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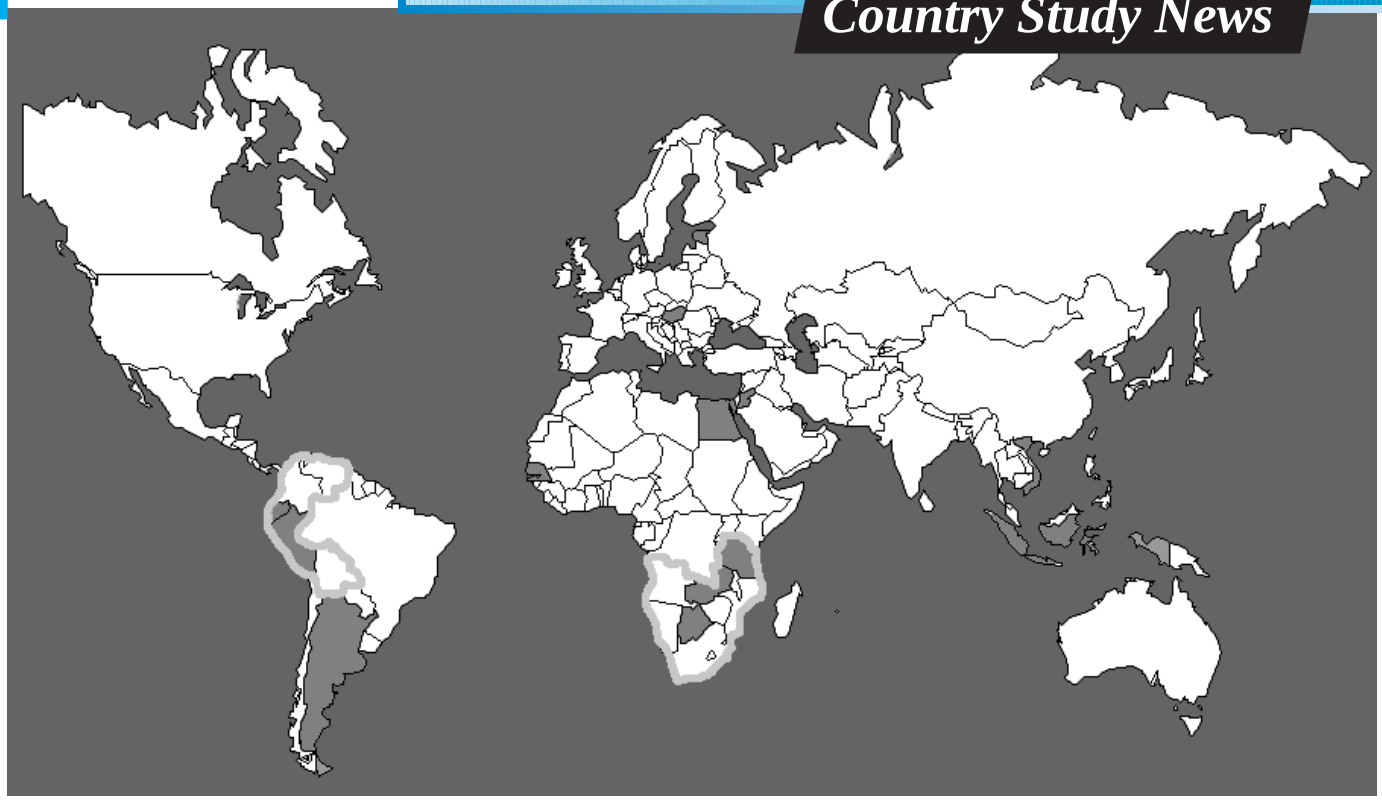
c2e2 News

Country Study News



The UNEP/GEF Project "Economics of GHG Limitations" and Parallel Country Studies

The limitation of greenhouse gas (GHG) emissions is a complex issue, intimately connected with economic development at local, national, regional and global levels. Key economic sectors such as energy, agriculture, industry and forestry all produce GHGs, and are likely to be affected directly and indirectly by any mitigation policy. The UNEP Greenhouse Gas Abatement Costing Studies, initiated in 1991 and coordinated by UCCEE, attempted to address these complex issues, developing a methodological framework and testing it through practical application in ten countries. The results of Phase Two were published in 1994 and described in earlier issues of *c2e2 news*. A third phase, extending the approach to other gases and sectors, and applying it in two countries, was completed at the end of 1995.

In 1996 the UNEP Centre launched a new project entitled "Economics of GHG Limitations" comprising eight national and two regional studies in parallel with a methodological development programme. The project is financed by the Global Environment Facility (GEF) through UNEP, and the UNEP Centre is responsible for coordination of the individual studies as well as development of the methodological framework, working in close collaboration with Lawrence Berkeley National Laboratory (LBNL). The national and regional studies are carried out by

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The UNEP Collaborating Centre on Energy and Environment (UCCEE) at Risø National Laboratory, Denmark supports the United Nations Environment Programme (UNEP) in pursuing its aim of incorporating environmental aspects into energy planning and policy world-wide, with special emphasis on developing countries. UCCEE works catalytically, encouraging, promoting and supporting research by local research institutions, coordinating projects and disseminating information, as well as carrying out a full in-house research programme in close collaboration with colleagues at Risø National Laboratory - the main public scientific research institute in Denmark.

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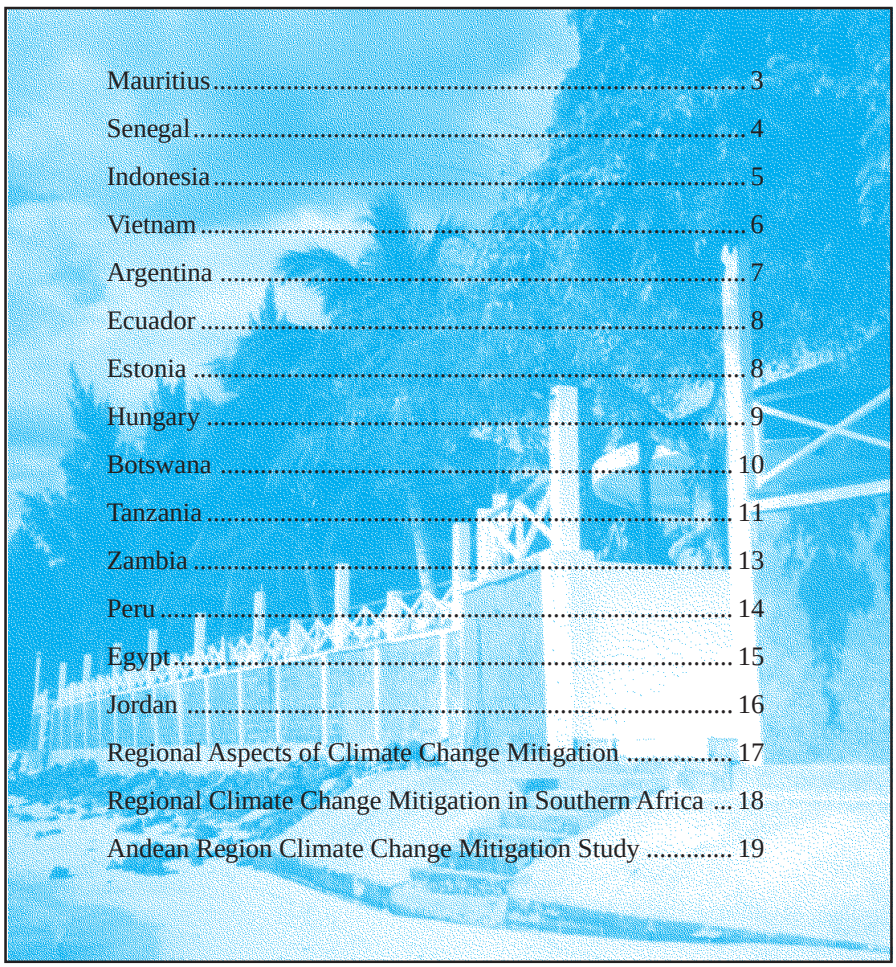


Africa	Asia	Latin America	Eastern Europe	Funding
Mauritius Senegal	Indonesia Vietnam	Argentina Ecuador	Estonia Hungary	UNEP/GEF “
SADC sub-region		Andean Group sub-region		“
Egypt	Jordan			UNDP/GEF
Botswana Tanzania Zambia		Peru		Danida “ “

Mauritius

The State of Mauritius lies in the Indian Ocean, some 800 km east of Madagascar, and comprises the islands of Mauritius, Rodrigues, St. Brandon, Agalega and in addition a number of smaller islands with limited or no population. The main island Mauritius has a land area of 1860 km^2 and a population of around 1.1 million inhabitants. The total coastline is approximately 200 km and most of it is surrounded by coral reef.

