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Preface

Since 1989, when the Netherlands put the climate change issue on the agenda of the heads of state of several countries and of the ministers of environment of seventy countries, the Netherlands has been a key actor in promoting national and international policies to deal with the climate change issue. In 1992, the Netherlands committed itself, under the United Nations Framework Convention on Climate Change (UNFCCC) to take policy measures domestically, and to assist developing countries through scientific cooperation, technology transfer and financial assistance.

The Netherlands takes these obligations seriously: there is a national climate change policy in place and the Netherlands is preparing to ratify the Kyoto Protocol. Policies to achieve the -6% commitment adopted by the government have been developed. The Netherlands makes available substantial funding to assist developing countries in preparing and implementing their own climate change policies. Such financial resources are provided through the multilateral channel (such as the Global Environment Facility) and the bilateral channel. An important example in the framework of the bilateral development co-operation is the Netherlands Climate Change Studies Assistance Programme (NCCSAP), which has been implemented since 1996 and which is the subject of this booklet.

The NCCSAP was designed to assist developing countries in the development of their National Communications, a commitment under the UNFCCC. Other objectives include enhancement of scientific co-operation, and support for capacity building, education and training. This booklet shows how the programme assists countries to formulate policy priorities for those sectors in which climate change needs to be taken into account.

The programme assists in preparing national reports, in comparing national situations in different contexts, and contributes to an overall learning process in all the concerned parties, including the Netherlands. It is hoped that this joint programme will be a contribution towards meeting the needs of developing countries in understanding how climate change affects their own people, and what options they have to deal with the problem. The NCCSAP will help to anticipate the effects of climate change on food production, health and vulnerable ecosystems in good time. It will provide the tools for realising economic development in an environmentally sustainable manner.

This booklet and the programme aim at providing essential information and at intensifying world-wide efforts of the developed and developing countries to meet their commitments under the UNFCCC, setting the basis for the actions needed at all levels - globally, nationally and locally - to effectively deal with the climate change problem.
Introduction

The NCCSAP is an initiative of the Netherlands Ministry of Foreign Affairs, Environment and Development Department, and started in 1996. The objectives of the programme are:
- To enable developing countries to implement commitments under the Framework Convention on Climate Change;
- To create a greater awareness of climate change issues; and
- To increase the involvement of policymakers, scientists and the general public.

The Programme supports the responsible ministry, mostly the Ministry of Environment, to initiate climate change studies which are carried out by appropriate scientific institutions.

These studies may include a variety of topics, such as greenhouse gas emission inventories, mitigation (emission reduction) studies, assessments of climate change impacts and adaptation options, and the compilation of the National Communication. The scope of the studies depends on national needs, priorities, experiences and expertise. The studies should contribute to the implementation of the United Nations Framework Convention on Climate Change (UNFCCC) and the National Communications of the participating countries.

Based on the conclusion of the International Panel on Climate Change (IPCC), it is expected that the impacts of climate change will be most severe in developing countries and thereby may hamper sustainable development and could lead to acute food shortage, poverty and health hazards. The Netherlands programme provides opportunities to carry out in-depth climate change impact and adaptation studies. Subsequently the majority of the studies under the Netherlands programme deals with climate change impact assessments, such as impacts on agriculture, forestry, water resources and coastal zones, and the identification of possible adaptation options. These studies complement other climate change studies, such as greenhouse gas emission inventories and mitigation studies.

It is the hope and the intention that the results of the climate change studies will find their way into the national sustainable development plans and environmental action plans of the countries participating. The studies can also assist the national institutes and authorities in strengthening their institutional roles and responsibilities by improving the public awareness on this highly complicated and long-term global issue.

Management

The Institute for Environmental Studies (IVM), Vrije Universiteit, Amsterdam has been contracted to manage the Netherlands Climate Change Studies Assistance Programme in cooperation with the Netherlands Coastal Zone Management Centre (CZMC). IVM supervises the studies related to emission inventories, mitigation, and impact and adaptation regarding agriculture and forestry, focusing on Bhutan, Bolivia, Ghana, Mali, Senegal, Yemen, Kazakhstan, Mongolia, and Zimbabwe, as well as co-ordinating the activities related to these issues between countries. The CZMC on the other hand has supervised the activities in most countries which have a coastal zone study as the main part of the climate studies, namely Costa Rica, Ecuador and Surinam. It also co-ordinated the coastal zone and water resources studies across countries.

