



Global Environment Facility

MOHAMED T. EL-ASHRY
CHIEF EXECUTIVE OFFICER
AND CHAIRMAN

July 7, 2000


Dear Council Member:

UNDP, as the Implementing Agency for the project, *India: Enabling Activities for the Preparation of India's Initial National Communication to the UNFCCC*, has attached the proposed project document for CEO endorsement prior to final approval of the project document in accordance with UNDP procedures.

The Secretariat has reviewed the project document. It is consistent with the proposal approved by the Council in December 1999 and the proposed project remains consistent with the Instrument and GEF policies and procedures. The attached explanation prepared by UNDP satisfactorily details how Council's comments and those of the STAP reviewer have been addressed. I am, therefore, endorsing the project document.

We have today posted the proposed project document on the GEF website at www.gefweb.org. If you do not have access to the Web, you may request the local field office of UNDP or the World Bank to down load the document for you. Alternatively, you may request a copy of the document from the Secretariat. If you make such a request, please confirm for us your current mailing address.

Sincerely,


for Mohamed T. El-Ashry
Chief Executive Officer
and Chairman

cc: Alternates, Implementing Agencies, STAP



United Nations Development Programme
GLOBAL ENVIRONMENT FACILITY (GEF)



23 June, 2000

Dear Mr. El-Ashry,

Subject: IND/99/G33/A/1G/99 – Enabling Activities for the
Preparation of India’s Initial National Communications
To the UNFCCC

I am pleased to enclose the enabling activity proposal for India entitled “Enabling Activities for the Preparation of India’s Initial National Communications to the UNFCCC” which was approved by the GEF Executive Council in November 1999. The response to comments from Council Members is also attached and these comments have been addressed in the project document.

As per paragraph 29 and 30 of the GEF Project Cycle, we are submitting this project to you for circulation to the Executive Council Members for comments and, subsequently, for your final endorsement.

Thank you in advance for expediting the review and approval of this project.

Yours sincerely,

Nick Brown
Officer-in-Charge

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PM

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Table - Council Member s Comments

COUNCIL MEMBERS COMMENTS	Clarifications/ Modifications in the PRODOC
<p>1. Comments from the Constituency of Republic of Korea, Australia and New Zealand: <i>We support GEF assistance to India for this project. We welcome the Indian Government s intention to prepare an initial national communication under the UNFCCC. We welcome the Indian Government s intention to link the enabling activities to prepare India s initial communication with a research project aiming at the development and improvement of local emission factors.</i> We encourage the Indian Government to consider an earlier starting date for this research project (currently January 2002), since improved emission factors could also improve the inventory that will be prepared in the context of the initial national communication. <i>We support the Indian government s comprehensive approach with regard to the development of a greenhouse gas inventory which builds on existing work that has been done, in particular, in the energy sector, through the ALGAS project; and puts greater emphasis on the generation of data and information in areas that have been considered only marginally in the past, in particular the land use change and forestry sector and the agricultural sector. India is a key developing country in the negotiations surrounding the UNFCCC and the Kyoto Protocol. India s intention to prepare a national communication including a greenhouse gas inventory under the UNFCCC is an important development of interest to us. A decision of the Conference of the Parties to the UNFCCC requires that the GEF provide financial assistance to developing countries for the preparation of such initial communications on request of the country.</i></p>	<p>The observations and suggestions are already covered in Section C (Activities 2.1 to 2.6). Section B.4 of the final Project Document outlines the indicative scope of the proposed targeted research project, which aims to collect fresh data and measurements especially in the context of sinks including continuous monitoring for measuring real emissions.</p> <p>Regarding the early start of the targeted research project, an early submission of the project proposal to the GEF is proposed and correspondingly, the start date would be adjusted.</p>
<p>2. <i>Comments from Switzerland:</i></p> <p><i>The project will support India's efforts in filing its first required national communication under the UNFCCC. It will further develop a comprehensive</i></p>	<p>The project proposal has been prepared in accordance with the guidelines for the initial national</p>

<p><i>database based on research efforts supported by GEF (ALGAS Project). As these earlier research projects were started prior to Kyoto they covered the greenhouse gases CO₂, CH₄ and N₂O. In Kyoto 3 technical gases, HFC PFC and SF₆ were also included in the basket of greenhouse gases. Emission reductions in these 6 greenhouse gases are potentially eligible for CDM.</i> It is not obvious why not all 6 GHG are made part of the comprehensive data basis established under this project.</p> <p>Under a Swiss sponsored project, the National Chemical Laboratory in Pune has established a first tentative inventory of emission sources. By 2002, when this project starts, preliminary emission estimations for HFC, PFC and SF₆ will have been made available.</p>	<p>communication and guidelines for GEF support.</p> <p>Please refer above on the clarifications provided for the targeted research project.</p>
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Dated: 20 June 2000, 2:30 pm

**UNITED NATIONS DEVELOPMENT PROGRAMME
GLOBAL ENVIRONMENT FACILITY
PROJECT OF THE GOVERNMENT OF INDIA
Project Document**

Project Number : IND/99/G33
Project Title : Enabling Activities for the preparation of India's Initial National Communication to the UNFCCC
Duration : Twenty-four months
Project Site: : New Delhi
ACC/UNDP Sector : 2000 Environment Policies
Government Sector : Environment
and sub-sector : Climate Change
Government Counterpart : Department of Economic Affairs, Ministry of Finance
Executing Agency : Ministry of Environment and Forests
Implementing Agency : Ministry of Environment and Forests

UNDP and Cost Sharing		
UNDP/GEF	:	US\$ 2,000,000
Cost Sharing or Third Party		
Total	:	US\$ 2,000,000
GOI Contribution (In-Kind) Rs. Equivalent		US \$ 109,000

Estimated Starting Date : July 2000

Brief Description: The project will assist India in undertaking the enabling activities to prepare initial national communication to the Conference of Parties in accordance with UN Framework Convention on Climate Change (UNFCCC) and to build capacity to fulfil its commitments to the Convention on a continuing basis.

On behalf of	Signature	Date	Name & Title
The Government (Dept. of Economic Affairs)	_____	_____	Rita Acharya Dy. Secretary (FB)
Executing Agency (Min. of Environment & Forests)	_____	_____	Mr. U.K.Choudhary Director (IC)
UNDP	_____	_____	Dr. Brenda McSweeney Resident Representative

Exchange Rate at the time of Project Document Signature: US\$ = Rs 43.70

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A. BACKGROUND AND CONTEXT

A.1 An Overview

The Indian government attaches great importance to climate change issues, and signed the United Nations Framework Convention on Climate Change (UNFCCC or Convention) in 1993. As one of the Non-Annex I Parties to the Convention, the Indian government endorses the principle of “common but differentiated responsibilities” put forward by the Convention as a basic prerequisite. India makes great effort to comply with the relevant obligations under the UNFCCC, including the submission of an initial national communication within two years after financial resources are provided. This proposal requests funding for the preparation of the initial national communication to the UNFCCC.

India has a large territory represented by complex geography and climate patterns. The high regional and sector variability in levels of social and economic development leads to similar patterns in vulnerability and adaptation measures due to climate change impacts. This necessitates in-depth regional and sector studies to estimate greenhouse gas (GHG) emissions as well as to assess vulnerability and adaptation measures across the country. In order to fulfill the requirements of the UNFCCC, the Indian government, through its various institutions and resources, has strengthened its researches on the (1) science of climate system and climatic change, (2) impact on social and economic development and (3) response strategies. However, due to the complexity of climate change issues, lack of research tools and basic data, and extremely limited financial support, the results of these researches are far from complete, and therefore further in-depth research and assessment in a wide range of areas and uncertain issues is required. This work would not be accomplished in the short term in the absence of adequate financial support from GEF.

India has already made its share of contribution to modifying the longer-term trends of climate change, by such national measures as (1) population control, (2) pursuing energy conservation and (3) persistent large-scale afforestation. India is willing to contribute further to addressing climate change, but as a developing country with a population which has crossed a billion on 13 May 2000, and a per capita GDP of less than \$US 370 (1994), India is faced with tremendous practical difficulties.

India is largely dependent on fossil fuels for its energy requirements. At present, coal accounts for about 60% of fossil fuel use in calorific terms followed by petroleum products (30%) and the remaining by natural gas. The relative emission of carbon dioxide (CO₂) for 1989-90 from coal, petroleum products and natural gas were estimated at 328.4 Tg/yr (65%), 162.7 (32%) and 17.5 (3%) respectively (*ALAGAS, India, 1998*). Electricity generation in India accounts for the largest share of coal consumption as out of the total installed electricity generation capacity 70% is coal-based.

Though the major energy requirements of the country are met by fossil fuel sources, 72% of the Indian population lives in rural areas dependent on agricultural and related activities, use biomass resources like wood, agricultural crop residues, dung-cakes etc. for energy. In India, the amount of biomass burnt annually is estimated to be about 426 Tg or about 6.3% of the global

level of 6800 Tg/yr. India also has a large cattle population that contributes around 40% to total methane emissions from the country (*ALGAS, India, 1998*).

Industrial growth and increasing urbanization in India have led to associated environmental changes. The vehicular population has grown at around 13% per year during the last decade. The growth of two-wheelers has been very high (16.6%) followed by cars (6.9%) and buses (5.7%). Motor vehicles are estimated to contribute 8% of the total fossil fuel related CO₂ emissions in India against the world average of approximately 15% (*ALGAS, India, 1998*). A variety of industrial processes, which transform materials by physical or chemical processes, are responsible for emissions of various greenhouse gases like CO₂, CH₄ and N₂O.

A.2 Climate Change Impact Assessment

Climate models have projected enhanced evaporation from global warming, which results in increased mean precipitation, seasonal shifts in precipitation, changes in soil moisture and changes or enhanced occurrence of extreme climatic events. This is expected to have significant impacts on natural ecosystems (forests, grasslands, wetlands, etc.), agricultural production, aquatic ecosystems, and human health.

India is the seventh largest country in the world with total geographical area of 329 Mha, land frontier of about 15,200 km and a coastline of 7,516 km. Table 1 gives the national circumstances for the base year 1994. Agriculture accounts for almost 30% of India's GDP and direct dependence of this sector on natural factors like monsoons indicates high vulnerability of national economy to climate change. Sea-level rise threatens all the coastal areas of the country especially the low-lying coral atoll of the Lakshadweep archipelago. Given India's regional and sectoral diversity, there is a need for in-depth assessment of potential impacts due to climate change and identify the needed adaptation strategies. Since the earlier efforts have largely focused on estimating GHG inventory and projects for GHG stabilization options, there is a need to assess sector vulnerability (forestry, agriculture and coastal zones etc.) to climate change impacts and the required adaptation measures.

Table 1: National Circumstances

Criteria	1994
Population (million)	929.4
Land area (million square kilometres)	328.7
GDP (1994 US billion \$)	342.9
GDP per capita (1994 US\$)	369.0
Land area used for agricultural purposes (million square kilometres)	50.5
Urban population as percentage of total population	27.0
Livestock population in million (disaggregated as appropriate)	387.2 (1986-87 figures)
Forest area (square kilometres)	20.7
Population below poverty line in millions (annual earnings less than US\$ 500)	168.2
Life expectancy at birth (years)	
Male	60.0
Female	61.7
Literacy rate (aged five years and above)	52

Source: 9th Five Year Plan, Planning Commission, India, 1997-98

A.3 India's Initiatives

In recognition of the great importance of climate change to the future of the country and the rest of the world, India has undertaken additional significant actions. At the national level, environmental protection and sustainable development have emerged as key national priorities in the approach paper to the Ninth Five-Year Plan (1997-2001). Several Indian institutions are already working in various sectors with the help of funds made available primarily by the Government of India and other agencies.

These institutions have conducted many studies over the last several years, which provide an inventory of greenhouse gas emissions and identify potential options for GHG stabilization that may be pursued. These inventories have steadily improved the estimates of carbon dioxide, methane and other GHG's from a variety of sources. Despite these improvements, the confidence level for carbon dioxide and methane emission estimates is not high, and is also low for nitrous oxide primarily due to substantial variability in emission coefficients across the country. For example, ash contents of Indian coal vary between 35 to 45% affecting the amount of carbon released upon combustion. Bottom up and top down estimates of carbon dioxide from fossil fuel combustion vary by 52 Tg or 10% and are much below the values estimated by the IEA (1997). The absolute magnitude of emissions is lower in the agriculture, landuse change and waste sectors but the emission estimates are more uncertain. The uncertainties also remain, because, for estimating the inventories "Good practices" as suggested by IPCC have not been followed. The "Good Practices" will enable India to manage the uncertainties in the GHG estimates in such a way so that they are neither over nor under estimated, are unbiased and are minimum.

Accomplishing this goal necessitates quality assurance (QA) and quality control (QC) procedures which were also lacking earlier. A QA/QC program contributes to the objectives of good practice guidance, namely, to improve transparency, consistency, comparability, completeness, and reliability in national inventories (FCCC/SBSTA/1999/Add.1).

The Department of Space in India had mapped the entire country in 1992 on a 1:1 million scale to identify various landuse categories. This study of 1992 has revealed that the total wasteland area is around 53.3 million hectares or 16.2% of the total geographical area of the country. The remote sensing forestry data can be used to estimate GHG emissions due to landuse change and forestry, GHG sink development, impact assessment etc.

A.4 Prior and On-going Activities Supported by UNDP/GEF

There are a few ongoing or recently completed GEF projects that relate to the activities proposed in this project. **Table 2 (Annex E)** shows the UNDP/India energy-related projects. Development of coal-bed methane resources and landfill methane recovery will yield some data that will be of use to the proposed project. The bio-diversity project will also provide some data and information on vulnerability assessment. Other projects will provide limited information. While these may not be directly useful to the proposed project, the capacity built for analysis, and data collection will be utilized since many of the same institutions will be engaged in the proposed project.

UNDP-GEF had sponsored the recently completed Asian Development Bank's regional project entitled "Asia Least Cost Greenhouse Gas Abatement Strategy (ALGAS)". This project identified and analysed mitigation options, developed least-cost strategies for mitigation/abatement of GHGs; and developed portfolios of bankable least cost GHG abatement strategies. Vulnerability and adaptation strategies were not analysed. Moreover, the primary focus of this project and other studies has been on the energy sector, with marginal treatment of land-use change, forestry and other sectors. The proposed activity will develop information and database on climate change impact and adaptation options in these sectors, while updating the options and least-cost strategy for the energy sector.

A.5 Present Institutional Framework

The Ministry of Environment & Forests (MoEF) is the designated nodal ministry responsible for national environmental policies, programmes and priorities for implementation, and for overall coordination of projects related to environment. Other line ministries such as the Ministries of Power, Agriculture, Science and Technology, Ocean Development provide necessary inputs to MoEF. The Ministry of Finance is consulted if implementation of environmental policies has an impact on the nation's finances as well as any fiscal incentives or penalties that may be proposed for enabling implementation of the environmental policies. The MoEF is also the focal point for all GEF-related matters and multi/bilateral donor funded environment programmes in India.

Appropriate executing agencies and departments in the state government carry out implementation of environmental policies and programmes formulated by the MoEF. MoEF's role consists of coordinating funds, providing guidance and technical expertise, and undertaking monitoring and evaluation. MoEF is assisted by a number of national as well as state level

development institutions, non-governmental organizations, industry associations, and private consultancy firms, etc. Several international organizations, research laboratories, and other such agencies also provide the inputs, as may be required, for facilitating the decision-making process of the Government of India.

A.6 Project Objectives

The project objectives are to generate, analyze and communicate information relevant to the preparation and submission of India's Initial National Communication (particularly in accordance with Art. 4.1 and Art. 12 of the UNFCCC), including completion of a national greenhouse gas inventory, vulnerability assessment, an adaptation option analysis, and any other information considered relevant for the National Communication itself.

B. PROJECT JUSTIFICATION

B.1 Present Situation

The first GHG emission estimates for India were made in 1991 and an update was prepared in 1992. Table 3 below gives a picture of the development of inventory over the years. The confidence level of emission estimates of the various gases is given in Table 4, which are ranging from low to medium.

Table 3: Previous Experience of GHG Inventory Development in India

Year	Inventory Details	Source and Sector Coverage
1991	First inventory, [<i>Global Change Report No.1, 1991, edited by A. P. Mitra</i>]	Fossil fuel combustion, rice cultivation and Enteric fermentation
1992	Update [<i>Global Change Report No.4, 1992, edited by A. P. Mitra</i>]	Additions of Emissions from transport, coal-mines, and 1991 methane campaign results included. IPCC Tier-II approach followed for livestock related emissions, Land use change and Forestry.
1996	Update [<i>Unpublished Report, 1998, edited by A. P. Mitra and Sumana Bhattacharya</i>]	Animal manure, agriculture crop residue, and waste included. Revised IPCC approach to methane emissions from rice paddy related and new approach in forestry and landuse change emissions.
1998	India ALGAS Report [<i>ADB, June 1999</i>]	GHG inventory for 1990 using IPCC 1995 and 1996 methodology and included industrial emissions.
1999	District level inventory paper submitted to Atmospheric Environment, February 2000 [<i>Amit Garg, P. R. Shukla, S. Bhattacharya and Dadhwal</i>]	Regional and sectoral analysis of GHG emissions for 1990 and 1995 covering all the Indian districts and all emission categories.

Table 4: Confidence Rating in GHG Inventories

GHG	Confidence Level
CO ₂	<u>Medium.</u> The top-down and bottom-up emission estimates are different for fuel combustion, mainly for coal where the CO ₂ emissions values vary considerably (top-down: 329 Tg , bottom-up: 385 Tg) due to uncertainty in emission coefficient.
CH ₄	<u>Medium.</u> Methane emissions from rice paddy fields measured covering all types of water management practices in India. Major uncertainties remains in methane emission due to the addition of organic supplements to soil, various types of cultivars and diverse environmental conditions prevailing over the various rice growing regions in India. Derived emission factors have been used for methane emissions from enteric fermentation in animals applying IPCC default values to Indian livestock profile (age, weight etc.). However actual measurements have to be performed. IPCC default emission factors have been used for all other sources. These have to be measured to increase the confidence level of Indian inventory estimates.
N ₂ O	<u>Low.</u> Estimates are based on IPCC default emission coefficients. Measuring Indian coefficients will increase the confidence level.

The estimates made so far in the earlier studies are indicated in Table 5. It may be noted that no inventory has been prepared for India for 1994. Table 6 compares India's CO₂ emission due to fuel combustion from two approaches (viz., top-down and bottom-up methods) and with respect to the figures suggested in the International Energy Agency document [*CO₂ Emission from Fuel Combustion*, 1997 edition]. There is a distinct difference between top-down and bottom- up approaches.

Table 5: Greenhouse Gas Inventories (Gg) of Anthropogenic Emissions by Sources and Removals by Sinks for 1990

Greenhouse Gas Source and Sink Categories	CO ₂	CH ₄	N ₂ O
1. All Energy		X	X
Fuel Combustion	565,900	X	X
Energy and Transformation Industries	508,600		
Industry	X		
Transport	57 300		
Commercial- Institutional	X		
Residential	X		
Other (please specify)	X		
Biomass Burned for Energy	300,460	1579	11
Fugitive Fuel Emission		X	
Oil and Natural Gas Systems		628	
Solid fuels		330	
2. Industrial Processes	24,200	X	
3. Agriculture	X		1
Enteric Fermentation		6,807	X
Rice Cultivation		4,070	
Savanna Burning		X	
Others (please specify)		X	X
Agricultural soils			240
Field burning of agricultural residues		116	3
4. Land Use Change and Forestry	X		
Changes in Forest and other woody biomass stock	X		
Forest and Grassland Conversion	52,066		
Abandonment of Managed Lands	X		
5. Other Sources as appropriate and to the extent possible (please specify)	X	X	X
Solid waste disposal on land		334	
Domestic and commercial waste water		49	
Industrial waste water		2905	

Source: ALGAS, 1998.