Participants at the first national workshop in Mauritius held in November 1996

The Mauritian economy is dominated by three activity areas: textile manufacturing, sugar production and tourism. Approximately half of the land area is cultivated and 90% of this area is used for production of sugar cane. The Mauritian economy has traditionally been very dependent on sugar production, but although it is still the dominant crop a deliberate diversification of the economy over the last decades has led to rapid expansion of, in particular, the textile manufacturing and tourism industries. These two are now the largest foreign exchange earners. The priority in the national planning process is generally on further diversification of the economy especially within the agricultural and manufacturing sectors.

Environmental concerns have been given increased priority in the latest development plans and both in terms of institutional structures and legislative foundation major steps have been taken in the early nineties. Mauritius has participated actively in international environmental cooperation since the UN conference on the environment in Stockholm in 1972.

A National Climate Committee (NCC) with the mandate "to improve our knowledge on climate change and its social, economic and environmental impacts" was established by Ministerial decree in 1991. The NCC is chaired by a representative from the Prime Minister's office and it has remained the main policy advisory body in the area of climate change.

Mauritius has already received support from the US Country Study Program for two studies: Inventory of GHG emissions, and Assessment of vulnerability to climate change and possible adaptation measures. The formal implementing organisation for both USCSP projects was Meteorological Services. The present activity

under the UNEP/GEF project is also coordinated by the Director of Meteorological Services and the study is being carried out by a technical working group composed of representatives from relevant government bodies, organisations and the university.

Although contributing an insignificant global share of anthropogenic greenhouse gases to the atmosphere, Mauritius is highly vulnerable to climate change impacts. Mauritius suffers considerable damage at regular intervals from cyclones, and serious coastal erosion is already evident. This vulnerability and a high level of environmental awareness contributed to Mauritius being the first country to ratify the UNFCCC.

In spite of the relatively low level GHG emissions, the country does have a potential for reductions, particularly of CO_2. Currently oil-fired power stations supply electricity to most of the island's consumers, apart from the sugar factories. The latter produce their own power from burning bagasse which has zero net emission of CO_2. A potential mitigation option for Mauritius would be to increase the amount of electricity generated by bagasse. Implementation of this option would require considerable investment in advanced technologies, as well as overcoming institutional barriers. In addition the future market for sugar is uncertain. All these factors enter into the analysis, along with other mitigation options such as the use of alternative transport fuels.

Project Coordinator:
R. J. Vaghjee, Director, Meteorological Services, Mauritius.

UNEP Centre Project Manager:
Henrik Meyer

Senegal

Although limiting greenhouse gas emissions is not necessarily a high-priority policy objective for Senegal, early studies[1] have demonstrated the existence of a number of mitigation options whose implementation could prove less expensive than alternative actions foreseen in national development plans. Earlier implementation of hydropower schemes, intensification of agricultural practices, energy efficiency improvement, afforestation for energy needs, among others, have been identified as options which entail an 'economic double dividend' either because their costs are lower than the technologies currently in use or because of the positive side-effects which would result from their implementation.

The Senegal country study intends to undertake in-depth analysis of these mitigation options as well as to explore new alternatives not yet covered by previous studies. The analysis is expected to concentrate on the cost evaluation of the options, their impacts on the overall economy, and the identification of barriers and constraints which prevent translating desired options into actions that simultaneously advance national development objectives while addressing climate change concerns.

The Directorate for the Environment at the Ministry for the Environment and Nature Protection has been nominated as the executing agency for the country study. Substantial support from the Directorates for Planning and Energy as well as technical backup from local experts is taking place.

The study is carried out in close collaboration between the local experts and ENDA-Tiers Monde - Energy Programme. ENDA is providing the national team with technical assistance and training on the construction of long-term scenarios, the macro-economic assessment of mitigation options and the use of LEAP model.

The National Seminar on Climate Change took place in Dakar from 16 to 17 January 1997 as part of both the country study activities and the CC:TRAIN Programme. The first part of the seminar was devoted to general aspects of climate change including the scope of the UNFCCC and the financial mechanisms for its implementation. The second part of the seminar comprised presentations on sectoral opportunities and constraints for mitigation actions. The seminar had a significant awareness-raising effect on climate change related issues. In addition, the seminar played a significant role in catalysing institutional interaction and facilitating the exchange of information and expertise among institutions.

Project Coordinator:
Ibrahima Sow, Ministry for Environment and Nature Protection, Senegal.

UNEP Centre Project Manager:
Arturo Villavicencio

[1] UNEP Greenhouse Gas Abatement Costing Studies: Phase Two Report, Appendix II, 'Country Summaries', UCCEE, Risø, Denmark, April 1994

Indonesia

The long-term and short-term national policies on climate change were defined by the National Committee on Climate and Environment in 1995.

The long-term policies include (a) developing scientific assessment and technology for a climate monitoring system and conducting research into the impacts of climate change, as well as related research, through regional and international co-operation; (b) establishing climate data information centres and climate change assessment centres, at the international, national and local levels; and (c) establishing a legal framework that is concerned with problems caused by the increase of greenhouse gases. The short-term policy is basically the operational approach for implementing the long-term policy.

Various studies relating to climate change have been conducted. Ongoing studies are.

US Country Studies Management Team. 1995. Indonesia Country Study on Climate Change

ADB. 1995. Asia Least-Cost Greenhouse Gas Abatement Strategy (ALGAS) Project

The principal objective of the UNEP/GEF project is to conduct a Climate Change Mitigation Study for Indonesia using the common methodological framework for calculating the cost of climate change mitigation activities at country level. In the process of completing the study, the project will also lead to the development and/or enhancement of local capacity to undertake this task independently after the conclusion of the project.

Within the overall methodological framework the project team will conduct the following tasks with technical assistance from UCCEE/ LBNL and other experts as necessary:

Develop an integrated methodology and create a database for the simultaneous assessment of mitigation options in the energy and forest sector: The methodology will make use of the MARKAL model which is currently used to analyse the mitigation options in the energy sector. This task will make changes to the model to include the analysis of options in the forestry sector, and to report on the capital investment and foreign exchange needs of each scenario. A database will be created for energy and forest sector mitigation options.

Collect cost and benefit data on forestry sector options: Forests constitute a significant portion of greenhouse gas emissions from Indonesia. An accurate assessment of the potential to reduce emissions in the forest sector, and the costs of the mitigation options, is essential in order to compare the costs with those of options in the energy sector. At the same time, forests provide a multitude of benefits which should be factored into the above analysis. The purpose of this task will be to gather the necessary data on costs and benefits in order to include them in the MARKAL analysis.