A prerequisite is that the studies are being carried out by institutions and scientists of the participating country to ensure capacity building and ownership. Wherever needed, the national study teams will be completed with international consultants for each specific sector of the climate change studies. The national study teams can contact these consultants for technical assistance/backstopping, advise and training. To facilitate communication between study teams of various countries and international consultants, the Netherlands programme provides, if needed, e-mail and internet connections and the necessary hardware and software.

Procedures

After formal inclusion in the Netherlands Climate Change Studies Assistance Programme by the Netherlands Ministry of Foreign Affairs (Environment and Development Department), national focal points will elaborate a detailed project proposal, in close cooperation with the management of the programme. This will contain the organisational framework of the country study, project descriptions, terms of references, workplans and budgets.

The country studies consist of technical, sectoral studies as well as two or three national workshops where scientists and policy makers meet to exchange information regarding the set up of the studies and preliminary results, and to discuss the implications for policy makers.

Additional to the national workshops, the programme provides regional workshops or bilateral meetings between countries. This will enable scientists and policy makers to meet with other country teams and to enhance (regional) networking.

Participating countries

The Netherlands Climate Change Studies Assistance Programme initially inclu-
seven countries: Bolivia, Costa Rica, Ecuador, Ghana, Senegal, Surinam and Yemen. In the meantime, five other countries have joined the programme: Colombia, Mali, Mongolia, Kazakhstan and Zimbabwe. Possibly, also Bhutan will join soon. The next section gives an overview of current country studies.

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### Overview

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* Studies have not started yet
* Study concerned mudflows and avalanches
* Studies undertaken to prepare National Action Plan

Schematic view of the interactions among climate studies carried out within the NCCSAP.
The Kingdom of Bhutan is a landlocked country in the Himalayan mountains. Because of the wide range of altitudes, Bhutan contains several types of ecosystems, varying from tropical to subtropical forests in the lowlands, to sparse alpine vegetation in the high areas. The forest area is estimated at about 72% of the total surface of Bhutan. Environment conservation is a very important aspect of Bhutan's development strategy. Violent storms coming down from the Himalayas were the source of the country name which translates as Land of the Thunder Dragon.

The studies Bhutan will carry out in the Netherlands Climate Change Studies Assistance Programme are being defined. These include:
- Impacts of climate change on the water resources and the identification of possible adaptation options. The availability of water is very important in Bhutan due to its sensitive ecosystems. Moreover, electricity production is mainly based on hydropower.
- Impacts of climate change on forests and/or agriculture and the identification of possible adaptation options. The agricultural and forest sectors are very important sectors in Bhutan: 93% of the population is employed in the agricultural sector.
- Development of climate scenarios and socio-economic scenarios to be used in the impact and adaptation studies.

The studies within the Netherlands Climate Change Studies Assistance Programme will be complementary to the on-going projects focusing on an emission inventory and the development of mitigation strategies (UNDP/GEF).

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Bolivia

Bolivia is a mountainous country in the Andes region in Central South America. The climate varies with altitude from humid and tropical in the Amazon region to cold and semi-arid at the highland plateau (Altiplano). Almost 50% of the country is covered with forests. The cold, thin air of the high plateau is an obstacle to efficient fuel combustion. Other environmental problems are deforestation, overgrazing, soil erosion and desertification.

Bolivia carried out the following studies in the Netherlands Climate Change Studies Assistance Programme:
- An update of the 1990 emission inventory to 1994, using the revised IPCC guidelines (1996). Since the sector ‘Land-use change and Forestry’ is the largest source of greenhouse gas emissions in Bolivia (around 83% of total CO₂ emissions), the update of the emission inventory specifically focused on the forestry sector. The uncertainty in emission estimates was reduced significantly.
- Studies on the possible impacts of climate change and identification of adaptation options. These studies included the following sectors:
  - the agricultural sector (livestock, grasslands, potato, soy, maize, rice);
  - the forest sector;
  - water resources.
- Climate change scenarios were developed and used in the impact studies.
- Studies on possible options to mitigate greenhouse gas emissions. These studies included the energy, forestry and agricultural sector.
- The preparation of the first National Action Plan and the National Communication of Bolivia.

The studies within the Netherlands Climate Change Studies Assistance Programme build upon results of earlier studies (US CSP) and complement other on-going projects focusing on the development of a climate change action plan (US SNAP, CC-TRAIN).