Table 6: Comparing top-down and bottom-up inventory estimates

Fuel type	Top down* (Tg CO₂)	Bottom up* (Tg CO₂)	IEA** (Tg CO₂)
Coal	328.5	384.8	-
Petroleum	162.7	151.8	-
Natural gas	17.5	23.9	-
Total	508.7	560.5	602

*Mitra, A. P. (editor), “Greenhouse Gas Emissions in India in the *Global Change Report* No. 10, 1998;

**”CO₂ Emission from Fossil Fuel Combustion in the *IEA Report*, 1997.

If future climate change regimes are going to build effectively upon the 1994 base-year inventory developed for India, it will be essential that there is coherence in the inventory numbers from the two theoretically equivalent methodologies. So long as these GHG emission estimates continue to be substantially different, a reliable and accurate baseline can not be estimated. The present project will reduce the prevailing variability in national GHG emission estimates.

B.2 Expected Situation at the End of the Project

The project duration is two years. At the end of the project, the GoI would be in a position to compile an initial national communication to the UNFCCC. GEF intervention will result in:

- strengthening and building of human and institutional capacity in India for the preparation of initial national communication,
- a comprehensive national inventory of GHGs with lower uncertainties to which quality control and quality assurance procedures will be applied to make it transparent, consistent, complete
- reduced variability and uncertainty of emission estimates by modifying the IPCC default emission factors to country-specific values.
- dissemination of information about climate change to the Indian public and preparation of India’s initial national communication.

B.3 Target Beneficiaries

The main beneficiaries are the international society, especially the convention parties, convention secretary and all country governments. In the absence of the UNFCCC, there would be no requirement for India to prepare a National Communication to the UNFCCC. International academia, private sector, NGOs and other institutions would also benefit from increased information. The main stakeholders in this project are all the national and state agencies who have responsibility for economic and other sectors that will be impacted adversely by climate change, and who may be able to play a key role in implementing the objectives of the UNFCCC.

B.4 Project Strategy

The initial national communication is proposed to be developed through a broad-based participatory planning process. The project will have two major components 1) to prepare Initial National Communication of India to the UNFCCC, and 2) to build capacity to fulfil its commitments to the Convention. In order to prepare the initial national communication as required by the FCCC (A/AC.237/55), the following aspects would be addressed.

- a) Development of comprehensive inventory for 1994 and improvement of its reliability vis-a-vis earlier estimates (ALGAS for 1990), which would involve reducing uncertainties of GHG emission coefficients in key source categories
- b) Identification of the key steps to implement the convention
- c) Presentation of information on specific needs and concerns arising from the adverse impacts of climate change.
- d) Generation of a reliable and comprehensive database accessible through the Internet for all of the outputs produced.

The project will use the standard IPCC guidelines and methodologies proposed in the Good Practice Report, 2000 for estimating the GHG emissions from different sectors. However, the country-specific emission factors, wherever available or measured during this project will be applied for improving the reliability of the estimates as against the default IPCC emission factors.

The project will provide the initial thrust for addressing areas of national concerns likely to arise due to climate change such as food security, water resources and coastal zone management for vulnerability assessment and adaptation measures.

Capacity-building and networking of national institutions and agencies would be through consultative meetings, planning and training workshops. This project will expose policy-makers, planners and researchers to participatory approaches for developing linkages of climate change and development.

The overall project strategy is presented at Figure 1. While the purpose of this proposal is to generate the initial national communication, it will also be used to evaluate and prepare a related project on 'targeted research'. This targeted research proposal will involve more detailed development of local emission factors and focus on methodological issues, which cannot be covered in this proposed project. It will be incrementally funded and will seek to strengthen the scientific capacity of the country to respond to the climate change challenge and lay the foundation for further national communications and implementation of the convention. The estimated starting date for this research-oriented project is January 2002 with an expected duration of three years. In order to maximize the impact of international support and develop possible synergies between present and the proposed projects, major findings and technical outputs generated by this project could be shared with the proposed project experts and management staff. The targeted research project will carry forward the work initiated by the present project and shall strengthen capacities for subsequent national communications, climate change impact assessment and adaptation related activities in India. The following activities are expected to be included in the targeted research proposal:

- Regular monitoring and measurement of emissions resulting out of anthropogenic activities in the energy, transport, industry, agriculture, forestry and waste sectors.
- Clearing house for climate change related database management and processing
- Strengthening and building of human and institutional capacity in India for energy and environment sector modelling
- Institutional and human capacity-building for climate change impact assessment on various sectors and adaptation policy formulation in India. This will include detailed studies across the country to assess regional and sector vulnerability to climate change impacts as well as to integrate adaptation measures into national planning process.
- Consolidation of indigenous efforts for climate change mitigation, including energy efficiency improvement efforts in various sectors, transfer of cleaner technology, promoting use of renewable technologies etc.

Strategies to achieve the project objectives

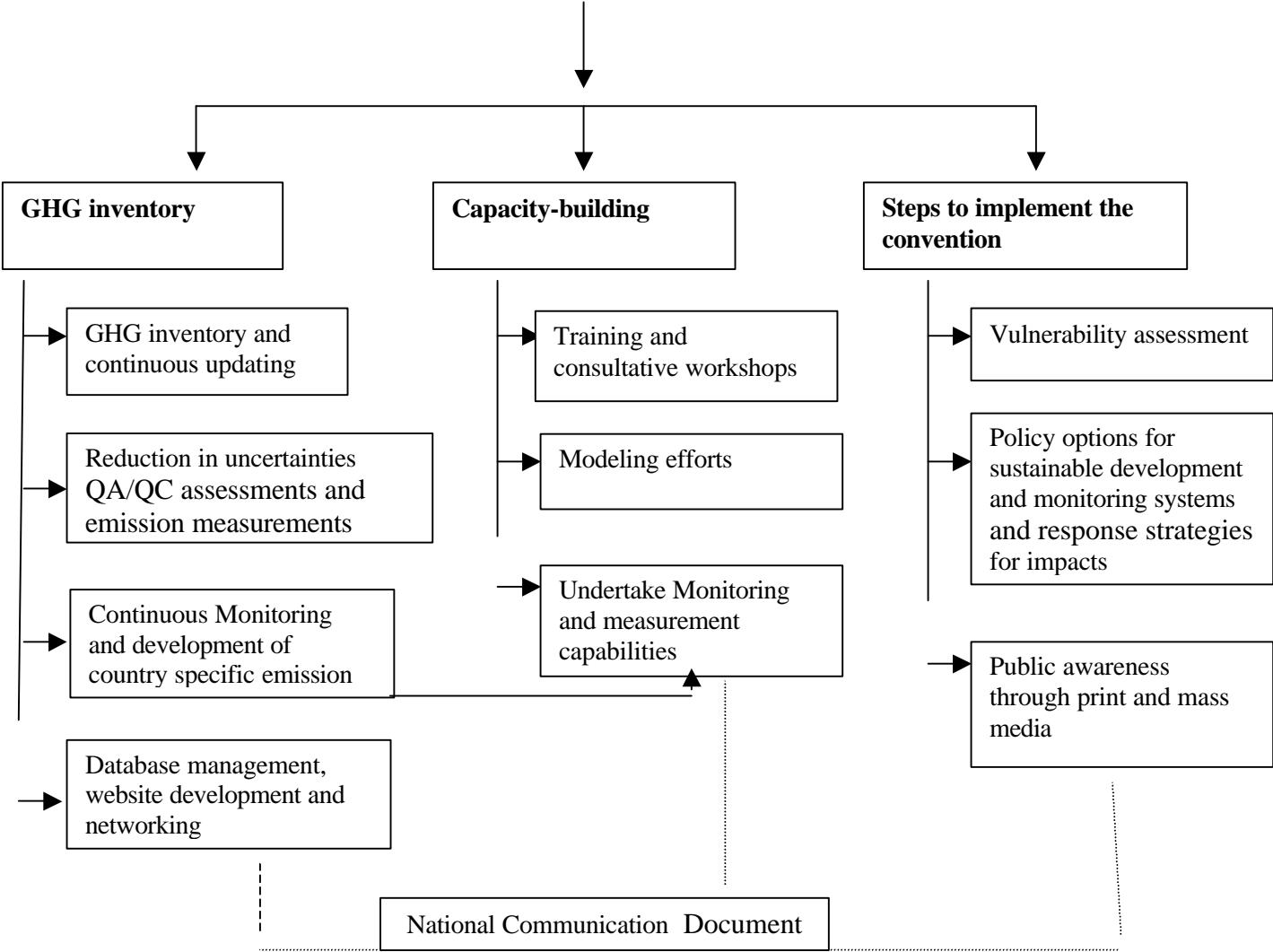


Figure 1: Schematic Diagram of the Project Strategy

B.5 Project Implementation Arrangements

The executing and implementing agency for this project will be the Ministry of Environment and Forests (MoEF), Government of India. The MoEF will take overall responsibility for the implementation and execution of the project, and the achievement of its objectives. A Steering Committee will be constituted by the MoEF to oversee the implementation of the project. This Committee will be comprised of representatives from the MoEF (Steering Committee Chair), the Planning Commission, cross-sectoral ministries, NGOs, prominent experts and UNDP. The Steering Committee will act as the co-ordinating mechanism for the preparation and finalisation of the initial national communication, and will provide the necessary guidance and oversight to the project implementation. Individual experts may be invited to provide inputs as appropriate to specific meetings.

Since the project will deal with several technical issues ranging in several sectors, a Technical Advisory Committee would be formed, which will consist of representatives and experts from ministries and institutions, research institutions, ministries, universities and NGOs and will be supported (as necessary) by national consultants, which will also act as technical counterparts for specific components of the projects. Each of the TAC representative institutions and other identified agencies will co-ordinate its respective sectoral area through the course of this project, and support the compilation of the national communication document. The project team and the TAC will examine the draft National Communication in this context and place before the Steering Committee for final approval of the national communication document. The technical Advisory Committee will meet at least once in two months and would be responsible for the following:

- Provide inputs for developing detailed quarterly workplans
- Identify agencies to complete the specified activities as per the workplan
- Facilitate development of detailed scope of work for different agencies
- Provide technical inputs to different components
- Provide guidance, monitor progress and review the outputs of different agencies
- Compile draft national communication document
- Any other matter related work (as per MoEF)

Some of the key institutions which will be participating in the project are the National Physical Laboratory (NPL), New Delhi; the Central Fuel Research Institute (CFRI) and the Central Mining Research Institute (CMRI), Dhanbad; Indian Institute of Petroleum (IIP), Dehradun; Institute of Bio-resource Technology, Palampur; the National Remote Sensing Agency (NRSA), Hyderabad; the Indian Institute of Management (IIM) Ahmedabad; the Indian Institute of Technology (IIT) Delhi and Bombay; the Indian Institute of Science (IISc), Bangalore; the Indian Agriculture Research Institute (IARI), New Delhi; the Central Leather Research Institute (CLRI), Chennai; the National Environmental Engineering Institute (NEERI), Nagpur; and the Tata Energy Research Institute (TERI), New Delhi.

The initial communication will be prepared under the guidance of TAC. In its capacity as the lead agency, the MoEF will supervise and monitor arrangements for the execution of the project. The MoEF will be responsible for ensuring:

- (i) Overall project execution and coordination.
- (ii) Coordination with various stakeholders, i.e. line ministries, state governments and collaborating institutions.
- (iii) Interactions with various research institutions, NGOs, environmental experts among others for effective implementation.
- (iv) Involving national institutes having the necessary capabilities for assistance in project execution.

A National Project Director (NPD) will be appointed by the MoEF in consultation with UNDP to provide overall coordination and supervision of the project. The NPD will be responsible for the review, monitoring and clearance of the workplan, which forms the basis for project execution. The Steering Committee will establish a sub-committee, which will select the project team and finalize the various contract decisions, and the NPD will be responsible for implementing these decisions. Day-to-day coordination will be done through a project management cell (PMC), comprising of a National Project manager and two National Consultants. If need be, the project team will be contracted and located in a facilitating agency, which could be a national institution/organization, NGO etc. Funds will also be channeled through the facilitating agency selected for the purpose. The project team will guide day-to-day activities of the project and coordinate the activities identified. The PMC will also assist the NPD in close coordination with the various line ministries, state governments, nodal departments, and the participating institutions.

The schematic diagram of the project implementation arrangements is shown in Figure 2.

B.6 Rationale for UNDP/GEF Support

India has ratified the UNFCCC on 1 November 1993 and submitted notification of its participation in the restructured GEF as of 12 May 1994 and is therefore eligible for GEF support. This proposal seeks funds for India for enabling activities defined by the conference of Parties (COP) as those measures that facilitate the implementation of response measures in accordance with the FCCC (Decision 11/CP.1) to prepare Initial National Communication of India to the COP in accordance with Article 12 of the UNFCCC, and to build capacity to fulfil its commitments to the Convention. This proposal has been prepared in accordance with the guidelines issued in the Annex to Decision 10/CP.2.

In the absence of the UNFCCC, there would be no requirement for India to prepare a National Communication to the UNFCCC. This project is required for India to complete its initial national communications, and its full costs represent the incremental costs of the activity (Table 7).

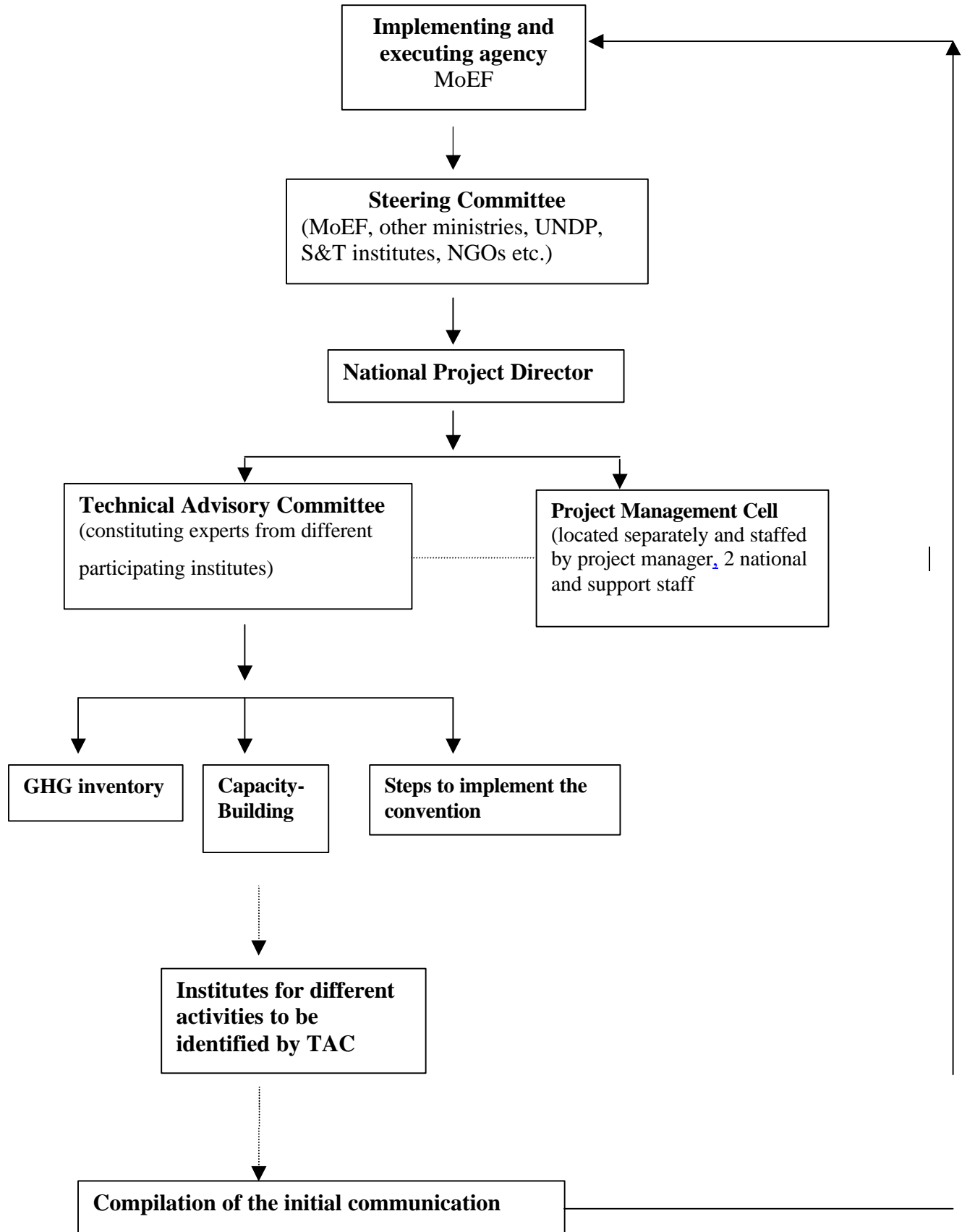
Table 7: Incremental Costs of National Communications

Benefits/Costs	Baseline	Alternative	Increment (Alternative-Baseline)
Global Environmental Benefits	None	An initial national communication will be submitted in a timely manner to the UNFCCC from the Indian Government	Global commitment to implementing the UNFCCC will be increased, as a key measure to manage and mitigate climate change
Domestic Benefits	None	Strengthened government agencies and institutions, and increased public awareness to climate change	Enhanced capacity to respond to the UNFCCC
Costs	None	\$2 million	\$2 million

B.7 Reasons for Assistance from UNDP

Environmental protection, poverty reduction, sustainable livelihood, and gender issues, are the four global priorities within the overall context of sustainable human development mandate of the UNDP. These priorities are fully reflected in the programs being developed under the GoI-UNDP/India Country Cooperation Framework (CCF-I). This project aims at assisting the Government in preparing the national communication to UNFCCC and addresses the UNDP environmental goals to protect and regenerate the global environment and natural resources asset base for sustainable development through promoting equity and burden sharing in international cooperation to protect and enhance the global and regional development.

Figure 2: Project Implementation Arrangements



B.8 Special Considerations

This project has significant environmental implications for the country such as the formulation of policy framework for integrating climate change concerns into planning and development of programs/policies related to sustainable development, adaptation measures and response strategies for impacts. It will help the country in meeting its obligations to the UNFCCC by preparing its initial national communication. Other important considerations include sustainability and capacity-building of the line ministries, institutions and agencies involved in addressing climate change issues.

B.9 Co-ordination Arrangements

The MoEF will co-ordinate all arrangements for the execution of the project. Day-to-day co-ordination of the project will be the responsibility of the Project Manager/Team contracted under this project. Links will be established with other ongoing national/state level initiatives, operational GEF projects, and the programmes/sub-programmes being developed by the UNDP/India under CCF-I.

