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THAILAND



COUNTRY PROFILE



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INTRODUCTION - 2002 COUNTRY PROFILES SERIES

Agenda 21, adopted at the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992, underscored the important role that States play in the implementation of the Agenda at the national level. It recommended that States consider preparing national reports and communicating the information therein to the Commission on Sustainable Development (CSD) including, activities they undertake to implement Agenda 21, the obstacles and challenges they confront, and other environment and development issues they find relevant.

As a result, in 1993 governments began preparing national reports for submission to the CSD. After two years of following this practice, the CSD decided that a summarized version of national reports submitted thus far would be useful. Subsequently, the CSD Secretariat published the first Country Profiles series in 1997 on the occasion of the five-year review of the Earth Summit (Rio + 5). The series summarized, on a country-by-country basis, all the national reports submitted between 1994 and 1996. Each Profile covered the status of all Agenda 21 chapters.

The purpose of Country Profiles is to:

- Help countries monitor their own progress;
- Share experiences and information with others; and,
- Serve as institutional memory to track and record national actions undertaken to implement Agenda 21.

A second series of Country Profiles is being published on the occasion of the World Summit on Sustainable Development being held in Johannesburg from August 26 to September 4, 2002. Each profile covers all 40 chapters of Agenda 21, as well as those issues that have been separately addressed by the CSD since 1997, including trade, energy, transport, sustainable tourism and industry.

The 2002 Country Profiles series provides the most comprehensive overview to date of the status of implementation of Agenda 21 at the national level. Each Country Profile is based on information updated from that contained in the national reports submitted annually by governments.

Preparing national reports is often a challenging exercise. It can also be a productive and rewarding one in terms of taking stock of what has been achieved and by increasing communication, coordination and cooperation among a range of national agencies, institutions and groups. Hopefully, the information contained in this series of Country Profiles will serve as a useful tool for learning from the experience and knowledge gained by each country in its pursuit of sustainable development.

NOTE TO READERS

The 2002 Country Profiles Series provides information on the implementation of Agenda 21 on a country-by-country and chapter-by-chapter basis (with the exception of chapters 1 and 23, which are preambles). Since Rio 1992, the Commission on Sustainable Development has specifically addressed other topics not included as separate chapters in Agenda 21. These issues of trade, industry, energy, transport and sustainable tourism are, therefore, treated as distinct sections in the Country Profiles. In instances where several Agenda 21 chapters are closely related, for example, chapters 20 to 22 which cover environmentally sound management of hazardous, solid and radioactive wastes, and chapters 24 to 32 which refer to strengthening of major groups, the information appears under a single heading in the Country Profile Series. Lastly, chapters 16 and 34, which deal with environmentally sound management of biotechnology, and transfer of environmentally sound technology, cooperation, capacity-building respectively, are presented together under one heading in those Country Profiles where information is relatively scarce.

TABLE OF CONTENTS

CHAPTER 2: INTERNATIONAL COOPERATION TO ACCELERATE SUSTAINABLE DEVELOPMENT IN DEVELOPING COUNTRIES AND RELATED DOMESTIC POLICIES.....	1
CHAPTER 2: INTERNATIONAL COOPERATION TO ACCELERATE SUSTAINABLE DEVELOPMENT IN DEVELOPING COUNTRIES AND RELATED DOMESTIC POLICIES - TRADE.....	4
CHAPTER 3: COMBATING POVERTY.....	5
CHAPTER 4: CHANGING COMSUMPTION PATTERNS.....	6
CHAPTER 4: CHANGING CONSUMPTION PATTERNS - ENERGY.....	8
CHAPTER 4: CHANGING CONSUMPTION PATTERNS - TRANSPORT.....	10
CHAPTER 5: DEMOGRAPHIC DYNAMICS AND SUSTAINABILITY.....	12
CHAPTER 6: PROTECTING AND PROMOTING HUMAN HEALTH.....	14
CHAPTER 7: PROMOTING SUSTAINABLE HUMAN SETTLEMENT DEVELOPMENT.....	16
CHAPTER 8: INTEGRATING ENVIRONMENT AND DEVELOPMENT IN DECISION-MAKING.....	17
CHAPTER 9: PROTECTION OF THE ATMOSPHERE.....	19
CHAPTER 10: INTEGRATED APPROACH TO THE PLANNING AND MANAGEMENT OF LAND RESOURCES.....	22
CHAPTER 11: COMBATING DEFORESTATION.....	24
CHAPTER 12: MANAGING FRAGILE ECOSYSTEMS: COMBATING DESERTIFICATION AND DROUGHT.....	26
CHAPTER 13: MANAGING FRA GILE ECOSYSTEMS: SUSTAINABLE MOUNTAIN DEVELOPMENT.....	28
CHAPTER 14: PROMOTING SUSTAINABLE AGRICULTURE AND RURAL DEVELOPMENT.....	29
CHAPTER 15: CONSERVATION OF BIOLOGICAL DIVERSITY.....	31
CHAPTER 16 AND 34: ENVIRONMENTALLY SOUND MANAGEMENT OF BIOTHECHNOLOGY AND TRANSFER OF ENVIRONMENTALLY SOUND TECHNOLOGY, COOPERATION AND CAPACITY-BUILDING.....	33
CHAPTER 17: PROTECTION OF THE OCEANS, ALL KINDS OF SEAS, INCLUDING ENCLOSED AND SEMI-ENCLOSED SEAS, AND COASTAL AREAS AND THE PROTECTION, RATIONAL USE AND DEVELOPMENT OF THEIR LIVING RESOURCES.....	35
CHAPTER 18: PROTECTION OF THE QUALITY AND SUPPLY OF FRESHWATER RESOURCES: APPLICATION OF INTEGRATED APPROACHES TO THE DEVELOPMENT, MANAGEMENT AND USE OF WATER RESOURCES.....	37
CHAPTER 19: ENVIRONMENTALLY SOUND MANAGEMENT OF TOXIC CHEMICALS, INCLUDING PREVENTION OF ILLEGAL INTERNATIONAL TRAFFIC IN TOXIC AND DANGEROUS PRODUCTS.....	39
CHAPTER 20 TO 22: ENVIRONMENTALLY SOUND MANAGEMENT OF HAZARDOUS, SOLID AND RADIOACTIVE WASTES.....	41

CHAPTER 24 TO 32: STRENGTHENING THE ROLE OF MAJOR GROUPS.....	44
CHAPTER 33: FINANCIAL RESOURCES AND MECHANISMS.....	48
CHAPTER 35: SCIENCE FOR SUSTAINABLE DEVELOPMENT.....	51
CHAPTER 36: PROMOTING EDUCATION, PUBLIC AWARENESS AND TRAINING.....	54
CHAPTER 37: NATIONAL MECHANISMS AND INTERNATIONAL COOPERATION FOR CAPACITY- BUILDING IN DEVELOPING COUNTRIES.....	57
CHAPTER 38: INTERNATIONAL INSTITUTIONAL ARRANGEMENTS.....	58
CHAPTER 39: INTERNATIONAL LEGAL INSTRUMENTS AND MECHANISMS.....	59
CHAPTER 40: INFORMATION FOR DECISION-MAKING.....	60
CHAPTER: INDUSTRY.....	62
CHAPTER: SUSTAINABLE TOURISM	63

LIST OF COMMONLY USED ACRONYMS

ACS	Association of Caribbean States
AMCEN	Africa Ministerial Conference on the Environment
AMU	Arab Maghreb Union
APEC	Asia-Pacific Economic Cooperation
ASEAN	Association of Southeast Asian Nations
CARICOM	The Caribbean Community and Common Market
CBD	Convention on Biological Diversity
CIS	Commonwealth of Independent States
CGIAR	Consultative Group on International Agricultural Research
CILSS	Permanent Inter-State Committee for Drought Control in the Sahel
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
COMESA	Common Market for Eastern and Southern Africa
CSD	Commission on Sustainable Development of the United Nations
DESA	Department for Economic and Social Affairs
ECA	Economic Commission for Africa
ECCAS	Economic Community for Central African States
ECE	Economic Commission for Europe
ECLAC	Economic Commission for Latin America and the Caribbean
ECOWAS	Economic Community of West African States
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
ESCAP	Economic and Social Commission for Asia and the Pacific
ESCWA	Economic and Social Commission for Western Asia
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FIDA	Foundation for International Development Assistance
GATT	General Agreement on Tariffs and Trade
GAW	Global Atmosphere Watch (WMO)
GEF	Global Environment Facility
GEMS	Global Environmental Monitoring System (UNEP)
GESAMP	Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection
GHG	Greenhouse Gas
GIS	Geographical Information Systems
GLOBE	Global Legislators Organisation for a Balanced Environment
GOS	Global Observing System (WMO/WWW)
GRID	Global Resource Information Database
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome
IAEA	International Atomic Energy Agency
ICSC	International Civil Service Commission
ICSU	International Council of Scientific Unions
ICT	Information and Communication Technology
ICTSD	International Centre for Trade and Sustainable Development

IEEA	Integrated Environmental and Economic Accounting
IFAD	International Fund for Agricultural Development
IFCS	Intergovernmental Forum on Chemical Safety
IGADD	Intergovernmental Authority on Drought and Development
ILO	International Labour Organisation
IMF	International Monetary Fund
IMO	International Maritime Organization
IOC	Intergovernmental Oceanographic Commission
IPCC	Intergovernmental Panel on Climate Change
IPCS	International Programme on Chemical Safety
IPM	Integrated Pest Management
IRPTC	International Register of Potentially Toxic Chemicals
ISDR	International Strategy for Disaster Reduction
ISO	International Organization for Standardization
ITTO	International Tropical Timber Organization
IUCN	International Union for Conservation of Nature and Natural Resources
LA21	Local Agenda 21
LDCs	Least Developed Countries
MARPOL	International Convention for the Prevention of Pollution from Ships
MEAs	Multilateral Environmental Agreements
NEAP	National Environmental Action Plan
NEPAD	New Partnership for Africa's Development
NGOs	Non-Governmental Organizations
NSDS	National Sustainable Development Strategies
OAS	Organization of American States
OAU	Organization for African Unity
ODA	Official Development Assistance/Overseas Development Assistance
OECD	Organisation for Economic Co-operation and Development
PPP	Public-Private Partnership
PRSP	Poverty Reduction Strategy Papers
SACEP	South Asian Cooperative Environment Programme
SADC	Southern African Development Community
SARD	Sustainable Agriculture and Rural Development
SIDS	Small Island Developing States
SPREP	South Pacific Regional Environment Programme
UN	United Nations
UNAIDS	United Nations Programme on HIV/AIDS
UNCED	United Nations Conference on Environment and Development
UNCCD	United Nations Convention to Combat Desertification
UNCHS	United Nations Centre for Human Settlements (Habitat)
UNCLOS	United Nations Convention on the Law of the Sea
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNDRO	Office of the United Nations Disaster Relief Coordinator
UNEP	United Nations Environment Programme

UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNFF	United Nations Forum on Forests
UNFPA	United Nations Population Fund
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
UNIDO	United Nations Industrial Development Organization
UNIFEM	United Nations Development Fund for Women
UNU	United Nations University
WFC	World Food Council
WHO	World Health Organization
WMO	World Meteorological Organization
WSSD	World Summit on Sustainable Development
WTO	World Trade Organization
WWF	World Wildlife Fund
WWW	World Weather Watch (WMO)

CHAPTER 2: INTERNATIONAL COOPERATION TO ACCELERATE SUSTAINABLE DEVELOPMENT IN DEVELOPING COUNTRIES AND RELATED DOMESTIC POLICIES

Decision-Making: The ministries and agencies responsible for decision-making on international cooperation and assistance for sustainable development are as follows: Fiscal Policy Office, Ministry of Finance; Office of the National Economic and Social Development Board, Office of the Prime Minister; Department of Technical and Economic Cooperation, Office of the Prime Minister; Ministry of Foreign Affairs; and Ministry of Commerce. Several national level committees have been created to coordinate policy and legislation on issues concerning international cooperation and development assistance for sustainable development. An International Economic Policy Committee has been established to consider policies related to economic, trade, commercial, and trade related environmental and technical issues. The Ministry of Foreign Affairs has several working groups that meet regularly to review policies related to cooperation and development assistance. The Department of Technical and Economic Cooperation works closely with the Ministry of Foreign Affairs and technical agencies on the transfer and exchange of technology, information, and data within the region. The central government is responsible for international relations through the Ministry of Foreign Affairs. Border relations with neighbouring countries are supervised at the local level by provincial governors and military and police authorities. All major groups are included in decision-making in this area.

Programmes and Projects: The technical cooperation activities under TICP have been implemented through bilateral programme, Annual International Training Courses Programme (AITC), The Technical Cooperation among Developing Countries (TCDC), Institutional Linkage Programme (ILP) and Third Country Training Programme (TCTP). Thailand Business Council for Sustainable Development (TBCSD) has completed several projects in recent years, including: TBCSD Guidelines for Sustainable Development, Pesticide-Free Agricultural Villages, Green Labelling, Pilot Project for Implementation of ISO 14000 and Sequential Training of ISO 14000, Environmental Conservation Circle, Coal and its Impact on the Environment, Renovation of Khlong Lod, Promotion of the Preservation and Development of the Historical City of Ayutthaya and TBCSD Public Relations.