Selected publications
- Plan Nacional de Acción sobre el Cambio Climático
- Sectores energético, forestal, agrícola, ganadero
- Comunicación Nacional de Bolivia a la Convención marco de las Naciones Unidas sobre el Cambio Climático

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Colombia is located in Northern South America, bordering both the Caribbean Sea and the North Pacific Ocean. As the country lies close to the equator, the average temperature varies little throughout the year. Apart from the three Andean chains, Colombia boasts the Sierra Nevada de Santa Marta, the highest coastal mountain range in the world. Over 50% of the territory east of the Andes is lowland or covered by thick rainforest crisscrossed by rivers. Colombia claims to have the highest number of species of plants and animals per unit area of any country in the world. Its main industries are textiles, coffee, oil, sugar cane and food processing. Within the NCCSAP the following study will be carried out:

- Assessment of the vulnerability of biogeophysical and socio-economic systems due to sea level change in the Colombian coastal zone (Pacific and Caribbean) and adaptation measures.

The study is co-financed by the Royal Netherlands Embassy in Colombia.
Costa Rica

Costa Rica is located in Central America and has a tropical climate with a dry and a rainy season. It is subject to hurricanes along the Atlantic coast, frequent flooding of lowlands at the onset of the rainy season, deforestation and soil erosion. Approximately 10% of the country’s population has settled in the coastal area, particularly located around two main sea ports of Puntarenas on the Pacific and Limon on the Caribbean.

Costa Rica participates in the Netherlands Climate Change Assistance Programme with the purpose to enhance the capacity of national teams for the assessment of the vulnerability to climate change in different production and natural resources areas, the identification and evaluation of possible adaptation options, and the preparation of the National Communication. The project consisted of four components:

- Assessment of the vulnerability of the Pacific Coast of Costa Rica to sea level rise and the evaluation of adaptation options including coastal zone management;
- Evaluation of the vulnerability of Costa Rica’s rich natural forest to climate change and the development of a (GIS) tool for decision making regarding reforestation and other CO2 sink enhancement measures, taking into account ecological and socio-economic criteria;
- Assessment of climate change impacts on the production of sugar cane, coffee and beans, and the identification of adaptation options. These crops represent the majority of Costa Rica’s agricultural production, which is ranked with 20% as the second most important contributant to its GNP;
- Preparation of the first National Communication of Costa Rica.

The studies within the Netherlands Climate Change Studies Assistance Programme built upon results of earlier studies (US CSP, UNEP/GEF and the National Programme for Climate Change) and complement other ongoing projects (UNDP/GEF).

Selected publications
- Estudios de Cambio Climatico en Costa Rica
  Including:
  - Introduccion: Escenarios Climatocos Para Costa Rica
  - Componente Agricola
  - Componente Bosques
  - Componente Ordenamiento Costero
  - Estudios de Cambio Climatico en Costa Rica - Resumen Ejectivo
  - Vulnerability to Climate Change in Costa Rica - Executive Summary

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Ecuador, in Western South America and bordering the Pacific Ocean, has a tropical climate along the coast which becomes cooler inland. It has a coastal plain, the inter-Andean central highlands, and a flat to rolling eastern jungle. Its main environmental problems are landslides, deforestation, desertification, soil erosion and periodic droughts.

The study under the Netherlands Assistance Programme focused on the coastal zone. This zone houses about half the population of the country. The three main economic sectors of Ecuador, the oil industry, banana plantation and shrimp farming, are all concentrated in the coastal zone. The coastal ecosystems, including mangroves, swamps and lagoons are under great stress due to over-exploitation, uncontrolled land use and contamination.

The study included:
- a coastal profile of the entire coast of Ecuador;
- a climate change impact assessment for the Gulf of Guayaquil;
- an evaluation of possible adaptation measures.

The study was a follow-up of an eight year programme on coastal zone management, which has been carried out with assistance of the Rhode Island University. This study, amongst others, has established institutional arrangements, involving different ministry representatives in a National Committee for the Management of Coastal Resources. In addition five Special Management Areas with local committees have been defined.

The studies within the Netherlands Climate Change Studies Assistance Programme built upon the United States Country Studies Program.