B.10 Counterpart Support Strategy

The MoEF has identified climate change as a major component of their sustainable development strategy, and will provide critical inputs for the successful completion of project activities. The MoEF, line ministries, state governments, national institutions, NGOs and the R&D centres are expected to contribute significantly by way of providing institutional inputs, technical expertise and relevant data from ongoing/completed activities and status reports of earlier completed projects.

C. DEVELOPMENT OBJECTIVE, IMMEDIATE OBJECTIVES, ACTIVITIES, AND OUTPUTS

The development objective of this project would be to facilitate the achievement of the ultimate objective of the United Nations Framework Convention on Climate Change, i.e. to stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.

C.1 Immediate Objective I: To prepare Initial National Communication Document

Output 1: Inventory of GHGs

Activity 1.1: Prepare methodological framework and analytical format for estimating the GHG emissions for the base year 1994 using IPCC 1996 methodology and the Good Practice Report, 2000 for energy and transformation, industrial process, agriculture, land use change, forestry and waste generation sectors.

Activity 1.2: Energy and Transformation Sector Inventory

Sub-activity 1.2.1: Collect and identify combustion activity data of fossil fuel by sector and type of device.

Output: Improved energy balance table and activity data for 1994. The new balance table will match coal and oil product categories and transport activity data with the ones recommended by the IPCC, separate coal used for raw material from that used for fuel.

Sub-activity 1.2.2: Estimate GHG emissions from fossil fuel combustion in energy and transformation sector including the transport sector.

Output: Estimate of carbon dioxide, methane and nitrous oxide emissions due to fuel combustion from the energy and transformation sector for 1994. Including detailed emission estimates from the transport sector as it is a major emitting source in the country.

Sub-activity 1.2.3: Determine methane emissions from Indian coal mining and post activity.

Output: Estimate of methane emissions by types of coal mines – high and low-methane underground state-owned coal mines, township and village coal mines, and surface coal mines.

Sub-activity 1.2.4: Conduct a study of biomass activity level in India and estimate the relevant GHG emissions

Output: Estimates of biomass consumption by type – wood, agricultural residue, livestock manure, etc. for energy purposes and GHG emission estimates.

Sub-activity 1.2.5: Conduct a study of methane leaks and fugitive emissions from oil and natural gas systems.

Output: Estimate of methane emissions from onshore and offshore oil and natural gas production, and from transportation, distribution, storage, processing and transformation of these fuels.

Sub-activity 1.2.6: Estimate India's total methane emission from energy activity in 1994.

Output: Compiled data and information from sub-activities 1.2.2 through 1.2.5 on methane emissions from fuel use in India.

Sub-activity 1.2.7: Estimate India's total GHG emission from energy activity in 1994.

Output: GHG emission inventory for energy activity in 1994.

Activity 1.3: Industrial Process Inventory

Sub-Activity 1.3.1: Estimate 1994 GHG emissions from cement production .

- Determine 1994 cement production by type in India through national and state data collection.

Output: Production volume for various types of cement and cement products.

- Estimate emissions from cement production.

Output: CO₂ emissions from cement production in India.

Sub-activity 1.3.2: Estimate 1994 GHG emissions from lime production.

- Determine 1994 lime production by type in India through national and state data collection.
Output: Production volume for lime.
- Estimate emissions from lime production.
Output: Carbon dioxide emissions from lime production in India.

Sub-activity 1.3.3: Estimate 1994 GHG emissions from iron and steel production.

- Determine limestone consumption in major steel plants.
Output: Limestone consumption data.
- Estimate carbon dioxide emissions from iron and steel production.
Output: Carbon dioxide emissions from iron and steel production.

Sub-activity 1.3.4: Estimate 1994 GHG emissions from calcium carbide production.

- Determine calcium carbide production and purity data for 1994.
Output: Volume of calcium carbide production of standard purity.
- Estimate carbon dioxide emissions from calcium carbide production.
Output: Carbon dioxide emissions from calcium carbide production.

Sub-activity 1.3.5: Estimate 1994 GHG emissions from adipic acid production.

- Determine adipic acid production for 1994.
Output: Volume of adipic acid production.
- Estimate nitrous oxide emissions from adipic acid production.
Output: Nitrous oxide emissions from this sector.

Sub-activity 1.3.6: Estimate India's total GHGs emissions from industrial processes in 1994

Output: GHG emission inventory for industrial processes in 1994.

Activity 1.4: Agriculture Sector Inventory

Sub-Activity 1.4.1: Estimate 1994 methane emissions from wetland rice fields.

- Data on rice paddy harvest area, nitrogen fertilizer and organic manure application, watering regime and rice cultivar will be collected for 1994. Measured methane emission factors and relevant information will be collected and extracted from published data for different types of Indian rice fields.
Output: Database of measured, collated and spatially extrapolated data.
- Determine methane emissions of various rice field sub-categories with calculated emission factors and quantified harvest areas for 1994.
Output: Estimated methane emission of each rice field sub-category.
- Quantify national methane emission by region and rice field type through integrating the results from each sub-category.
Output: Methane emissions of 1994 by region and type of rice fields.

Sub-Activity 1.4.2: Estimate 1994 nitrous oxide emissions from croplands.

- Secondary data on harvest area and nitrogen fertilizer consumption will be collected for 1994.

Output: Data on crop harvest area and nitrogen fertilizer consumption for major crops.

- Collecting nitrous oxide (N₂O) emissions factors from published data for different types of croplands.

Output: Collected emission factors from published data.

- Estimation of nitrous oxide emissions from croplands of India by using collected and collated data.

Output: N₂O emissions for India from croplands.

Sub-Activity 1.4.3: Estimate 1994 methane emissions from enteric fermentation.

- Ruminant animal population number and structure, feed components and feed intake data will be estimated for 1994 using secondary data sources.

Output: Livestock data for 1994.

- Collecting information on feed digestibility and emission factor from published data.

Output: Collected data on feed digestibility and emission factors.

- Estimation of methane emissions from ruminant animals using above data

Output: Methane emissions for India from ruminant animals by type of animal.

Sub-Activity 1.4.4: Estimate 1994 methane and nitrous oxide emissions from animal waste management systems

- Collect activity data from secondary sources for 1994

Output: Database of collated and spatially extrapolated data.

- Methane and nitrous oxide emissions from animal waste using above data will be estimated.

Output: Methane and nitrous oxide emissions for India from animal waste management systems.

Activity 1.5: Landuse Change and Forestry Sector Inventory

Sub-Activity 1.5.1: Collect land cover and landuse change data and validate it using maps, statistical data, by province and forest type.

Output: Database of collated, validated, and mapped data.

Sub-Activity 1.5.2: Collect data on forest soil type and soil carbon content, and estimate changes in soil carbon due to various landuse and land cover change activities.

Output: Database of collated, validated and mapped data on soil carbon by region and forest type.

Sub-Activity 1.5.3: Using above data and the IPCC methodology, estimate carbon and other GHG flows from Indian forests for 1994.

Output: An emissions inventory for the forestry sector for 1994.

Activity 1.6: Waste Sector Inventory

Sub-Activity 1.6.1: Collect data on items such as municipal solid waste (MSW) generation by region and city, decomposable organic fraction, methane released and recovered, oxidation factors for 1994.

Output: Database of collated, validated data for 1994.

Sub-Activity 1.6.2: Estimate methane emissions from wastewater handling systems based on volume by city and region, and percentage of flared methane.

Output: Methane emissions from this source by city and region.

Sub-Activity 1.6.2: Compile 1994 inventory for methane emission from municipal solid waster and waste water handling systems of India.

Output: A 1994 inventory of methane emissions from MSW and waste water for India.

The financial requirements for activity 1.6 will be as under.

Indicators for Output 1: Inventory Reports, databases, trained researchers/technicians.

Output 2: Reducing Uncertainties in GHG Emission Inventory Estimates

Uncertainties in GHG emissions inventory arrive due to variability in activity level of source categories (e.g. amount of coal consumption in various sectors, cement production etc.) and emission coefficients. Methodological choice for individual source categories is an important factor in determining overall inventory uncertainty (Table 8). Generally, inventory uncertainty is lower when emissions are estimated using the most rigorous methods, but due to finite resources, this may not be feasible for every source category. It is good practice to identify those source categories that have the greatest contribution to overall inventory uncertainty in order to make the most efficient use of available resources. By identifying these key source categories in the national inventory, we can prioritize the efforts and improve overall estimates. Such a process will lead to improved inventory quality, as well as greater confidence in the emission estimates that are developed.

A key source category is one that is prioritized within the national inventory system because its estimate has a significant influence on a country's total inventory of direct greenhouse gases in terms of the absolute level of emissions, the trend in emissions, or both. The current information suggests that coal consumption for power generation accounts for 30% of total CO₂ equivalent GHG emissions, followed by livestock related emissions (13%), transport sector (10%) and steel industry (9%). There are lower uncertainties in fuel consumption level for large point sources like power and steel plants. However significant uncertainties exist in sector level consumption of petroleum products due to changing technology mix in the transport sector as well as due to agriculture and industrial sectors, similarly for the quality and quantity of fodder consumption by livestock. Though methane emissions from livestock are significant, uncertainties resolution is difficult due to large numbers of dispersed sources.

The other component to reduce emission uncertainties is to increase the reliability of emission coefficients. Some earlier Indian studies (Mitra et al, 1992) have measured emission coefficients for methane from Indian rice paddy fields under different water regimes, and methane due to enteric fermentation in animals etc. Many more similar studies are required for key source categories. However, due to budget constraints only a few key source categories may be covered under the present proposal for improving the reliability of emission coefficients. These are now discussed.

Activity 2.1: Appropriate QA and QC measures need to be applied to assert the quality of activity data and that of emission coefficient measurements so as to reduce the uncertainty in the GHG budget estimates. This process will also help in identifying those source categories that have the greatest contribution to overall inventory uncertainty and determine the sectors where uncertainties of activity level and coefficients require improvement in their estimation. Scientists estimating the GHG inventories need to be trained for the appropriate methods for QA and QC application. A training workshop therefore needs to be organized for all personnel involved in budget estimates and measurement.

Output: Scientists trained for the appropriate utilization of QA and QC methods for developing a priority list of source categories for uncertainty reduction in activity level and coefficients.

Activity 2.2: Reduction of Uncertainty in the Energy Sector:

The priority areas identified that need measurement of emission coefficients are:

Sub-activity 2.2.1: Determination of carbon dioxide, CH₄ and N₂O from the transport sector. In the present project it is intended to study the emission factors of CH₄, CO₂ and N₂O of various fuels and from different engine types. In order to reduce uncertainties in the emission estimates, actual measurements are necessary taking into account engine mix in the country, age profile of engines, fuel used etc. It is preferable that this sub-activity is assigned to an institution that is already equipped with basic infrastructure, and will require only additional equipment and accessories to conduct full range of GHG measurements.

Output: Revised Carbon dioxide, CH₄ and N₂O emission coefficients for transport.

Sub-activity 2.2.2: Biomass burning for fuel (this will also measure emissions from crop residue considered under the agriculture sector). Biomass burning for fuel use results in the emission of CH₄ and N₂O. This sub-activity will quantify India specific emission factors for biomass burning (dung cake, fuelwood, charcoal and different agricultural crop residues) in the laboratory.

Output: Revised CH₄ and N₂O emission coefficients from biomass burning.

Activity 2.3: Reduction of Uncertainty in the Industrial Sector

In the earlier inventory estimates only CO₂ and N₂O emissions from selected industries have been reported using default emission factors. In order to reduce the uncertainties, we need to measure emissions from many industrial activities (refer Activity 1). However, budget constraints will not permit such extensive exercise, forcing us to limit measurements to some key source categories only. These are CO₂ emission from the cement industries, N₂O measurements from Nitric and Adipic acid manufacturing, and CH₄ measurements from paper manufacturing.

Output: Revised CO₂, CH₄ and N₂O emission coefficients from cement, nitric acid, adipic acid and paper manufacturing.

Activity 2.4: Reduction of Uncertainty in the Agriculture Sector

The various sub-source categories for which measurements are needed include enteric fermentation in livestock, manure management, rice cultivation and emission from fertilizer application to soils.

Sub-activity 2.4.1: Methane and N₂O measurement from enteric fermentation in animals and animal manure. This is the largest source of methane emission from the agriculture sector as has been indicated during the ALGAS project. CH₄ emission estimates from this sector were based on age and weight profile of animals using rule of thumb method depending on the type and quantity of feed intake and weight of the animals typically relevant to the Indian conditions. The CH₄ budget from this sector was not derived directly from measurements. In this project therefore, it is intended to measure year round, the emission factors from dairy and non-dairy cattle to reduce (the largest source amongst all domestic animals in India) the large uncertainties associated with this sector. The SF₆ technique will be used to measure the emission factors for these two types of cattle. This facility will also be used to measure CH₄ and N₂O emissions from manure management.

Output: Revised CH₄ and N₂O emission coefficients from enteric fermentation in animals and animal manure.

Sub-activity 2.4.2: CH₄ emission from rice fields. CH₄ emission coefficients from rice paddy fields under different water regime conditions have been extensively studied and based on these studies IPCC emission factors from this sector has been standardized. However, uncertainties still remain in terms of CH₄ emission due to organic amendment, cultivar and different environmental impacts. Therefore, further measurements need to be carried out to take into account the addition of organic manure to soils and different cultivars.

Output: CH₄ emission coefficients due to organic amendment and various cultivars.

Sub-activity 2.4.3: N₂O, CH₄ and CO₂ emissions from soils.

Site measurements are to be undertaken for N₂O emissions from application of synthetic fertilizer, crop residue and sewage sludge application, and from cultivation of organic soils. For these studies, a dedicated Gas Chromatograph will be necessary. Samples will be collected all year round and simultaneous measurement of CO₂ and CH₄ also will be made at the selected fields for wheat, gram, pulses and sugarcane.

Output: Revised N₂O, CH₄ and CO₂ emission coefficients from soils.

Activity 2.5: CO₂, CH₄ and N₂O Measurements from Landuse, Land Cover Change and Forestry Sector

In the previous inventory reports from India, budget estimates for CO₂ alone have been reported based on IPCC default emission factors. The other gases due to landuse change have been totally ignored. In order to strengthen the inventory and reduce the uncertainty in emissions from this sector in the national budgets, it is imperative that campaign mode measurements be under taken.

Output: Revised CO₂, CH₄ and N₂O coefficients from land use land cover change and forestry sector.

Activity 2.6: CH₄ and N₂O Measurements from the Waste Sector

Increased urbanization is leading to large solid waste generation within cities. The Indian GHG emission inventories reported earlier, have made budget estimates only for CH₄ from this source based on sporadic measurements. The municipal and industrial waste water are also large sources of both CH₄ and N₂O emissions.

Output: Revised CH₄ and N₂O emission coefficients from the waste sector.

Output 3: Enhanced Institutional Capacities

Activity 3.1: Organize two workshops to train participants for 3-5 days in data collection, collation and analysis for inventory estimation, impact assessment and various other aspects of climate change including capacity-building to integrate climate change concerns into national planning.

Output: Participants trained to assist the project in above activities.

Activity 3.2: Organize workshops to train participants in vulnerability assessment due to climate change and adaptation strategies for agriculture, forestry, natural ecosystems, coastal zones, public health and water resources sectors. These workshops will be a part of the sub-contract for vulnerability and adaptation activities in each of the identified sectors (refer sub-output 4c). Also as a part of this activity inception and final workshops will be organized.

Output: Workshop summary report, project planning guidelines, and review of project activities in the final workshop.

Activity 3.4: Lead institutions in the country will be identified to undertake preparation of GHG inventory in different sectors for output 1 earlier. The methodological framework and analytical format for estimating GHG inventories using IPCC 1996 methodology and the Good Practice Report, 2000 for various sectors will be documented. This activity will form a part of Activity 1.1. These will be distributed to various government agencies, industry and other related institutions for enhancing institutional capacities in the country.

Output: Documented methodological framework and analytical format for estimating GHG inventories.

Activity 3.5: Promote publications in international and national journals, and books on climate change issues by Indian authors and prepare multimedia material (CDs, video cassettes etc.) on the same topic for a wider outreach.

Output: About ten publications on climate change issues.

Indicators for Output 3: (i) Participants trained to assist the project in 1994 inventory estimation (ii) Consolidated outputs of various workshops (iii) Publications on climate change issues.

Output 4: General Description of Steps Taken or Envisaged to Implement the Convention
Enable India to fulfil its reporting obligations with respect to options for a **general description of steps taken**, including determining how to best implement sector-specific adaptation options and strategies in a manner that is consistent with national development strategies and priorities. This will include building the capacity of national and provincial experts and institutions to undertake this work.

Sub-Output 4a: Programs Related to Sustainable Development, Research and Public Awareness

Activity 4.1: A meta-data directory of programs already implemented and being planned by the government and other bilateral and multilateral agencies to be compiled which will include related references and key institutes/people working in this area. This will bring out the impact of these programs vis-a-vis sustainable development and identify areas, which need to be further strengthened.

Output: A meta-data directory of programs.

Activity 4.2: Assessing research programs of participating institutions for addressing the identified national priority areas related to sustainable development. The identified institutions will formulate projects on each of the key areas for integration with the targeted research.

Output: A directory of targeted research activities proposed by various participating institutions.

Activity 4.3: Efforts to increase public awareness through various media highlighting relevant information about the issues related to sustainable development.

Output: Publicity material for increasing awareness on climate change issues.

Indicators for Sub-Output 4a: (i) Meta-data directory of ongoing programs (ii) Related publicity material (iii) Directory of targeted research activities.

Sub-Output 4b: Policy Options for Monitoring Systems and Response Strategies for Impacts

Activity 4.4: Consultative Expert meetings to be organized involving experts working on assessment of impacts due to climate change on agriculture, water resources, coastal zones, forestry, natural ecosystems, public health and economy in general. These meetings shall be address issues such as:

- Compilation of existing knowledge base on vulnerability assessment and adaptation measures for various sectors mentioned above.
- Identifying financial and technological needs and constraints to reduce vulnerability of systems due to climate change.
- Identify area for strengthening monitoring systems.
 - Identifying policy options for monitoring systems and response strategies needed to combat the impacts of climate change.
- Identify areas for further thrust in research.

Indicators for Sub-Output 4b: A summary of the meeting proceedings, and an improved awareness of vulnerability and adaptation issues in India.

Sub-Output 4c: Policy Frameworks for Implementing Adaptation Measures and Response Strategies

The potential impacts of climate change on agriculture, forestry, coastal zones, human health and natural ecosystems will be assessed based on the likely climate scenarios using the existing climate models and any material through change in short-lived gases. It is generally agreed that the South Asian region, dominated by the monsoons is one of the most difficult regions to model, with considerable differences among models and high sensitivity to model parameters. Based on the model projections, it is estimated that the mean surface temperature is projected to increase by 1.5-2.5°C in Southern India while in the north, it may be increase by 2.5-3.5°C by 2040. Assessment has become more difficult due to the complex role played by climate forcing due to aerosols, its extent and more regionality. Given such complexities within India itself, this study will attempt to identify regions of higher vulnerability to climate change, and develop possible adaptation measures. The assessment of impacts will focus on social aspects and will attempt to link with the HDI. Due to the high uncertainties involved, efforts will be made further to evaluate

the issues and options for appropriate adaptation measures in the proposed targeted research. The following briefly describes sector-wise indicative scope of analysis for determining the vulnerability and adaptation measures and the proposed budget allocations. The level of these details and the exact scope would be finalized after deliberations and discussions on the subject at the project inception workshop.