Status: As a result of the financial and economic crises that began in Thailand in July 1997, all key economic indicators recorded significant decreases. Production, consumption, trade, investment, and economic growth all decreased several percentage points, and are only now beginning to recover. The economy grew at an annual rate of 10.7 percent during the period 1986-1991. Since then, the growth rate slowed down gradually reaching 5.5 percent in 1996, and a negative -0.4 percent in 1997. The economy decreased 9.4 percent in 1998, and is projected to grow 2 percent in 1999. Per capita income in 1998 was US\$1,834.00, with more than 60 percent of Thailand's labor force employed in agriculture. Until the onset of the economic crisis in 1997, the manufacturing sector was outstripping agriculture in relative importance. But throughout 1997 and 1998 agriculture has been the only high-performing sector in the economy. Rice is the country's most important crop--Thailand is a major exporter in the world rice market. Other agricultural commodities produced in significant amounts include fish and fishery products, tapioca, rubber, corn, and sugar. Exports of processed foods such as canned tuna, pineapples, and frozen shrimp have risen dramatically. The financial and economic crises have impacted on the management of natural resources, already in a serious state of degradation. Due to the return migration to rural areas of an estimated 1.2 million workers dismissed from urban employment, encroachment of forested watersheds for expansion of farmland has increased. Many communities have increased hunting and extraction of forest and non-timber forest products from forestry resources. Existing water resources have been insufficient to meet the increased need for irrigation for second and third cropping. The incidence of forest fires has increased. The use of illegal drugs in rural areas also has increased. Public safety and security are at risk in that insufficient attention is being given to issues related to the safe use of toxic chemicals and the management of hazardous and radioactive wastes.

Capacity-building, Education, Training and Awareness-Raising: In an effort to protect fragile ecosystems, an environmental quality awareness programme is being implemented among ethnic minority groups inhabiting highland areas of Thailand. In addition, an industrial occupations development programme is being implemented to promote a diversity of income generating opportunities for poor urban and rural workers.

Information: Information and data on bilateral, sub-regional, regional, and multilateral/international cooperation are available from the Department of Technical and Economic Cooperation (DTEC). Potential users can contact DTEC directly. Information is provided to the Public Relations Department for dissemination to the public via Radio Thailand on a regular basis. In addition, significant information is available via the Internet, as well as press releases and other mass media channels. To enhance the quality and availability of environmental data, remote sensing technology is being employed to survey natural resources.

Research and Technologies: During both the Seventh and Eighth National Economic and Social Development Plans (1991-2001), Thailand has aimed to strengthen human resources in the fields of science and technology, to support national development, to adopt new technology to increase industrial and agricultural productivity. Thailand supports the implementation of a sustainable development strategy. It calls for the enhancement of overseas development assistance from developed countries to increase the capability of developing countries to fight natural resources degradation and environmental deterioration. Thailand has acquired technology mainly via commercial channels. As Thailand is now both a recipient and a provider of technical assistance, environmentally sound technologies are essential for the country to sustain its development, while technologies received as well as those developed domestically can be transferred to other developing countries. Beginning in 1991, the National Science and Technology Development Agency has supported research, development, and engineering in scientific and technological spheres. The Agency's goals include: i) to support public sector research, development and engineering projects; ii) to support technological strengthening in the private sector; and, 3) to offer scholarships in the fields of science and technology for study abroad and locally. In support of small and medium scale enterprises, the Board of Investment and the Ministry of Industry have provided a systematic and continuous programme of facilitating technical linkages among industries and supported the efforts of Thai industries to gain access to technologies from the international market. In addition to significant public sector investments in implementing Agenda 21, Thai business leaders have taken an active interest in participating in the global efforts to participate in the sustainable development process. To this end, the Thailand Business Council for Sustainable Development (TBCSD) was established in 1993 by a group of leading figures in the Thai business community. The TBCSD is a non-profit organization that promotes sustainable development through business leadership.

Financing: The Thai Environment Fund administered by the OEPP provides loans to municipalities and sanitary districts for environmental protection and rehabilitation projects, and grants to NGOs for environmental management activities. In addition, the Energy Conservation Fund administered by National Energy Policy Office (NEPO) makes supplementary funding available to improve energy efficiency in 150 establishments. Thailand has been operating a Research Development Fund since 1992, to support research in the basic and applied sciences as well as social sciences. Bilateral and multilateral sources are available on the following page titled as "Total Assistance to Thailand by Donors Fiscal Year 1997". Additional Information is readily available from the Bank of Thailand at this website address: http://www.bot.or.th/bothomepage/databank/EconData/IIP/iip_e.htm

Cooperation: Technical cooperation has been delivered to Thailand through two main channels namely multilateral and bilateral cooperation. Multilateral cooperation has been provided by international organizations such as the United Nations and the European Union. Bilateral cooperation has been given by individual donor countries to Thailand such as Japan, Australia, Germany, Denmark, France, Sweden, Belgium and Canada. Thailand's has also received cooperation from a number of non-governmental organizations. Thailand has been an active member of the United Nations and has participated in numerous international peacekeeping and election monitoring activities in all regions of the world. Through participation as a founding member of ASEAN, the Cairns Group, and the WTO, Thailand has played an important role in promoting trade liberalization through the GATT. The Thai Government has allocated funds for numerous activities that promote international cooperation and foster the basis for improved coordination on international environmental matters. Thailand is a party to the following Conventions or international agreements: Climate Change, Endangered Species, Hazardous Wastes, Marine Life Conservation, Nuclear Test Ban, Ozone Layer Protection, Tropical Timber 83, Tropical Timber 94, Wetlands and has signed, but not ratified: Biodiversity, Climate Change-Kyoto Protocol, Law of the Sea.

The Department of Technical and Economic Cooperation (DTEC) has been authorized by the Government of Thailand to supervise and coordinate Technical Cooperation that is given by foreign donors to the Government of Thailand and then is distributed to government agencies and private organizations. The Thai Government has a policy to uphold all commitments under the UN Charter, various treaties and agreements to which Thailand is party. At present, Thailand provides technical cooperation to other developing countries under the scheme entitled "The Thai International Cooperation Programme " (TICP). TICP 's major recipients are the neighbouring countries in the Mekong sub-region namely Laos PDR, Cambodia, Vietnam and Myanmar. Moreover, TICP also contributes technical cooperation for development with other countries in Asia, the Pacific, and Africa as well as Eastern Europe.

Throughout the 1990s, Thailand has supported joint research, professional networking, and other activities related to sustainable development between experts in the region by participating in the UNDP, UNIDO and other bilateral relations to facilitate cooperation. In addition, the Kenan Institute Asia (KIASia) supports greater development cooperation between the United States and Asia. The Institute, headquartered in Bangkok, Thailand, works to bring U.S. technology, knowledge, and business expertise to bear on issues of importance to the region. Established with an endowment provided by private sources and the Thai and US governments, KIASia is a Thai non-profit foundation. It cooperates closely and receives funding from the US Agency for International Development (USAID) and the Thai Department of Technical and Economic cooperation (DTEC). The Institute operates on the premise that private enterprise is a key to sustainable solutions to Asia's development needs. It works closely with the Frank Hawkins Kenan Institute of Private Enterprise at the University of North Carolina at Chapel Hill.

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CHAPTER 2: INTERNATIONAL COOPERATION TO ACCELERATE SUSTAINABLE DEVELOPMENT IN DEVELOPING COUNTRIES AND RELATED DOMESTIC POLICIES - TRADE

Decision-Making: No information available.

Programmes and Projects: No information available.

Status: No information available.

Capacity-Building, Education, Training and Awareness-Raising: No information available.

Information: No information available.

Research and Technologies: No information available.

Financing: No information available.

Cooperation: No information available.

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CHAPTER 3: COMBATING POVERTY

Decision-Making: In Thailand, there is no specific poverty legislation in force, but the country's Economic and Social Development Plans have been aimed at poverty reduction, especially during the last 20-25 years. Progress made in this area during the Seventh Plan (1992-1996) was evaluated formally in 1995. The Eighth Plan (1997-2001) has been completed and contained specific targets for the further reduction of both urban and rural poverty. The Eighth and Ninth (2002-2006) Plan's formulation were both initiated on a "bottom-up" consultation basis to emphasize the participation of poor communities and women in problem solving. This latest plan and Thailand's long-term Environment Quality Promotion Strategy make linkages between poverty and the environment.

Programmes and Projects: Support for trade liberalization through the reduction of trade barriers and the promotion of foreign direct investment, have made Thailand an attractive location for foreign investors to establish their industrial and manufacturing facilities. Activities related to education reform and the promotion of non-formal education programs, community and rural development, village defense, and citizenship training programs all contribute to addressing the root causes of poverty. Numerous special programs are supported by the Thai Government to alleviate poverty in both urban and rural areas. In addition to providing welfare payments to the rural poor, the government provides training to increase employment opportunities. Linked to training, vacant agricultural land is being rented and being made available to those interested in pursuing agricultural development activities. Also being supported are training and funding for rural occupational development and business ventures, as well as promotion of occupational interest groups. In urban areas, revolving funds for family based businesses are being promoted through self-help programs.

Status: Thailand has made significant progress in alleviating poverty, with the percentage of people living below the poverty line decreasing from 27.2 percent to less than half (13 percent) in eight years. Similarly, until the East Asian financial and economic crises of 1997, unemployment had fallen to record lows (1.51 percent in 1997).

Capacity-building, Education, Training and Awareness-Raising: Thailand's easily trainable and highly skilled work force and well-developed physical infrastructure provided sufficient incentives for investments that served as the foundation of economic growth.

Information: Information is available from the website of the Office of the National Economic and Social Development Board, (NESDB) at: www.nesdb.go.th.

Research and Technologies: No information available.

Financing: The Thai Government has made the further reduction of poverty a major priority. Programs of the current government that address the issue include: a debt moratorium on agricultural debt; a government subsidized health scheme for the poor; village development funds available for on-lending to poor who do not qualify for commercial loans; employment generation through the one village-one product scheme.

Cooperation: Numerous national and international non-governmental organizations are providing material, financial, and other assistance to the children of poor families through government operated social service and public welfare programs .

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CHAPTER 4: CHANGING CONSUMPTION PATTERNS

Decision-Making: Several government agencies are responsible for various development sectors for the sustainable consumption and production patterns such as the National Economic and Social Development Board, the National Environment Board, Ministry of Finance, Ministry of Agriculture and Cooperatives, Ministry of Industry, Ministry of Commerce, the Consumer Protection Office. The Energy Conservation Promotion Act B.E. 2535 (1992) has established measures to conserve energy in factories and buildings, and promote energy-efficient materials, machinery and equipment. The National Energy Policy Council and NEPO are the main monitoring bodies on implementation of relevant laws, regulations and standards submitted by concerned implementing agencies. A bureau, BERC, is set up under the DEDP to supervise the designated facilities (factory/building) to comply with the Act. There is no National Strategy, Policy or multi-year Work Programme directly addressing the Sustainable Consumption and/or Production Patterns. Thailand has applied a 5-year national plan to ensure its sustainable development. Balance of demands of production and the conservation of natural resources and environment has been stressed in the Eighth National Economics and Social Development Plan (1997-2001); The Policy and Perspective Plan for Enhancement and Conservation of National Environmental Quality (1997-2016). Specific policy and economic instruments that are applied to discourage unsustainable and encourage sustainable consumption and production practices include: Tax differentiation between lead and non-lead gasoline; Raw water charges in agriculture and non-agricultural uses; Tax incentives for waste treatment facilities; TOD and TOU rates of charge for power consumption; and Tax incentives for private and public institutions to conserve energy. The government is promoting intensively the local participation in resource and environmental management in their communities. The Local Administration Organization is the legal institution at the grass-root level to initiate the decision in resource utilization and environmental protection in its jurisdiction. The new constitution (1998) substantially promotes the role of local community in resource and environmental management.

Programmes and Projects: The following are programmes related to energy conservation and waste minimization. The Compulsory Programme relates to the legislative and regulatory implementation of energy conservation such as in Energy Conservation Promotion Act. The Voluntary Programme includes the Rural and Small Industries Programme, the Research and Development Programme and the Industrial Liaison Programme. The main aims of these programmes are to support and cooperate with the public and private sector in energy utilization efficiency, reduction of environmental impact and public campaign of energy conservation. The Complementary Programme promotes education and training on energy conservation to the public, raises public awareness in energy conservation. Demand-side Management Programme covers pursuit of energy efficiency promotion for electrical appliances, buildings and factories; promoting energy conservation habit and use of efficient technology; monitoring and evaluation of the programmes. Waste minimization programmes, waste separation programmes in schools and major urban centres are promoted to phase out the use of ozone-depleting substances in Thailand. Resource conservation programmes are implemented as nation-wide reforestation and forest rehabilitation programmes and problematic soil improvement programmes.

Status: Targets of conservation of natural resources and environmental protection have been specified in the Policy and Perspective Plan for Enhancement and Conservation of National Environmental Quality (1997-2016). Targets for pollution control have been stated in the Pollution Management Action Plan (1997-2006). Targets for power consumption and emissions of sulphur dioxide have been specified in the 8th National Economic and Social Development Plan. Major research, development, and demonstration projects and activities include an energy conservation programme in which biogas generation from pig manure and land fills are implemented, and an industrial Liaison Programme in which solar roof-top pilot project is implemented. In the biogas projects, 6 major pig farms participated, accounting for 10,000 cum. of the biogas system. If the project reaches its full scheme and finishes 15 years operation as planned, there will be 27 million cum. of biogas produced. In addition, 100 thousand tons of organic fertilizer will be obtained as by products. The first phase of the project has been completed. Construction of the facilities in four projects has been completed while another two are being constructed. The main constraint is the lack of personnel with expertise in energy.

