	254,000	23.1	132,000	7.7
Secretary of State for Tourism and Environment	-	-	-	10,000	12,000	12,000	12,000	12,500	13,000	13,500	22,000	2.0	63,000	3.7
Environment	15,000	60,000	74,000	65,000	53,400	51,000	65,000	83,000	90,000	100,000	267,400	24.3	389,000	22.6
Geography and Cadastre	-	20,000	38,000	56,000	66,000	50,000	63,000	80,000	69,000	75,000	180,000	16.3	337,000	19.6
Total	**35,000**	**125,000**	**159,000**	**394,000**	**388,550**	**271,500**	**321,000**	**362,000**	**365,500**	**398,000**	**1,101,550**	**100.0**	**1,718,000**	**100.0**
Memo item:														
Capital expenditures		10,000	42,000	41,500	36,000	10,500	42,000	60,000	54,000	60,000	129,500	11.8	226,500	13.2

Source: Combined Resources Budget documents for FY2002/03 and FY2003/04.

Annex Table 4: Summary of Funding for Natural Resources and Envionment Sector
(In US$)

Source of Funds	Annual Disbursements										Total	
	FY1999/00	FY2000/01	FY2001/02	FY2002/03	FY2003/04	FY2004/05	FY2005/06	FY2006/07	FY2007/08	FY2008/09	Disbursed	Approved
Donors												
Norway	200,000	91,440	264,047	922,428	975,078	741,312	699,192	495,612	-	-	4,389,109	3,630,589
TFET	-	-	-	67,000	1,269,000	929,000	169,000	-	-	-	2,434,000	2,434,000
United States	-	14,819	428,947	928,714	-	125,000	125,000	-	-	-	1,622,480	1,622,280
China	-	-	-	700,000	700,000	-	-	-	-	-	1,400,000	1,400,000
Japan	1,060,000	8,170	24,525	7,167	-	-	-	-	-	-	1,099,862	1,099,862
UNDP	-	-	119,000	-	345,000	523,574	318,571	268,571	268,571	228,571	929,000	929,000
ADB	-	215,000	35,000	240,000	240,000	100,000	-	-	-	-	830,000	830,000
WHO	-	-	22,666	22,666	22,668	119,500	119,500	-	-	-	307,000	307,000
Portugal	-	23,714	170,463	12,779	-	-	-	-	-	-	206,956	205,012
Australia	22,500	22,500	18,232	102,340	-	-	-	-	-	-	165,572	163,661
Sweden	15,000	15,000	-	-	-	-	-	-	-	-	30,000	30,000
Sub-total	1,297,500	390,643	1,082,880	3,003,094	3,551,746	2,538,386	1,431,263	764,183	268,571	228,571	13,413,979	12,651,404
CFET Budget Appropriation	35,000	125,000	159,000	394,000	388,550	271,500	321,000	362,000	365,500	398,000	2,819,550	2,819,550
Total funding	**1,332,500**	**515,643**	**1,241,880**	**3,397,094**	**3,940,296**	**2,809,886**	**1,752,263**	**1,126,183**	**634,071**	**626,571**	**16,233,529**	**15,470,954**
CFET as % of total	2.6	24.2	12.8	11.6	9.9	9.7	18.3	32.1	57.6	63.5	17.4	18.2

Source: Annex Tables 2 and 3.

Annex Table 5: Proposed New Projects and Programs for the Natural Resources and Environment Sector
(In US$)