Activity 4.5: Agriculture Sector Vulnerability Assessment and Adaptation

Independent studies¹ (Swaminathan et al, 1991; Rao and Sinha, 1994; Kalra et al, 1996; Lal, 1998) have assessed the impacts of climate change on Indian agriculture sector. These include impact assessment on grain yield of the two main Indian staple foods namely rice and wheat due to enhanced levels of CO₂, change in temperature, moisture etc. Also substantial reduction in grain yield has been observed due reduced radiation [Chameides² et. al. 1996]. The efforts would derive from these to further identify the regional variations and sensitivity with respect to climate change. Agricultural impacts would be assessed mainly for crop yields and variability, shifts in relative productivity and production.

Output: A status report on vulnerable regions and sectors in India due to climate change and suggesting policy frameworks for implementing adaptation measures and response strategies. This report will also contain a priority list of proposed case studies for targeted research activities in these areas.

Activity 4.6: Forestry Sector Vulnerability Assessment and Adaptation

A few independent studies³ (Ravindranath et al, 1997) have assessed climate change impacts and adaptation strategies for some specific forest zones in India in addition to estimates of GHG emissions due to burning of forest biomass based on satellite and ground based measurements⁴; the efforts would derive from these to further identify the regional variations and sensitivity with

¹ Sinha S.K., Swaminathan M.S, 1991. "Deforestation, climate change and sustainable nutrition security", in *Climate Change* 16, 33-45.

Rao D.G., Sinha S.K, 1994. "Impacts of climate change on simulated wheat production in India" in *Implications of Climate Change for International Agriculture: Crop Modelling Study, US Climate Change Division Report EPA 230-B-94-003*, India, 1-10.

Kalra N., Aggarwal P.K., 1996. Evaluating the Growth Response for Wheat Under Varying Inputs and Changing Climate Options Using Wheat Growth Simulator-WTGROWS. in *Climate Variability and Agriculture*, Narosa Publishing House, New Delhi.

¹Lal M., Singh K.K., Rathore L.S., Srinivasan G., Saseendran S.A., 1998. "Vulnerability of Rice and Wheat Yields in NW India to Future Changes in Climate. In *Agricultural and Forestry Meteorology* 89 (1998), 101-114.

² Case study of the effect of Atmospheric Aerosols and Regional Haze on Agriculture: An Opportunity to Enhance Crop Yields in China through Emission Controls?, W.L.Chameides, H.Yu, S.C.Liu, M.Bergin X.Zhou, L.Mearns, G.Wang, C.S.Kiang, R.D.Saylor, C.Lou, Y.Huang, A.Steiner, and F.Giorgi, *PNAS* chameides et al.96(24):13626

³ Ravindranath N. H., Sukumar R., Deshingkar Priya, 1997. *Climate Change and Forests: Impacts and Adaptation: A Regional Assessment for the Western Ghats, India*. Stockholm Environment Institute (SEI), 1997; and for the Himalayan region by SEI.

⁴ Krishna Prasad V., Prabhat K. Gupta, Yogesh Kant, C. Sharma, T. Rajagopal, K. V. S. Badrinath, and A. P. Mitra; "GHG Emissions from Biomass Burning in India: Estimates from Satellite and Ground-based Measurements", Proceedings of IGES/NIES Workshop on GHG inventories for Asia – Pacific Region, Shonan Village Centre, Japan, 9-10 March 2000.

respect to these including impact abatement and sink enhancement (refer Activity 4.13). Vulnerability reduction would require sink enhancement. Therefore this activity will identify and support institutions/NGOs that can strengthen efforts to increase GHG sinks and undertake measures to take abatement measures (refer Activity 4.14). Forestry sector would cover changes in species diversity, forest regeneration, growth rates, forest production and migration of species.

Output: A status report on vulnerable regions and sectors in India due to climate change and suggesting policy frameworks for implementing adaptation measures and response strategies. This report will also contain a priority list of proposed case studies for targeted research activities in these areas.

Activity 4.7: Natural Ecosystems Vulnerability Assessment and Adaptation

Limited research has been conducted on the assessment of vulnerability and adaptation to climate change of natural ecosystems in India. Natural ecosystems include natural forest, natural grassland, natural reserve, wetland, freshwater, desert and desertification ecosystems. This project will collect observed available data for 1994 and assess the current status of the main natural ecosystems. It will use the IPCC Methodology and Technical Guidelines for Assessing Impacts and Adaptation in this sector. This activity will also draw inputs from the UNDP-GEF supported BSAP project and therefore the budget requirements are lower than the other components.

Output: A status report on vulnerable regions and sectors in India due to climate change and suggesting policy frameworks for implementing adaptation measures and response strategies. This report will also contain a priority list of proposed case studies for targeted research activities in these areas.

Activity 4.8: Coastal Zones Vulnerability Assessment and Adaptation

India is a coastal country with a coastline of over 7516 km. The Lakshadweep islands are particularly sensitive to changes in sea level and climate. In order to strengthen the management of coastal zones, the extent of impact due to rise in sea level and extreme events in the Indian coastal zone needs to be well understood, so that active adaptation strategies for India's vulnerable coastal areas may be adopted. For this purpose, it is important to analyze the trends of sea level change and the occurrence of extreme events, study the tidal difference caused by the rising sea levels, update and upgrade the database on sea level change, and assess adaptation strategies for different vulnerable coastal regions.

Output: A status report on vulnerable regions and sectors in India due to climate change and suggesting policy frameworks for implementing adaptation measures and response strategies. This report will also contain a priority list of proposed case studies for targeted research activities in these areas.

Activity 4.9: Public Health Sector Vulnerability Assessment and Adaptation

The potential changes in temperature and precipitation due to climate change will likely increase the spread of disease on the Indian subcontinent. The increased stress will be felt through higher incidence rate and mortality of vector-borne diseases, and severe impact on India's public health systems, which are already stretched to the limit. Hence, it is important to understand the extent to which public health will be affected due to climate change. Work is needed on the relationship between temperature, rainfall and humidity on incidence rate as well as mortality of various vectors including malaria and effect of climate change on heat stress and incidence of respiratory diseases due to enhanced local pollutants.

Output: A status report on vulnerable regions and sectors in India due to climate change and suggesting policy frameworks for implementing adaptation measures and response strategies. This report will also contain a priority list of proposed case studies for targeted research activities in these areas.

Activity 4.10: Water Resources Sector Vulnerability Assessment and Adaptation

Research on impact, vulnerability assessment and adaptation to climate change on India's water resources could be conducted using alternative equilibrium global circulation models (GCMs). The important dimensions include study of key river systems (e.g. Ganga, Cauvery, Narmada etc), availability of ground water, water quality and water availability. The present work will assess available information on these dimensions, evaluate the range of options for adaptation to potential climate change and variability, including the policies, costs, benefits and challenges as well as development and sustainability factors associated with impact and adaptation at regional and catchment scales.

Output: A status report on vulnerable regions and sectors in India due to climate change and suggesting policy frameworks for implementing adaptation measures and response strategies. This report will also contain a priority list of proposed case studies for targeted research activities in these areas.

Indicators for Sub-Output 4c: A portfolio of reports suggesting policy frameworks for implementing adaptation measures and response strategies in different sectors.

Sub-Output 4d: Building Capacity to Integrate Climate Change Concerns into Planning

Activity 4.11: Indian policy makers, particularly from those sectors that are likely to be more vulnerable, will be exposed to climate change issues through a workshop (refer Activity 3.1).

Output: Policy-makers will have increased awareness on climate change issues and their inter-relation with the national planning process.

Activity 4.12: Modelling tools to be used for projecting future carbon emission scenarios to assess energy efficiency requirements/investments, which can be integrated into the planning process for implementation. This may be developed as a part of Activity 3.5.

Output: Future emission projections and related policy analysis.

Indicators for Sub-Output 4d: Portfolio of future emission scenarios using different energy models for them to be implemented in the national policy planning process.

Sub-Output 4e: Programs to Address Climate Change, Adverse Impacts, Including Abatement and Sink Enhancement

Activity 4.13: Prepare an inventory of previously executed or ongoing programs that are addressing climate change, adverse impacts including abatement and sink enhancement. This activity will be apart of the sub-contract under Activity 4.6.

Output: An inventory of previously executed or ongoing programs addressing climate change, adverse impacts including abatement and sink enhancement.

Activity 4.14: Identify and support institutions/NGOs that can strengthen efforts to increase GHG sinks and undertake measures to take abatement measures. These include CO₂ sequestration through forest regeneration, clean development mechanisms, reducing CH₄ emission through fodder management and also through effective water management etc. This will be a part of the sub-contract under Activity 4.6.

Output: A list of institutions/NGOs that can strengthen efforts to increase GHG sinks and undertake measures to take abatement measures.

Indicators for Sub-Output 4e: (i) An inventory of previously executed or ongoing programs addressing climate change (ii) Strengthen research initiatives of some identified institutions involved in the sink enhancement programs.

Output 5. Other Information

Sub-Output 5a: Material Relevant for Global Emission Trends

Activity 5.1: Compile material relevant to global emission, which would include GHG inventory to be built up for the preceding years from 1980 onwards and leading upto 2000, projections of Indian emissions up to 2035 also to be made. This may be developed as a part of Activity 3.5.

Output: An inventory of global emission trends.

Indicator for Sub-Output 5a: GHG inventory for 1980-2000 and future projections.

Sub-Output 5b: Financial and Technological Needs and Constraints for Vulnerability Assessment and Adaptation

Activity 5.2: Please refer to Activities 4.5 to 4.10 under Sub-Output 4c.

Indicators for Sub-Output 5b: A portfolio of reports suggesting policy frameworks for implementing adaptation measures and response strategies in different sectors.

Sub-Output 5c: Clearing house for database on climate change.

Activity 5.3: Establish an Enabling Activity Data Centre ('clearing house') to archive the huge database generated during this project. This will include setting up necessary hardware and processing equipment, designing interactive software programs for data analysis and developing a website for data dissemination as deemed suitable by the Government of India. This Centre may be housed with the PMC. This activity will be sub-contracted.

Output: Enabling Activity Data Centre

Activity 5.4: A repository of data will be made at the Enabling Activity Data Centre (location to be decided by TAC) which will be disseminated through Internet in a user-friendly format and also the reports and publications arising out of this project will be available through the same medium.

Output: A website containing outputs of this project as deemed suitable by the Government of India.

Indicators for Sub-Output 5c: A user-friendly website.

Output 6. National Communication Document

Activity 6.1: Prepare a draft document on India's Initial national communication as per the UNFCCC guidelines.

Output: The final national communication.

Indicators: The final national communication.

The detailed workplan and activity matrix is given in annex II. Indicative TORs for the NPD, NPM and national consultants (for the PMC), and for the other national consultants proposed for various sub-contracts are given in Annex IV.

D. INPUTS

D.1. Government Inputs

The government will provide the necessary counterpart staff and in-kind support for the implementation of the project activities. The government (MoEF) will also provide the necessary office accommodation, local transportation, support staff, data, information and other facilities that may be required by the NPD to perform his duties under this project. The government will also provide, wherever feasible, local transportation for the consultants during their field visits and facilitate other logistical arrangements for the experts.

D.2. UNDP/GEF Inputs

UNDP/GEF inputs will be provided to primarily meet costs pertaining to project manager and two national consultants to provide inputs and overall co-ordination for compilation of information required for compilation of national communication. In addition, the costs for carrying out activities pertaining to different elements of national communication would be supported from the budgetary provisions made under the project. Some costs of expendable equipment like journals, reports and books and non-expendable equipment like computer software would also be met out of UNDP/GEF's budget, which is given in Annex 1.

E. RISK AND MITIGATION MEASURES

A number of possible risk factors are listed in Table 9 along with likelihood of occurrence and remedial measures.

Table 9: Project Risks and Mitigation Strategies

Risk Description	Likelihood of Occurrence and Remedial Measures
Establishment of Steering Committee	Low. MoEF has assured to establish a Steering Committee with members drawn from DEA, other line ministries and participating institutions/agencies and other stakeholders including UNDP.
Appointment of NPD and responsibilities of Project Manager	Low. The NPD will be appointed by the MoEF to co-ordinate this project on a part-basis, and will not be available for day-to-day management of the project. The Terms of Reference attached to this project clearly delineate the Project Manager's project execution responsibilities and differentiate these from those of the NPD.
Appointment of national experts and sub-contracts	Low. A Technical Advisory Committee will be established by the Steering Committee to ensure that appropriate Terms of Reference are approved for the national experts and sub-contracts (based on the indicative Terms of Reference annexed to this document). The Selection Sub-Committee will review and approve all candidates and bids.
Lack of active participation by stakeholders	Low. The Steering Committee members will ensure active participation of stakeholders. The Project Team will be familiar with local situations to facilitate active stakeholder participation.
Changes in priorities offline ministries/state governments	Very low. Government line ministries and state governments have already begun to work on priority issues relevant to the project.
Delays due to collection of data required for the various activities	Low. The project will hire consultants that are well experienced and networked to get the required data. The Steering Committee members and NPD will facilitate this to the extent possible.
Endorsement of national communication document	Low. The Steering Committee will actively work to ensure that all stakeholders are regularly informed on the progress made as well as on the likely contents of the national communication.

F. PRIOR OBLIGATIONS AND PREREQUISITES

F.1 Prior Obligations

There are no prior obligations.

F.2 Pre-Requisites

The MoEF will designate a senior level officer (who may be dealing with the subject of climate change) as NPD of the project. The MoEF will also establish a Steering Committee under the chairmanship of the Secretary to guide the implementation of the project. The Committee will consist of representatives of the concerned line ministries, collaborating institutions, DEA and

UNDP. A selection committee comprising representatives from MoEF, UNDP and an expert would be constituted for appointing personnel at the PMC. It would also be the responsibility of the MoEF and other line ministries to make available relevant data to the project staff and the consultants as may be required for the implementation of the project. The participating line ministries will designate nodal points within respective collaborating agencies/organizations who will participate full-time during the duration of the project.

G. PROJECT REVIEW, REPORTING, AND EVALUATION

The project will be subject to the tripartite review (jointly by representatives of the MoEF, DEA, and UNDP) once in every twelve months from the start of full implementation. The National Project Director shall prepare and submit to each tripartite review meeting, a Project Performance Evaluation Report (PPER). Additional PPERs may be requested, if necessary. A final project report will be prepared for consideration at the terminal tripartite review meeting. Annex II, III and IV give the standard monitoring and evaluation activities, time frames and responsibilities.

H. LEGAL CONTEXT

The project document shall be the instrument envisaged in the supplemental provision to the project document, attached hereto. The host country implementing agency shall, for the purpose of the supplemental provision to the document, refer to the government cooperating agency described in the supplemental provisions.

The following types of revisions may be made to this project document with the signature of the UNDP Resident Representative only, provided he or she is assured that the other signatories of the project document have no objections to the proposed changes:

- Revision in, or addition of, any of the annexes of the project document;
- Revisions which do not involve significant changes in the immediate objectives, outputs or activities of a project, but are caused by the rearrangement of inputs agreed to or by cost increases due to inflation; and
- Mandatory annual revisions, which re-phase the delivery of agreed, project inputs or other costs due to inflation or take into account agency expenditure flexibility.

J. PROJECT BUDGET

The project budget sheets are attached in Annex 1.

Project Budget Covering UNDP-GEF Contribution (in US \$)

Country: India

Project no: Ind/99/G33

Project Title: EA for the Preparation of India's Initial Communication

C.1 Immediate objective I: To prepare initial national communication document

Code	Description		Total	2000	2001	2002
		W/ m*	US \$	US \$	US \$	
<i>10</i>	<i>Project personnel</i>					
13	Administrative support					
13.1	Support staff for PMC#	72	36,000	9,000	18,000	9,000
13.2	Support staff for TAC^	72	36,000	9,000	18,000	9,000
13.99	Subtotal	72	72,000	18,000	36,000	18,000
<i>15.00</i>	<i>Monitoring and Evaluation</i>					
15.01	Local travel		50,000	12,500	25,000	12,500
15.99	Subtotal		50,000	12,500	25,000	12,500
<i>16</i>	<i>Mission Costs</i>					
16.01	International travel # #		20,800	0	10,400	10,400
16.99	Subtotal		20,800	0	10,400	10,400
<i>17</i>	<i>National professionals</i>					
17.01	National Project Manager	24	48,000	12,000	24,000	12,000
17.02	National Experts	48	72,000	18,000	36,000	18,000
17.03	Members of Steering Committee and Technical Advisory Committee *	12	72,000	18,000	36,000	18,000
17.99	Subtotal		192,000	48,000	96,000	48,000
19	Component total		334,800	78,500	167,400	88,900
<i>20</i>	<i>Sub- contracts</i>					
21.0	Sub- contracts A for Inventory estimates					
21.01	Energy and transformation industries (activity 1.2)		56,700	0	35,100	21,600
21.02	Industrial process (activity 1.3)		56,700	0	35,100	21,600
21.03	Agriculture (activity 1.4)		56,700	0	35,100	21,600
21.04	Land use change and forestry (activity 1.5)		56,700	0	35,100	21,600

Code	Description		Total	2000	2001	2002
21.05	Waste (activity 1.6)		56,700	0	35,100	21,600
22.00	Sub-contracts B for vulnerability and adaptability (V and A) assessment					
22.01	Agriculture (activity 4.5)		61,500	0	45,700	15,800
22.02	Forestry (activity 4.6)		61,500	0	45,700	15,800
22.03	Natural ecosystems (activity 4.7)		48,200	0	36,500	11,700
22.04	Coastal zones (activity 4.8)		61,500	0	45,700	15,800
22.05	Public health (activity 4.9)		61,500	0	45,700	15,800
22.06	Water resources (activity 4.10)		50,700	0	38,500	12,200
23.00	Subcontract C for Data Centre (activity 5.3)					
23.01	Channel, space hiring & host setting up		15,000	2,000	10,700	5,000
23.02	Database archiving		20,000	0	15,500	5,000
23.03	Software programming		10,000	0	5,000	5,000
23.04	Website development		15,000	0	10,000	5,000
23.05	Miscellaneous		5,000	1,000	3,000	1,000
24.00	Subcontract D Reducing uncertainties in GHG emission inventory estimates					
24.01	Transport sector (sub-activity 2.2.1)		98,200	50,000	30,000	18,200
24.02	Biomass burning (sub-activity 2.2.2)		69,700	30,700	24,500	14,500
24.03	Rice cultivation		41,700	17,000	18,700	6,000
24.04	Industrial sector (activity 2.3)		48,150	25,150	13,000	10,000
24.05	Livestock related (sub-activity 2.4.1)		1,09100	50,000	39,100	20,000
24.06	Soils (sub-activity 2.4.2)		84,500	34,500	30,000	20,000
24.07	LUCC and forestry (activity 2.5)		36,750	5,000	20,500	11,250
24.08	Waste (activity 2.6)		37,000	25,000	8,000	4,000
25.00	Subcontract E Targeted Research					
25.01	Targeted Research		62,100	10,000	40,000	12,100
29	Component total		1,280,600	250,350	701,300	332,150
<i>30</i>	<i>Training & Education</i>					
33.01	Planning and Consultative Workshop (activity 3.3)	1	22,400	0	22,400	0
33.02	Training workshops (activity 3.1)	2	45,000	22,500	22,500	0

Code	Description		Total	2000	2001	2002
33.03	Training workshop on application of appropriate QA/QC measures (sub-activity 2.1)		49,000	49,000	0	0
33.04	Inception and Final workshops (activity 3.3)	2	49,000	24,500	0	24,500
33.05	Consultative meetings (two) for output 2	3	20,200	0	20,200	0
33.06	Documentation (activity 3.4)		30,000	0	15,000	15,000
33.07	Publication (activity 3.5)	10	24,000	0	20,000	4,000
39	Component total		239,600	96,000	100,100	43,500
45	<i>Equipment</i>					
45.01	Non- Expendable Equipment		60,000	40,000	10,000	10,000
45.02	Expendable Equipment		10000	5,000	2,500	2,500
49	Component total		70,000	45,000	12,500	12,500
50	<i>Miscellaneous</i>					
52.01	Reporting Costs		50,000	5,000	15,000	30,000
53.01	Sundries		25,000	5,000	10,000	10,000
59	Component total		75,000	10,000	25,000	40,000
	Project total budget		2,000,000	484,850	998,400	519,950

The support staff for Project Management Cell (PMC) includes one office manager-cum-accountant (@ \$700/month) and two secretaries-cum-data entry operators (@ \$400/month). They will be employed for the complete project duration.