Selected publications
- Evaluacion de la Vulnerabilidad de la Cuenca Baja del Rio Guayas al Levantamiento Acclerado del Nivel de Mar
- Cambio Climatico en la Zona Costera del Golfo de Guayaquil y la Cuenca Baja del Rio Guayas
- Cambio Climatico, Vulnerabilidad del Recurso Hidrico - Golfo de Guayaquil
- Cambios Climaticos en La Zona Costera del Golfo de Guayaquil, Parte I : Informe Sobre El Sistema Natural del Estuario del Golfo de Guayaquil, Parte II: Biodiversidad del Estuario Interior del Golfo de Guayaquil
- Ecuador – Profil de sus Recursos Costeros
Ghana

Ghana is located on the west coast of Africa. Its tropical climate is warm and comparatively dry along the south-east coast, hot and humid in the south-west and hot and dry in the north. The recent drought in the north affected severely the marginal agricultural activities. Other environmental problems are deforestation, overgrazing and soil erosion. Lake Volta is the world’s largest artificial lake.

Ghana carried out the following studies in the Netherlands Climate Change Studies Assistance Programme:

- Impacts of climate change on water resources and identification of possible adaptation options. The availability of water for domestic, agricultural and industrial use is fundamental for the economic development of Ghana. Therefore, a need exists to assess the impacts of climate change on future water availability (surface water and groundwater) and future water demand.

- Impacts of climate change on the coastal zone and identification of possible adaptation options. A large part of the population of Ghana lives in the coastal area, where some major economic activities also take place (fishing, salt winning, industries, oil and gas exploration). A potential rise in sea level will severely increase the current coastal erosion. This study will also contribute to a comprehensive, integrated coastal zone management plan.

The studies within the Netherlands Climate Change Studies Assistance Programme build upon results of earlier studies and complement other ongoing projects (UNDP/GEF).

Selected publications

- Climate Change Impacts on Sea Level Rise and Adaptation Strategies for the Coastal Zone of Ghana
- Climate Change Vulnerability and Adaptation Assessment on Water Resources in Ghana
- Initial National Communication of Ghana under the United Nations Framework Convention on Climate Change

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Kazakhstan

Kazakhstan is situated in Central Asia, bordering the Caspian sea and the Aral sea. It has been independent since 1991 and is currently in a transition towards a market economy. It has a continental, arid and semi-arid climate, and covers mountains, deserts, semi-deserts, and steppe zones. The water level of the Caspian sea is rising, while the drying up of the Aral Sea causes major (environmental) problems.

The studies Kazakhstan carried out in the Netherlands Climate Change Studies Assistance Programme included:
- An update of the 1990 emission inventory to 1994, using the 1996 IPCC guidelines. Due to the decline of economic activity in the transition period towards a market economy, greenhouse gas emissions have decreased enormously. Moreover, large changes have occurred in the collection and processing of statistical data.
- Studies on the possible impacts of climate change and the identification of adaptation options. These studies included the following:
  - Effects of sea level rise of the Caspian Sea. During the last two decades, the level of the Caspian sea has risen by 2.5 m, causing the flooding of a large coastal area. The rise of the Caspian sea level causes serious socio-economic and ecological problems. A study of impacts on the Caspian sea level rise, and the development of adaptation strategies was undertaken.
  - Water resources. The main rivers of Kazakhstan are fed by glaciers, and are the basic sources of water for areas with advanced irrigation agriculture, and mining and minerals processing industries. A climate change impact assessment and the development of adaptation strategies is a priority for the Government of Kazakhstan.
  - Mudflows and avalanches. Vulnerability and adaptation options in the Mountain region in South and Southeast Kazakhstan were assessed.
  - The preparation of the first National Communication of Kazakhstan.

The studies within the Netherlands Climate Change Studies Assistance Programme build upon results of earlier studies (US CSP) and complemented the project focusing on the development of a climate change action plan (US SNAP).

Selected publications
- Initial National Communication of the republic of Kazakhstan under the United Nations Framework Convention on Climate Change
- Kazakhstan’s greenhouse gas emissions and sinks inventory: 1990&1994
- Assessment of impact and adaptation to climate change for Kazakhstan’s part of the Caspian Sea coastal sector and mountain region of south and southeast Kazakhstan

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Mali

Mali is a landlocked country in Western Africa, southwest of Algeria. It is among the poorest countries in the world, with 65% of its land area desert or semidesert. Economic activity is largely confined to the riverine area irrigated by the Niger and the Bani. Here, a rich inland delta is formed where rainfall is reliable, which gives way to small pockets of natural forest. About 80% of the labour force is engaged in farming and fishing. Mali is heavily dependent on foreign aid and vulnerable to fluctuations in world prices for cotton, its main export. Current environmental issues include deforestation, soil erosion, desertification, inadequate supplies of potable water and poaching.