Capacity-Building, Education, Training and Awareness-Raising: There are several programmes for education and awareness-raising carried out by related agencies: The DSM Programme operated by the EGAT promotes energy efficiency and energy conservation of industry and domestic; The energy auditing programme in industry and buildings under the Department of Energy Conservation Promotion; and Various public campaign programmes on reuse/recycle as well as other resource conservation through various media by Department of Environmental Quality Promotion. Training for targeted groups includes: Energy Exhibition Park to provide students, business operators and the general public the knowledge and methods of energy conservation and to promote use of high efficiency electrical equipment, and Energy Conservation Camping targeting at students to provide them a better understanding on the current situation of energy and petroleum, to raise awareness in energy conservation, to train efficiency use of energy and to promote the initiative and dissemination of energy conservation information and techniques to others. There are several campaign programmes such as Energy Saving in Households and Offices, Car Pool and other transportation related programmes. Financial support from the Energy Conservation Fund also provided to awareness campaign programmes through media such as TV, radio spots, newspapers to promote sustainable consumption patterns. Several campaigns were successful including Car Pool, 6 Approaches to Save Gasoline, Primary Energy Sources for Electricity etc.

Information: Data are generally available on consumption and production aspect. The figure of the overall picture of efficiency is not available. Efficiency information can be obtained in some areas such as the Royal Decree on Designated Buildings help reduce energy consumption in business buildings in 1997 by 14%, accounting for total decrease of power demand by 650 MW. Several annual statistical reports are available, such as: Oil and Thailand; Electric Power in Thailand; Thailand Energy Situation; and A paper on Strategies for the Energy Development during the 8th National Economic and Social Development Plan (1997-2001) prepared by the National Energy Policy Office. Information is distributed to the academic institute and related government agencies through NEPO. A web site of the information of the Department of Energy Conservation Promotion is under construction.

Research and Technologies: Ways in which clean and environmentally sound technologies are promoted and applied in production include replacement of lignite and fuel oil in power generation, Flue Gas Desulphurization (FGD) system and the installation of oil vapour recovery system. Other technology-related issues that are being addressed include a study on Energy Efficiency Standards Regime, which is being carried out to draft recommendation for establishing a national energy efficiency standards regime that will reduce energy consumption in the country significantly. Studies in reuse/recycle of industrial wastes have also been carried out, and the results will be used to promote resource conservation.

Financing: Both the government budget and the special fund such as the Energy Conservation Promotion Fund and the Environmental Fund are the main sources of support to the public and private sector in development of sustainable production and consumption pattern

Cooperation: Cooperation takes place through Asia-Pacific Economic Co-operation, Association of South East Asian Nations, Danish Co-operation for Environment and Development and Bangladesh-India-Myanmar-Sri Lanka-Thailand Economic Co-operation

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CHAPTER 4: CHANGING CONSUMPTION PATTERNS - ENERGY

Decision-Making: In 1986, the Thai Cabinet established the National Energy Policy Council (NEPC) to take responsibility for energy policies and measures. The Energy Policy Committee and the Energy Conservation Promotion Fund Committee assist in its work, and the National Energy Policy Office (NEPO) acts as the Secretariat. In 1992, NEPO was established as a permanent department under the Office of the Prime Minister to enhance its efficiency and its flexibility in recommending energy policies to cope with the rapidly changing energy situation. NEPO has responsibilities under three pieces of legislation, namely: the National Energy Policy Council Act, 1992; the Royal Decree on the solution and Prevention of Petroleum Oil Shortage, 1973; and, the Energy Conservation Promotion Act, 1992. Under this legal framework, NEPO is responsible for recommending policies, development plans, and measures related to the energy sector to the NEPC, which is chaired by the Prime Minister. In addition, NEPO is responsible for coordinating and monitoring policy implementation of other energy-related agencies. The Energy Conservation Promotion Fund, under the Energy Conservation Promotion Act, 1992, provides subsidies to government agencies, state enterprises, educational institutions, and private organizations, to be used for energy conservation programmes. In practice, the role of these groups in decision-making is very limited. The central government formulates and implements all measures. However, policies or projects that will affect the public are discussed in public hearings, to obtain views and comments to be incorporated in the final version of the policies, projects, or implementation guidelines. The private sector is involved totally in energy production and distribution. Its role is coordinated with the state through representation on the Energy Conservation Promotion Fund Committee and the National Environment Board as well as numerous national committees, sub-committees, and boards. Most NGOs and locally influential politicians tend to play major roles in objecting to constructing energy projects. At present, there is strong opposition to the construction of coal-fired power plants, natural gas pipelines, and large-scale dams.

Programmes and Projects: One of the ongoing and expanding Government initiatives intended to change consumption patterns is the National Energy Conservation Programme. Several research and development projects are proceeding under the Voluntary Programme, such as the biomass energy promotion programme, that focuses on the use of agricultural wastes as an energy source; and, on solar energy, with a feasibility study being conducted on the utilization of hybrid power systems in remote areas or areas beyond the grid system. The main programmes undertaken to cut down emission of greenhouse gases and reduce GHG concentration in the atmosphere is the Energy Conservation Programme, which consists of three sub-programmes of the Compulsory Programme, the Voluntary Programme and the Complementary Programme. Programmes or projects undertaken to reduce emissions from the usage of petroleum-based fuels for transport are Natural Gas for Vehicles Programme and Hybrid Vehicle Project.

Status: The petroleum situation in Thailand in 1999 was slightly better than the preceding year. Efforts at energy self-dependency led to a reduction of oil imports. Imported crude dropped by 1.9 percent. Refined products as a whole increased by 41.6 percent. On daily average, Thailand produced more petroleum in 1999 than in 1998. All produced gas was utilized domestically. Mostly found as low BTU, Thai coal has served the nation as core alternative fuel for decades. Thailand imports coal in small amounts to fulfil industrial needs. The main use of coal in Thailand is electricity generation. There is no plan to use nuclear energy for the next decade. It is expected that in the next decade the demand for natural gas and coal will increase, particularly for use as fuels for power generation, whereas the share of petroleum utilization will decrease slight, as will the demand for renewable energy (i.e., wood chips, rice husks, and bagasse). Trade liberalization and privatization will impact on the supply and demand for energy in Thailand, in that the supply and demand of energy will be allocated more efficiently; energy will be cheaper; and, energy shortages will not likely occur. Consumption patterns likely will remain unchanged since Thailand's energy market has been under the free trade system, in particular the petroleum market. Regarding the development of cleaner technologies for fossil fuels: The market development cost is high, and identifying a sufficiently large market for such technologies is time-consuming. In addition, there is limited budget, personnel, and expertise for technology development.

Capacity-Building, Education, Training and Awareness-Raising: The Public Awareness Campaign Project under the complementary Programme aims at changing consumers behaviour and attitudes towards energy consumption to achieve efficient use of energy. On the environmental side, under Thailand Policy and Prospective Plan for Enhancement and Conservation of National Environmental Quality, 1997-2016, monitored by the National Environment Board, policy and implementation guidelines have been established for environmental education and promotion. Thailand is implementing a Public Relations Programme that is undertaken for changing the consumption and behaviour patterns of Thai consumers. The objective is to achieve energy savings. This programme is implemented under the "Divide by Two" campaign. The programme consists of the following activities: A general awareness campaign and Education and community-oriented activities. The Thai Government is implementing the "Dawn Project" that integrates energy conservation and environmental studies in 600 primary and secondary school curriculums nationwide. The Human Resources Development Project under the Complementary Programme in particular the "Roon-Arun" Project; promotion of energy conservation courses at the university level; seminars and training for owners / energy managers of designated and non-designated factories and buildings, and energy consultants and technicians; and, scholarships for university students, researchers, and government officials to pursue studies in Thailand and overseas, in energy-related courses.

Information: Energy information is available in Thailand from several sources. Annual publications of the Department of Energy Development and Promotion with important data include Thailand Energy Situation; Oil and Thailand; and Elite Power in Thailand. In addition, the National Energy Policy Office (NEPO) issues quarterly Energy Journals and the NEPO website is accessible. Annual publications of APEC and ASEAN also are available.

Research and Technologies: Since Thailand has significant potential to use agricultural residues or wastes to generate power, it is considered feasible and appropriate to promote utilization of biomass in power generation by SPPs. Thailand is also endowed with solar energy, with good potential to reap benefits from solar energy in the form of both electrical and thermal power. Biomass technology is being applied through a pilot phase of 5-7 years of promotion of renewable energy utilization for power generation by Small Power Producers (SPP), with a target of 300 MW electricity to be generated and connected to the grid. The bidding process has been initiated for installation of a 500 kW solar system in north-western Mae Hong Son province. Feasibility studies are underway to determine the financial return on installing a hybrid power system (wind, solar, and/or diesel) for national parks and wildlife sanctuaries. A biogas project is being implemented for power generation on livestock farms, being expanded from 10,000 m³ in Phase 1, to 40,000 m³ in Phase 2. The new transportation mode being devised with a view to improving fuel efficiency and promoting cleaner environment are carried out under the following projects: Natural Gas Vehicle Project and Hybrid Vehicle Project.

Financing: The Energy Conservation Promotion Fund is established under Thailand Energy Conservation Act of 1992, with the objective of providing support to those who wish to implement energy conservation activities. To raise initial working capital for the Fund, 1,500 million baht was transferred from the Petroleum Fund in 1992. At the end of fiscal year 1999 (30 September 1999), the Fund had accumulated capital of approximately 14,000 million baht. The principal objective of the Fund is to provide financial support to designated factories and buildings for investments in and operation of energy conservation programmes. At the same time, the Fund also supports other agencies that wish to undertake energy conservation, including activities related to renewable energy projects, energy-related research and development, public awareness campaigns, and the expenses for management and monitoring of the Energy Conservation Programme.

Cooperation: Thailand is involved in following other international/regional cooperation; Asia-Pacific Economic Cooperation Forum (APEC), Association of Southeast Asian Nations (ASEAN), Bangladesh-India-Myanmar-Sri Lanka-Thailand Economic Cooperation Forum (BIMST-EC) and Mekong River Commission (MRC).

CHAPTER 4: CHANGING CONSUMPTION PATTERNS - TRANSPORT

Decision-Making: The Ministry of Transport and Communications, Ministry of Interior, and the Office of the Prime Minister are responsible for making decisions in the management and improvement of the transport system. The National Economic and Social Development Board (NESDB) serves as the coordinator, facilitating cooperation among related ministries and agencies of the government to formulate policy or legislation concerning the national transport system. The land traffic management operations carried out by the Office of the Commission for the Management of Land Traffic (OCMLT), a policy and planning office, are aimed at traffic and road network management for effective usage. The development of high-quality public transport systems is emphasized. The principal legal instrument related to the highway system in Thailand is the Highway Act of 1992. Laws related to land transportation include the Automobile Act of 1979; the Land Transportation Act of 1979, revised in 1992; and, the Property Procurement for Public Transport Act of 1996. Laws dealing with aviation include the Air Navigation Act of 1954 and implementing regulations of the Civil Aviation Board. The Land Traffic Act was revised in 1992, and the Property Procurement for Public Transport Act was passed in 1996. Decision-making on transport issues in the past has been made by the central government. Under the new Thai Constitution, local governments are now authorized to make decisions to construct and maintain roads in municipalities and sub-districts. In the future, the Thai Cabinet will authorize local governments to formulate their own policies regarding the road system in their own sub-districts.

Programmes and Projects: OCMLT accomplishments include: Encouragement of car service provision for government officials, Planning of Road Traffic and Transport, Improving of Bus Road Network, Acquisition of more air-conditioned buses, Taxi system improvement project, Measures to reduce the number of certain types of vehicles, and Information Centre for Office Exchange Project.

Status: The Bangkok Metropolitan Region has the most urgent needs for an improved transport system. *Development of a Supplementary Mass Transit System:* The official master plan for the development of mass transit system for Bangkok indicated certain routes carrying 7,000 - 12,000 passengers per hour. This traffic volume was not sufficient to warrant inclusion in the primary mass transit system. Rather, there was a need for a supplementary mass transit system that would efficiently incorporate these secondary routes to create a comprehensive transport network. In October 1996, OCMLT hired a consultancy firm to assist in designing such a system for Bangkok. According to the firm's commendations, a supplementary mass transit system should be developed to incorporate five new routes.

Upgrading of vehicle fleet: Thailand's fleet of public buses have been upgraded significantly.

Capacity-Building, Education, Training and Awareness-Raising: The public is encouraged to use public transport and measures are introduced to reduce personal car usage. The most important aspect is educating the public and campaigning to instil a culture of orderly road usage for the benefits of the public.

Information: *Information Centre for Office Exchange Project:* From a Royal Initiative of His Majesty the King to reduce the travelling distance between home and office, government officials are now being offered an opportunity to choose an office nearer to their home by exchanging duties with other officials. An Information Centre for Office Exchange has been established in all ministries with Office of the Civil Service Commission compiling all information. The travelling by officials can be lowered to a certain extent.

Research and Technologies: *Research and Development in Renewable Energy:* Technical assessment of co-generation and waste fuel utilization between industries is underway at the Department of Energy Development and Promotion and the Thailand Institute for Scientific and Technological Research. The preliminary assessment indicates that various industries, particularly agro industries that generate a high volume of production waste that can be used as fuel sources for the co-generation systems. Such research results are being disseminated through the New and Renewable energy Program in which incentives are provided to organizations implementing the renewable energy pilot projects, energy conservation plans, and other related services.

Financing: In addition to budget funds, an initial budget of US\$0.75 million has been provided through the Energy Conservation Fund to improve energy efficiency in 150 establishments. The initial phase is expected to conservation energy equivalent to 16 million litres of crude oil. Thailand has developed several fiscal and financial policies to promote more sustainable patterns of consumption and production, with the ultimate objective of spurring efficient use of natural resources and protecting the environment. Because energy is the most fundamental input for all production and consumption needs, Thailand pushed forward aggressive policies to restrain energy consumption.