^Support staff for Technical Advisory Committee (TAC)

#Assumes two officials visiting twice during the project duration. Each visit will be for 10 days. The per head budget for one trip includes \$2,500 for international air travel, \$2,000 for DSA, \$500 for domestic air travel and \$200 for local travel totalling \$5,200/head/trip.

* about 30 TAC members will be given an honorarium for their contribution to this project @ \$100 (maximum) over the period of 24 months.

PROJECT BUDGET

Annex IB

BUDGET COVERING Government of India's CONTRIBUTION (In Kind)

Country : INDIA
 Project No. : IND/99/G33
 Project Title : Enabling Activities for the Preparation of India's Initial National Communication to the UNFCCC

Code	Description of Inputs	Total		2000	2001
		m/m	Rs.	Rs.	Rs.
13	Administration and Support staff				
13.01	Support Staff	60	1,172,500	586,250	586,250
17	National Project Staff				
17.01	National Project Director (NPD)	24	1,704,000	852,000	852,000
15.00	Travel				
15.01	Local travel		25,500	15,500	10,000
19	Component Total		2,050,000	1,453,750	1,448,250
45.01	Equipment		1,500,000	1,500,000	
45.02	Operation and maintenance		50,000	20,000	30,000
49	Component total		1,550,000	1,520,000	30,000
99	Grand total		4,452,000	2,793,750	1,478,250

(US \$ = Rs. 42.48)

Annex C: Budget Covering UNDP-GEF Sponsored Activities (in US \$)

Enabling Activity Commitment	Planning & execution	Capacity Building			TOTAL
		Data Gathering & Research	Institutional Strengthening	Training & Education	(US\$)
	I	II	III	IV	
1. National Circumstances	48,000	--	--	--	48,000
2. GHG Inventories -	60,000	216,000	261,000	350,000	887,000
3. General Description of steps					
(a) Programs related to sustainable development, research, public awareness, etc.	30,000	--	10,000	60,000	100,000
(b) Policy Options for Monitoring Systems and Response Strategies for Impacts	30,000	30,000	35,000	30,000	125,000
© Policy frameworks for implementing Adaptation measures and response Strategies	25,000	25,000	25,000	25,000	100,000
(d) Building Capacity to integrate Climate Change Concerns into Planning	25,000	--	60,000	15,000	100,000
(e) programs to address Climate change, adverse impacts, incl. Abatement, sink enhancement	30,000	30,000	35,000	30,000	125,000
4. Other Information					
(a) Material relevant for Global Emission Trends	25,000	25,000	50,000	--	100,000
(b) Vulnerability Assessment and Adaptation	50,000	75,000	50,000	75,000	250,000
5. Compilation and Production of Initial National Communication	60,000	--		--	60,000
6. Project management	54,000	--		--	54,000
7. Monitoring / Evaluation	50,000				50,000
Total	479,000	416,000	520,000	585,000	2,000,000

Grand total					2,000,000

Annex II: Matrix of Activities Required for Preparation of Initial National Communications

Please note: 'X' indicates areas covered under this project

Enabling Activity	Planning & execution	Capacity-Building		
Commitment		Data Gathering and Research	Institutional Strengthening	Training & Education
1. National Circumstances	X, P	NA	NA	NA
2. Greenhouse Gas Inventories A1. GHG inventory preparation for the base year 1994 for Energy, industry, agriculture, forestry/ land use land cover change and waste sectors using IPCC methodology A2. Analyze the uncertainties in key sectors using the IPCC Good practice report criterion B. Reducing uncertainties through emission coefficient measurements in country specific emission factors for certain key sub sectors like Transport, certain industrial emissions, biomass burning, enteric fermentation, animal manure, rice cultivation, emission from soils forestry and land use land cover changes, and waste C. Bridging gap areas between top down and bottom approaches in the energy sector C. Web site development and Data base generation	X, P	X, P	X, P	X, P
3. General Description of Steps taken or envisaged to implement the Convention				

(a) Programs related to sustainable development, research, public awareness, etc.	X	NA	X	X
(b) Policy Options for Monitoring Systems and Response Strategies for Impacts	X	X	X	X
(c) Policy Frameworks for Implementing Adaptation Measures and Response Strategies	X	X	X	X
(d) Building Capacity to Integrate Climate Changes Concerns into Planning	X	NA	X	X
(e) Programs to Address Climate Change and its Adverse Impacts, including Abatement and Sink Enhancement	X, G	X, G	X, G	X, G
4. Other Information				
(a) Material Relevant for Calculation of Global Emission Trends	X, P	X, P	X, P	X, P
(b) Financial and Technological Needs and Constraints for - Vulnerability Assessment and Adaptation	X	X	X	X
5. Compilation and Production of the Initial National Communication	X	NA	NA	NA

X – Areas to be covered under this project.

P - Partly Covered under ALGAS

G – To be covered partly under “India: Selected Options for Stabilizing GHG Emissions” Project (IND/93/G31)

TIME PLAN AND SEQUENCING

Activities	Quarter (Starting July 2000)							
	1	2	3	4	5	6	7	8
Constitution of the Steering Committee, TAC and PMC and preparation of the action plan	X							
Data collection for identifying gap areas in the available inventory		x						
Initial national workshop			x					
Preparation of sectoral inventory			x	x	x	X		
Workshop on application of appropriate QA/QC measures			X					
Measurements for country specific emission factors		x	X	x	X			
Work for preparing and publishing Meta data directory on programs on sustainable development		x	x	x	x			
National workshop on policy options for monitoring systems and response strategies						x		
Work on development of policy options for implementing adaptation measures and response strategies and a portfolio of the same				x	x	x	x	
Work on survey of existing policy options integrated in to the planning process, modeling options to assess future energy efficiency and investment requirements			x	x	x	x	x	
Work on programs to assess climate change adverse impacts including abatement and sinks			x	x	x	x		
Generation of material relevant for global emission		x	x	x	x	x	x	
Studies to be undertaken for assessing financial and technological needs Vulnerability Assessment and Adaptation			x	x	x	x	x	
National workshop on vulnerability assessment (1 and 2)			x			x		

Capacity building and database generation	X	X	X	X	X	X	X	
A consolidated workshop on the national communication							X	
Report preparation						X	X	X

PROJECT PLANNING MATRIX

NARRATIVE SUMMARY	OBJECTIVITY- VERIFIABLE INDICATORS	MEANS OF VERIFICATION	CRITICAL ASSUMPTION
1. Development Objectives			
To facilitate the achievement of the ultimate objective of the UNFCCC	National communications	Communications to COP	India and other countries remain committed to the UNFCCC in accordance with the provisions of the Article 12.
2. Immediate Objective (outcomes) / purposes			
Immediate Objective I: To prepare initial national communication document	Initial National Communication Document	Communication to COP	India remains committed to the UNFCCC in accordance with the provisions of the Article 12.
Output -1: Development of GHG inventory from Energy and transformation industries, Agriculture, Land use change and Forestry and Waste sectors	<ul style="list-style-type: none"> • Sectoral Inventories created for the base year 1994 	Validation of results by using comparable methodologies	Accuracy of the inventory is crucial and critical for climate change related activities
Output -2: Reducing uncertainties in GHG emission inventory estimates through application of QA and QC measures and measurement of emission coefficients for priority areas	<ul style="list-style-type: none"> • Reduction of uncertainties in activity data, measured emission coefficients and thus the overall GHG budgets 	Validation of inventories through QA/ QC measures	Reduced uncertainties will lead to improved the inventory

<p>Output-3: Enhanced institutional capacities</p>	<ul style="list-style-type: none"> Improved institutional capacity through various training workshops 	<ul style="list-style-type: none"> Compilation of workshop outputs Documented methodological and analytical frameworks 	<p>Capacities built will be retained or available for future national communication activities</p>
<p>Activities: Compile information from existing sources, establish national project team (under the supervision of steering committee), hold inception and planning and consultative workshops, training workshops on data compilation and analysis for inventory estimates, on QA and QC measures, identify the critical areas which increase the uncertainties in the national GHG inventory, reduce uncertainties through application of QA and QC measures and measurement of emission factors in critical sectors, review and adapt existing methodologies and if need arises use the new methodologies developed, establish data collection mechanism system, prepare and circulate draft inventory and finalize.</p>			
<p>Immediate Objective II: General description of steps taken or envisaged to implement the convention</p>	<ul style="list-style-type: none"> Identification of the key steps to implement the convention 	<p>National Communication document finalized</p>	<p>The steps identified will help in implementing the convention</p>
<p>Output-1: Programs related to sustainable development, research and public awareness</p>	<ul style="list-style-type: none"> Compilation of information on of relevant ongoing and past programs Assess research programs to develop projects for targeted research Efforts to increase public awareness 	<p>Impacts of the publicity material developed</p>	<p>Technical, policy and financial resources would be available for carrying out the programs</p>
<p>Output -2: Policy options for monitoring systems and response strategies for impacts</p>	<ul style="list-style-type: none"> Expert meetings to be organized on impacts on climate change Research reports 	<p>Policy directions envisaged in the national communication</p>	<p>The necessary institutional support would be provided on a sustained basis</p>

Output –3: Policy frameworks for implementing adaptation measures and response strategies	<ul style="list-style-type: none"> Preliminary assessment of potential impacts of climate change on Agriculture, health, water resources, forestry and natural ecosystem 	Policy framework in place	The government will remain committed to global environment concerns
<p>Activities: Impacts to be assessed scientifically by using models on crop yields and variability, its latitudinal shift; forestry sector would cover changes in species diversity, forest regeneration, growth rates, forest production and migration of species; natural ecosystem research will be linked to the ongoing BSAP project, Coastal zone vulnerability assessment studies will involve trends in extreme events, study of tidal differences caused by sea level rise, update and upgrade data base on sea level change and assess adaptation strategies for some coastal areas in the country; Impact on health will be linked to assessment of relationship between temperature, rainfall and humidity on incidence rate of malaria, heat stress and some respiratory diseases; Impact on water resources will include study of key river systems, availability of ground water, and water quality and formulation of policy measures in response to water stress.</p>			
Immediate Objective: III Generation of other relevant information	<ul style="list-style-type: none"> Development of clearing house for data base, a portfolio of projects and policy papers, development of trends in emission inventory including future projections 	Data center established, portfolio of projects and relevant policies for adaptation strategies and trends in Indian emissions	This will further add value to the national communication
Output 1: Material relevant for global emission trends	<ul style="list-style-type: none"> Emission inventory to be developed for 1985-2000 Future projections under various scenarios 	Trends in Indian GHG emissions	This activity will add to the trends in global emission inventory and strengthen it further
Output –2: Financial and technological needs and constraints for	<ul style="list-style-type: none"> A portfolio of papers /projects suggesting policy frameworks for 	Linked to immediate objective – II, output 3	This will provide linkages with the targeted research

vulnerability assessment	implementing adaptation measures and response strategies in different sectors		
Output –3: Clearing house for database on climate change	<ul style="list-style-type: none"> Archival of data base and its accessibility through website 	Establishment of data center for enabling activity	Regular update of information would be carried out for continuous validation of the same
Activity: Acquisition of activity data from 1985 to 2000, estimation of GHG inventory from 1985 to 2000 and future projections using integrated impact assessment models, Establishment of a data center and website, acquisition of relevant hardware and soft ware etc. for the same.			

TERMS OF REFERENCE

1. The Steering Committee

The MoEF will establish the Steering committee with members drawn from other government ministries, departments, national NGOs, research institutions and other stakeholders including community based organizations.

Composition:

The steering committee will comprise of (but not limited to) representatives from the Planning Commission, central ministries, NGOs, private sector, experts and scientists.

Roles and Responsibilities

1. Set general guidelines for the formulation process of the national communication
2. Ensure that the national communication is integrated fully with sectoral plans, policies and the Ninth Plan.
3. Ensure UNFCCC obligations are met and guidance from the COP is considered during the implementation of the project.
4. Ensure that all necessary steps are taken so that the National Communication eventually becomes a part of the National Policy.
5. Monitor the performance of the project by evaluating periodic reports.
6. Supervise hiring decisions made under this project, and review arrangements and subcontracts periodically.
7. Provide access to data/archives or any other information required by the participating institutions and organizations
8. Seek inputs from the Project Advisory Committee.
9. Participate in national workshops, consultations and state workshops as appropriate.
10. Liaison with the corresponding state departments and catalyze their participation in the planning process.
11. Facilitate the inter-sectoral consultations and enhance inter-ministerial collaboration.
12. Make their respective organizations aware of the importance of climate change, its impacts and promote commitment at all levels.
13. Finalize and approve the draft national communication document.

2. National Project Director (NPD)

The NPD will be critical in catalyzing inter-ministerial and broader stakeholder support towards the objectives of this project and liaising with counterparts in other ministries, state governments

and ministries. The NPD will liaison between the steering committee, Project Advisory Committee and the PMC who will carry out the actual work of this project. The National Project Director will be responsible for communicating to the Steering Committee, the overall management and implementation of the project.

The Joint Secretary in charge of the Climate Change Unit within MoEF will be appointed the NPD of the project. The NPD's administrative role will consist of regularly monitoring the progress of the project appraising the performance of national consultants in collaboration with the Project Manager, preparing recommendations to the steering committee, organizing workshops and consultations.

Specific Duties of the NPD entail;

- Preparing progress and completion reports as required by GoI and UNDP procedures
- Organizing and convening steering committee meetings
- Leading the organization of national workshops and consultations
- Assist the consultants in carrying out their assignments by facilitating interaction and contacts with other ministries, organizations and institutions.
- Ensure that a transparent and participatory approach is followed, stakeholders are consulted and involved in the project.
- Co-ordinating with line ministries, state governments and institutions (such as the private sector, NGOs, CBOs) involved in the project execution.
- Overall management of the project team (project manager and national consultants) and conveying the official position of the steering committees.
- Reviewing project budget revisions and all other administrative arrangements required under GoI and UNDP procedures.
- Provide administrative inputs to the project and monitoring arrangements as per GOI/UNDP procedures.
- Preparing reports and recommendations to the project steering committee.
- Take all the steps necessary to ensure GOI's commitment and support to the approval of the national communication..
- Involve departments and experts in the project
- Attend national workshops, consultations and state workshops as appropriate.

3. National Project Manager (NPM)

The NPM will carry out day to day working of the project. A full time consultant hired for the duration of the project will fill be position of NPM. It is critical that a highly qualified and motivated person be found and selected for this position, and the person is able to devote all of his or her time to the duties described in the TORs. The Steering Committee should approve the candidate selected.

Work Description

The NPM will be fully responsible for the day to day implementation of this project. The NPM will administer all technical project inputs and coordinate the execution of all project activities. The NPM will report directly to the NPD and steering committee and liaison with all individual and organizations involved in the planning process.

The NPM will prepare monthly work plans and activity reports for circulation to the NPD, steering committee, DEA and UNDP. The NPM will propose budget revisions as needed and prepare requests for disbursements in a timely fashion to ensure that funds are available when needed for project activities.

The NPM will supervise the work of all national consultants and other working groups, including national workshops and consultations. He will also provide guidance and assistance to state planning teams as appropriate and upon request. The NPM will be responsible for the preparation of outlines of key project documents and will assign responsibilities for write up to the other national consultants.

The NPM will be responsible for the final compilation of all documents. He will ensure that all activities are conducted in accordance with the methodologies outlined in the project document. He will be responsible for assessing training needs and arranging training. Among others, he will be familiar with the UNFCCC, all IPCC reports including guidelines and recent COP guidance and emerging issues in the field of climate change and ensure these are incorporated in the project and that it conforms to objectives of the project.

Lines of authority for reporting requirements;

The NPM will report to the NPD and steering committee on all project activities.

Principal Activities:

Administration of project inputs

- Prepare detailed monthly plans and cost estimates for accounting and timely disbursement of funds as needed
- Maintain detailed records of all expenditures incurred in accordance with GoI and UNDP procedures.

Co-ordination

- Co-ordinate the implementation of project activities as set out in the project document.
- Co-ordination between the steering committee, thematic working groups, consultants, NPD and UNDP.

- Co-ordinate all logistical arrangements for steering committee meetings, national workshops, consultations and meetings.
- Maintain regular contacts as needed with all government, non-government, community-based and international organizations that are concerned in the planning process and ensure smooth functioning of the project.
- Maintain regular contact with state officials involved in preparing state BSAPs, co-ordinate provision of technical and administrative assistance, provision of resources and materials.

Supervision of Project Activities

- Supervise the work of national consultants and thematic working groups.
- In conjunction with the national consultants, thematic groups, prepare detailed contents of activities.
- For all project documents, assign writing responsibilities to national consultants.
- Hold periodic brainstorming sessions with the national consultants, thematic groups and NPD, to better define options, priorities and plan course of action.
- Maintain regular contact with state planning teams, obtain regular status reports and provide assistance and guidance to states as appropriate.
- Supervise the consultative process with stakeholders including state governments, nodal agencies and co-operating partners.

Technical Inputs and Participation

- Assess training needs of national consultants, and make arrangements for providing the same.
- Ensure the project is in conformity with objectives of the UNFCCC.
- Ensure that a participatory methodology is followed and effective stakeholder participation is achieved.
- Obtain technical inputs (material and human resources) to assess and include measures for recent issues in the field of climate change, particularly those emerging from recent COP (such as issues related to sustainable development, response strategies for impacts, abatement and adaptation etc.)
- Circulate reports, studies and documents prepared to prominent experts for technical reviews.
- Take overall responsibility for preparing the draft and final national communication

Qualifications

The NPM should be a senior level professional, with an advanced degree and research experience in climate change. The NPM should have expertise in policy analysis, management and implementation, and experience with government working and research activities. He/she should have expertise in some energy and climate change related models for India. He/she should have prior experience in organisation, co-ordination and management of international and national workshops and be familiar with participatory methodologies. The NPM should be well versed with the UNFCCC planning manuals and guides. He/she will need to have excellent managerial, inter-

disciplinary, writing and communication skills. He/she should be bi-lingual in Hindi and English and be proficient in use of computers.