Expand the coverage of electricity efficiency in the national assessments: The current analysis of energy-sector mitigation options does not adequately treat efficiency improvement in electricity supply and use. The purpose of this task will be to collect new data on the costs of reducing transmission and distribution loss and power-generation own loss, and the use of electricity in the residential, commercial and industrial sector. These mitigation options to reduce electricity-sector losses will be explicitly represented using the new data in the MARKAL model.

Analyse scenarios of energy and forest sector mitigation at the national level: The project team will develop baseline and alternative mitigation scenarios of energy and forest sector options and analyse their costs and benefits , capital investment needs, and foreign exchange flows. The latter may be compared with national accounts in order to estimate the impact of alternative scenarios. Using the above information the project team will prepare cost curves, which will include both forest- and energy-sector options.

Discuss sector-specific strategies for the adoption of mitigation options: Based on the above analysis, the project team will discuss alternative strategies for the adoption of the cost-effective and most appealing mitigation options. Sector-specific strategies will be discussed at the second national workshop and at the regional conference.

A national workshop was held on 18-19 December 1996 at the Agricultural University Campus in Bogor. Based on the review of work completed the Indonesian team would undertake the following tasks in the next six months: (1) run the MARKAL model including the forestry sector, (2) data on the forestry sector would be provided by Dr. Ginting and colleagues, (3) primary data would be collected for forest sector for the island of Java by May 1997, and (4) energy efficiency data would be collected and/or collated to improve their representation in the MARKAL model.

Project Coordinator:
R.T.M. Sutamiharja, Ministry of State for Environment, Indonesia

UNEP Centre Project Manager:
Pramod Deo

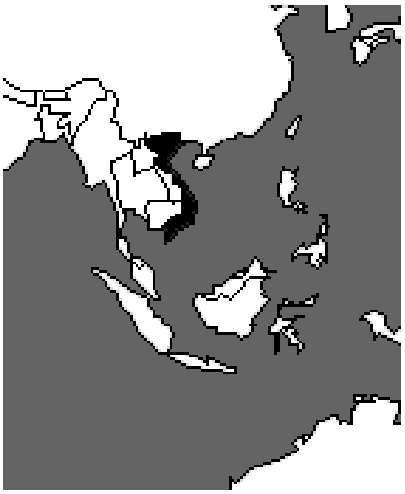
Vietnam

The World Resources Institute (WRI) has estimated the GHG emissions from Vietnam at approximately 53.4 million tons CO_2 in 1991. Vietnam's per capita CO_2 emissions are only 0.29 tons/year compared to 4.21 tons/year for the global average. The primary sources of CO_2 emissions in Vietnam are from energy consumption and cement production (38%) and from 'land use changes' or deforestation (62%). The most rapid growth of GHG emissions in Vietnam is expected to come from growth in energy consumption, estimated to average about 12 percent per annum. Much of the expected growth in energy consumption is expected to come from fossil fuels.

The primary sink for GHG emissions in Vietnam is its forests. Present forest cover is estimated at 9.3 million hectares. However, Vietnam's forests and soils are being depleted at approximately 100,000 ha/yr. As a result, Vietnam's forest cover declined from 45 percent of total land area in 1950 to the present estimate of 28 percent. The primary reason for this decline is land clearing for agriculture with secondary reasons being the expansion of shifting agriculture and in some areas over-cutting for timber production and the supply of fuelwood for household energy. In fact, over 70 percent of total energy consumption in Vietnam is derived from fuelwood, and other biomass (rice straw), but most is sustainably produced.

Vietnam has a relatively long coastline and two major river deltas. Its coastline lies in the path of the South China sea typhoons. A majority of the population is therefore vulnerable to coastal and delta flooding. This fact has caused the Government of Vietnam to be increasingly concerned about the potential adverse impacts of climate change and sea-level rise.

A few studies relating to climate change have been conducted in the past



and a GEF/UNDP project, Asia Least Cost Greenhouse Gas Abatement Strategy (ALGAS), is being executed by the Asian Development Bank (ADB). The present UNEP/GEF project builds on the significant previous and ongoing work in GHG related projects, especially the work being done in ALGAS on identification of mitigation/abatement options and development of a least-cost strategy for abatement of GHG emissions.

The principal objective of the UNEP/GEF project is to conduct a Climate Change Mitigation Study for Vietnam, particularly focusing on land-use change, and adopting a common methodological framework for calculating the cost of climate change mitigation activities at country level. In the process of completing the study, the project will also lead to the development and/or enhancement of local capacity to undertake this task independently after the conclusion of the project.

Within the overall methodological framework the Vietnamese project team will develop new approaches and methods, particularly in the land-use sector, and use them for estimating the costs of alternative scenarios. The project team will conduct the following tasks with technical assistance from UCCEE/LBNL and other experts as necessary:

Develop an integrated methodology and create a database for the simultaneous assessment of mitigation options in the forest and agriculture sector: The methodology will build on the existing approach used to develop the National Master Plan. With the support of the FAO and other experts, a sector plan has been prepared which explicitly addresses future land-use change scenarios for Vietnam. In this task, the study team will review the sector report, ascertain the data that are needed for a sector mitigation assessment, and develop a comprehensive model for the analysis of options in the land-use change sector. A data base will be created for land-use change mitigation options.

Collect cost and benefits data on forestry sector options: Forests constitute a significant portion of greenhouse gas emissions from Vietnam. An accurate assessment of the potential to reduce emissions in the forest sector, and the costs of the mitigation options, is essential in order to compare the costs with those of options in the energy sector. At the same time, forests provide a multitude of benefits which should be factored in the above analysis. The purpose of this task will be to gather the necessary data on costs and benefits in order to include them in the methodology to be developed as outlined in the above task.

Expand the coverage of electricity efficiency in the national assessments: The current analysis of energy-sector mitigation options does not adequately treat efficiency improvement in

electricity supply and use. The purpose of this task will be to collect new data on the costs of reducing transmission and distribution loss and power-generation own loss, and the use of electricity in the residential, commercial and industrial sectors. These mitigation options to reduce electricity-sector losses will be explicitly represented using the new data in existing energy-sector models.

Analyse scenarios of energy and land-use sector mitigation at the national level: The project team will develop baseline and alternative mitigation scenarios of energy and land-use sector options and analyse their costs, benefits from the forest and agriculture sector, capital investment, and foreign exchange flows. The latter may be compared with national accounts in order to estimate the impact of alternative scenarios. Using the above information the project team will prepare cost curves, which will include both land-use- and energy-sector options.

Discuss sector-specific strategies for the adoption of mitigation options: Based on the above analysis, the project team will discuss alternative strategies for the adoption of the cost-effective and most appealing mitigation options. The project team shall explore the use of a model for analysing the macro-economic consequences of adopting mitigation strategies. Sector-specific strategies will be discussed at the second national workshop and at the regional conference.

Project Coordinator: Nguyen Trong Hieu, Institute of Meteorology and Hydrology, Vietnam

UNEP Centre Project Manager: Pramod Deo

Argentina

Industrial pollution, especially water pollution, is one of the most urgent problems on Argentina's environmental agenda. Its high concentration in densely populated areas (the one that could be called "extended Greater Buenos Aires") strongly contributes to the problem. Air pollution from motor vehicles in densely populated urban areas adds to the industrial contamination and results in critical environmental problems. Major environmental impacts in rural areas of Argentina are deforestation, and the associated increases in flooding, erosion and elevation of the phreatic bed, as well as agrochemicals (pesticides and fertilisers) with regard to the generation of toxic waste. Oil and natural gas production are responsible for rather minor environmental problems at the national level, although their impact may be significant in production areas.