Cooperation: In 1994, OCMLT received funding from the Asian Development Bank to provide technical assistance to the Office of Mega projects. The purpose of the Mega project Technical Support was to coordinate the work of the transport mega projects that includes the electric train system and the expressway system and five other projects that have already been or are in the process of being approved. These projects are the Second Stage Expressway, the elevated Vibhavadi Rangsit Toll Road, Ram Inthra - At Narong Expressway, Rapid Transit System, Bangkok Train Transit and Elevated Road and the Third Stage Expressway.

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CHAPTER 5: DEMOGRAPHIC DYNAMICS AND SUSTAINABILITY

Decision-Making: The National Economic and Social Development Board (NESDB) and the Ministry of Public Health (MOPH) are most directly concerned with demographic issues in Thailand. NESDB and the Ministry of Science, Technology and Environment (MOSTE) are the principal government agencies responsible for the integration of all aspects of population, environment, and development. NESDB considers demographic trends when preparing five-year plans for sustainable social and economic development. Plans include policies to reduce population growth rates and manage geographic distribution. Thai plans recognize the critical importance of providing educational opportunities for women. MOPH is involved in providing family planning, and maternal and child health services. The National Commission on Women's Affairs, which reports directly to the Prime Minister, has introduced a Gender-Based Analysis Methodology, for use in sustainable development planning. NGOs are actively involved in family planning and developing public awareness programmes. The Population and Community Development Association, Planned Parenthood Association of Thailand, and other NGOs, work on population issues with strong governmental support. The Twenty Year Perspective Policies and Plans for the Developmental of Women (1992-2011) aims to involve women in decision making at all levels, and particularly in sustainable development, through three major initiatives: economic participation, social participation, and political and administrative participation.

Programmes and Projects: MOPH, working in conjunction with other organizations, implements programmes relevant to demographic change in the following areas: assessing the effects of demographic changes on development programmes; strengthening preventive and curative health facilities and services; information dissemination; and providing good-quality family planning services and family planning counselling and its integration in the reproductive health context. An assessment of changes in the age structure and its impact on the health care system has occurred. Consequently, health care policies and programmes have been formulated. For example, health insurance schemes covering all aspects of preventive, rehabilitative, and curative care services are provided, especially to low income groups, the elderly, children, the handicapped, and other underprivileged groups. Preventive health care programmes emphasizing reproductive health care have been launched. These programmes provide comprehensive health care, including pre-natal care; education and information on health and responsible parenthood; the opportunity for all women to breast-feed; health care for all children; and measures to reduce the risk of maternal and child mortality and morbidity.

Status: Health service facilities at all levels have been upgraded and improved in terms of their quality and efficiency. In Thailand, there are 9,239 Sub-district Health Centres (covering 99.4% of total sub-districts); 708 District Hospitals (covering 91.6% of total districts); 75 General Hospitals; and 17 Regional Hospitals and Medical Centres. In addition, there are hospitals for which other organizations are responsible, for example those of the Ministry of University Affairs, Ministry of Defense, and State Enterprises. Private hospitals provide about 19% of total public services in terms of the number of beds provided.

Capacity-Building, Education, Training and Awareness-Raising: Educational materials dealing with population and development are being developed through officials at the central and provincial levels of MOPH.

Information: The main organizations which disseminate information concerning demographic trends and health status to the public regularly include Mahidol University, Chulalongkorn University, and MOPH (website: www.moph.go.th).

Research and Technologies: No information available.

Financing: NGOs are working on population issues to receive financial support from the Government and international organizations. However, financial assistance from international agencies has decreased during the last few years.

Cooperation: Partners in Population and Development, a South-South Initiative, were created to coordinate a technical cooperation programme among 10 member countries, including training/study tours and technical assistance. In addition, several Thai and international non-governmental organizations are cooperating to disseminate family planning and quality of life materials throughout the country. The Population and Community Development Association (PDA) is a Thai NGO that has received international assistance and has been highly successful in implementing population control and poverty alleviation programs in Thailand.

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CHAPTER 6: PROTECTING AND PROMOTING HUMAN HEALTH

Decision-Making: The Ministry of Public Health (MOPH) coordinates human health protection with other organizations, such as the Ministry of Science, Technology and Environment (MOSTE). The Ministry of Interior, the Bangkok Metropolitan Administration, the Ministry of University Affairs, the Thai Red Cross Society, and NGOs provide services ranging from care and treatment, health promotion, disease prevention, and rehabilitative care. However, decision-making structures are decentralized in these areas. The major groups involved in health care include local authorities, health volunteers, under-privileged groups (for example, children, youth, elderly, and the poor), and private organizations.

Programmes and Projects: MOPH implements the following programmes in collaboration with other organizations: primary health care and health education; control of communicable diseases; health protection for high risk groups; health as quality of life; and health protection from environmental hazards. The Primary Health Care Programme was launched in 1977 as the main public health strategy to reach the goal of "Health for All by the Year 2000". The programme is based on community involvement, utilization of appropriate technology, intersectoral collaboration, and equity in the health system. The programme aims to satisfy basic community health needs for clean water, sanitation, adequate and balanced nutrition, food safety, and maternal and child health care. It works through village health volunteers and receives government support through health centres, district hospitals, and provincial health officials. The programme covers all villages and communities in rural, sub-urban, and urban areas. About 65,170 Community Primary Health Care Centres have been established and 719,500 Village Health Volunteers have been trained all over the country. In 1993, a set of practical and appropriate health indicators was developed to monitor the "Health for All" goal at the community level. So far, about 80% of communities have passed the minimum criteria. Thailand is expected to achieve the goal of "Health for All" by the Year 1999.

Programmes have been created to reduce environmental health risks from pollution and to promote environmental health protection. Activities include: advocacy among business owners, polluters, workers, consumers and people in general, through meetings, publications, mass media and special campaigns; revision, enactment and enforcement of legislation concerning environmental health by applying economic instruments in pollution control (for example, appropriate subsidies or charges); development of environmental health; surveillance programmes dealing with the quality of drinking water, surface water, and health; encouragement of control of water and air pollution, especially in large cities; establishment of occupational health programmes in both industrial and agricultural sectors to limit workers' exposure to health hazards; and lastly, implementation of the World Health Organization (WHO) Healthy Cities Programmes. All these approaches play a significant role in the Eighth National Economic and Social Development Plan. Government support gives top priority to health insurance programmes for lower income groups, children under 12, disabled persons, and the elderly. In addition, a programme to promote better health and quality of life of urban dwellers, especially under privileged groups, has been implemented. Intersectoral committees on pollution prevention and control at provincial levels have been established. Programmes to strengthen local authorities' capacity, especially in municipalities, were created to encourage community participation in supporting environmental health.

Status: Most childhood diseases that are vaccine preventable (poliomyelitis, tetanus, neonatorum) have declined dramatically during the past decades due to successful immunization programmes, while other communicable diseases (for example, diarrhoea, dengue fever/dengue hemorrhagic fever, and acute respiratory tract infection) are still common. The prevalence of adult diseases (for example, venereal diseases) has decreased due to a condom promotion programme. On the other hand, some diseases have re-emerged (for example, tuberculosis because of HIV/AIDS, and malaria and filariasis which foreign workers imported from endemic areas). Other diseases that need to be eradicated before the year 2000 include rabies and leprosy. HIV/AIDS is a serious problem to which the government has given top priority. MOPH, in conjunction with NGOs, has adjusted its strategies to prevent and control HIV/AIDS by focusing on strengthening individual and community capacity at all levels, especially in villages, to reduce the personal and social impacts of HIV. Emphasis is given to advocacy and information

dissemination in order to help people avoid risky behaviour, to reduce the number of new HIV infections, and to lower the prevalence of the disease in women and their offspring.

Capacity-Building, Education, Training and Awareness-Raising: No information available.

Information: No information available.

Research and Technologies: Related to AIDS, the government is working with hospital technicians to install blood quality standards and to meet the need for medical equipment at smaller hospitals throughout the country. Health service programs for laborers, environmental health monitoring, and private sector social welfare programs are being pursued in collaboration with the private sector. Recognizing the importance of indigenous knowledge, the government has initiated programs to provide health services using traditional medicines and is establishing a museum that focuses on traditional medical practices.

Financing: The central Government and all concerned agencies support regional and local organizations in the implementation of their activities by providing finance, technical assistance, equipment and training. Financial support is provided by the Government at central and local levels, the private sector, local authorities, NGOs, and international organizations.

Cooperation: International agency cooperation is active in the United Nations Environment Programme (UNEP) on Global Environment Monitoring Systems (GEMS), WHO on environmental health planning and the Healthy Cities Programme; the United Nations Children's Fund (UNICEF) in Children's programmes, and the United Nations Educational, Scientific and Cultural Organization (UNESCO) on environmental studies.

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CHAPTER 7: PROMOTING SUSTAINABLE HUMAN SETTLEMENT DEVELOPMENT

Decision-Making: Recognizing the importance of stable rural communities and the quality of rural environments for sustainable development, Thai officials continued to stress rural occupational and infrastructure development under the Eighth National Economic and Social Development Plan (1997-2001), a theme that is continued under the Ninth Plan (2002-2006).

Programmes and Projects: The protection of soil, land and water resources are being addressed also through activities to prevent river bank erosion, shore erosion in coastal areas, flood prevention, and the expansion of land tenure security. Sustainable agriculture systems will be introduced in highland areas and nation wide through demonstrations of “New Theory Agricultural Development.” Related to conserving the environment, special activities include support for programs in community health and the environment, indigenous environmental knowledge and technology development, and, solar power development. To help the poor, low income urban housing will be increased and the rural works generation fund is expanded to generate employment opportunities and sources of alternative income for rural people.

Status: Improved rural infrastructure in support of successful distribution and marketing of food and agricultural products is seen as critical to economic efficiency and competitiveness. Linkages to the broader regional, national, and global economies are essential. The aim is to support development of integrated, diversified, and competitive food systems, providing greater opportunities for rural communities to participate in national and global commercial activities. To this end, numerous special activities are being pursued related to all sectors of the economy. Thais prefer to live in detached houses (80.7 percent in 1996, down from 89.9 percent in 1976). However, town houses, apartments and row houses also were growing options for an increasing number of people living in urbanized areas.

Capacity-Building, Education, Training and Awareness-Raising: Throughout the 1980s and 1990s, millions of Thais travelled overseas. Workers from the poor and populous North and Northeast travelled to work overseas, much as they once migrated to work seasonally in Bangkok in the 1960s and 1970s. In addition, the significant increase in disposable income among urban and upper and middle income Thais during the 1990s, combined with improved air travel facilities, allowed more Thais to travel overseas. In the course of work and travel, they were able to observe the living conditions of others, primarily in more developed countries.

Information: No information available.

Research and Technologies: Research and development on construction standards are being undertaken and road safety standards are being established.

Financing: Investments include further development of water resources and improved management of those resources, canal cleaning, and the development of rural water supply systems. Urban and regional planning activities will be continued, as will rural road, bridge, and expressway construction. Self-help land settlements established in the 1960s and 1970s will continue to receive government administrative support. In support of the re-orientation of government planning and administration, several programs emphasize funding for the transfer of rural infrastructure components to local governments. Funding also is provided for area development linked to regional markets, including the Southern Seaboard Development Project, construction of a multipurpose pier, and development of sub-regional towns in the Mekong River Basin. Large investments also are being made in transportation infrastructure through the upgrading of rural roads passing through communities; construction of industrial and urban ring roads; and, roads to relieve traffic congestion. Additional investments are being made in the sustainable development and use of water resources; water resources development; accelerated water supply development; small-scale irrigation project development; river basin management; municipal water supply improvement; and, expansion of water supply systems in sanitary districts

CHAPTER 8: INTEGRATING ENVIRONMENT AND DEVELOPMENT IN DECISION-MAKING

Decision-Making: Thailand has established the National Economic and Social Development Board (NESDB), and the National Environmental Board (NEB) as National sustainable development coordination mechanisms. For over 40 years, the NESDB's mandate has been to supply social and economic data to Government, prepare draft comprehensive National Economic and Social Development Plans for Cabinet and Parliamentary approval (usually at 5-year intervals), evaluate progress compared with Plan targets, and undertake such special analyses as may be assigned to it from time to time. NEB's responsibilities are focused on improving environmental management within the larger framework of sustainable development drafted by NESDB; to submit policies and plans for enhancement and conservation of environment quality for Cabinet approval; to prescribe environmental quality standards; to consider and give approval to Changwat (provincial) Action Plans; to approve programmes to mitigate hazards caused by pollution; to specify measures to strengthen coordination among government agencies (and the private sector) concerning environmental quality, to submit periodic reports on environmental conditions to the Cabinet, and to perform other functions in support of sound environmental management policies. The Office of Environmental Policy and Planning (OEPP) is the agency responsible for Environmental Impact Assessment (EIA) development. The agency is currently working with the Asian Development Bank and other international agencies to strengthen the EIA practice and build capacity for the future assessment of work. NGOs are consulted regularly regarding environmental development policies even though they are not officially represented in the NESDB or NEB. These NGOs represent a wide cross-section of experts trained and experienced in social and economic affairs, community organizations, public health, policy analysis and governance. All major stakeholders are consulted and encouraged to participate in the EIA process.

Programmes and Projects: No information available.