4. Indicative TORs for the members of the Technical Advisory Committee (TAC)

The members of the TAC will comprise of eminent scientists, experts, activists and private sector representatives having extensive work and research experience. The experts will be responsible for gathering information about their respective sectors, assessing gaps, identifying priorities, options and developing strategies and action plans. They will provide technical inputs and be responsible for synthesizing all technical papers, studies, and reports in their respective areas.

Each TAC member will initially decide upon the course of action, studies to be conducted and then formulate details for respective sub-contracts and national consultants who will do much of the actual data gathering. The experts will facilitate access to the data by the national consultants. They will hold periodic brainstorming sessions to debate and decide upon courses of action and will attend expert meetings and national workshops.

Lines of Authority

NPD and NPM, who will seek advice and concurrence of the Steering Committee and selection committee, will co-ordinate TAC establishment. TAC experts will directly submit reports to the NPM. Any problems encountered will be brought to the attention of the NPD.

Activities

- Gather preliminary information on the thematic area, identify areas in which studies need to be undertaken, main sources of information and draw up details for respective sub-contracts.
- Guide the selection committee, NPD and NPM in selecting institutions and national consultants for various sub-contracts.
- Review work of national consultants to make sure satisfactory progress is being made, obtain regular status reports.
- Provide technical inputs to consultants in written form.
- Debate studies to identify gaps, develop criteria to ascertain and rank priorities, facilitate application of priorities in national workshops, and consultations.
- Ascertain training needs and national capacity in the thematic area.
- Attend national workshops and expert meetings as appropriate.
- Provide inputs to PMC as and when requested and review studies, reports and action plans developed by them.
- Assist in compiling the reports from consultants, assess the same and help in the planning process.
- Develop participatory methodologies for defining strategy objectives, identifying and analyzing strategies and action plans for their respective sectors.
- Hold consultations with nodal agencies, participating institutions, and stakeholders to seek their views and input into planning.

Outputs:

Reports stocktaking and summarizing the present status of country level inventory development, available abatement scenarios and response strategies to combat the adverse effects of climate change, studies on vulnerability assessment of key areas of national importance and programs on sustainable development. The reports should include the institutional and human capacity in the respective areas. Assessment of sustainability of use, sharing of benefits, cross-sector practices, legal and institutional factors concerning the area. Criteria for setting priorities and identifying gaps, methodology for developing preliminary strategies and spatially referenced action plans.

5. Project Staff

Two national consultants will be hired to assist the NPM in carrying out his/her duties. The national consultants will assist in preparing progress reports, financial statements, and liaising with the NPD, thematic working groups and state planning groups. The national consultants will assist in providing technical input to the state planning groups, disseminate materials and information, organize and co-ordinate workshops, meetings and consultations under the project. The national consultants will keep in regular contact with the thematic working groups and will facilitate their work as necessary.

It is currently envisaged that both the national consultants will have experience in working in at least one of the areas to be dealt with in the project (inventory development and projections, vulnerability assessment studies, development of abatement and adaptation strategies) and have experience in participatory methods and institutional arrangements. Expertise in some energy and climate change related models for India would be preferable. At least one of the consultants should have expertise in policy analysis and management, and have excellent managerial, interdisciplinary, writing and communication skills. Both the consultants should be bi-lingual in Hindi and English and be proficient in use of computers.

Lines of authority for reporting requirements;

The national consultants will report to the NPM directly. They will assist the NPM in all his/her activities and smooth discharge of responsibilities.

Principal Activities:

Administration of project inputs

Assist NPM in preparing detailed monthly plans and cost estimates for accounting and timely disbursement of funds as needed

Co-ordination

The NPM will distribute work between the two consultants for co-ordinating the following activities, such that no overlap occurs.

- Co-ordinate the implementation of project activities as set out in the project document.
- Assist NPM in co-ordination between the steering committee, thematic working groups, consultants, NPD and UNDP.
- Co-ordinate all logistical arrangements for steering committee meetings, national workshops, consultations and meetings.
- Maintain regular contacts as needed with all government, non-government, community-based and international organizations that are concerned in the planning process and ensure smooth functioning of the project.
- Maintain regular contact with state officials involved in preparing state BSAPs, co-ordinate provision of technical and administrative assistance, provision of resources and materials.

Supervision of Project Activities

- Assist NPM to prepare detailed content of activities in conjunction with the thematic groups.
- Writing responsibilities for all project documents as assigned by the NPM.
- Participate and contribute qualitatively to periodic brainstorming sessions with the NPD, NPM and thematic groups, to better define options, priorities and course of action.
- Maintain regular contact with state planning teams, obtain regular status reports and provide assistance and guidance to states as appropriate.
- Assist NPM in supervising the consultative process with stakeholders including state governments, nodal agencies and co-operating partners.

Technical Inputs and Participation

- Ensure the project is in conformity with objectives of the UNFCCC.
- Ensure that a participatory methodology is followed and effective stakeholder participation is achieved.
- Obtain technical inputs (material and human resources) to assess and include measures for recent issues in the field of climate change, particularly those emerging from recent COP (such as issues related to sustainable development, response strategies for impacts, abatement and adaptation etc.)
- Circulate reports, studies and documents prepared to prominent experts for technical reviews.
- Assist NPM in preparing the draft and final national communication

5. Indicative TORs for various national consultants for sub-contracts

The main activities of this project are inventory assessment for 1994, reducing uncertainty in emissions, and vulnerability and adaptation policy formulation. Further sub-activities under each of these main activities encompass diverse sectors like energy and transformation sectors, agriculture, land use, forestry, industrial processes, waste, water resources, human health, natural ecosystems etc. These are specialized areas of knowledge and therefore related project activities have to be conducted under expert guidance. It is therefore proposed to hire at least one national consultant for each sub-activity who will guide and administer the various components under his/her respective sub-contract. They will be responsible for developing implementation methodology and plans, gathering information, assessing gaps, identifying priorities, options and co-ordinations with the PMC/TAC. They will also provide technical inputs and be responsible for synthesizing all studies and reports for their respective sub-contracts.

Responsibilities

These national consultants will be directly responsible for delivering the contractual obligations for the respective sub-contracts. Indicative TORs for national consultants for various sub-contracts are appended below.

1. Reduction of uncertainty in the energy sector:

(i) Determination of Carbon dioxide, CH₄ and N₂O from the transport sector from the engine source:

a. National consultants - Category II:

The person should be an expert in the field of measurement of emission from the transport sector. He should be well versed with the changing trends of fuel use and engines in the country and also with various emissions norms (Euro-I, Euro-II) followed world over and also in India.

b. National consultants - Category I:

Should have 2-3 years of experience of working in the area of climate change and have experience in the various techniques of GHG and other trace gas emission measurements. Should be aware of the different emission norms associated with the transport sector world wide and the ones followed in India. The candidate should be well versed with MS office, some graphics packages and tools for calculations.

(ii) Biomass burning for fuel :

Should have 2-3 years of experience of working in climate change area and should have experience in various techniques of GHG and other trace gas emission measurement and analysis. Should be well versed with MS office, some graphic software, and tools for calculations.

2. Reduction of uncertainty in the Industrial sector:

Should have 2-3 years of experience of working in climate change area and should have experience in various techniques of GHG and other trace gas emission measurement and analysis. Should be well versed with MS office, some graphic software, and tools for calculations.

3. Reduction of uncertainty in the agriculture sector:

(i) Methane and N₂O measurement from enteric fermentation in animals and animal manure

a. National consultant- Category II:

The person should be an eminent researcher in climate change area. He should be well versed with the various techniques and analysis of GHG and other trace gas measurements in the agriculture sector.

b. National consultants- Category I:

Should have 2-3 years of experience of working climate change area and should have experience in various techniques of GHG and other trace gas emission measurement and analysis. Should be well versed with MS office, some graphic software, and tools for calculations.

(ii) N₂O, CH₄ and CO₂ emissions from soils

Should have 2-3 years of experience of working in climate change area and should have experience in various techniques of GHG and other trace gas emission measurement and analysis. Should be well versed with MS office, some graphic software, and tools for calculations.

4. CO₂, CH₄ and N₂O measurements from the land use land cover change and forestry sector

Should have 2-3 years of experience of working in climate change area and have experience in various techniques of GHG and other trace gas emission measurement and analysis. Should be well versed with MS office, some graphic software, and tools for calculations.

5. CH₄ and N₂O measurements from the waste sector

Should have 2-3 years of experience of working in climate change area and have experience in various techniques of GHG and other trace gas emission measurement and analysis. Should be well versed with MS office, some graphic software, and tools for calculations.

6. Vulnerability and adaptation measures for agriculture sector:

The person should be an eminent researcher in agriculture sector and climate change impact assessment. He should be well versed with vulnerability and adaptation policies and strategies for various facets of the Indian agriculture sector including livestock. He should also be an expert in analytical tools and models used for these studies.

7. Vulnerability and adaptation measures for LUCC and forestry sector:

The person should be an eminent researcher in Indian forestry sector and impact assessment due to climate change. He should be well versed with vulnerability and adaptation policies and strategies for Indian forestry and land use change. He should also be an expert in analytical tools and models used for these studies.

8. Vulnerability and adaptation measures for natural ecosystems:

The person should be an eminent expert in climate change impact assessment on natural ecosystems. He should be well versed with vulnerability and adaptation policies and strategies for various types of ecosystems. He should also be an expert in analytical tools and models used for these studies.

9. Vulnerability and adaptation measures for coastal zones:

The person should be an eminent expert in climate change impact assessment for the Indian coastal zones. He should be well versed with vulnerability and adaptation policies and strategies for various facets of the Indian coastal areas including regional variability. He should also be an expert in analytical tools and models used for these studies.

10. Vulnerability and adaptation measures for public health:

The person should be an eminent expert in public health and management policies preferably with a medical degree. He should be well versed with vulnerability and adaptation policies for Indian population for various vector-borne diseases. He should also be an expert in analytical tools and models used for these studies.

11. Vulnerability and adaptation measures for water resources:

The person should be an eminent expert on Indian water resources and systems and impact of climate change. He should be well versed with vulnerability and adaptation policies and strategies for various facets of the Indian water resources. He should also be an expert in analytical tools and models used for these studies.

12. Energy and transformation sector inventory assessment:

The person should be an eminent expert on Indian energy system and impact of climate change. He should be well versed with UNFCCC and IPCC inventory assessment methodologies for the energy and transformation sectors. He should also be an expert in analytical tools and models used for these studies.

13. Industrial sector inventory assessment:

The person should be an eminent expert on industrial emissions. He should be well versed with UNFCCC and IPCC inventory assessment methodologies for industrial activities. He should also be an expert in analytical tools and models used for these studies.

14. Agriculture sector inventory assessment:

The person should be an eminent expert on Indian agriculture sector emissions. He should be well versed with UNFCCC and IPCC inventory assessment methodologies. He should also be an expert in analytical tools and models used for these studies.

15. LUCC and forestry sector inventory assessment:

The person should be an eminent expert on Indian forestry sector emissions. He should be well versed with UNFCCC and IPCC inventory assessment methodologies. He should also be an expert in analytical tools and models used for these studies.

16. Waste sector inventory assessment:

The person should be an eminent expert on solid waste, industrial and residential waste water related emissions. He should be well versed with UNFCCC and IPCC inventory assessment methodologies. He should also be an expert in analytical tools and models used for these studies.

Outputs:

Reports stocktaking and summarizing the present status of country level inventory development, available abatement scenarios and response strategies to combat the adverse effects of climate change, studies on vulnerability assessment of key areas of national importance and programs on sustainable development. The reports should include the institutional and human capacity in the respective areas. Assessment of sustainability of use, sharing of benefits, cross-sector practices, legal and institutional factors concerning the area. Criteria for setting priorities and identifying gaps, methodology for developing preliminary strategies and spatially referenced action plans.

6. Methodologies for recruiting consultants, assuring and evaluating the quality of work undertaken by National Consultants.

It is anticipated that a number of long and short-term consultants will be hired to assist in the execution of project activities. Therefore it is necessary to establish procedures to select the best candidates possible for the job and ensure that the work performed is of a high quality.

Methodology for Recruitment

- A balanced selection committee of 3-4 persons should be set up by the Steering Committee.
- The selection committee should establish and agree upon a standard weighted ranking for judging CV's and applications. Major factors should include education, experience and communication skills.
- The selection committee should approve TORs for each position prior to advertising it openly.
- Each member of the committee should rank the applications independently. The three or four applicants with the highest average score for each position should be called in for an interview.
- A separate weighted ranking should be prepared and agreed upon for the interview.
- On the day of the interview, the committee should agree upon a set of key questions to be asked of each candidate.
- The selection committee should calculate the scores for each candidate immediately after each being interviewed. After all the interviews are completed, average scores should be calculated together by the selection committee.

Methods for Assuring Quality Work

- Always recruit the best candidate available. When preparing the contract for each consultant, specify that the consultant is to be paid for delivering a product, not for the number of weeks or months worked.

- The basic product for each consultant is the report, or reports to be produced as per the terms of reference. Final payment of honorarium must be contingent upon approval.
- Review by the thematic working group, NPM and NPD. The consultants will be required to complete and modify their draft reports after receiving written comments by working group members who have reviewed their drafts.
- It is recommended that the contract for each consultant specify the following staggered payment for consultants hired to produce the report; 20% of honorarium and advanced upon signature of the contract; 40% upon receipt of a full draft report/study; 40% upon approval by the thematic working group, NPM and NPD.

Methods for Evaluating the Quality of Work Performed

- Each report/output should be read, critiqued or approved by at least two members of the TAC
- TORs need to be precise specially the outputs the consultant is to produce.
- Follow the participatory methodology outlined in the WRI/IUCN/UNEP planning guidelines and UNEP Guide to country studies.

7. Scope of Work for Contracts/Sub-Contracts

The PMC in consultation with TAC will commission institutions/organizations and consultants to carry out various project activities not covered by individual consultants, and sub-contract publishing and dissemination of the national communication.

The contracting/sub-contracting agencies will carry out specific tasks and provide technical inputs as per their TORs to be developed by the NPD/NPM in consultations with TAC.

The contracting/sub-contracting agencies will act under the overall guidance of the NPM and the operational supervision of the project team, and will be primarily responsible for providing inputs for preparation of the national communication.

ANNEX V
STAP ROSTER REVIEW

DR. MARK TREXLER

I have reviewed the project proposal entitled “Enabling Activities for the Preparation of India’s Initial Communication to Fulfil Its Commitment to the UNFCCC.”

I found the document to be well written and convincing with respect to the need to further support India’s efforts in filing its first required national communication under the UNFCCC. The filing of such communications will become more and more important over time, and developing an effective model for these communications at this stage is certainly desirable.

My primary concern with the document has to do with the fact that I consider it unlikely that the funding requested will be sufficient to carry out the very large number of analytical tasks encompassed in the proposal. I have little doubt that the inventory work by itself, prior to any treatment of mitigation and V&A assessments, could consume the project’s budget. The budget provided in the document is sufficiently general that it is not clear whether an attempt has been made to match up tasks with the budget on a line item basis. This may be a shortcoming that can be appropriately addressed once implementation of the project is undertaken, when a more detailed workplan will be prepared.

In this context, a number of points and recommendations are made below:

1. Given the fact that the accomplishment of the named tasks is likely to be budget-constrained, it would be desirable as soon as possible to develop a priority ranking for the various tasks that are covered. Such a priority ranking would probably not be particularly difficult, taking into account the relative quantitative and policy importance of the different gaps that are clearly identified in the document, and the likely ability of the named tasks to reduce current uncertainties. There is little recognition in the document of the fact that achieving high levels of analytical certainty in some parts of India’s emissions inventory may have little statistical or policy relevance given other gaps that might remain. The overall picture needs to be taken into account. In the beginning to implement this project, it would be very desirable to prepare a master table of gaps, the likely importance of the emission in question to India’s overall inventory, current emissions uncertainty levels, the tasks to be undertaken by the project, and the degree to which different uncertainties will be reduced through the project. Done correctly, such a table could help prioritize among the tasks to be carried out. It could also flag areas in which the work proposed might not be a significant contribution to reducing the overall uncertainties associated with India’s GHG inventory, as well as its mitigation and V&A assessments.

2. Although the desirability of a “comprehensive database” is asserted several times in the proposal, it is never clear what kind of database is really intended. Will it be “user friendly” for posting on the internet, focusing on key information, or will it be a repository for everything pulled together by the project? In the latter case it may be so dense that it serves little use other than to the project scientists themselves. Carefully selecting the audience and the goals of this database should be an immediate priority for the project, before one starts to have the database designed.
3. Section 4 discusses the linkage of this enabling activity to a subsequent proposal to be prepared. It is not clear exactly how the future proposal will build on the work being taken now, since there seems to be considerable overlap in the list of tasks.
4. In discussing biomass burning, and the work that is planned to quantify the emissions associated with this burning, there is little explicit recognition of the fact that some of the biomass resources involved represents a sustainable use, while other biomass is effectively being mined. In developing the workplans in this area this distinction should be taken into account in order to provide as relevant an assessment as possible.
5. Table 3 of the document is confusing. The uncertainty ranges for the three gases are each expressed differently. One as an absolute number, one as a +/-, and one as a range. Why can't they all be expressed consistently? Also, in discussing what the project will accomplish, the estimation of the degree to which uncertainties will be reduced is less specific than is needed to prioritize among the tasks. The assessment of how much uncertainty in the various inventory areas can really be reduced by the project merits additional attention. It is also unclear whether the estimates of uncertainty reductions that are present in Table 3 are absolute or relative. It is also unlikely that uncertainty levels will be reduced by the same amount for each gas.
6. In discussing the resolution of the differences between top-down and bottom-up analyses, there is insufficient justification of the need to accomplish such a resolution. It is not clear, for example, particularly in the absence of an emissions target for the country, that these differences have to be fully resolved in order to productively pursue any given set of mitigation options. If this task truly is important, it would be helpful to have it better explained.

In conclusion, the project proposal adequately justifies the importance of the tasks to be carried out, and will build effectively on work carried out to date by a range of projects and activities. Although prioritization of the tasks to be pursued will probably be required given budgetary limits, the successful implementation of this project will clearly set the stage for improving India's ability to fulfill its commitments under the UNFCCC, and for India's participation in the Convention generally.

ANNEX VI

RESPONSE TO STAP TECHNICAL REVIEW

The STAP roster reviewer suggested that the project is needed and important to help India prepare its initial national communications. However, he made six concrete suggestions about how it might be improved. While most of the comments have been incorporated at this stage of preparation, others can only be taken into account during project document formulation. The reviewer made the following suggestions:

1. Because India's needs exceed the budgetary resources in this regard, serious prioritization will have to occur before the project can be implemented—This suggestion will be kept in mind as the project document is formulated, so that the most important needs in the climate change area receive appropriate attention.
2. The role of the “comprehensive database” needs clarification—This suggestion has been taken and the expected role of the database has been clarified at several points in the proposal. The intention is that it is an internet-accessible database incorporating all of the relevant results of the project.
3. Linkage to subsequent targeted research proposal is not clear—The intention is that as the work on the initial national communication moves ahead, methodological problems will be highlighted. The future project, alluded to in this section, is intended to help solve some of the methodological issues and pave the way for future smooth implementation of the climate change convention.
4. Biomass assessment should distinguish between sustainable and non-sustainable uses—This is an interesting and challenging point to retain in mind. At several points in the proposal, this point has been inserted, but the real test of how to achieve this will come in the project document formulation and project implementation stages.
5. Table 3 numbers are confusing—The numbers alluded to in Table 3 have all been rewritten in terms of a relative percentage of uncertainty in the estimate being discussed (e.g., Uncertainty < 50%).
6. What does top-down and bottom-up difference matter?—This point has been clarified in the text. If top-down and bottom-up estimates of GHG emissions differ dramatically, then the methodologies or numbers utilized are not terribly reliable. The goal is to have both estimates agree so that we have a high degree of confidence in the resulting GHG inventory, as this will serve provide the basis for much future climate change work in India.