Transport and industry are the major GHG sources, followed by the energy sector itself. Another significant source of GHG emissions, in the form of methane, is waste. The advance of the agricultural frontier is responsible for the above mentioned deforestation which also has global environmental consequences in the form of carbon sink removal.

In recent years Argentina has undergone a process of institutional and regulatory transformation, contributing to a decentralisation of decision making and increasing the importance of the market. The energy system, the main actor of such transformation, is significantly responsible for the environmental agenda. The process applied by the state in the past aimed at substituting non-renewable energy sources, consequently causing a positive result on gas emissions and other environmental impacts. The new situation, whose objective is to maximise benefits and avoid getting involved in capital intensive investments, gives rise to a new context in which the intention to orient private actors' decisions toward environmentally clean and efficient options requires new strategies and provides opportunities and obstacles that should be explored.

In this context, the federal authorities are carrying out a comprehensive study of climate change issues in Argentina, covering the GHG emission inventory, vulnerability and adaptability analysis, and mitigation options. The study is funded by the GEF (through UNDP) and is scheduled to submit a national report to the UNFCCC by the end of 1997. The study, undertaken by the Secretariat of Science and Technology, began in July 1996 and is being carried out with the cooperation of a large number of public and private institutions.

The UNDP/GEF study on climate change is complemented by the UNEP/GEF project "Economics of Greenhouse Gas Limitations" which includes Argentina as a case study. The Secretariat of Science and Technology is responsible for the project while technical execution is by the Institute of Energy Economics. A national workshop to be held in June 1997 will discuss the effects of technological innovation on future mitigation scenarios.

Project Coordinator: Daniel Bouille, IDEE, Argentina

UNEP Centre Project manager: Arturo Villavicencio

Ecuador

The environmental agenda in Ecuador has been dominated by concern for the declining forest cover, destruction of mangroves and land degradation. However, few activities have provoked such serious extensive environmental damage in Ecuador as petroleum exploration and exploitation, which began in Ecuador's Amazonian region in 1970. Direct impacts deal with the pollution of watercourses by crude oil and formation of water spillage, soil erosion and pollution by indiscriminate building of roads paved with oil wastes. Some of the most evident indirect effects include deforestation and destruction of biodiversity in large areas; native peoples affected by the alteration of their habitat, their culture and the introduction of diseases; and economic and social marginalisation of native peoples and settlers.

Within that context, climate change mitigation actions should be understood as an essential component of a complex and inter-linked set of strategies and policies aimed ultimately at fostering a sustainable development path. Options such as improved operations and maintenance in the oil industry, gas-pipeline leak reduction, reduced flaring, land-use policies, and in general efficiency improvements in energy production and use have significant impacts not only as measures for controlling GHG emissions but also as urgent actions for mitigating environmental deterioration in the country.

Ecuador has been conducting a climate change country study with support from the USA Country Study Programme. The study, conducted by the Meteorological Institute, as the lead agency, was initiated in May 1994 and is at the completion stage. While the national GHG inventory has been completed following the IPCC guidelines, climate change mitigation and vulnerability analyses have only been covered in broad terms. The ongoing

mitigation study undertaken under the UNEP GEF project will asses potential mitigation options in depth, integrate them into a comprehensive analytical framework, evaluate economic and social impacts, and provide government institutions with necessary elements for a national climate change mitigation strategy.

A working team, including relevant institutions under the coordination of the National Advisory Commission for the Environment, has been appointed for supporting the study, which is conducted by the Ecuadorian Foundation for Energy and Environment. The Stockholm Environment Institute - Boston Center and the Institute for Energy Economics are providing technical support to the national team.

A national workshop took place on 10-11 April 1997.

Project Coordinator: Carlos Quevedo, Ecuadorian Foundation for Energy and Environemnt.

UNEP Centre Project Manager: Arturo Villavicencio

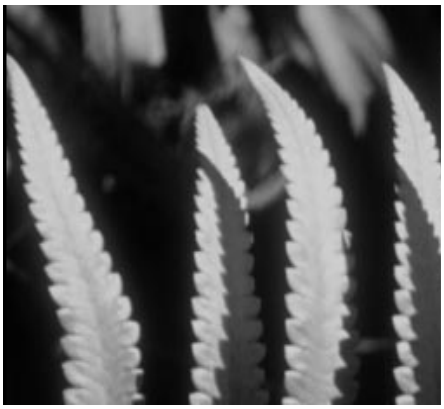
Estonia

The Estonia country study is being carried out by the Stockholm Environment Institute - (SEI-Tallinn), which has been nominated as the project executing agency by the Estonian Ministry of Environment.

The Estonia country study concentrates on mitigation options in the energy sector, which is the dominant source of the country's greenhouse gas emissions. Estonia's energy situation is quite unique in its reliance on oil shale, which exists in abundance in Estonia but is highly carbon-intensive. Efficiency improvements in oil shale combustion are likely to be high priority options. Other likely options include combined heat and power, nuclear energy, and renewable energy.

SEI-Tallinn is collaborating with other research organisations both within and outside of Estonia. Collaborating institutions include Tallinn Technical University Department of Electrical Power Engineering, and the Stockholm Environment Institute headquarters in Stockholm Sweden.

In addition to the UNEP/GEF project "Economics of GHG Limitations" , SEI-Tallinn is also the Estonian executing agency for another UNEP/GEF project on climate change impacts and adaptation, implemented by the



Hungary

Norwegian institute CICERO. SEI-Tallinn's role in both UNEP/GEF projects ensures maximum coordination between the two projects. The first national workshop for the UNEP Centre project, in Roosta Estonia from 31 October to 1 November 1996, was held jointly with the national workshop for the CICERO project, bringing together all government ministries and research organisations involved in both projects.

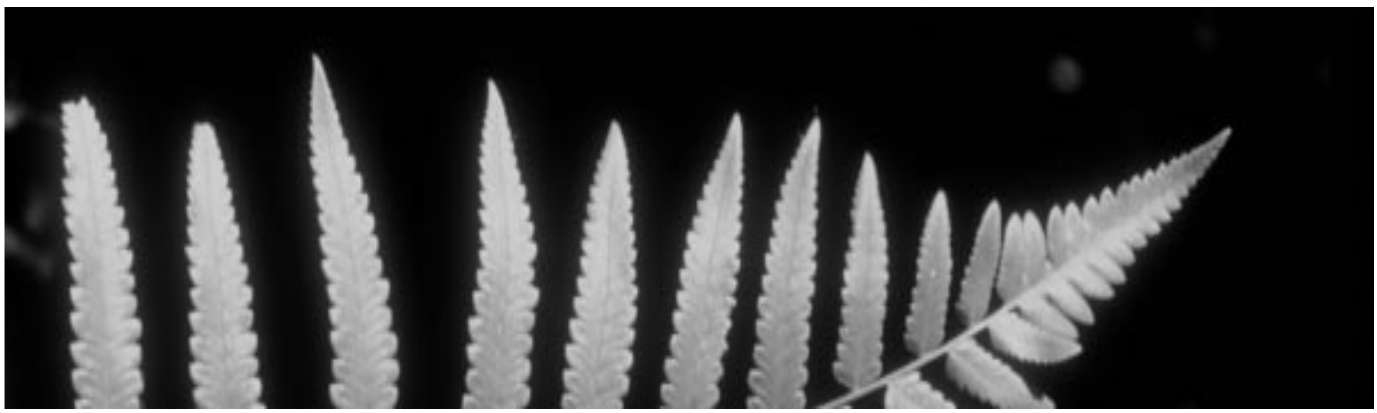
Project Coordinator: Tiit Kallaste, SEI-Talinn
UNEP Centre Project Manager: Robert Redlinger

The Hungary country study of the UNEP/GEF project is being carried out by the Department of Environmental Economics of the Technical University of Budapest, which has been nominated as the project executing agency by the Hungarian Ministry of Environment and Regional Policy. The Hungarian study builds on previous climate change mitigation work done through Dutch-Hungarian bilateral assistance, cooperation with the CICERO institute Norway, and the US Country Studies Program.