Status: A number of international agreements have called for national strategies, plans and programmes in both sectoral and cross-sectoral areas. Laws and regulations are revised from time to time, reflecting, inter alia, a growing appreciation of sustainable development concerns. The main constraints to implementing international legal instruments related to sustainable development recently signed or ratified have been the lack of staff resources, technical expertise, time, and funding. Technologies to prevent and reduce waste and to improve efficiency in resource utilization are necessary. Clean and environmental-friendly technologies should be promoted along with the enhancement of human resource capacity. Coordination between related agencies, national, regional and local levels is also vital to the transfer of principles to plans and policies. Development of rapid and transparent information flows to the public and concerned parties is needed for policy and planning formulation process. There are also difficulties encountered in amending existing national legislation. However, the United Nations Development Programme (UNDP) and other agencies' expert assistance on specific issues, time-tested procedures for the Economic and Social Commission for Asia and the Pacific (ESCAP), and other UN consultations are perceived as very helpful.

Capacity-Building, Education, Training and Awareness-Raising: Capacity-building should provide the appropriate technological development at all levels. Research institutions, academia, the private sector and NGOs all contribute in the capacity building effort. At the national level, private sector organization and the public research institutions and academia play important role. At provincial or lower levels, NGOs, the public and the private sector are important in capacity-building. Thailand is now accelerating in building capacity to provincial and local administration especially the Sub-district Administration Organization in resource and environmental planning and management, along with the decentralization of resource management policies of the country.

Information: The Ministry of Agriculture and Cooperatives has established the Natural Resources and Biodiversity Institute to facilitate and coordinate the government initiatives at the national and international level on issues related to the conservation of natural resources and trade and environment. Significant emphasis is being placed on the review of laws in the agriculture sector to ensure that they conform to the 1997 Thai Constitution and are responsive to individual sectoral needs considering the impacts of globalization, trade liberalization, and a heightened level of environmental awareness among many consumers. The government also is supporting

establishment of a legal development institute for civil society organizations. Special attention is given to the protection of civil liberties, the extension of legal knowledge to rural areas, and the elaboration of a new body of constitutional law.

Research and Technologies: No information available.

Financing: Finance is an important factor related to the quality of EIA reports, and EIA consulting firms are usually selected on the basis of the lowest bidding price. Winning bids are quite low and do not allow for experienced experts to participate in preparing most reports.

Cooperation: Generally, the political implications of international agreements and other policy issues are dealt with through consultation among all groups of stakeholders and, following a national tradition, action is taken only after a consensus on major policy issues has been reached. EIA has been used as an integrative environmental management tool among countries. International cooperation such as expert assistance can help develop capacity in the area of EIA. Presently, Thailand cooperates with various institutes in developing countries to organize EIA-related training/workshops and to prepare technical guidelines.

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CHAPTER 9: PROTECTION OF THE ATMOSPHERE

Decision-Making: The Office of Environment Policy & Planning (OEPP) of the Ministry of Science, Technology & Environment (MOSTE) is primarily responsible for the protection of the atmosphere. Air pollution standards are reviewed continuously and are revised occasionally by the Pollution Control Department and the Ministry of Science Technology and Environment. The Hazardous Substances Control Division of the Department of Industrial Work of the Ministry of Industry is responsible for the control of chlorofluorocarbons (CFCs). The other offices involved in decision-making for protecting the atmosphere are: Department of Energy Development and Promotion of MOSTE, National Energy Policy Office and Office of the National Economic and Social Development Board under the Office of the Prime Minister. The DIW, the Pollution Control Department (PCD) and the Industrial Estates Authority of Thailand (IEAT) share responsibility for improving environmental practices, including pollution control, waste minimization, wastewater treatment, and toxic waste practices in all plants, especially those with ten or more workers. The Enhancement and Conservation of National Environmental Quality Act of 1992 stipulates provisions for several aspects of air pollution control, namely: Environmental Protection and Pollution Control. The Policy and Prospective Plan for Enhancement and Conservation of National Environmental Quality, 1997-2016, provides goals, policies, and implementation guidelines for addressing air pollution. Strategies and goals related to greenhouse gas emissions, terrestrial and marine resource development for greenhouse gases, substances that deplete the ozone layer, transboundary air pollution, and conserving and increasing greenhouse gas sinks are included in this and other policy documents. NGOs have carried out studies on the negative health effects resulting from air pollution. NGOs and the private sector have participated in efforts to strengthen the scientific basis for decision-making, promote sustainable development, and prevent stratospheric ozone depletion. Agencies involved include the Department of Industrial Works, United Nations Development Programme (UNDP), United Nations Environment Programme (UNEP), and the World Bank. In 1990, a National Committee on Climate Change was established to advise on matters concerning the UNFCCC and to recommend a national policy on climate change issues, comprised of representatives from relevant government agencies, experts from academic institutes and NGO representatives.

Programmes and Projects: As of December 1996, under UNEP, two projects have been completed, and under the World Bank, four solvent cleaning projects have received funding. Phase II of the domestic refrigerator projects have been submitted recently for consideration by the 21st Executive Committee. Implementation of high priority environmental projects to address air pollution include: Project for the Preparation of Measures and Directions in Prevention and Resolution of Air and Noise Pollution; Project for the Inspection and Monitoring of Air and Noise Pollution; Prescription and Improvement of Air and Noise Pollution Control Standards Project; and Preparation and Improvement of Air and Noise Pollution Data Base System Project. To accelerate reforestation and forest rehabilitation, the Government initiated a Reforestation Campaign to Commemorate the Royal Golden Jubilee of the Coronation of the King of Thailand that was celebrated beginning in 1994. The target for reforestation was 80,000 hectares at various sites including: along 50,000 km of roads and highways; schools; government offices; religious compounds; parks; recreation areas; riversides; around dams and reservoirs; and in degraded forests. A variety of measures and changes have been introduced to in Thailand in the following areas: in land-use practices with the aim of protecting the atmosphere; to prevent further depletion of the ozone layer; and to increase greenhouse gas sinks. Thailand's government has remained active in its efforts to curb the import of various ozone depleting substances (ODSs), such as CFCs and halon, according to the provisions of its Country Programme (an official phase out schedule for the country) as well as working to motivate industries to cooperate in the phasing out process.

Status: The general impact of atmospheric changes in Thailand on human health, settlements, ecosystems, and economic activities has been minimal. According to the Department of Energy Development and Promotion, the use of ozone depleting substances (ODS) in Thailand is declining. Thailand has made significant progress in phasing out ODS – between 1992 and 1997, imports dropped by more than half to 4,527 metric tons ODP (or 5,186 metric tons). Carbon dioxide emissions in Thailand have nearly doubled from 125 million tons in 1990 to about 232 million tons in 1996. Air pollution in Thailand is most sever in Bangkok Metropolitan Region. In order to conserve forest and protect biological diversity, Thailand has established a comprehensive protected areas system

covering a total area of 10.6 million hectares or 20.6 percent of the land area. At the national level, the early detection system and the capacity to predict climate changes and fluctuations are rated as "poor" and national level capacity-building and training to perform systematic observations and assessments is rated "adequate." In terms of transboundary atmospheric pollution, the country's capacity for observation, assessment, and research is rated as "poor," while its rating on information exchange is "good." Among the potential barriers to technology transfer in Thailand are the recent economic crisis and the lack of information networks.

Capacity-Building, Education, Training and Awareness-Raising: Public awareness on environmental issues such as climate change is raised through a systematic dissemination of information. There are government agencies that disseminate information on the issues to the public through different media including newspapers, radio, television, posters, and other means. A basic knowledge of natural resource and environmental issues is emphasized in the educational system. In addition, public awareness is enhanced through direct participation in natural resources conservation and environmental protection activities. Thailand encourages different parties, public and private, to actively participate in natural resources and environmental management, as well as in discussions and activities related to climate change. Thailand has also made strides towards increasing public awareness among industries. During Ozone Day, 16 September 1996, DIW organized a seminar in which industries were given the opportunity to learn about new alternatives to ODSs as well as share their experiences of changing to non-ODS technology. Public awareness on natural resources conservation and environment protection also has increased through the efforts of the private sector, such as voluntary programmes on green labelling and clean technology that have contributed indirectly to public education and awareness of natural resources and environmental issues. The Government has provided training opportunities in the area of transboundary atmospheric pollution control. Specific technology required to enhance the capacity of local institutions in Thailand include the following: development of local emission factors for inventory assessment in different sectors; skills in comprehensive vulnerability assessment; skills in choosing suitable mitigation and adaptation options; skills in dealing with CDM related issues; and skills in operating transferred technologies. The Ministry of Science, Technology, and Environment is presently cooperating with the Ministry of Education to further expand natural resources and environmental studies in the educational curricula at all levels. Twenty-one regional centres for environmental education have been established across the country to promote environmental education system. Additionally, NEPO, in cooperation with the Ministry of Education, has launched programmes for conserving energy and natural resources in schools to integrate energy saving and natural resources preservation awareness in the educational curricula. The Royal Thai Government has encouraged students to exchange experiences and information through an Internet website called School Net.

Information: The 1994 national inventory of greenhouse gases (GHGs) represents the second official inventory of GHGs in Thailand. The main constraints to developing a more accurate and reliable inventory of greenhouse gases in Thailand are the absence of local emission factors for the key sectors, such as agriculture, energy and forests, and the lack of sufficient data for inventory estimation. Due to the currently limited use of Internet facilities in Thailand, scientific data and information on the protection of the atmosphere and issues concerning climate changes are made available to potential users and decision makers at the national level through annual reports prepared by line agencies of the Ministry of Science, Technology, and Environment in document form. Inter-active database systems being developed that will make data available on the Internet. In addition, periodic evaluations and research reports are produced by concerned agencies and are made available to the public and relevant individuals at the national level. Data on Ambient Air Quality Standards and other related information for Thailand are available on the World Wide Web Site of the Department of Environmental Quality Promotion.

Research and Technologies: In 1991, the National Science and Technology Department Authority (NSTDA) was established with the mission of supporting research, development, and engineering in scientific and technological spheres. The NSTDA has three main goals: (i) to support public sector research, development and engineering projects; (ii) to support technological strengthening in the private sector, and (iii) to offer scholarships in the fields of science and technology for study abroad and locally. More than one billion baht was allocated to the NSTDA in 1996. Since UNCED in 1992, Thailand has been in the forefront of developing countries in climate change research. Since the early 1990, studies related to climate change impacts and greenhouse gases have been conducted by various research and academic institutes. Collaborative research has been organized to exchange knowledge and

experience on climate change issues. During the 7th Plan period, Thailand concentrated on strengthening local manpower in science and technology to support national development. The country also promoted the use of new technologies to increase industrial and agricultural productivity and used fiscal policy measures to promote environmentally friendly technologies. Total investment in the direct procurement of technology, machines, and equipment under the 7th National Plan was several billion baht[2]. Several Thai research and development organizations are supporting technology transfer and capacity building. The National Science and Technology Development Agency is an important promoter of research and development in the areas of engineering, science and technology that are critical to the country's development. The Environmental Research and Training Centre of the Department of Environmental Quality Promotion provides support for environmental training and promotes research related to climate change related. Other governmental and non-government research and development institutes concerned with various aspects of climate change issues include: the National Research Council, the National Research Fund, the Thailand Productivity Centre, and the Thailand Institute for Scientific and Technological Research. Thailand is funding the following research programmes aimed at promoting a better understanding of the processes and consequences of changes in the atmosphere.

Financing: Funds and equipment from the multilateral fund of the Montreal Protocol are channelled through implementing agencies such as the World Bank and UNDP. These funds and equipment are used to assist industries in Thailand to change to non-ODS technology. The percentage of the Thai Government budget for the Eighth National Economic and Social Development Plan (1997-2001) allocated to protection of the atmosphere is approximately three percent. In Thailand, NGOs that are registered with the Ministry of Science, Technology and Environment are eligible for financial support from the Environment Fund to pursue development activities. The Thai government has continuously encouraged NGOs to apply for support from the Fund to carry out natural resource and environmental development projects and activities.

Cooperation: Thailand has ratified the United Nations Framework Convention on Climate Change, the Montreal Protocol, the Vienna Convention, the London Amendment, the Copenhagen Amendment and the BASEL Convention. The Kyoto Protocol is under consideration. Bilateral and multilateral technical cooperation for climate change in Thailand began in the early 1990s. The Thai Government has not taken any initiative within the framework of the United Nations and its regional commissions to convene a regional conference on transportation and the environment, except for participating in a few seminars on "Vehicle Emission Control", sponsored by the World Bank. In the area of transboundary atmospheric pollution, regional, multilateral and bilateral agreements are being approved and discussed. United Nations bodies and intergovernmental organizations have participated in efforts to strengthen the scientific basis for decision making, promote sustainable development, prevent stratospheric ozone depletion, and reduce transboundary atmospheric pollution. There was a Trilateral Conference between the Department of Industrial Works (Thailand), the United States Environmental Protection Agency, and the Japanese Ministry of International Trade and Industry on CFCs. Thailand, as an Article 5 country under the Montreal Protocol, is eligible for assistance from the Multilateral Fund. Two implementing agencies, the World Bank and UNDP, work in Thailand to channel funds and equipment from the Multilateral Fund to industries in Thailand. The Global Environment Facility (GEF) is the principal source of multilateral funding used to address problems arising from climate change. The GEF has channelled financial support through the ADB, UNDP, UNEP or the World Bank.