Tentative estimates of different outputs

Output 1: Inventory of GHGs

Activity 1.1: Prepare methodological framework and analytical format for estimating the GHG emissions for the base year 1994 using IPCC 1996 methodology and the Good Practice report, 2000 for energy and transformation, industrial process, agriculture, land use change, forestry and waste generation sectors.....no expenses

Activity 1.2: Energy and transformation sector inventory

The financial requirements for activity 1.2 will be as under.

1. National consultants (including overheads)	
Category II... 18 w/m @ \$1,000 per month	\$18,000
Research assistants... 30 w/m @ \$400 per month	\$12,000
2. Secondary data acquisition	\$ 4,000
3. Two expert meetings (refer activity 4.4)	\$10,200
4. Travel (for data collection, meetings etc)	
5. @ \$50 per day for 100 days	\$ 5,000
6. Miscellaneous	
Communication	\$ 2,000
Stationary and Xerox	\$ 2,000
Books, journals etc.	\$ 1,500
Report preparation	\$ 2,000
Component total	\$56,700

Activity 1.3: Industrial process inventory

The financial requirements for activity 1.3 will be as under.

1. National consultants (including overheads)	
Category II... 18 w/m @ \$1,000 per month	\$18,000
Research assistants... 30 w/m @ \$400 per month	\$12,000
2. Secondary data acquisition	\$ 4,000
3. Two expert meetings (refer activity 4.4)	\$10,200

4. Travel (for data collection, meetings etc)	
5. @ \$50 per day for 100 days	\$ 5,000
6. Miscellaneous	
Communication	\$ 2,000
Stationary and Xerox	\$ 2,000
Books, journals etc.	\$ 1,500
Report preparation	\$ 2,000
Component total	\$56,700

Activity 1.4: Agriculture Sector Inventory

1. National consultants (including overheads)	
Category II... 18 w/m @ \$1,000 per month	\$18,000
Research assistants... 30 w/m @ \$400 per month	\$12,000
2. Secondary data acquisition	\$ 4,000
3. Two expert meetings (refer activity 4.4)	\$10,200
4. Travel (for data collection, meetings etc)	
5. @ \$50 per day for 100 days	\$ 5,000
6. Miscellaneous	
Communication	\$ 2,000
Stationary and Xerox	\$ 2,000
Books, journals etc.	\$ 1,500
Report preparation	\$ 2,000
Component total	\$56,700

Activity 1.5: Land use change and Forestry Sector Inventory

The financial requirements for activity 1.5 will be as under.

1. National consultants (including overheads)	
Category II... 18 w/m @ \$1,000 per month	\$18,000
Research assistants... 30 w/m @ \$400 per month	\$12,000
2. Secondary data acquisition	\$ 4,000
3. Two expert meetings (refer activity 4.4)	\$10,200
4. Travel (for data collection, meetings etc)	
5. @ \$50 per day for 100 days	\$ 5,000
6. Miscellaneous	
Communication	\$ 2,000
Stationary and Xerox	\$ 2,000
Books, journals etc.	\$ 1,500

Report preparation	\$ 2,000
Component total	\$56,700

Activity 1.6: Waste Sector Inventory

The financial requirements for activity 1.6 will be as under.

1. National consultants (including overheads)	
Category II... 18 w/m @ \$1,000 per month	\$18,000
Research assistants... 30 w/m @ \$400 per month	\$12,000
2. Secondary data acquisition	\$ 4,000
3. Two expert meetings (refer activity 4.4)	\$10,200
4. Travel (for data collection, meetings etc)	
5. @ \$50 per day for 100 days	\$ 5,000
6. Miscellaneous	
Communication	\$ 2,000
Stationary and Xerox	\$ 2,000
Books, journals etc.	\$ 1,500
Report preparation	\$ 2,000
Component total	\$56,700

Output 2: Reducing uncertainties in GHG emission inventory estimates

Due to budget constraints only a few key source categories may be covered under the present proposal for improving the reliability of emission coefficients.

Activity 2.1: Appropriate QA and QC measures need to be applied to assert the quality of activity data and that of emission coefficient measurements so as to reduce the uncertainty in the GHG budget estimates. The tentative cost for organizing this workshop will be as follows:

1. Experts for training the participants @ \$2000 per day for 5 days	\$10,000
2. Travelling expenses for the participants @ \$100 per head	\$ 6,000
3. Staying expenses for the participants @ \$30 per head per day for 5 days	\$9,000
4. Study material for the participants @ \$100 per head	\$6,000
5. Workshop venue booking charges @ \$500 per day for 5 days	\$2,500
6. Multimedia and projection system hiring charges	\$1,000
7. Working lunch, snacks etc during the workshop	
8. @ \$30 per head per day for 5 days	\$9,000

9. Miscellaneous	
Communication	\$1,000
Publicity and invitation materials etc	\$1,500
Stationary and Xerox	\$1,000
Summary report preparation	\$2,000
Component total	\$49,000

Output: Scientists trained for the appropriate utilization of QA and QC methods for developing a priority list of source categories for uncertainty reduction in activity level and coefficients.

Activity 2.2: Reduction of uncertainty in the energy sector:

The priority areas identified that need measurement of emission coefficients are:

Sub-activity 2.2.1: Determination of Carbon dioxide, CH₄ and N₂O from the transport sector.

The financial requirements for this sub-activity will be as under:

1. National consultants (including overheads)	
Category II ...18 w/m (@ \$1,000 per month)	\$18,000
Category I...18 w/m @ \$400 per month	\$ 7,200
2. Methane analyser (one)	\$40,000
3. Accessories for FTIR and GC	\$28,000
4. (Includes mass controller, process parts, cells, columns,	
5. Carrier gas, special syringes, reference gases etc.)	
6. 4. Miscellaneous	\$ 5,000
(Stationary and Xerox, Books, journals, reference gas, other small components, Report preparation and others)	
Component total:	\$98,200

Sub-activity 2.2.2: Biomass burning for fuel (this will also measure emissions from crop residue considered under the agriculture sector)

1. National consultants (including overheads)	
Category I.... 18 w/m @ \$400 per month	\$ 7,200
Gas chromatograph for CH ₄ and N ₂ O analysis	\$40,000
2. Sampling Flasks (10 each for at least 10 sources such	\$15,000
3. as dung cake, 4-5 types of fuel wood, charcoal, rice husk,	
4. bagasse, wheat straw, coconut fibers etc. @ \$150)	
5. Air sucking oil free pump (five @US\$700)	\$ 3,500

6. Fabrication of special chamber (two @ US\$750)	\$ 1,500
7. Miscellaneous (Communication, xerox, report writing, standards of CH ₄ and N ₂ O repair necessary for the special chamber)	\$ 2,500
Component total	\$69,700

Activity 2.3: Reduction of uncertainty in the Industrial sector

The budget requirement for this activity is:

1. National consultants (including overheads) 36 w/m (@ \$ 400 per month)	\$114,400
2. Travel	\$ 3,000
3. Sampling flasks (25 including spares @ \$150 per flask)	\$ 3,750
4. Portable Gas chromatograph	\$20,000
4. Oil free pumps including tubes (4 pumps@ \$750)	\$ 3,000
5. Miscellaneous (Standards for CH ₄ , N ₂ O and CO ₂ , report preparation, Xerox, paper, and other small consumable items)	\$4,000
Component total	\$48,150

Activity 2.4: Reduction of uncertainty in the Agriculture sector

The various sub-source categories for which measurements are needed include enteric fermentation in livestock, manure management, rice cultivation and emission from fertilizer application to soils.

Sub-activity 2.4.1: Methane and N₂O measurement from enteric fermentation in animals and animal manure

The budget requirement for this activity is:

1. National consultant (including overheads) Category II...18 w/m @ \$1,000 per month	\$18,000
Research associates 18 w/m (@ \$400 per month)	\$ 7,200
2. Chambers for animals (two @ US12,000)	\$24,000
3. Gas Chromatograph for CH ₄ and N ₂ O	\$40,000
4. Air conditioning	\$ 6,500
5. Maintenance and hiring of two animals including feed, caretaker etc. @ \$1,500each)	\$ 3,000
6. Constant temperature baths (two @ \$1,200)	\$ 2,400

7.	Material for making four SF ₆ permeation tubes	\$ 3,000
8.	Construction of pit for manure storage (one)	\$ 1,000
9.	Miscellaneous (Communication, Xerox, report writing, other lab equipment, standards for CH ₄ , N ₂ O, SF ₆ , tubes, carrier gases, special syringes etc.)	\$ 4,000
Component total		\$109,100

Sub-activity 2.4.2: CH₄ emission from rice fields

The tentative cost of carrying out these measurements are as follows:

1.	Research assistants (including overheads) 18 w/m @ \$ 400 per month	\$ 7,200
2.	Persepx boxes (3 for each field for 4 fields @ \$430)	\$ 5,200
3.	Sample flasks (about 150 flasks @ \$150 for the study)	\$ 22,500
4.	Oil free pumps (4 @ \$700)	\$ 2,800
5.	Miscellaneous (Communication, Xerox, paper, report writing, Other lab equipment, standards for CH ₄ , N ₂ O, CO ₂ etc.)	\$ 4,000

Component total		\$41,700
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Subactivity 2.4.3: N₂O, CH₄ and CO₂ emissions from soils

Site measurements are to be undertaken for N₂O emissions from application of synthetic fertilizer, crop residue and sewage sludge application, and from cultivation of organic soils. For these studies, a dedicated Gas Chromatograph will be necessary. Samples will be collected all year round and simultaneous measurement of CO₂ and CH₄ also will be made at the selected fields for wheat, gram, pulses and sugar cane. Two research assistants will be required for 18 months for collection of samples and analysis. The laboratory to be sub-contracted for this job should have Gas chromatograph for CH₄ and N₂O analysis. However a CO₂ analyzer may have to be provided since these measurements are not routinely conducted. A vehicle with driver will also be required for carrying the samplers and other accessories back and forth. The following is the tentative estimate of the equipment and personnel needed to conduct the measurements:

1.	Research assistants (including overheads) 18 w/m @ \$ 400 per month	\$ 7,200
2.	IR based CO ₂ analyzer (one)	\$23,500
3.	Sample flasks (50 each for 4 fields @ \$150)	\$30,000
4.	Oil free pumps (4 @ \$700)	\$ 2,800

5.	One vehicle fitted with equipment (including driver)	\$17,000
6.	Miscellaneous (Communication, Xerox, paper, report writing, Other lab equipment, standards for CH ₄ , N ₂ O, CO ₂ etc.)	\$ 4,000

Component total **\$84,500**

Activity 2.5: CO₂, CH₄ and N₂O measurements from land use land cover change and forestry sector

In the previous inventory reports from India, budget estimates for CO₂ alone have been reported based on IPCC default emission factors. The other gases due to land use change have been totally ignored. In order to strengthen the inventory and reduce the uncertainty in emissions from this sector in the national budgets, it is imperative that campaign mode measurements be undertaken. Two persons will be required to carry out campaign mode experiments at least at two different locations in the country where slash and burn of forest area is undertaken to clear fields for use in agriculture. This work will be sub-contracted to a laboratory, which has experience in carrying out such measurements and has portable GC and other equipment necessary for measuring the emission factors for CO₂, CH₄ and N₂O. The minimum budget requirement for this activity will be:

1.	National consultants (including overheads) Category I...36 w/m @ \$ 400 per month	\$14,400
2.	Sampling flasks (75 @ \$150)	\$11,250
3.	Oil free pumps (3 @ \$700)	\$ 2,100
4.	Travel	\$ 6,000
5.	Miscellaneous (Communication, Xerox, paper, report, other lab Equipment, standards for CH ₄ , N ₂ O,CO ₂ etc.)	\$ 3,000

Component total **\$36,750**

Activity 2.6: CH₄ and N₂O measurements from the waste sector

Increased urbanization is leading to large solid waste generation within cities. The Indian GHG emission inventories reported earlier, have made budget estimates only for CH₄ from this source based on sporadic measurements. The municipal and industrial waste water are also large sources of both CH₄ and N₂O emissions. Therefore, this project intends to carry out extensive measurements at Municipal solid waste dumpsites and at a few industries such as breweries, food and paper. The budget requirement for this activity will be:

1.	National consultants (including overheads) Category I. 18 w/m @ \$ 400 per month	\$7,200
2.	Sampling flasks (3 @ \$150 each for all the sites)	\$1,800
3.	Portable gas chromatograph	\$20,000
4.	Travel	\$4,500
5.	Miscellaneous (Communication, Xerox, paper, report, spare valves, other lab Equipment, etc.)	\$3,500
Component total		\$37,000

Output 3: Enhanced institutional capacities

Activity 3.1: Organize two workshops to train participants for 3-5 days in data collection, collation and analysis for inventory estimation, impact assessment and various other aspects of climate change including capacity building to integrate climate change concerns into national planning. About 30 participants from various sectors and institutions will attend each workshop. The financial requirements for each of these capacity-building workshops will be as under.

1.	Travelling expenses for the participants @ \$100 per head	\$ 3,000
2.	Staying expenses for the participants @ \$20 per head per day for 5 days	\$ 3,000
3.	Study material for the participants @ \$100 per head	\$ 3,000
4.	Workshop venue booking charges @ \$500 per day for 5 days	\$ 2,500
5.	Multimedia and projection system hiring charges	\$ 1,000
6.	Working lunch, snacks etc during the workshop	
7.	@ \$30 per head per day for 5 days	\$ 4,500
8.	Miscellaneous	
	Communication	\$ 1,000
	Publicity and invitation materials etc	\$ 1,500
	Stationary and Xerox	\$ 1,000
	Summary report preparation	\$ 2,000
Component total		\$22,500

Activity 3.2: Organize workshops to train participants in vulnerability assessment due to climate change and adaptation strategies for agriculture, forestry, natural ecosystems, coastal zones, public health and water resources sectors. These workshops will be a part of the sub-contract for vulnerability and adaptation activities in each of the identified sectors (refer sub-output 4c). About 30 participants from related sector and institutions will attend each workshop. The financial requirements for each of these capacity-building workshops will be as under.

1.	Travelling expenses for the participants @ \$100 per head	\$ 3,000
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2. Staying expenses for the participants @ \$20 per head per day for 2 days	\$ 1,200
3. Study material for the participants @ \$50 per head	\$ 1,500
4. Workshop venue booking charges @ \$500 per day for 2 days	\$ 1,000
5. Multimedia and projection system hiring charges	\$ 1,000
6. Working lunch, snacks etc during the workshop @ \$30 per head per day for 2 days	\$ 1,800
7. Miscellaneous	
Publicity and invitation materials etc	\$ 500
Summary report preparation as part of the main report	\$ 500
Component total	\$10,500

Activity 3.3: Three two-day workshops will also be organized to implement this project. These include a *Planning and Consultative Workshop* for the institutions involved in this project, one *Inception Workshop* at project beginning stage for wider audience and one *Final Workshop* at project completion stage. About 40 participants including senior level experts from participating institutions are expected to attend the planning and consultative workshop and about 50 each for the inception and final workshops. The financial requirements for planning and consultative workshop will be as under.

1. Traveling expenses for the participants @ \$100 per head	\$ 4,000
2. Staying expenses for the participants @ \$30 per head per day for 2 days	\$2,400
3. Workshop venue booking charges @ \$500 per day for 2 days	\$ 1,000
4. Multimedia and projection system hiring charges	\$ 1,000
5. Working lunch, snacks etc during the workshop @ \$50 per head per day for 2 days	\$ 4,000
6. Miscellaneous	
Communication	\$ 2,000
Publicity and invitation materials etc	\$ 2,500
Stationary and Xerox	\$ 2,500
Summary report preparation	\$ 3,000
Component total	\$22,400

The financial requirements for each of the inception and final workshops will be as under.

1. Travelling expenses for the participants @ \$100 per head	\$ 5,000
2. Staying expenses for the participants @ \$30 per head per day for 2 days	\$ 3,000
3. Workshop venue booking charges @ \$500 per day for 2 days	\$ 1,000
4. Multimedia and projection system hiring charges	\$ 1,000
5. Working lunch, snacks etc during the workshop @ \$50 per head per day for 2 days	\$ 5,000

6. Miscellaneous

Communication	\$ 3,000
Publicity and invitation materials etc	\$ 2,000
Stationary and Xerox	\$ 2,500
Summary report preparation	\$ 2,000
Component total	\$24,500

Activity 3.4: Lead institutions in the country will be identified to undertake preparation of GHG inventory in different sectors for output 1 earlier. The methodological framework and analytical format for estimating GHG inventories using IPCC 1996 methodology and the Good Practice report, 2000 for various sectors will be documented. This activity will form a part of activity 1.1. These will be distributed to various government agencies, industry and other related institutions for enhancing institutional capacities in the country. About 1000 sets will be distributed costing \$30 each.

Output: Documented methodological framework and analytical format for estimating GHG inventories.

Activity 3.5: Promote publications in international and national journals, and books on climate change issues by Indian authors and prepare multimedia material (CDs, video cassettes etc.) on the same topic for a wider outreach. Expenses these activities will be about \$24,000, however each publication and multimedia publications will be dealt with on a case to case basis .

Output: About ten publications on climate change issues.

Output 4: General description of steps taken or envisaged to implement the convention

Enable India to fulfil its reporting obligations with respect to options for a **general description of steps taken**, including determining how to best implement sector-specific adaptation options and strategies in a manner that is consistent with national development strategies and priorities. This will include building the capacity of national and provincial experts and institutions to undertake this work.

Sub-Output 4a: Programs related to sustainable development, research and public awareness

Activity 4.1: A meta-data directory of programs already implemented and being planned by the government and other bilateral and multilateral agencies to be compiled which will include related references and key institutes/people working in this area. This will bring out the impact of these programs vis-à-vis sustainable development and identify areas, which need to be further strengthened.

Output: A meta-data directory of programs

Activity 4.2: Assessing research programs of participating institutions for addressing the identified national priority areas related to sustainable development. The identified institutions will formulate projects on each of the key areas for integration with the targeted research.

Output: A directory of targeted research activities proposed by various participating institutions.

Activity 4.3: Efforts to increase public awareness through various media highlighting relevant information about the issues related to sustainable development.

Output: Publicity material for increasing awareness on climate change issues

Indicators for sub-output 4a: (i) Meta-data directory of on-going programs (ii) Related publicity material (iii) Directory of targeted research activities.