The primary objectives of the Hungarian study are to concentrate on the following mitigation options and policy instruments: energy efficiency, forest plantations/bioenergy, and economic instruments such as carbon/energy taxes. The Technical University of Budapest is establishing collaborations with various other Hungarian institutions to address these issues in detail. Collaborating institutions include universities such as Budapest University of Economics and the University of Forestry and Wood Sciences in Sopron, and private engineering/consulting organisations such as EGI-Contracting/Engineering. The first national workshop, bringing together all participants in the Hungarian study, was held on 30-31 October 1996 in Budapest.

As part of the active cooperation among the Hungarian team, the UNEP Centre, and Lawrence Berkeley National Laboratory (LBNL) in the USA, three Hungarian experts from the Technical University of Budapest and the Ministry of Environment and Regional Policy spent one month as guest researchers at LBNL in Berkeley, researching energy efficiency programs and implementation issues in the USA. Their guest research also involved meetings in Washington DC with the US Environmental Protection Agency.

Project Coordinator: Tamás Pálvölgyi
UNEP Centre Project Manager: Robert Redlinger



Botswana

Botswana is one of the three countries being covered by the Danida-funded project "Climate Change Mitigation in Southern Africa Phase II" along with Zambia and Tanzania. Phase I of the programme was initiated carried out in 1994[2].The main purpose of the first phase was to establish the collaborative regional framework and to present an overview and assessment of relevant national and regional climate-change related information, experience and on-going programmes.

Phase I surveyed the GHG emitting sectors, included a preliminary inventory for 1990 for the main GHGs and identified potential mitigation options. In addition to this an on-going US country study plans to carry out a more detailed GHG inventory and mitigation analysis. A UNDP/GEF project is scheduled to start in 1996 to build national capacity to deal with the national communication to the UNFCCC. The results of these two projects, when they become available, will be integrated into the national and regional programme.

The most important area for mitigation study is the energy sector, as suggested by the GHG inventories in the Phase I study. Within this, the household, the industrial and transport sub-sectors are particularly significant. In the household sub-sector a major issue is the scarcity of fuelwood, while the other two sectors are the major consumers of fossil fuels in Botswana. A detailed abatement costing study for these sectors should take into account any energy linkages with agriculture and forestry sectors.

The executing agency for the Botswana country study is EECG Consultants, Gaborone on behalf of the Ministry of Mineral Resources and Water Affairs. A multidisciplinary team with representatives from the University of Botswana, Departments of Mines and Energy Affairs, and the Botswana Power Corporation are working under the direction of the project coordinator Dr Peter Zhou (EECG Consultants). The first National Workshop was held in Gaborone on 28-29 October 1996 and this was attended by a broad spectrum of stakeholders from government, utilities and industry.

Project Coordinator: Peter Zhou, EECG, Botswana

UNEP Centre Project Manager: Gordon Mackenzie

[2] Climate Change Mitigation in Southern Africa. Phase I, UNEP Collaborating Centre on Energy and Environment, Risø National Laboratory, Denmark. August 1995.

Dr. Peter Zhou, EECG, at the first national Botswana workshop

Tanzania

Tanzania has already been the subject of a GHG inventory and climate change mitigation study, supported by the German technical cooperation agency GTZ, and assisted by the UNEP Centre. That study, carried out by the Centre for Energy, Environment, Science and Technology (CEEST), Dar es Salaam, concentrated mainly on the energy sector and identified various mitigation options. Preliminary results were reported in the report of the Phase I project[3] and final results were reported by CEEST[4].

The energy economy in Tanzania is largely focused on collecting, distributing, and consuming wood fuels (wood and charcoal) to satisfy household demands for cooking. As much as 90% of all primary energy consumed in Tanzania is biomass based. The commercial and industrial energy sectors in Tanzania are extremely small in relation to the household sector. Virtually, all of Tanzania's wood fuel comes from forests-- over 90% of all roundwood harvests are for charcoal and fuelwood. As can be expected, much of the demand for fuelwood is satisfied through deforestation.

It is estimated that about 70% of the deforestation in Tanzania is due to fuelwood harvests, directly or indirectly, with about 30% of the deforestation being the result of agricultural land clearing. As the economy matures, deforestation associated with agricultural land use clearing is expected to grow, increasing emissions of greenhouse gases, and reducing the supply of material traditionally available to provide energy.

Given Tanzania's heavy dependence on biomass resources for primary energy, the resultant mining of natural forests, and expected increases in deforestation for agricultural purposes, it is clear that measures to broadly affect the carbon balance in biomass (and soils) are among the most important for mitigating climate change, at least in the short term. Such measures broadly involve conserving existing biomass resources, increasing carbon stocks in new forests, and substituting of wood products for more energy-intensive materials.

A number of promising energy

The CEEST headquarters in Tanzania

Building local capacity in CEEST, Tanzania.

Dar es Salaam harbour

Transport of charcoal in Dar es Salaam

sector mitigation options were identified and assessed in an integrated framework using the LEAP model. These options included the introduction of combined-cycle power plants, increased use of domestic hydropower resources, power imports from neighbouring countries, as well as various energy saving and fuel switching measures in transport and industry.

The Danida-supported study, part of the project "Climate Change Mitigation in Southern Africa Phase II", concentrates on the land-use, agriculture and forestry sectors and focuses on the mitigation potential and cost of protecting the natural carbon stocks (forests) and increasing the sink by afforestation.

The study involves a consideration of modified agricultural practices so that this sector, vital to the Tanzanian economy, can achieve increased productivity while avoiding drastic destruction of natural forest. The mitigation options identified will be compared cross-sectorally with those assessed in the earlier (Phase I) study.

The study is being carried out by CEEST on behalf of the Ministry of Energy, Minerals and Water Affairs, Tanzania. A first National Workshop was held in Dar es Salaam on 31 October 1996 and this brought together representatives from relevant ministries, organisations and academia.

Project Coordinator:
Prof. Mark Mwandosya,
CEEST, Tanzania

Local Project Manager:
Hubert Meena, CEEST

UNEP Centre Project Manager:
Gordon Mackenzie

[3] Climate Change Mitigation in Southern Africa. Phase I, UNEP Collaborating Centre on Energy and Environment, Risø National Laboratory,

[4] Technological and Other Options for the Mitigation of Greenhouse Gases in Tanzania. Final Report. The Centre for Energy, Environment, Science and Technology, Dar Es Salaam, Tanzania. November 1995.
Denmark. August 1995.

Zambia

Charcoal, produced in rural areas in Zambia, is both consumed locally and transported over long distances to supply cooking fuel needs.

Zambia is a land-locked country in Southern Africa lying between Zaire, Tanzania, Malawi, Mozambique, Zimbabwe, Botswana, Namibia and Angola. With a population of about 8 million, over 40% of whom live in urban areas, it is the most urbanised country in sub-Saharan Africa. The economy is based to a very large extent on the mining of copper which generates 90% of the country's foreign exchange earnings.

The country has suffered economic decline since the mid-1970s attributable to a number of causes such as the international oil crises, depressed copper prices, recurring drought and the general instability in the region until relatively recently. After the introduction of multi-party democracy and the ensuing programme of economic restructuring and liberalisation, the country can now be said to be in a state of transition.