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CHAPTER 10: INTEGRATED APPROACH TO THE PLANNING AND MANAGEMENT OF LAND RESOURCES

Decision-Making: The Ministry of Agriculture and Cooperatives (MOAC) established the Natural Resources and Biodiversity Institute in 1998 to serve as a mechanism to improve the administration and management of natural resources and terrestrial and marine biodiversity by MOAC through: closer collaboration on programme implementation among MOAC line agencies; formulation of natural resources and environmental management policies that are more responsive to local needs; and seeking to resolve constraints to policy implementation. In addition, the Office of the Land Development Committee, Department of Land Development, MOAC, serves as the secretariat to the National Land Development Committee that coordinates policy on the management of agricultural land and soils. It undertakes policy and plan review and formulates options for consideration of the National Land Development Committee. Coordination functions are undertaken by various national committees, namely: National Environment Board; National Agricultural Development Policy Committee; and, the National Economic and Social Development Board. The Land Development Act of 1983 sets out the terms and conditions for policy and planning of land utilization, and defines actions in relation to land census, land economics, and management of soils. The Act establishes a national Land Development Board, with the Minister of Agriculture and Cooperatives as Chairman. Sub-district (tambon) administrative organizations (TAO) have been established as corporate bodies at the grassroots level of local government. The TAO has a legal responsibility for formulating five-year development plans for the sub-district that are to include rehabilitation and conservation of natural resources and the environment. According to the 1954 Land Code, there are two major types of secure land documents. These correspond to the two phases of land acquisition, namely, legal possession and utilization. The law allows sale, mortgage, and other transfers utilizing these documents to record the transaction. Several documents are issued by various government agencies that confer some rights to land within the context of specific settlement or welfare programmes. In addition to the above documents, many farmers have tax certificates providing evidence that they have paid a land tax. The National Forest Reserves Act of 1964 restricts the transfer of forest to other uses. An act of parliament is required to degazette land for the land reform programme.

A National Policy on Integrated Land Management was last revised in 1997. The objectives of the policy are as follows: Effective use of land resources for various activities, based on their capacity and environmental conditions throughout the country; Conserve, rehabilitate, and develop degraded soils, and land, to be a resource base for sustainable development, by accelerating rehabilitation of infertile soils, and by mitigating soil erosion in coastal areas; Conserve and utilize areas containing unique ecosystems and geology, by maintaining the natural balance. The Office of Environmental Policy and Planning has developed policies and guidelines for the effective use of land resources for various activities, based on their capacity and environmental conditions. The "Policy and Prospective Plan for Enhancement and Conservation of National Environmental Quality, 1997-2016" aims to conserve and utilize areas containing unique ecosystems and geology by maintaining the natural balance. The Royal Forest Department operates a comprehensive protected areas system that aims to preserve biodiversity in Thailand. Plans for the expansion of human settlements are reviewed by provincial level land use and provincial development committees and municipal authorities, as well as town and country planning officials, for their impacts on landscape (open space); forest lands; wetlands; and, biological diversity in coastal areas. Provincial land use plans are reviewed and revised every 5 years by the Department of Town and Country Planning working in collaboration with provincial, district, sub-district, municipal, and sanitary district authorities, with the participation of provincial and sub-district administrative organizations and district councils. The principal mechanism used to facilitate the active involvement and participation of all concerned in decision-making on land use and management, the sub-district (tambon) administrative organization (TAO), involves, in particular, communities and people at the local level (including farmers, small-scale food producers, indigenous people, NGOs and women).

Programmes and Projects: Main activities in implementing the policy include projects such as: Natural Resources and Biodiversity Development Project, Capacity-building in the Water Sector, Sustainable Agricultural Development Project, Agricultural Policy Reform Programme, Rural Poverty Alleviation Programme: Capacity Strengthening for Sustainable Agriculture, and Agricultural Land Use Planning Project.

Status: The Thai Government has operated a land reform programme since 1975, to address the issue of forest reserve lands occupied by settlers as a result of population growth, expansion of rural communities, and the increase in demand for agricultural land. Since 1992 the Agricultural Land Reform Office (ALRO) has distributed 3.9 million hectares of land to 1.223 million farmers, granting them secure land tenure, and permanently removing this land from the forestry sector.

Capacity-Building, Education, Training and Awareness-Raising: The capacity of a variety of land and agriculture related agencies has been, currently is being, or will soon be strengthened to ensure the improvement of evaluation systems for land and land resources.

Information: The Department of Land Development maintains a computerized database of agricultural land use in Thailand, using satellite imagery and aerial photographs to monitor land use changes and vegetative cover. The National Research Council of Thailand also uses satellite imagery and aerial photographs to monitor land use changes and vegetative cover. Sufficient information on all aspects of land capability and suitability on a nation-wide scale is available through the Department of Land Development. Climatic and hydrological data is available from the Royal Irrigation Department. Information on agricultural inputs is available from the Office of Agricultural Economics and the Departments of Agriculture and Agricultural Extension. Data on land covered by human settlements is available from the Department of Town and Country Planning and the Department of Land. The information is disseminated through regional, provincial, and district level offices and centers of the respective agency. The Department of Agriculture and the Natural Resources and Biodiversity Institute of the Ministry of Agriculture and Cooperatives currently are implementing projects that will develop indicators for integrated land management and sustainable agricultural development linked to the sustainable use of land resources. This data is being incorporated into a central database and in the near future will be available through the web site of the Natural Resources and Biodiversity Institute of the Ministry of Agriculture and Cooperatives.

Research and Technologies: No information available.

Financing: The budget for sustainable land management is derived from the Thai Government.

Cooperation: No information available.

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CHAPTER 11: COMBATING DEFORESTATION

Decision-Making: The Thai Department of Land Development operates three offices that provide linkages between the national forest programme and integrated land management strategy and policy, namely: Office of the Land Development Committee, Office of Highland Development, and Office of Coastal Land Development. Organizations that provide effective coordination and facilitate the mechanisms to harmonize cross-sectoral policies related to forests include the Natural Resources and Biodiversity Institute of the Ministry of Agriculture and Cooperatives, and the Royal Forest Department. The Community Forestry Bill currently being considered by the Thai Council of State recognizes the right of communities to establish community forests on degraded forest lands; and the right of indigenous people to establish community forests in protected areas. The principal objectives of sustainable forest management in Thailand's 8th National Economic and Social Development Plan include: (i) to preserve and rehabilitate conservation forests to cover at least 25 percent of land area, and to maintain mangrove forests to be not less than 160,000 hectares; and, (ii) to promote and expand total forest cover to 40 percent of land area. The Thai Forestry Sector Master Plan was completed in 1991 and is under consideration by the Government. Thailand has a Statement of Forest Policy, that was approved by Cabinet in 1985, which promotes issues such as: forest management, use of wood energy as a substitute for fossil fuel, reforestation, and dealing with forest degradation. To achieve reforestation and forest rehabilitation targets, all logging concessions have been banned since 1989. No compensation is provided for forest owners who provide non-market environmental benefits to society by managing their forests sustainably. Thailand's Forest Plantation Act of 1992 provides incentives to owners of forest plantations in the form of facilitating the movement of logs in the country. The Thai Board of Investment also provides tax incentives to private sector firms undertaking environmental rehabilitation and restoration projects as part of an export oriented investment of any nature, not only wood and non-wood forest products.

Programmes and Projects: To accelerate reforestation and forest rehabilitation, the Government initiated a Reforestation Campaign to Commemorate the Royal Golden Jubilee of the Coronation of the King of Thailand that was celebrated beginning in 1994. The target for reforestation was 80,000 hectares at various sites including: along 50,000 km of roads and highways; schools; government offices; religious compounds; parks; recreation areas; riversides; around dams and reservoirs; and in degraded forests.

Status: The regions of Thailand that have experienced the highest rate of forest depletion have the highest incidence of poverty. Significant expansion of agriculture production for income generation has occurred on forest lands since 1960. As a result, biodiversity and land suitable for forestry have been removed from the forestry sector. The poor soils have resulted in significant incidence of marginal agriculture. In order to conserve forest and protect biological diversity, Thailand has established a comprehensive protected areas system covering a total area of 10.6 million hectares or 20.6 percent of the land area. Thailand does not recycle forest products on any significant scale.

Capacity-Building, Education, Training and Awareness-Raising: To accelerate reforestation and forest rehabilitation, the Government initiated a Reforestation Campaign to Commemorate the Royal Golden Jubilee of the Coronation of the King of Thailand that was celebrated beginning in 1994. The target for reforestation was 80,000 hectares at various sites including: along 50,000 km of roads and highways; schools; government offices; religious compounds; parks; recreation areas; riversides; around dams and reservoirs; and in degraded forests.

Information: Thailand has its own criteria and indicators for sustainable forest management. The indicator that may be useful in assessing progress towards sustainable forest management at the international level is that related to protecting remaining natural forest areas from encroachment. The Royal Forest Department prepares annual reports to the National Forest Policy Committee and the National Agricultural Policy Committee, that are made available to the FAO for reporting. The "Policy and Prospective Plan for Enhancement and Conservation of National Environmental Quality, 1997-2016" (prepared by the Office of Environmental Policy and Planning), and the 8th National Economic and Social Development Plan, establish goals, policies, and guidelines for implementation of forest resources management and the management of biodiversity in Thailand. The goals and targets established in these documents are used to monitor policy implementation. The Thai Ministry of Agriculture

(www.moac.go.th) has a website with links to the Royal Forest Department website (www.forest.go.th) that provides information on forest management in Thailand, including forest policies. Information booklets and other media formats are made available through district, provincial, and regional forestry offices throughout the country.

Research and Technologies: No information available.

Financing: No information available.

Cooperation: Thailand consistently attends meetings and collaborates in the programmes of the Inter-governmental Forum on Forestry and international conventions, as well as meetings of international organizations, multilateral institutions, and conferences of parties; namely: CBD, CITES, UNFCCC, CCD, UNESCO-MAB, ITTO, and World Heritage. The Royal Forest Department is seeking cooperation from developed countries to initiate a carbon sequestering programme through forest plantations.

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CHAPTER 12: MANAGING FRAGILE ECOSYSTEMS: COMBATING DESERTIFICATION AND DROUGHT

Decision-Making: Major groups involved in desertification issues include the Department of Land Development and the agricultural organization Volunteers for Land Conservation at the local level in villages.

Programmes and Projects: Thailand is conducting many programmes and activities that are in line with the objectives of the Desertification Convention. They include land use planning in several watershed areas, conservation of land and water programmes, the establishment of land development villages, etc. In addition, the Thai Government is implementing the following special programs:

1. Natural Resources and Biodiversity Development Project, Ministry of Agriculture and Cooperatives;
2. Restructuring of the Ministry of Agriculture and Cooperatives;
3. Capacity Strengthening in the Water Sector, Royal Irrigation Department, Ministry of Agriculture and Cooperatives; and, Office of the National Water Resources Committee, Office of the Prime Minister;
4. Sustainable Agricultural Development Project, Department of Agriculture, Ministry of Agriculture and Cooperatives;
5. Agricultural Policy Reform Program;
6. Natural Resources Management Program;
7. Coastal Habitats and Resources Management Project;
8. Rural Poverty Alleviation Program: Capacity Strengthening for Sustainable Agriculture;
9. Comprehensive Water Resources Development Strategy; and
10. Agricultural Land Use Planning Project

Status: The increasing frequency of droughts has prompted the Thai Government to make advance preparations to provide drought relief on a routine basis. These activities are carried out on an as-needed basis by the Ministry of Interior and the civic action arm of the Thai military. Further, the Ministry of Agriculture and Cooperatives has drought relief programs to accelerate recovery from drought periods, in addition to conducting extensive scientific research on producing artificial rain. Nearly every ministry of the Thai Government has emergency funds available to provide drought relief to affected people. In addition to normal preparations to relieve suffering during period of drought, the Thai Government supports special activities related to land development that focus on the rehabilitation of saline soils (mainly in northeastern Thailand) and acid soils (mainly in the central region).

Capacity-Building, Education, Training and Awareness-Raising: Capacity building and technology issues in Thailand include: land use planning, and land and water conservation. To achieve land use goals, the Thai Government has adopted the following measures:

- (i) Increase awareness of the value and usefulness of soil by extension and training programs and effective land use practices;
- (ii) Promote soil improvement and conservation of soil and water resources by using measures favourable to environmental quality enabling the sustainable use of soil and land;
- (iii) Formulate specific laws for land use zoning and controlling activities that may affect the soil resources; such as removing topsoil and sand mining; and effective enforcement of laws and regulations;
- (iv) Improve and establish mechanisms for effective administration and management that facilitate national control of land use;
- (v) Formulate guidelines for protection and solution of coastal erosion problems;
- (vi) Develop a systematic soils and land information network, as a support unit for administration and management policy and implementation levels;
- (vii) Encourage local administration units and community groups to participate in the administration and management of soil resources;
- (viii) Use economic incentives as a mechanism for promoting appropriate land use, based on potential and capacity;

- (ix) Develop public land and abandoned areas as deemed appropriate for the benefit of the community;
- (x) Designate fertile land and irrigated areas for protection as agricultural areas;
- (xi) Designate management guidelines for agricultural land in irrigated areas that conform to its land use and socio-economic capacities;
- (xii) Use legal and fiscal measures to preserve and protect fertile agricultural areas;
- (xiii) Prepare conservation and sustainable utilization management plans at all levels; and
- (xiv) Allow people to participate in implementation and to receive reasonable benefits from any development and utilization of unique ecosystems.