Sub-Output 4b: Policy options for monitoring systems and response strategies for impacts

Activity 4.4: Consultative Expert meetings to be organized involving experts working on assessment of impacts due to climate change on agriculture, water resources, coastal zones, forestry, natural ecosystems, public health and economy in general. These meetings shall be address issues such as:

- Compilation of existing knowledge base on vulnerability assessment and adaptation measures for various sectors mentioned above.
- Identifying financial and technological needs and constraints to reduce vulnerability of systems due to climate change.
- Identify area for strengthening monitoring systems.
- Identifying policy options for monitoring systems and response strategies needed to combat the impacts of climate change.
- Identify areas for further thrust in research.

These one-day meetings will be a part of the sub-contract for vulnerability and adaptation activities in each of the identified sectors. About ten experts from related sector and institutions will attend each meeting. The financial requirements for each of these meetings will be as under.

1. Travelling expenses for the experts @ \$100 per head	\$ 1,000
2. Staying expenses for the experts @ \$30 per head per day for 1 day	\$3,00
3. Honorarium for the experts @ \$350 per head per day	\$3500
4. Working lunch, snacks etc @ \$30 per head per day	\$3,00
Component total	\$ 5,100

Sub-Output 4c: Policy frameworks for implementing adaptation measures and response strategies

The following are the proposed budget allocations for each of the sectors to be assessed for vulnerability.

Activity 4.5: Agriculture sector vulnerability assessment and adaptation

The financial requirements for this activity will be as under.

1. National consultants (including overheads)	
Category II... 18 w/m @ \$1,000 per month	\$18,000
Research assistants.. 36 w/m @ \$ 400 per month	\$14,400
2. Secondary data acquisition	\$ 1,000
3. Training workshop (refer activity 3.2)	\$10,500
4. Expert meeting (refer activity 4.4)	\$ 5,100
5. Travel (for data collection, meetings etc)	
@ \$50 per day for 100 days	\$ 5,000
6. Miscellaneous	
Communication	\$ 2,000
Stationary and Xerox	\$ 2,000
Books, journals etc.	\$ 1,500
Report preparation	\$ 2,000
Component total	\$61,500

Output: A status report on vulnerable regions and sectors in India due to climate change and suggesting policy frameworks for implementing adaptation measures and response strategies. This report will also contain a priority list of proposed case studies for targeted research activities in these areas.

Activity 4.6: Forestry sector vulnerability assessment and adaptation

This activity will identify and support institutions/NGOs that can strengthen efforts to increase GHG sinks and undertake measures to take abatement measures (refer activity 4.14). Forestry sector would cover changes in species diversity, forest regeneration, growth rates, forest production and migration of species.

The financial requirements for this activity will be as under.

1. National consultants (including overheads)	
Category II... 18 w/m @ \$1,000 per month	\$18,000
Research assistants... 36 w/m @ \$400 per month	\$14,400

2. Travel (for data collection, meetings etc)	
@ \$50 per day for 100 days	\$ 5,000
3. Secondary data acquisition	\$ 1,000
4. Training workshop (refer activity 3.2)	\$10,500
5. Expert meeting (refer activity 4.4)	\$ 5,100
6. Miscellaneous	
Communication	\$ 2,000
Stationary and Xerox	\$ 2,000
Books, journals etc.	\$ 1,500
Report preparation	\$ 2,000
Component total	\$61,500

Activity 4.7: Natural ecosystems vulnerability assessment and adaptation

Limited research has been conducted on the assessment of vulnerability and adaptation to climate change of natural ecosystems in India. Natural ecosystems include natural forest, natural grassland, natural reserve, wetland, freshwater, desert and desertification ecosystems. This project will collect observed available data for 1994 and assess the current status of the main natural ecosystems. It will use the IPCC Methodology and Technical Guidelines for Assessing Impacts and Adaptation in this sector. This activity will also draw inputs from the UNDP-GEF supported BSAP project and therefore the budget requirements are lower than the other components.

The financial requirements for this activity will be as under.

1. National consultants (including overheads)	
Category II... 12 w/m @ \$1,000 per month	\$12,000
Research assistants...24 w/m @ \$400 per month	\$ 9,600
2. Secondary data acquisition	\$ 1,000
3. Training workshop (refer activity 3.2)	\$10,500
4. Expert meeting (refer activity 4.4)	\$ 5,100
5. Travel (for data collection, meetings etc)	
6. @ \$50 per day for 70 days	\$ 3,500
7. Miscellaneous	
Communication	\$ 2,000
Stationary and Xerox	\$ 1,500
Books, journals etc.	\$ 1,000
Report preparation	\$ 2,000
Component total	\$48,200

Activity 4.8: Coastal zones vulnerability assessment and adaptation

In this project the following will be studied. The trends of sea level change and the occurrence of extreme events , study of tidal difference caused by the sea level rise will be undertaken , update and upgrade the database on sea level change, and assess adaptation strategies for different vulnerable coastal regions.

The financial requirements for this activity will be as under.

1. National consultants (including overheads)	
Category II... 18 w/m @ \$1,000 per month	\$18,000
Research assistants...36 w/m @ \$400 per month	\$14,400
2. Secondary data acquisition	\$ 1,000
3. Training workshop (refer activity 3.2)	\$10,500
4. Expert meeting (refer activity 4.4)	\$ 5,100
5. Travel (for data collection, meetings etc)	
@ \$50 per day for 100 days	\$ 5,000
6. Miscellaneous	
Communication	\$ 2,000
Stationary and Xerox	\$ 2,000
Books, journals etc.	\$ 1,500
Report preparation	\$ 2,000
Component total	\$61,500

Activity 4.9: Public health sector vulnerability assessment and adaptation

Work is needed on the relationship between temperature, rainfall and humidity on incidence rate as well as mortality of various vectors including malaria and effect of climate change on heat stress and incidence of respiratory diseases due to enhanced local pollutants.

The financial requirements for this activity will be as under.

1. National consultants (including overheads)	
Category II... 18 w/m @ \$1,000 per month	\$18,000
Research assistants...36 w/m @ \$400 per month	\$14,400
2. Secondary data acquisition	\$ 1,000
3. Training workshop (refer activity 3.2)	\$10,500
4. Expert meeting (refer activity 4.4)	\$ 5,100

5. Travel (for data collection, meetings etc)	
@ \$50 per day for 100 days	\$ 5,000
6. Miscellaneous	
Communication	\$ 2,000
Stationary and Xerox	\$ 2,000
Books, journals etc.	\$ 1,500
Report preparation	\$ 2,000

Component total **\$61,500**

Activity 4.10: Water resources sector vulnerability assessment and adaptation

The present work will assess available information on these dimensions, evaluate the range of options for adaptation to potential climate change and variability, including the policies, costs, benefits and challenges as well as development and sustainability factors associated with impact and adaptation at regional and catchment scales.

The financial requirements for this activity will be as under.

1. National consultants (including overheads)	
Category II... 18 w/m @ \$1,000 per month	\$18,000
Research assistants...24 w/m @ \$400 per month	\$ 9,600
2. Secondary data acquisition	\$ 1,000
3. Training workshop (refer activity 3.2)	\$10,500
4. Expert meeting (refer activity 4.4)	\$ 5,100
5. Travel (for data collection, meetings etc)	
@ \$50 per day for 80 days	\$ 4,000
6. Miscellaneous	
Communication	\$ 2,000
Stationary and Xerox	\$ 1,500
Books, journals etc.	\$ 1,000
Report preparation	\$ 2,000

Component total **\$50,700**

Output 5. Other information

Sub-Output 5c: Clearinghouse for database on climate change.

Activity 5.3: This activity will be sub-contracted involving following sub-activities.

1. Procure necessary equipment for setting up the clearing house	\$70,000
2. Channel hiring, host setting up, office space sharing charges etc.	\$15,000
3. Archive database (generated during the project) on a regular basis	\$20,000
4. Design interactive software programs for data analysis	\$10,000
5. Create and maintain interactive website for dissemination of key data	\$15,000
6. Miscellaneous (communication, stationary, floppies, etc.)	\$ 5,000
7.	
Component total	\$1,35,000

Annex VIII

Standard annex to sub-programme/project documents for use in countries, which are not party to the Standard Basic Assistance Agreement (SBAA).

1. The standard text below must be attached to and will become an integral part of every sub-programme document and GEF project document to be signed by a Government, which has not yet signed the SBAA. The attachment of annex is a pre-condition to the approval of any new sub-programme in those countries, whether the approval takes place at headquarters of the field. It is the Resident Representative's responsibility to ensure that annex is incorporated in all sub-programme documents prior to signature by the Government.
2. The regional bureaux are responsible for monitoring adherence to this required procedure. If a country refuses to sign the annex, this becomes a matter of policy that must be referred to the Administrator.
3. Subsection 2.0, below, lists that Government, which have signed the SBAA. The standard annex to the sub-programme document set out below is required only if the country does not appear on this list.

Standard Text: Supplemental Provisions to the Sub-programme

Document: The legal context

General responsibilities of the Government, UNDP and the executing agency

1. All phase and aspects of UNDP assistance to this sub-programme shall be governed by and carried out in accordance with the relevant and applicable resolutions and decisions of the competent United Nations organs and in accordance with UNDP policies and procedures for such sub-programmes, and subject to the requirements under UNDP Monitoring, Evaluation and Reporting System.
2. The Government shall remain responsible for this UNDP-assisted development sub-programme and the realisation of its objectives as described in this Sub-programme Document.
3. Assistance under this sub-programme document being provided for the benefit of the Government and the people of (the particular country or territory), the Government shall bear all risks of operations in respect of this sub-programme.
4. The Government shall provide to the sub-programme the national counterpart personnel training facilities, land, buildings, equipment and other required services and facilities. It shall designate the Government Co-operating Agency named in the cover page of this document (hereinafter referred to as the "Co-operations Agency"), which shall be directly responsible for the implementation of the Government contribution to the sub-programme.
5. The UNDP undertakes to complement and supplement the Government participation and will provide through the Executing Agency the required expert services, training, equipment and other services within the funds available to the sub-programme.

6. Upon commencement of the sub-programme the Executing Agency shall assume the responsibility for sub-programme execution and shall have the status of an independent contractor for this purpose. However, that primary responsibility shall be exercised in consultation with UNDP and in agreement with the Co-operating Agency Arrangements to this effect shall be stipulated in the Sub-programme Document as well as for the transfer of this responsibility to the Government or to an entity designated by the Government during the execution of the sub-programme.
7. Part of the Government's participation may take the form of cash contribution to UNDP. In such cases, the Executing Agency will provide the related services and facilities and will account annually to the UNDP and to the Government for expenditure incurred.

(a) Participation of the Government

1. The Government shall provide to the sub-programme the services, equipment and facilities in the quantities and at the time specified in the Sub-programme Document. Budgetary provision, either in kind or in cash, for the Government's participation so specified shall be set forth in the Sub-programme Budgets.
2. The estimated cost of items included in the Government contribution, as detailed in the Sub-programme Budget, shall be based on the best information available at the time of drafting the sub-programme proposal. It is understood that price fluctuations during the period of execution of the sub-programme may necessitate an adjustment of said contribution in monetary terms; the latter shall at all times be determined by the value of the services, equipment and facilities required for the proper execution of the sub-programme.
3. Within the given number of man-months of personnel services described in the sub-programme document, minor adjustments of individual assignments of sub-programme personnel provided by the Government, may be made in consultation with the Executive Agency, if this is found to be in the best interest of the sub-programme. UNDP shall be so informed in all instances where such minor adjustments involve financial implications.
4. The Government shall continue to pay the local salaries and appropriate allowances of national counterpart personnel during the period of their absence from the sub-programme while on UNDP fellowships.
5. The Government shall defray any customs duties and other charges related to the clearance of sub-programme equipment, its transportation, handling, storage and related expenses within the country. It shall be responsible for its installation and maintenance, insurance and replacement, if necessary, after delivery to the sub-programme site.
6. The Government shall make available to the sub-programme - subject to existing security provisions - any published and unpublished reports, maps, records and other data, which are considered necessary to the implementation of the sub-programme.
7. Patent rights, copyrights and other similar rights to any discoveries or work resulting from UNDP assistance in respect of this sub-programme shall belong to the UNDP. Unless otherwise agreed by the parties in each case, however, the Government shall have the right to

use any such discoveries or work within the country free of royalty and any charge of similar nature.

8. The Government shall assist all sub-programme personnel in finding suitable housing accommodation at reasonable rents.
9. The services and facilities specified in the Sub-programme Document which are to be provided to the sub-programme by the Government by means of a contribution in cash shall be set forth in the sub-programme Budget. Payment of this amount shall be made to the UNDP in accordance with the Schedule of Payments by the Government.
10. Payment of the above mentioned contribution to the UNDP on or before the dates specified in the Schedule of Payments by the Government is a prerequisites to the commencement or continuation of sub-programme operations.

(b) Participation of the UNDP and the executing agency

1. The UNDP shall provide to the sub-programme through the Executing Agency the services, equipment and facilities described in the Sub-programme Document. Budgetary provision for the UNDP contribution as specified shall be set forth in the Sub-programme Budget.
2. The Executing Agency shall consult with the Government and UNDP on the candidature of the Sub-programme Manager* who, under the direction of the Executing Agency, will be responsible in the country for the Executing Agency's participation in the sub-programme. The Sub-programme Manager shall supervise the experts and other agency personnel assigned to the sub-programme, and the on-the-job training of national counterpart personnel. He shall be responsible for the management and efficient utilisation of all UNDP-financed inputs, including equipment provided to the sub-programme.
3. The Executing Agency, in consultation with the Government and UNDP, shall assign international staff and other personnel to the sub-programme⁶ as specified in the sub-programme Document, select candidates for fellowships and determine standards for the training of national counterpart personnel.
4. Fellowships shall be administered in accordance with the fellowship regulations of the Executing Agency.
5. The Executing Agency may, in agreement with the Government and UNDP, execute part or all of the sub-programme by subcontract. The selection of subcontractors shall be made, after consultation with the Government and UNDP, in accordance with the Executing Agency's procedures.
6. All material, equipment and supplies which are purchased from UNDP resources will be used exclusively for the execution of the sub-programme, and will remain the property of the UNDP in whose name it will be held by the Executing Agency. Equipment supplied by the UNDP shall be marked with the insignia of the UNDP and of the Executing Agency.
7. Arrangements may be made, if necessary, for a temporary transfer of custody of equipment to local authorities during the life of the sub-programme, without prejudice to the final transfer.

8. Prior to completion of UNDP assistance to the sub-programme, the Government, the UNDP and the Executing Agency shall consult as to the disposition of all sub-programme equipment provided by the UNDP. Title to such equipment shall normally be transferred to the Government, or to an entity nominated by the Government, when it is required for continued operation of the sub-programme or for activities following directly therefrom. The UNDP may, however, at its discretion, retain title to part or all of such equipment.
9. At an agreed time after the completion of UNDP assistance to the sub-programme, the Government and the UNDP, and if necessary the Executing Agency, shall review the activities continuing from or consequent upon the sub-programme with a view to evaluating its results.
10. UNDP may release information relating to any investment oriented sub-programme or potential investors, unless and until the Government has requested the UNDP in writing to restrict the release of information relating to such sub-programme.

* May also be designated Sub-programme Co-ordinator or Chief Technical Adviser, as appropriate.

Rights, Facilities, Privileges and Immunities

1. In accordance with the Agreement concluded by the United Nations (UNDP) and the Government concerning the provision of assistance by UNDP, the personnel of UNDP and other United Nations Organisation associated with the sub-programme shall be accorded rights, facilities, privileges and immunities specified in said Agreement.
2. The Government shall grant UN volunteers, if such services are requested by the Government, the same rights, facilities, privileges and immunities as are granted to the personnel of UNDP.
3. The Executing Agency's contractors and their personnel (except nationals of the host country employed locally) shall:
 - (a) Be immune from legal process in respect of all acts performed by them in their official capacity in the execution of the sub-programme;
 - (b) Be immune from national service obligations;
 - (c) Be immune together with their spouses and relatives dependent on them from immigration restrictions;
 - (d) Be accorded the privileges of bringing into the country reasonable amounts of foreign currency for the purposes of the sub-programme or for personal use of such personnel, and of withdrawing any such amounts brought into the country, or in accordance with the relevant foreign exchange regulations, such amounts as may be earned therein by such personnel in the execution of the sub-programme; and
 - (e) Be accord together with their spouses and relatives dependent on them the same repatriation facilities in the event of international crisis as diplomatic envoys.

4. All personnel of the Executing Agency's contractors shall enjoy inviolability for all papers and documents relating to the sub-programme.
5. The Government shall either exempt from or bear the cost of any taxes, duties, fees or levies which it may impose on any firm or organisation which may be retained by the Executing Agency and on the personnel of any such firm or organisation, except for nationals of the host country employed locally, in respect of:
 - (a) The salaries or wages earned by such personnel in the execution of the sub-programme;
 - (b) Any equipment of the sub-programme or which, after having been brought into the country, may be subsequently withdrawn therefrom;
 - (c) Any substantial quantities of equipment, materials and supplies obtained locally for the execution of the sub-programme, such as, for example, petrol and spare parts for the operation and maintenance of equipment mentioned under (b), above, with the provision that the types and approximate quantities to be exempted and relevant procedures to be followed shall be agreed upon with the Government and, as appropriate, recorded in the Sub-programme Document; and
 - (d) As in the case of concessions currently granted to UNDP and Executing Agency's personnel, any property brought, including one privately owned automobile per employee, by the firm or organisation or its personnel for their personal use or consumption or which after having been brought into the country, may subsequently be withdrawn therefrom upon departure of such personnel.
6. The Government shall ensure
 - (a) Prompt clearance of experts and other persons performing services in respect of this sub-programme; and
 - (b) The prompt release from customs of:
 - (i) Equipment, materials and supplies required in connection with this sub-programme; and
 - (ii) Property belonging to and intended for the personal use or consumption of the personnel of the UNDP, its Executing Agencies, or other persons performing services on their behalf in respect of this sub-programme, except for locally recruited personnel.
7. The privileges and immunities referred to in the paragraph above, to which firm or organisation and its personnel may be entitled, may be waived by the Executing agency where, in its opinion or in the opinion of the UNDP, the immunity would impede the course of justice and can be waived without prejudice to the successful completion of the sub-programme or to the interest of the UNDP or the Executing Agency.
8. The Executing Agency shall provide the Government through the Resident Representative with the list of the personnel to whom the privileges and immunities enumerated above shall apply.

9. Nothing in this Sub-programme Document or Annex shall be construed to limit the rights, facilities, privileges or immunities conferred in any other instrument upon any person, natural or juridical, referred to hereunder.

Suspension or termination of assistance

1. The UNDP may be written notice to the Government and to the Executing Agency concerned to suspend its assistance to any sub-programme if in the judgement of the UNDP any circumstance arises which interferes with or threatens to integration of the successful completion of the sub-programme or the accomplishment of its purpose UNDP may, in the same or subsequent written notice, indicate the under which it is prepared to resume its assistance to the sub-programme. Any such suspension shall continue until such time as such conditions are accepted by the Government and as the UNDP shall give written notice to the Government and the Executing Agency that is prepared to resume its assistance.
2. If any situation referred to in paragraph 1, above, shall continue for a period of fourteen days after notice thereof and of suspension shall have been given by the UNDP to the Government and the Executing Agency, then at any time thereafter during the continuance thereof, the UNDP may be written notice to the Government and the Executing Agency terminate the sub-programme.
3. The provisions of this paragraph shall be without prejudice to any other rights or remedies the UNDP may have in the circumstances, whether under general principles of law or otherwise.