	Possible Funding Source	Proposed Amount	FY2004/05	FY2005/06	FY2006/07	FY2007/08	FY2008/09	Total
Environment								
Environment Division capacity building		390,000	100,000	140,000	150,000			390,000
Institutional development in environment sector		600,000	100,000	200,000	300,000			600,000
Environmental outreach program		600,000	50,000	250,000	300,000			600,000
Environmental governance with MEA focus	UNDP/GEF	200,000	100,000	100,000				200,000
Timor Leste pollution control		540,000	150,000	190,000	200,000			540,000
Biodiversity conservation		500,000	50,000	250,000	200,000			500,000
Sub-total		2,830,000	550,000	1,130,000	1,150,000	-	-	2,830,000
Integrated resource management								
Support for intersectoral management mechanisms		100,000		50,000	50,000			100,000
Capacity building for sustainable land management		400,000		200,000	200,000			400,000
Groundwater survey	ADB	1,000,000	500,000	500,000				1,000,000
Sub-total		1,500,000	500,000	750,000	250,000	-	-	1,500,000
Onshore oil and gas development								
National energy policy	USAID	275,000	275,000					275,000
Onshore oil and gas seismic exploration		2,560,000	560,000	2,000,000				2,560,000
Establishment & imlementation of national oil company		825,000		825,000				825,000
Petroleum data management system	NORAD	650,000	325,000	325,000				650,000
Sub-total		4,310,000	1,160,000	3,150,000	-	-	-	4,310,000
Minerals								
Capacity building for resource survey & management	NORAD	500,000	250,000	250,000				500,000
Capacity building admin. & licensing of mining law		500,000		250,000	250,000			500,000
Legal, regulatory framework & investment promotion		500,000	500,000					500,000
Geological survey capacity building	NORAD	1,000,000		500,000	500,000			1,000,000
Geological museum		500,000			250,000	250,000		500,000
Sub-total		3,000,000	750,000	1,000,000	1,000,000	250,000	-	3,000,000
Renewable energy programs								
Solar energy demonstration project		625,000		300,000	325,000			625,000
Participatory rural energy development	UNDP	410,000	205,000	205,000				410,000
Wind resource assessment		500,000			250,000	250,000		500,000
Sub-total		1,535,000	205,000	505,000	575,000	250,000	-	1,535,000
Total proposed new programs		13,175,000	3,165,000	6,535,000	2,975,000	500,000	-	13,175,000
CFET additional counterpart		950,000	250,000	400,000	250,000	50,000	-	950,000
Grand total		**14,125,000**	**3,415,000**	**6,935,000**	**3,225,000**	**550,000**	**-**	14,125,000

Annex Table 6: Classification of Natural Resources and Environment Sector Expenditures by Type of Expenditure
(US$)

Category	Annual Appropriations										Total			
	FY1999/00	FY2000/01	FY2001/02	FY2002/03	FY2003/04	FY2004/05	FY2005/06	FY2006/07	FY2007/08	FY2008/09	FY1999/00-FY20003/04		FY2004/05-FY2008/09	
											Amount	Percent	Amount	Percent
On-budget expenditures														
Recurrent spending														
Donors	237,500	378,120	1,050,901	2,246,455	2,751,746	2,544,386	1,681,263	1,014,183	318,571	228,571	6,664,722	63.9	5,786,974	27.5
CFET	35,000	115,000	117,000	352,500	352,550	261,000	279,000	302,000	311,500	338,000	972,050	9.3	1,491,500	7.1
Proposed new	-	-	-	-	-	1,575,000	2,380,000	2,150,000	-	-	-	-	6,105,000	29.0
Sub-total	272,500	493,120	1,167,901	2,598,955	3,104,296	4,380,386	4,340,263	3,466,183	630,071	566,571	7,636,772	73.2	13,383,474	63.5
Capital spending														
Donors	1,060,000	12,523	13,747	756,639	800,000	244,000	150,000	-	-	-	2,642,909	25.3	394,000	1.9
CFET	-	10,000	42,000	41,500	36,000	10,500	42,000	60,000	54,000	60,000	129,500	1.2	226,500	1.1
Proposed new						1,590,000	4,155,000	825,000	500,000	-	-	-	7,070,000	33.5
Sub-total	1,060,000	22,523	55,747	798,139	836,000	1,844,500	4,347,000	885,000	554,000	60,000	2,772,409	26.6	7,690,500	36.5
Total on-budget expenditures														
Donors	1,297,500	390,643	1,082,880	3,003,094	3,551,746	2,538,386	1,431,263	764,183	268,571	228,571	9,325,863	89.4	5,230,974	24.8
CFET	35,000	125,000	159,000	394,000	388,550	271,500	321,000	362,000	365,500	398,000	1,101,550	10.6	1,718,000	8.2
Proposed new	-	-	-	-	-	3,165,000	6,535,000	2,975,000	500,000	-	-	-	13,175,000	62.5
Total	1,332,500	515,643	1,223,648	3,397,094	3,940,296	6,224,886	8,687,263	4,351,183	1,184,071	626,571	10,409,181	99.8	21,073,974	100.0
Off-budget donor expenditures	-	-	18,232	-	-	-	-	-	-		18,232	0.2	-	-
Total expenditures	1,332,500	515,643	1,241,880	3,397,094	3,940,296	6,224,886	8,687,263	4,351,183	1,184,071	626,571	10,427,413	100.0	21,073,974	100.0