Information: The capacity of each of the following agencies has been / currently is being / will soon be strengthened to ensure the improvement of evaluation systems for land and land resources:

- Department of Land Development Department: Agricultural Land Use Planning Project;
- Office of Agricultural Economics: Strengthening for Natural Resource Policy and Management Project in the Office of Agricultural Economics, Ministry of Agriculture and Cooperatives;
- Agricultural Land Reform Office: Agricultural and Rural Development Project;
- Office of Environmental Policy and Planning: Monitoring, Analysis, and Evaluation of Provincial and Local Environmental Planning Project;
- Department of Environmental Quality Promotion: System Prototype for Information Dissemination; and
- Department of Land: Accelerated Land Titling Program

The Department of Land Development maintains a computerized database of agricultural land use in Thailand, using satellite imagery and aerial photographs to monitor land use changes and vegetative cover. The National Research Council of Thailand also uses satellite imagery and aerial photographs to monitor land use changes and vegetative cover.

Sufficient information on all aspects of land capability and suitability is available at a nation-wide scale is available through the Department of Land Development. Climatic and hydrological data is available from the Royal Irrigation Department. Information on agricultural inputs is available from the Office of Agricultural Economics and the Departments of Agriculture and Agricultural Extension. Data on land covered by human settlements is available from the Department of Town and Country Planning and the Department of Land. The information is disseminated through regional, provincial, and district level offices and centers of the respective agency. Potential users of land use data are required to make a formal written request to the appropriate agency responsible for the data being requested as follows: data on forest land use should be requested from the Royal Forest Department; data on agricultural land use should be requested from the Department of Land Development; agro-economic data related to cropping is available from the Office of Agricultural Economics; and data on forest land that has been allocated for agriculture is available from the Agricultural Land Reform Office; etc. This data is being inputted into a central database and in the near future will be available through the website of the Natural Resources and Biodiversity Institute of the Ministry of Agriculture and Cooperatives (www.moac.go.th)

Research and Technologies: No information available.

Financing: The budget for sustainable land management is derived from the Thai Government.

Cooperation: The International Convention to Combat Desertification in Countries Experiencing Drought and/or Desertification Particularly in Africa has not yet been signed by the Thai Government. The Government has designated representatives to participate in the various meetings of the Intergovernmental Negotiating Committee for the Desertification Convention. In terms of regional and international cooperation the following organizations assist Thailand in its efforts to combat desertification: the Japan International Cooperation Agency (JICA), the United Nations Food and Agriculture Organization (FAO), and the International Board of Soil Resources and Management (OSTROM IBSRAM).

CHAPTER 13: MANAGING FRAGILE ECOSYSTEMS: SUSTAINABLE MOUNTAIN DEVELOPMENT

Decision-Making: The Secretariat of the National Security Council and the Department of Land Development are responsible for the sustainable management of mountains in Thailand.

Programmes and Projects: Several Thai Government agencies operate programs that focus on highland development, giving special attention to agricultural development, particularly livestock, fisheries, and crops. These activities are linked to efforts to control soil erosion in occupied watersheds. In addition, government departments are providing educational and public health services to highland communities to improve the quality of life. Nearly all activities mentioned here have been initiated and are guided by the Royal Projects Office; namely, the Doi Kham Royal Highlands Project.

Status: The Department of Land Development reports that the highland area of Thailand is about 96.1 million rai, consisting of a Northern Part 54.0 million rai; a Middle Part 12.0 million rai; a Southern Part 14.6 million rai; a North Eastern Part 12.1 million rai; and an Eastern Part 3.4 million rai. Natural resource degradation and deforestation has had a very negative impact on the ecological balance. The population living in highland areas is about 850,000 persons distributed among 20 provinces. Highland communities are classified into four groups: registered community; unregistered community with the potential to be a registered community; unregistered community which cannot be a registered community; and special community.

Capacity-Building, Education, Training and Awareness-Raising: Capacity building and technology issues relate to land and water conservation systems in highland areas.

Information: No information available.

Research and Technologies: The Thai Government has long provided funds for highland agricultural research, extension, and development. Significant work also has been undertaken to control erosion in mountain areas that are occupied.

Financing: The financing of land management is derived from the Thai Government budget and donor sources.

Cooperation: International cooperation stems from the Association of South East Asia Nations (ASEAN) and bilateral activities with Burma, Cambodia, and Laos. Thailand receives aid from the Asia Development Bank (ADB) and Finland. For more than ten years (up to 1999) Thailand received technical assistance from the German Government through GTZ on the Thai-German Highland Development Program. In addition, directly related to the management of fragile mountain ecosystems, UNDP provided assistance to the Royal Forest Department, from 1986 to 1992 for the Reforestation of Denuded Forest Lands in Khao Kho Project, Phetchabun province.

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CHAPTER 14: PROMOTING SUSTAINABLE AGRICULTURE AND RURAL DEVELOPMENT

Decision-Making: The Community Development Department (CDD), Ministry of Interior, is responsible for improving the quality of life and environment of rural people to meet basic minimum needs by promoting participation in family and community development activities. The Department of Land Development is the principal Thai Government agency responsible for the rehabilitation of degraded lands. A national policy on sustainable agriculture and rural development, as well as on food security issues, was last revised in 1998. The Ministry of Agriculture and Cooperatives is executing economic policies adopted by the Thai Cabinet in 1998 to reduce poverty through agriculture and food security. Other policy recommendations include a Policy on Fertilizer and Agricultural Chemicals, and the development of agricultural potential in irrigation command areas. Under the Eighth National Social and Economic Development Plan, the Department of Land Development will undertake the following activities to promote sustainable agriculture between 1997-2001: land use planning, land and water conservation systems, Vertiver grass against erosion, cropping systems, integrated agricultural systems, selection of crop varieties tolerant of pest and soil, and tree conservation and forests expansion by growing new trees. In the next two years (1999-2001) the Ministry of Agriculture and Cooperatives is implementing an agriculture sector reform policy that requires a paradigm shift that will result in the implementation of measures that will lead to increases in equitable access to production-support services by the rural poor.

Programmes and Projects: In terms of environmental development, the CDD has 3 main programmes: Rural Infrastructure Development to build, maintain and use public properties; Environmental Development to encourage conservation of natural resources through non-formal education; and the Water Resource Utilization Promotion Project. In addition, through the Community Approach to the Natural Resources Management Project (CNM Project), the CDD has established a collaborative relationship with the Faculty of Social Administration, Thammasat University, a committee of community development experts from the University of Wisconsin-Madison in the United States, and The Royal Forest Department of the Ministry of Agriculture and Cooperatives. The CNM project received funding from the Ford Foundation. The project's goal is to encourage participation in natural resource management with an emphasis on community forests, the role of community development, workers, and the process of raising the level of local participation. The CDD encourages participation in the conservation, maintenance, and sustenance of nature and the environment through a joint effort of the government and private sector. Other projects of the Ministry of Agriculture and Cooperatives, and the Department of Agriculture include: promotion of crop diversification at the farm level and increasing non-farm employment opportunities in rural areas. The Natural Resources and Biodiversity Institute (NAREBI) of the Ministry of Agriculture and Cooperatives is operating a sustainable agricultural development program on a pilot basis at five locations in Thailand. The focus is on the application of participatory approaches to the management of natural resources upon which agricultural development is dependent. In addition, the Department of Agriculture recently completed implementation of a sustainable agricultural development project that focused on capacity building of government organizations, NGOs, and small farmers, to enhance agricultural sustainability. The main outputs were national and local networks among government offices, NGOs, and farmers; a database dedicated to sustainable agricultural development; awareness raising campaigns to promote sustainable agricultural development; on-farm oriented research activities; and trials of suitable holistic farming systems applying sustainable practices.

Status: According to the Thai Government's policy indicated in 8th National Plan (1997-2001), sustainable agriculture is practiced in an area of not less than 20 percent of Thailand's cultivable area (or 4 million hectares). Since the financial and economic crises of 1997, the rural sector has been coping with the impact of re-migration involving an estimated 1.2 million people, reduced remittances, and increased numbers of rural youth who would, in normal circumstances, have migrated out to urban centers. The result is that poverty in some rural areas is rapidly increasing - in aggregate from 11.4 percent in 1996 to 13 percent in the first quarter of 1998. Real wages have fallen by 13 percent since 1997, and seasonal unemployment has increased significantly.

Capacity-Building, Education, Training and Awareness-Raising: The Sustainable Agricultural Development Project of the Department of Agriculture promotes environmental awareness in rural areas, resulting in a correct and common understanding about sustainable agriculture. Extension services are provided to community-based

organizations and NGOs to develop small-scale irrigation systems with farmers; to encourage community irrigation systems; and, to examine systems for finding water for individual farms. The Royal Forest Department is receiving support to strengthen the capacity of forestry researchers to operate botanical gardens at sites in the country with unique flora, to ensure adequate protection for plant genetic resources.

Information: The Natural Resources and Biodiversity Institute of the Ministry of Agriculture and Cooperatives currently is designing a web page that will have links to natural resources and agriculture databases of the line agencies of the Ministry. At this time, the Ministry has an Internet web page (www.moac.go.th) with links to those line agencies that also have web pages. Indicators are currently being developed in Thailand. The Government has initiated the development of on-farm and off-farm programmes to collect and record indigenous knowledge. Weak institutional coordination is a major problem in implementation of sustainable agriculture measures. The principal information gap is that databases are not yet linked nor accessible to the general public.

Research and Technologies: The Ministry of Agriculture and Cooperatives is implementing a comprehensive sustainable agricultural development programme to implement integrated farm management technologies and practices. Sustainable agricultural development programmes have been initiated through 40 Agricultural Technology Transfer Centers throughout Thailand using the resources of the Department of Agricultural Extension, Department of Agriculture, Department of Land Development, and the Natural Resources and Biodiversity Institute, Ministry of Agriculture and Cooperatives. The Ministry of Agriculture and Cooperatives has completed a biodiversity assessment, with the assistance of UNDP, the World Bank, and the GEF; as well as created Biodiversity and Genetic Engineering and Biotechnology Institutes for protection and sustainability of genetic resources.

Financing: The Department's investment budget for the rehabilitation of degraded lands between 1993 and 1997 was approximately US\$183 million.

Cooperation: Since no early warning systems are in place to monitor food supply nor any national or regional institutions exist for an early warning system, the Thai Government is cooperating with ASEAN Member Countries to develop a regional system for monitoring the food security situation. Support is being made available from the following multilateral and bilateral agencies: UNDP, World Bank, Asian Development Bank, European Commission, AusAID, Organization for Economic Cooperation and Finance, Government of Denmark, Government of Japan, Government of Canada, Government of Germany, Food and Agriculture Organization.

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CHAPTER 15: CONSERVATION OF BIOLOGICAL DIVERSITY

Decision-Making: In accordance with the decision of the UNCED, the Royal Forest Department (RFD) has formed a committee to consider biological diversity issues. Currently, RFD is in the process of establishing an office to handle implementation in cooperation with the National Committee on the Convention on Biological Diversity which is the national biodiversity governing body under the National Environmental Board. The Department of Fisheries is responsible for aquatic fauna in Thai waters (including crocodiles). The Department of Fisheries has adequate capacity and technological inputs in regards to aquatic fauna. Traders, aquaculturists, and crocodile farmers are involved.

Programmes and Projects: The Department of Livestock Development (DLD) has continued to work on programmes for the conservation of indigenous animal genetic resources, which include endangered species.

Status: Thailand has a Biodiversity Action Plan, prepared by the Office of Environmental Policy and Planning, that serves as a guideline for Thai Government agencies for planning and budgeting. Thailand also includes the management of biodiversity in forest ecosystems as part of its “Policy and Prospective Plan for Enhancement and Conservation of National Environmental Quality, 1997-2016.” The Ministry of Agriculture and Cooperatives has established the Natural Resources and Biodiversity Institute to coordinate and facilitate biodiversity administration and management among its line agencies. The Royal Forest Department operates a comprehensive protected areas system that aims to preserve biodiversity in Thailand.

Capacity-Building, Education, Training and Awareness-Raising: In recognition of the need for more effective support to programs designed to preserve Thailand’s remaining biodiversity, the Ministry of Agriculture and Cooperatives recently established the Natural Resources and Biodiversity Institute, to monitor implementation of natural resources policies. The unit also serves as the Ministry’s focal point for information on natural resources and biodiversity, and formulates policy options on conservation and environmental issues related to trade in agricultural products and to the conservation of biodiversity. In addition, the government is pursuing several programs to institutionalize the management of natural resources using a basin approach, thus integrating the efforts of numerous agencies and ensuring participation by all key stakeholders.

Information: The Department of Land Development maintains a computerized database of agricultural land use in Thailand, using satellite imagery and aerial photographs to monitor land use changes and vegetative cover. The National Research Council of Thailand also uses satellite imagery and aerial photographs to monitor land use changes and vegetative cover. Sufficient information on all aspects of land capability and suitability is available at a nation-wide scale is available through the Department of Land Development. Climatic and hydrological data is available from the Royal Irrigation Department. Information on agricultural inputs is available from the Office of Agricultural Economics and the Departments of Agriculture and Agricultural Extension. Data on land covered by human settlements is available from the Department of Town and Country Planning and the Department of Land. The information is disseminated through regional, provincial, and district level offices and centers of the respective agency. Potential users of land use data are required to make a formal written request to the appropriate agency responsible for the data being requested as follows:

- data on forest land use should be requested from the Royal Forest Department;
- data on agricultural land use should be requested from the Department of Land Development;
- agro-economic data related to cropping is available from the Office of Agricultural Economics;
- data on forest land that has been allocated for agriculture is available from the Agricultural Land Reform Office; etc.