Mali carries out the following studies in the Netherlands Climate Change Studies Assistance Programme:
- Elaboration of climate scenarios for Mali;
- Agriculture: Vulnerability and adaptation of cotton and maize crops;
- Water resources: Effects of climate change on small water basins.

These projects were preceded by studies undertaken for preparing Mali's initial National Communication, which were funded by UNDP/GEF.
Mongolia

Mongolia is a landlocked country situated in Central Asia. It has a continental climate, with warm, short summers, and cold, long winters. It has an ecological critical transition zone, Siberian taiga forest, Central Asian steppe, and the high Altai mountains. The Government of Mongolia declared its entire territory a biosphere preserve. However, unmanaged resource use has resulted in loss of biodiversity and increased rates of desertification.

The Netherlands Climate Change Studies Assistance Programme supported Mongolia to develop a National Action Plan. Therefore, GHG emission mitigation options were analysed and an implementation strategy was developed. In addition, an overall impact assessment of the agricultural sector was carried out, which included identification and evaluation of adaptation measures on crop planting, rangelands and livestock. Finally the Initial National Communication was prepared.

The project aims to enhance the climate change dialogue between governmental, non-governmental, academic and business experts. A public awareness and education programme will be part of the project. The intention of Mongolia is to integrate climate change priorities into other developments plans. The Climate Change Action Plan will build upon the results of earlier climate change studies (US CSM and ALGAS), and upon the National Environment Plan.

Selected publications
- GHG mitigation case studies
- Climate Change Studies in Mongolia
- Mongolia’s National Action Plan
- Climate Change
Senegal is a western African country, with a relatively long coast bordering the North Atlantic Ocean. It has a hot and humid tropical climate with strong winds. Its lowlands are seasonally flooded. Other environmental problems are deforestation, overgrazing, soil erosion and desertification.

Senegal carries out the following studies in the Netherlands Climate Change Studies Assistance Programme:
- Impacts of climate change on agriculture and identification of possible adaptation options. Agriculture has been a sector of great concern to the Government of Senegal for many years. Although agricultural production has improved, many problems remain regarding food production. In this context it is important to have an understanding of the possible impacts of climate change and, even more important, of feasible adaptation options.
- Impacts of climate change on coastal zones and the identification of possible adaptation options. Senegal has a coastline of 750 km which is highly susceptible to erosion. The highest erosion observed nowadays is twenty meters per year. Several highly populated areas are located along the coast, including Dakar, Saint Louis, Mbour and Rufisque. Sea level rise may have very serious effects in Senegal.
- Development of climate scenarios for Senegal. These scenarios will are used in the impact and adaptation studies on agricultural and coastal zones.
- The preparation of the first National Communication of Senegal.

The studies within the Netherlands Climate Change Assistance Studies Programmes build upon earlier results of climate change studies (UNEP/GEF), and will complement other on-going studies focusing on mitigation assessment (CC:TRAIN, UNDP/GEF).

Selected publications
- Deuxième Communication National du Senegal, Concention Cadre Des National-Unies Sur Les Changement Climatiques
- Vulnerabilité des Productions Agricoles au Changement Climatique au Senegal
- Etude de Vulnerabilité des Cotes Senegalesises aux Changements Climatiques

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Surinam is located in northern South America, bordering the North Atlantic Ocean. It has a tropical climate which is moderated by trade winds. Large areas are covered by tropical rain forests. The bauxite industry is crucial for its economy. Shrimp and forestry products are of increasing importance.

Surinam recently ratified the UNFCCC and is therefore obliged to prepare its National Communications. To meet its commitments under the UNFCCC, Surinam carries out an emission inventory for the year 1994, using the revised IPCC guidelines of 1996. The emission inventory pays specific attention to land use change and forestry.

In addition, the study in Surinam focuses on the coastal zone since the low lying coast is expected to be very vulnerable to sea level rise. Current coastal erosion is already threatening the main economic areas along the coast. This coastal study has three components:
- a coastal resources profile for the year 1995;
- a vulnerability assessment for the different regions in the coastal zone;
- a pilot project in which the findings of the other components is applied to one coastal zone management area.