GHG Inventory and Climate Change Mitigation studies for Zambia have been carried out under GTZ and USCSP projects. In the former case the studies were conducted by the Centre for Energy, Environment, Engineering (Zambia) Ltd (CEEEZ), Lusaka on behalf of the Ministry of Energy and Water Development and with assistance from the UNEP Centre through Phase I of the Danida activity. Preliminary results were included in the Phase I report[5] of the Danida activity and the final reports were published recently[6].

The US Country Study Program supported inventory, vulnerability and adaptation, and mitigation studies, through the Environmental Council of Zambia, though these studies so far remain unpublished.

The inventory studies have confirmed that Zambia is a net sink of carbon. Uptake of carbon dioxide by forest regrowth leads to a net absorption of 60 million tonnes per annum.

There is nevertheless an interest in promoting mitigation options which can both further enhance the net uptake of CO_2 and provide other environmental and developmental advantages, such as reducing local deforestation, reducing indoor air pollution, saving foreign currency for fuel purchases and increasing standards of living.

In the power sector, Zambia has abundant hydropower resources, both shared with neighbours (the Zambezi) and purely domestic, mainly on the Kafue River. At the present time the excess generating capacity is about 500 MW. This capacity is already being exported to neighbouring countries avoiding CO_2 emissions from coal-fired generation.

Phase II of the Danida-funded project, running in parallel with the UNEP/GEF project "Economics of GHG Limitations", builds on the studies conducted by CEEEZ, and in particular aims at elaborating the mitigation potential and cost of the identified options. Several of the options involve substituting charcoal as a household cooking fuel, or improving the efficiency of the production and use of the fuel. Although inventory studies indicate that Zambia is a net sink of carbon, reduction of deforestation for charcoal production would offer a mitigation potential. The Phase II study will include an integrated assessment of the various household fuel options, such as electrification, improved charcoal kilns, improved stoves and coal briquetting.

The study is being carried out by CEEEZ, as in Phase I, but now on behalf of the Ministry of Environment and Natural Resources which is the climate change focal point for Zambia. Close connection is maintained with the Ministry of Energy and Water Development through the participation of the Department of Energy, as well as other government bodies and the electricity utility, ZESCO.

The first national workshop was held in Livingstone from 23 to 26 September 1996 and was attended by stakeholders from government, industry and NGOs. The main purposes of the national workshop were to create awareness of the project (and general climate change issues) among stakeholders, to solicit the views of stakeholders with regard to mitigation options and to identify the issues involved in establishing the baseline scenario for Zambia. The workshop was judged to be highly successful in achieving these goals.

Project Coordinator: Prof. Francis Yamba, CEEEZ, Zambia
Local Project Manager: Beston Chitala, CEEEZ
UNEP Centre Project Manager: Gordon Mackenzie

[5] Climate Change Mitigation in Southern Africa. Phase I, UNEP Collaborating Centre on Energy and Environment, Risø National Laboratory, Denmark. August 1995.

[6] Measures to implement the UNFCCC: Zambia Country Study on Climate Change - Inventories and Mitigation Analysis. (Summary Report), Deutsche Gesellschaft für Technische Zusamarbeit (GTZ) GmbH. 1996.

Peru

Achieving the objectives of the UNFCCC implies putting in place or strengthening institutional structures and processes, as well as building up and enhancing human resources. These are the ultimate goals of a collaborative effort undertaken by the UNEP Centre together with National Environmental Council (CONAM) in Peru. The project, supported by Danida, has three immediate objectives:

- to strengthen individual knowledge and expertise on the methodological approaches within economic assessment and modelling GHG emission limitation;
- to enhance the competence of institutions to incorporate climate change mitigation strategies in their sectoral policies and create a framework in which those strategies play a meaningful role in decision-making and actions; and
- to promote institutional interaction with a view to achieving an institutional structure that allows effective co-ordination among sectoral climate change mitigation programmes and actions.

Climate Change initiatives

Peru has already conducted a climate change study with support from the US Country Study Programme. The study was initiated in June 1994 and finalised by November 1996. The study was conducted by the Faculty of Environmental Engineering of the National University of Engineering (UNI) in collaboration with teams from the Peruvian Institute of Nuclear Energy (IPEN) and the National Service of Meteorology and Hydrology (SENAMHI).

- The study comprised three main components:
- GHG inventory and climate change mitigation options for energy-related activities.
- GHG inventory and climate change mitigation options for non-energy sector.
- Vulnerability analysis for coastal zones.

CONAM was established in conjunction with the implementation of the Environmental Protection Law in June 1995. One of the duties of CONAM is to be the national agency responsible for complying with obligations and commitments under the Climate Convention. Its main role in this context is in coordinating the participation of the different institutions who are preparing the national communication to the FCCC.

New directions

The present Danida-funded project on capacity building, institutional support and training addresses two particular aspects of national capacity strengthening.

First, there is a need to enhance the ability to address and evaluate the crucial questions related to policy choices and the design of climate change mitigation strategies. It is of paramount importance to place these questions within the context of the national development agenda. Special emphasis is placed on the analysis of the social, institutional and economic conditions for the successful implementation of mitigation strategies that also promote social and economic development.

Secondly, coordination among institutions dealing with climate change related issues is essential in order to promote permanent inter-institutional interaction, and to ensure a continuous transfer of information and know-how among concerned institutions.

Within this context, the project's activities address the following needs:

- to put in place or strengthen institutional structures as well as building and enhancing the necessary human resources to participate effectively in implementing the FCCC,
- to introduce implementation mechanisms for translating mitigation plans into concrete strategies and actions. These mechanisms include strengthening local agencies, upgrading units within ministries, modifying laws and regulatory frameworks, and modifying the curricula of training institutions.

In the long term, emphasis needs to be placed on reinforcing institutional structures for the continuous assessment and improvement of climate change mitigation analysis as well as for ensuring the sustainability of mitigation strategies. Long-term sustainability of mitigation actions will depend on building an active constituency in the local research and scientific community, among policy-makers and NGOs, and among the key actors involved in the implementation of mitigation actions.

The project was started in November 1996 and will be concluded in April 1998.

Project Coordinator: Patricia Iturregui, National Commission for Climate Change (CONAM), Peru

UNEP Centre Project Manager: Arturo Villavicencio

Egypt

Building Capacity in the Arab Republic of Egypt to Respond to the Challenges and Opportunities created by National Response to the Framework Convention on Climate Change

The Arab Republic of Egypt covers a land area of over one million km^2 in the hyper-arid regions of North Africa and West Asia astride the Sahara and Arabian deserts, with a rainfall in most parts of less than 50 mm. The Nile is the country's basic life sustaining system, providing more than 95% of its water requirements. Less than 3% of the land is cultivated and occupied by a population over 52 million, resulting in a high population density of about 1,300 people per km^2. In view of this, Egypt's environmental problems and issues are dominated by the critical need to manage the scarce common resources of water and cultivable land more effectively to meet the needs of a population which grew at a rate of 2.56% per annum between 1980 and 1990.

The UNEP Greenhouse Gas Abatement Costing Studies[7] project played an important role in initiating mitigation analysis in Egypt. The central features of the 1994 UNEP country study for Egypt were: the definition of a reference or baseline scenario; identification of abatement options; and construction of a consistent abatement scenario, which aimed at specific values of emission reduction in a defined year in the short term (2010) and in the medium term (2030). This was followed by another study on GHG emissions, adaptation and mitigation options especially in energy sector under the U. S. Country Studies Programme. This collaboration between the Egyptian and US Governments is being continued with a SNAP country study to facilitate the preparation of a national climate change action plan.