The particular aim of this pilot project is to further develop and specify identified adaptation measures in a real coastal zone management context and analyse their possible effects and feasibility.

Selected publications
- Greenhouse gas emission inventory for Suriname 1994
- Project country study climate change Suriname and first steps towards integrated coastal zone management
- Coastal Resources and their Social Economic Value
- Water Resources – Profile
- Water Resources – Prediction
- Ecology profile: Inventory of Study Area Characteristics, Habitat and Species
- Impacts on ecology: Prediction

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Yemen

Yemen is a country in the Middle East at the southern coast of the Arabian Peninsula. It has a desert climate, varying from hot and humid along the coast to temperate in the western mountains, and extraordinarily hot in the east. There is a very limited supply of natural fresh water resources. The main environmental problems are over-grazing, soil erosion and desertification.

Yemen carried out the following studies in the Netherlands Climate Change Studies Assistance Programme:

- Impacts of climate change on agriculture and identification of possible adaptation options. Although Yemen has a desert climate, it has a relatively large potential for agricultural production due to its fertile soil and high rainfall in some regions. However, water supply is not always sufficient. Future climate change may increase these problems and could have severe impacts on food production. The agricultural sector is therefore one of the priority areas of the Government of Yemen.

- Impacts of climate change on water resources and the identification of possible adaptation options. Water resources are very limited in Yemen. Moreover, the availability of water resources is directly linked with agriculture. This study will therefore be carried out in close co-ordination with the agricultural study.

- Development of climate scenarios and socio-economic scenarios to be used in the impact and adaptation studies.

- The preparation of Yemen’s first National Communication.

The studies carried out by Yemen under the Netherlands Climate Change Studies Assistance Programme are closely co-ordinated with studies carried out with UNDP/GEF assistance. The latter include: an emission inventory of greenhouse gases, a mitigation study in the energy sector, and a limited coastal zone study. The two sets of studies cover the whole range of climate change studies.

Selected publications

- Impact of Climate Change on Water Resources in Yemen - Case Study: Abyan Delta With its Contributing Catchment

- Assessment of Potential Impacts of Climate Change on Coastal Zone Areas of Yemen

- An Assessment of Climate Change on Agriculture in the Republic of Yemen

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Zimbabwe is a landlocked tropical country bordering Zambia, Mozambique, South Africa and Botswana. The country has an estimated population of 12 million. About 70% of the inhabitants live in rural areas. The agriculture sector is the largest employer of labour. It contributes about 12% to national GDP. The tobacco subsector, however, is the leading source of foreign currency followed by mining.

Although Zimbabwe is wholly within the tropics, its climate is sub-tropical due to its inland position and altitude. Annual rainfall ranges from about 400 to 1000 mm, is generally variable and the country does suffer from periodic droughts.

Zimbabwe carries out the following studies in the Netherlands Climate Change Studies Assistance Programme:
- Identification of barriers to the adoption of win-win mitigation technologies in industry and the energy sector.
- Improving the results of existing studies on agriculture by trying to identify whether their unsatisfactory results are caused by deficiencies in the climate scenarios.

These studies build upon earlier studies, such as the impact studies within the US Country Studies, the UNDP Capacity Building Project, and the results of the Initial National Communication enabled by UNEP/GEF.

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Coastal Zone Management Studies

Before the start of the Netherlands Climate Change Studies Assistance Programme, the Netherlands Government financed coastal zone management studies in several countries. These studies, which all have been carried out through the Coastal Zone Management Centre, addressed both vulnerability to sea level rise and the identification of possible adaptation measures. The Common Methodology of the IPCC was applied in all cases. These studies can be regarded as the precursors of the climate change studies in the current Netherlands Programme. The following pages provide a short description of the coastal zone management studies in Bangladesh, Egypt, Nicaragua and Vietnam.

Bangladesh

Bangladesh is bordered by India on the east, west and north and by the Bay of Bengal on the south. The land is a deltaic plain with a network of numerous rivers and canals. It has a tropical climate with cool, dry winters, hot, humid summers and cool, rainy monsoons. It is vulnerable to droughts and much of the country is routinely flooded during the summer monsoon season. Other environmental threats are overpopulation and deforestation. Its economy is mainly agricultural.