The UNDP/GEF project was launched at a Project Initiation Workshop held on 2 December 1996 in Cairo. Given the important role played by UCCEE in mitigation studies in general and specifically in Egypt, the UNDP has established a direct contract with the UNEP Centre for technical support to the national team. Under the project, policy and technical proposals for climate change adaptation and mitigation generated through a variety of sources will be assessed in order to develop country reports intended to help guide national and sub-national policy development.

UCCEE's assistance focuses on the following project activities:

- Review of Country Climate Change Policies
- Identify and document existing policies and policy analyses relevant to climate change in Egypt, including energy and land-use policies.
- Scenario Development
- Development of national scenarios, including projected future levels of greenhouse gas emissions and their removals by sinks with special focus on non-energy sectors and activities.
- National Policy Analyses

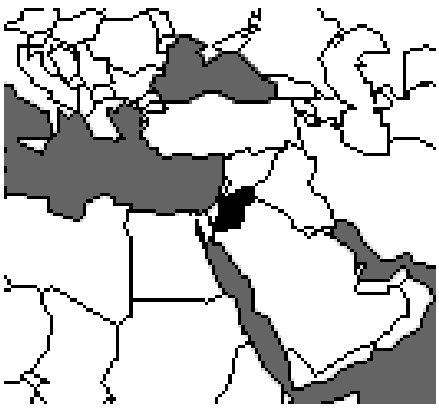
Egyptian Environment Affairs Agency (EEAA) and other implementing agencies like the Organisation for Energy Conservation and Planning (OECP) co-ordinate policy analysis to develop and assess policy options and institutionalise information collection and policy assessments, bringing in relevant experience from region and elsewhere.

UNEP Centre Project Contact:
Pramod Deo

Jordan

Building Capacity for GHG Inventory and Action Plans in the Hashemite Kingdom of Jordan in response to UNFCCC Communications Obligations

The Hashemite Kingdom of Jordan covers a land area of over 97 thousand km^2 in a hot and dry region of West Asia. It is an almost land-locked state bordered by Israel to the west, Syria to the north, Iraq to the east and Saudi Arabia to the south. It is largely desert country in the east with annual precipitation of less than 12 centimetres. The population of Jordan is 4.14 million and population density was about 42.4 people per km^2 in mid-1991. In the longer term, Jordan is likely to be confronted by a severe shortage of the most basic of natural resources, water, which can be overcome only through increased regional cooperation. Jordan's environmental problems and issues are



dominated by the critical need to manage the scarce common resources of water and cultivable land more effectively to meet the needs of a growing population.

The UNDP/GEF project was launched on 29 September, 1996 in Amman at an initiation workshop, inaugurated by the Minister of Municipal, Rural Affairs and the Environment. This project will provide technical assistance, institutionalise communication, and build capacity in Jordan to assist in climate change mitigation and adaptation through the advancement of national priorities in areas such as energy efficiency, fuel substitution, renewable energy development, and forest conservation and management. At the same time, local capacity to respond to the Framework Convention on Climate Change will be promoted through the development of GHG inventory assessments, establishment of policy dialogues, evaluation of technological options, investigation of climate change impacts, and analysis of adaptation opportunities. UNDP has established direct contract with UCCEE in order to provide required technical assistance.

On 15 March 1997, a national workshop on Jordan's GHG inventory was held in Amman to review the "National Inventory of Anthropogenic Emissions by Sources and Removals by Sinks of GHGs not Controlled by the Montreal Protocol".

The working sessions introduced the UNFCCC and the project in hand, before reviewing the estimates of emissions and removals given in the inventory and the methodologies and data used in preparing the draft. The workshop was attended by a large number of participants from government, academic, business and non-governmental institutions and organisations. The discussions and views expressed were notably well informed considering that there has been no previous work on the climate change issue in the country. A training workshop on the analysis of mitigation options was held during the period 12-14 April 1997

On completion of this project by May 1998, Jordan will have a consi–derably improved capacity through which to respond to the challenges and opportunities presented by its ratifica–tion of the UNFCCC. It is expected that a two-tiered institutional mechanism consisting of a policy-making Inter-Ministerial Steering Committee and a permanent technical secretariat in the General Corporation for Environment Protection (GCEP) would be strengthened that it would be able to coordinate the activities that are necessary to develop policy options related to climate change and to comply with the provisions of the Convention.

UNEP Centre Project Contact: Pramod Deo

Regional Aspects of Climate Change Mitigation

Ian H. Rowlands, UNEP Centre

The Kariba Dam on the Zambezi, an example of regional collaboration in power generation between Zambia and Zimbabwe

Internationally coordinated action by developing countries could help to mitigate global climate change in ways that are environmentally, economically and socially beneficial. As part of the UNEP/GEF project on 'The Economics of Greenhouse Gas Limitations', a study of the prospects for such regional action is well underway.

International regions have received relatively little attention in the study of climate change mitigation, for most of the work to date has concentrated upon the national level. Recognition, however, that extremely attractive possibilities may also exist at the regional level has prompted this investigation to move into the international level.

Some mitigation options depend upon cooperation between two or more neighbouring countries - for example, sharing offshore gas resources or integrating transportation infrastructure. Other options, moreover, are possible only by exploiting the economies of scale that emerge at the regional level - for example, developing either a large hydropower facility or a market for energy efficiency devices. Thus, it seems evident that regional action could, at least in theory, present mitigation options which are both cost-efficient and development-promoting.

The study aims to advance our understanding about the issue in two ways. First, it will begin to develop a broad methodological framework for assessing regional climate change options (like those suggested in the paragraph above). A variety of criteria will be developed to assess these options: climate-related (that is, savings in terms of greenhouse gas emissions that are abated and/or absorbed), economic (that is, the cost of such proposals), developmental (that is, how the actions would contribute to the region's own development goals, measured on a variety of social, economic and environmental yardsticks) and institutional (that is, what barriers to implementation might arise?).

During 1996, progress on the development of this methodology was realised. For one, the concept of a 'regional baseline' was investigated. Given that some regional options would clearly impact already-developed national options (an international market for a particular renewable energy technology, for example, would make any calculation of the same in the strictly national context obsolete), the impact of regional options upon national strategies obviously warrants attention. Moreover, in light of the unique institutional and political challenges that arise when we take the analysis to the international level, particular investigations were also undertaken in this area. Research revealed that the importance accorded, for example, sovereignty, distributional effects and power could make regional options that much more difficult to implement.

The study will also apply the methodology to two specific international regions in the developing world: the Southern African Development Community and the Andean Pact. These are described in the following two articles

Findings from this project, which will begin to emerge in late 1997, will contribute directly to policy discussions -- not only in the two sets of countries under specific examination, but in other regional groupings as well, as their representatives consider their own regional mitigation options. Although regional options are not expected to deliver all of the answers, they could well offer new opportunities for climate-change mitigation. Accordingly, it would seem that the study of regional options can only increase the chances of creating a portfolio of climate mitigation options that is efficient and fair.

Regional Climate Change Mitigation in Southern Africa

Gordon A. Mackenzie and Ian H. Rowlands, UNEP Centre

One of the regions selected for study in the UNEP/GEF project is the group of countries making up SADC (the Southern African Development Community). SADC is a grouping of 12 countries - Angola, Botswana, Lesotho, Malawi, Mauritius, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe - whose expressed aim is to promote regional economic development and integration. The Community has evolved from a previous grouping, SADCC (the Southern African Development Coordination Conference) with the addition of South Africa and, most recently, Mauritius.

Technically, SADC represents a sub-region, but as a well-defined group of countries, already interacting across most sectors, and with a growing collective identity, it represents a suitable case for the study of internationally coordinated mitigation actions.

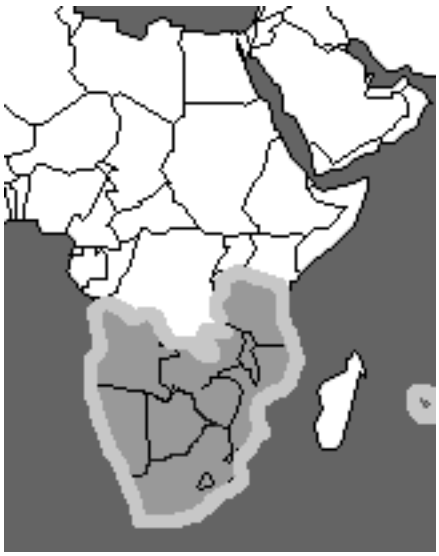
The SADC regional study is being carried out as a collaboration among the Southern Centre for Energy and Environment (SCEE), based in Harare, Zimbabwe; the Centre for Energy, Environment, Science and Technology (CEEST) in Dar es Salaam, Tanzania; and the UNEP Centre. Responsibilities within the project are shared so that SCEE is working on regional aspects of electrical power supply, while CEEST is studying non-power options for mitigation at the regional level. The latter are expected to include broad measures, within trade and transport arrangements, as well as other energy sector initiatives, such as markets for renewables. The UNEP Centre, as study coordinator, is responsible for the synthesis of these studies, as well as research into the institutional and political issues involved in regional cooperation related to climate change.

An important characteristic of the southern African region with regard to energy resources is the existence of coal in the southern part (predominantly South Africa and Zimbabwe) and vast hydropower potential in the north (Zambia and Zaire). One of the most obvious areas for cooperation within SADC, directly linked to climate change mitigation, is the regional pooling of electricity capacity with a view to minimising CO_2 emissions.

Power trading is already taking place within the Southern African Power Pool and power is being exchanged between the utilities of the region on a daily basis. The motivation behind SAPP, however, is not to minimise CO_2 emissions. The power pool is fully justifiable in terms of security of supply and economic considerations. The addition of CO_2 emission minimisation would provide a further argument for such cooperation, and its possible extension.

CO_2 emissions at the regional level could be minimised to some degree by operating existing plant to favour the import of hydropower from the north. The major opportunity for CO_2 reduction though lies in directing future investment towards low or zero emission plant like hydropower rather than coal-fired stations.

The potential barriers against international cooperation aimed at CO_2 reduction are nevertheless daunting. National interests, particularly with



regard to security of supply, remain of paramount importance to the actors involved. The technical complexity of large generating capacity separated by long distances also presents problems with regard to system stability. However, the potential environmental gains to be achieved, both locally and globally, are considerable so that there may be large incentives to overcome both the political and technical difficulties.

Regional cooperation for climate change mitigation has received little attention so far, and the national and regional actors within SADC have not been fully sensitised to the possibilities and opportunities. The present activity, along with the parallel study in the Andean Group, will hopefully contribute to this sensitisation process.

A first regional workshop within the UNEP/GEF project was held in Harare in February 1997, hosted by the Southern Centre for Energy and Environment. The workshop brought together the country teams from Botswana, Tanzania and Zambia, as well as representatives from utilities in these countries, Zimbabwe and South Africa.

Andean Region Climate Change Mitigation Study

Arturo Villavicencio, UNEP Centre

Andean countries have made significant progress with GHG inventories and mitigation analysis. Following the IPCC Guidelines for National Greenhouse Inventories, national teams in Bolivia, Colombia, Ecuador, Peru and Venezuela have already established their preliminary inventories. Mitigation studies have been completed by Peru and Venezuela and they are in progress in Bolivia, Colombia and Ecuador.

The regional mitigation study for the Andean region will focus on two main issues: (i) the opportunities and incentives for countries to cooperate on implementing regionally-coordinated mitigation actions; and (ii) the policies, strategies and institutional arrangements necessary to promote such regional cooperation. The ultimate objective is to analyse the possibilities for improving the cost effectiveness of national actions, policies and strategies by exploring additional options whose implementation requires regional cooperation.

The reasons for selecting the Andean countries as a regional study case were identified. The first is the already established institutions and mechanisms for economic and political integration among the Andean countries; and the second is the relative homogeneity among the countries which suggest it may be easier to take advantage of potential complementarities.

The study intends to analyse three types of regionally concerted actions which could be relevant to the Andean countries context. They are as follows:

- actions which involve the exploitation of a binational or multinational shared natural resource and which require the construction of a binational or multinational facility. A number of experiences within Latin America (Brazil-Paraguay, Argentina - Uruguay, Ecuador - Peru, among others) will provide the study with concrete examples on actors, institutions and agreements involved in these types of multinational projects;
- actions which seek to take advantage of the potential complementarities between national energy systems. The idea is that one country's comparative advantage (in terms of energy resources, for instance) could also benefit other countries within the region provided that their energy systems could be integrated; and
- actions that could be adopted by an individual country provided that one or several countries within the region proceed in the same direction. These kind of actions are aimed at implementing policies and strategies on environmental standards and regulations, as well as to promote intra-regional trade of environmentally sound energy technologies.

The study is conducted jointly by the UNEP Centre and the Institute for Energy Economics in Argentina in collaboration with the Latin American Energy Organisation. A first regional workshop is scheduled to take place at OLADE headquarters in Quito, Ecuador in May 1997.

Continued from front page

centres and government agencies in the participating countries and regions. Participating countries are: Argentina, Ecuador, Estonia, Hungary, Indonesia, Mauritius, Senegal and Vietnam. The two sub-regional studies will focus on the SADC (Southern African Development Community) countries in southern Africa and the Andean Group countries in South America. The participating countries were chosen, from among a number of national requests, to represent the three primary developing regions (Africa, Latin America and Asia) as well as Eastern Europe. Of these countries several have already embarked on or completed CC mitigation studies, while others have yet to gain experience in the procedure.

In parallel with this UNEP/GEF project a number of other country studies have been initiated. These comprise Botswana, Tanzania and Zambia in Southern Africa (financed by Danida), Peru (also financed by Danida) and Egypt and Jordan (financed by GEF through UNDP).

The new studies will take full advantage of existing or ongoing studies, for example those conducted under the US Country Studies Program, in order to avoid overlap, exploit synergies and gain as much capacity building experience and useful information as possible.

Thus a total of fourteen countries, spanning the three "developing" continents, Africa, Asia and Latin America, and also including former centrally planned countries, are following a common set of assumptions and methodological guidelines, over the same time schedule, with coordinated project management and support from the UNEP Centre and LBNL.

The fourteen countries represent a wide mix of systems with respect to energy and other sectors, and in terms of level of development, rural/urban mix, availability of natural resources, etc. This diversity facilitates the broad development of methodological guidelines to treat a variety of circumstances and settings. In particular, the broadening of the analysis from simply energy, as in the early phases of mitigation studies, to treat forestry, land-use and agriculture introduces significant challenges.

The Methodological Guidelines being followed by the country teams are generally an extension of those developed in the UNEP GHG Abatement Costing Study. These have been enhanced and extended with respect to forestry and land-use mitigation options, macroeconomic assessment and multi-criteria assessment. The Guidelines document is supplemented by handbook material on special topics. This methodological development activity is being carried out by staff at the UNEP Centre and LBNL in parallel with the country study execution, and results are presented at methodological workshops attended by representatives of all country teams.

This supplement to *c_2e_2 news* no. 9 presents brief profiles of the countries taking part in the parallel set of country studies.

c_2e_2 news provides up-to-date information at regular intervals on the activities of the UNEP Centre, UNEP and related events and developments. Information on forthcoming conferences, reports, studies, etc. are welcome. The views expressed in this newsletter do not necessarily represent those of the United Nations Environment Programme, Risø National Laboratory or Danida.

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