From 1991 to 1994, Bangladesh carried out a study on the vulnerability of the coastal zone to sea level rise. It analysed climate change issues in the context of integrated coastal zone management, considering other long-term impacts as well, and focuses on a quantitative analysis. The main conclusions are:

- Climate change and sea level rise will affect the whole of Bangladesh and not only the coastal areas. The main impacts are likely to be: inundations, droughts, salt water intrusion and low flow conditions.
- The combination of high development, absence of upstream watershed management and climate change is expected to bring the country in a critical situation with respect to damage of river floods and storm surges and the availability of fresh water in the dry period.
- Effective adaptive responses to the threat of climate change and sea level rise include measures such as the creation of support and extension services to improve or change agricultural practices, negotiations on water sharing arrangements with India, efficient mechanisms for disaster management, development and introduction of desalination techniques, and the plantation of mangrove protection belts.

Egypte

Egypt is located in Northern Africa, bordering the Mediterranean Sea. It has a vast desert plateau which is interrupted by the Nile valley and delta. The Nile is the only perennial water source. Environmental problems include the increasing soil salinisation below the Aswan High Dam, water pollution and desertification. Tourism, agriculture and (oil) industry are important for Egypt’s economy.

The 1992-1993 study showed that the River Nile Delta is very vulnerable to sea level rise. Erosion rates are expected to increase drastically. Nearly 10 million people would be affected. Adaptation or protection measures are expected to absorb a substantial part of the national budget.

In 1994, the passing of the Environment Law gave the task of initiating coastal zone management activities to the Egyptian Environmental Affairs Agency (EEAA). Based on this law, a national committee for integrated coastal zone management (ICZM) was established in which many different departments participate. The committee’s task is to develop an integrated coastal zone programme. With assistance from the Netherlands and Denmark, the vulnerability assessment study resulted in the development of a Framework ICZM programme. This framework identifies the key issues in the Egyptian coastal zone: shore erosion and flooding, irrational land use, water pollution and deterioration of natural resources. Priority and long-term actions were identified which are presently being implemented. This framework also pays attention to the institutional requirements, the legislative requirements and to the financial and the human resources.
Situated in Central America, Nicaragua has a tropical climate in the lowlands, and a cooler climate in the highlands. The main environmental problems include deforestation, soil erosion and water pollution. In addition, Nicaragua is subject to destructive earthquakes, landslides and occasional severe hurricanes. Very important for its economy is the export of agricultural commodities, largely coffee and cotton.

The Governments of Nicaragua, the Netherlands and Denmark embarked in 1996 on an integrated coastal zone management (ICZM) project in Nicaragua’s coastal zone. In this phase, a team within the Ministry of Environment and Natural Resources was established which created awareness among stakeholders and actors, and identified key problems and potentials of the coastal zone. The conclusions of the first phase were that a sustainable use of Nicaragua’s natural resources could make a substantial contribution to the nation’s development. The ICZM objective is to find the balance between economic growth, ecological integrity, equity and manageability. Other principles include a participatory approach, a reduced role of Government and the precautionary principle.

To implement the strategies, three lines of action are proposed for immediate activities in the second phase of the study. The main aim of action is the regionalisation of ICZM. Other aims are further development of the ICZM concept, training and institutionalisation of the project within the Ministry of Environment and Natural Resources, and the creation of technical units at a regional level.

Vietnam is located in Southeast Asia and has a tropical climate in the south and a monsoon climate in the north with a hot, rainy season and warm, dry season. It has low, flat deltas, highlands and hills. Vietnam is occasionally struck by typhoons with extensive flooding. It is in transition from a planned economy towards a market based economy. Most export earnings are generated by rice and crude oil.

In the period 1994-1996, a project has been conducted which assessed the vulnerability of the coastal zone of Vietnam to the impacts of accelerated sea level rise due to global warming. The Common Methodology of the IPCC was used. During the study extensive data on physical, socio-economic and institutional characteristics of the coastal zone of Vietnam were collected. Digitisation of the entire coastal zone formed the basis for GIS analyses which determined areas of different land-use types inundated by various flood scenarios. Further analyses provided loss and risk figures for land use types, population and capital value.

The findings showed the high sensitivity of Vietnam to a sea level rise. Vietnam’s vulnerability is ranked as critical and protection measures needed are immense. Most sensitive areas are the Mekong Delta and the region of Ho Chi Minh City and Vung Tau. Integrated coastal zone management is seen as an essential tool, in addition to actions for strengthening local capabilities for coastal management.