This data is being inputted into a central database and in the near future will be available through the website of the Natural Resources and Biodiversity Institute of the Ministry of Agriculture and Cooperatives (www.moac.go.th)

Research and Technologies: The DLD develops research programmes concentrating on these indigenous animal genetic resources by assigning the Animal Husbandry Division to research and monitor such species, aiming to

maintain pure line breeding and then utilize cross breeding to produce a sustainable herd. In terms of wildlife conservation under CITES, the Human Resources Institute (HRI) is cooperating with the Botany and Weed Science Division in identifying varieties of indigenous fruit crops and vegetable and medicinal plants. HRI also cooperates with the International Board for Plant Genetic Resources (IBPGR) in the collection of introduced varieties.

Financing: No information available.

Cooperation: The Convention on Biological Diversity was signed by Thailand in 1992. The Convention has not yet been ratified. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) was signed in 1975 and ratified in 1983.

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CHAPTERS 16 AND 34: ENVIRONMENTALLY SOUND MANAGEMENT OF BIOTECHNOLOGY AND TRANSFER OF ENVIRONMENTALLY SOUND TECHNOLOGY, COOPERATION AND CAPACITY-BUILDING

Decision-Making:

Technologies: The Department of Industrial Works (DIW), the Ministry of Industry, Pollution Control Department (PCD), the Office of Environment Policy and Planning, Ministry of Science, Technology and Environment are the primary national agencies promoting the transfer of environmentally sound technology. The Federation of Thai Industry and the Thailand Environment Institute are significant players in this process. The Ministry of Industry has established the National Accreditation Council. A subcommittee under the Council is responsible for International Standards Organization (ISO) 14000 issues. The Thai Industrial Standard Institute is the national body responsible for turning ISO 14000 into the Thai Standard, and acts as a certification body together with the Thailand Environment Institute. The Eighth National Economic and Social Development Plan (1997-2001) proposes the development of prototypes and commercial technology for waste disposal and green technologies to be applied to the production process. The Plan also promotes the analysis and evaluation of technology for appropriate environmental management especially in the agriculture, industrial and energy sector. There are incentives or economic instruments in effect to encourage the use of ESTs. These include The Environmental Fund; IFCT loans with low interest rate for the private sector to improve the environmental management system; Tax reductions for imported equipment that help protecting or controlling pollution, tax privilege in investment promotion, especially, for environmental conservation & rehabilitation activities; and Tax difference between leaded and un-leaded gasolines. With regard to legislation to protect Intellectual Property Rights (IPRs) the Ministry of Commerce has revised the Patent Acts that pertain to computer software and has upgraded the status of Patent Division under the Department of Commerce Registration to the Department of Intellectual Property.

Biotechnologies: The Department of Livestock Development (DLD) has continued to work on programmes for the conservation of indigenous animal genetic resources which include endangered species. The DLD is preparing to renew the Livestock Breeding Improvement Regulation to conserve and appropriately use indigenous and exogenous animal genetic resources.

Programmes and Projects:

Technologies: The private sector (business and civil society) is making certain efforts to promote the transfer of ESTs and cleaner production processes. For example, the Industrial Federation of Thailand, the Thailand Business Council for Sustainable Development and private companies such as the Petroleum Authority of Thailand, the Electricity Generating Authority of Thailand, and the Siam Cement Public Company Limited, have put effort into promoting cleaner production process. Joint venture companies and investment incentives are actively promoted to handle waste treatment. There are pilot projects for 20 factories to join the ISO 14000 certification scheme and many firms have already received ISO 14000 certificates. Regarding the development of basic criteria or general guidelines that may be useful in assessing technology options, the National Environmental Protection Office (NEPO) is undertaking a study of labelling and standard setting to conserve energy, which should become a basis of national policy.

Biotechnologies: No information available.

Status:

Technologies: No information available.

Biotechnologies: No information available.

Capacity-Building, Education, Training and Awareness-Raising:

Technologies: No information available.

Biotechnologies: No information available.

Information:

Technologies: Sources of information on environmentally sound technologies existing at the national level include the Asian Institute of Technology (AIT), the Federation of Thai Industries (FTI), Industrial Estates Authority of Thailand (IEAT), Industrial Finance Corporation of Thailand (IFCT), the DIW, the PCD, and trade missions attached to embassies. However, better access to e-mail sources of information at national levels and a central comprehensive and authoritative data bank or clearinghouse, which would include technological alternatives, is needed to improve the quality and accessibility of information on environmentally sound technologies.

Biotechnologies: No information available.

Research and Technologies:

Technologies: Numerous specialized research and development programs are being implemented in support of the Eighth Plan, including: plant material technology and biotechnology; materials technology; and, electronics and computer technology. A special Biological Pest Control Centre is being established to undertake research and development on non-toxic methods of agricultural pest control. In addition, a national GIS program continues to be operated, which is being enhanced with the implementation of a remote sensing project for management of natural resources.

Biotechnologies: The DLD develops research programmes concentrating on these indigenous animal genetic resources by assigning the Animal Husbandry Division to research and monitor such species, aiming to maintain pure line breeding and then utilize cross breeding to produce a sustainable herd. The National Genetic Engineering and Biotechnology Centre has supported public and private sector in R&D to promote sustainable development. Five main areas are emphasized: Plant biotechnology; Animal biotechnology; Biotechnology for rural and small farmer development; Biotechnology for sustainable development; and Biotechnology for health.

Financing:

Technologies: The Thai Government allocates budget funds on a routine basis for the general administration of several units that support scientists and technologists, namely: the Department of Science Services; the Thailand Institute for Technical and Scientific Research; and, the National Research Council of Thailand. In addition, centers are operated that provide science information services and nuclear science and technology information services. Research and development programs are supported for technology extension and for applications of science and technology for development.

Biotechnologies: The budget supporting the Eighth Plan provides funding for the Ministry of Science, Technology, and Environment to operate research and regulatory programs in biotechnology. In addition, the Department of Agriculture is implementing a program to conserve indigenous herbs, crops, and organic matter.

Cooperation:

Technologies: To enhance South-South cooperation, the Association of South East Asia Nations (ASEAN) has an active committee on science and technology, reflecting its interest in obtaining pollution control and other environmentally sound technologies. To increase the amount of foreign direct investment, IFCT manages external financing for the elimination of chlorofluorocarbons (CFCs). International agencies and foreign Governments provide both technical and financial assistance. To establish or strengthen environmentally sound technology centres, the United States Agency for International Development (USAID) has provided assistance to FTI and other agencies. The Asia Development Bank (ADB) is discussing the possibility of creating an industrial and wastewater treatment technology centre to be managed by PCD. The United Nations Environment Programme (UNEP), the United Nations Industrial Development Organization (UNIDO), the German Agency for Technical Cooperation (GTZ), Danish Cooperation for Environment and Development (DANCED), the Japan International Cooperation Agency (JICA), and APO support the technology transfer efforts of Thailand. Several countries are involved in technology exhibits at IEAT's headquarters. Demonstration projects on cleaner technology for electroplating, tanneries, palm oil, and tuna fish are carried out by DIW with the cooperation of APO, GTZ, and DANCED.

Biotechnologies: No information available.

CHAPTER 17: PROTECTION OF THE OCEANS, ALL KINDS OF SEAS, INCLUDING ENCLOSED AND SEMI-ENCLOSED SEAS, AND COASTAL AREAS AND THE PROTECTION, RATIONAL USE AND DEVELOPMENT OF THEIR LIVING RESOURCES

Decision-Making: In Thailand, different agencies are responsible for coastal zones under their own mandates. Integrated coastal zone management is generally coordinated by the Office of Environmental Policy and Planning. The National Environmental Board is the main body to determine the national coastal resource and environment policy. Other agencies playing major roles in coastal resource management include: the Pollution Control Department, the Harbor Department, the Department of Fisheries, the Royal Forestry Department, the Department of Local Administration, the City Planning Department, the Department of Industrial Work, and the Department of Environmental Quality Promotion. Thailand has established a National Committee on Sustainable Development of the Sea. Legislation affecting integrated coastal zone management and sustainable development includes: Fisheries Act 1994, National Marine Act 1961, Navigation in Thai Water Act 1961, Coastal Water Quality Standards, and Prohibition of certain types of fishing gear, among others. There is no specific national policy on oceans and seas. Policies for integrated coastal zone management and sustainable development are directed toward: fully protecting the remaining mangrove areas, marine environment protection, and conservation of marine living resources. In general, representatives of stakeholders have been nominated as committee members. Methods in place to encourage sustainable use and conservation of marine living resources include: control of fishing gear and vessels, improvement of licensing system, and periodical ban of fishing in the Gulf of Thailand, among others. The local communities are promoted to participate in the public hearing of any major development that potentially generates environmental impacts.

Programmes and Projects: Programme to install the artificial reefs along the twenty-three coastal provinces of Thailand, Programmes to install the floating anchor for boats in environmentally critical areas, Development of an Action Plan and Pollution Sources Control to Improve the Coastal Water Quality in the Gulf of Thailand and Andaman Coast and Development of a Mathematical Model for Predictions of the Movement of Oil Spills are relevant.

Status: The major current uses of the coastal areas in Thailand are fishing, aquaculture and tourism. The percentage of the economy contributed by fishing is about two percent of GDP. Shipping impacts on sustainable development mainly through improper waste management, especially in relation to the ship cleaning. Oil spills from ships also generate a major impact. In addition, there is conflict over land use in port development. Impacts from other coastal- and marine-based industries are several. Over-fishing deteriorates the fishery resources. Conversion of mangrove forest to shrimp farms affects the coastal resources. There is over-capacity utilization of tourism resources, especially in the coral reef areas, and improper management of pollution in the areas. Oil and gas operations and transportation increase the risk to the coastal and marine environment. Operational discharges from offshore oil, gas exploration and exploitation generate pollutants, which include oil produced in water, oil contaminated drill cuttings, production chemicals and other discharges and emissions. The primary sources of land-based pollution are domestic sources, industrial development areas and tourism areas, especially beach resorts and agriculture and aquaculture activities. There is also pollution from non-point sources, such as agriculture and urban runoff and coastal erosion. The primary sources of sea-based pollution are offshore oil and gas operations, wastes from maritime transportation, shipping, oil spills, dredging and the red tide and harmful algal bloom. One of the main constraints recently faced by Thailand is the economic crisis that accelerates resource exploitation, reduces budgets available for ocean and coastal resource management. The unilateral action in using environmental issues as trade barriers of developed countries also seriously affects the livelihoods of the small fishing households. Other constraints include: Some duplication of efforts undertaken by various government agencies involved; The limited human and financial resources to oversee the coastal areas of the length of 2600 kms; The lack of knowledge and skills of the multi-ecosystem of tropical zones.

Capacity-Building, Education, Training and Awareness-Raising: Programmes to educate policy-makers include seminars and study tours for new approaches in sustainable coastal management, such as the use of economic instruments, integrated coastal resource management, integrated watershed management. Capacity-building

training programmes for the local administration organizations are being implemented for preparing resource and environmental management plans. Support to the factories to adopt ISO 14000 has been provided with training, auditing, etc. Local communities are also trained by NGOs to enhance their capability in managing coastal resources in their areas. The Environmental Promotion Department regularly conducts campaigns for raising public awareness in protecting ocean and coastal resources. Similarly, the Fisheries Department also actively promotes the rehabilitation of fishery resources.

Information: National fishery statistics include the number of catch, types of vessels, fishing gear, number of fishing households, and registered vessels. Research works on sustainable fishing, fishing efforts, etc. Information on water quality is available in the coastal urban centers, coastal sea water quality, ocean pollution warning systems, etc. There are also statistics on oil spills in Thai waters. Thailand has national mineral statistics, mineral deposit mapping, and a master plan for national mineral resource management. With respect to critical uncertainties, Thailand maintains the following information: national GHG inventory for 1990 and mitigation policies to cope with climate change vulnerability and adaptation; and assessment of these uncertainties by the Meteorological Department. There is GIS on coastal areas, and it has been utilized in marine and coastal resource management and planning, such as Songkla Basin and Phanga Bay. The Department of Fisheries has recently begun to set up GIS to assist decision-makers and planners. The information is mainly used by the public agencies and academic institutes. Simple indicators have been recommended for use at the provincial level in the preparation of provincial environmental action plans. At the national level, the sustainable yield of fishery resources is estimated, while the Green Account of Gross National Product is being developed. Water quality standards of the seawater are also regularly monitored.

Research and Technologies: Basically, the lack of appropriate technology transfer is the major issue to impede the development of innovative approaches to sustainable coastal resource utilization. The proposed technology should be effective and suitable to the areas. It should be cost-effective and harmonized with the local government.

Financing: In general, activities are financed by the national budget. Some external assistance has been provided through research works under bilateral or multi-lateral programmes.

Cooperation: Thailand is a Party to several Conventions relevant to oceans and seas, including: Framework Convention on Climate Change; MARPOL; SEAPOL; CITES; CBD (to be signed); RAMSAR; The Convention Concerning the Protection of the World Cultural and Natural Heritage. Thailand is in the process of ratifying the Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and their Disposal, and it is in the process of being a Party to the following Conventions: the International Convention for Prevention of Pollution from Ships; the International Convention on Oil Pollution Preparedness Response and Cooperation; and the International Convention on Civil Liability. Thailand is also a member of or Party to the following: the ASEAN Working Group on ASEAN Seas and Marine Environment and the Sub-Committee on Marine Science; the Regional Programme on Prevention and Management of Marine Pollution in the East Asian Sea; The ASEAN Agreement on The Conservation of Nature and Natural Resources; Agreement on the Network of Aquaculture Centres in Asia and the Pacific; The Southeast Asian Fisheries Development Centre. Regional meetings and cooperation, such as ASEAN, APEC, and ESCAP, also provide opportunity to exchange experiences at the policy-making level.

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CHAPTER 18: PROTECTION OF THE QUALITY AND SUPPLY OF FRESHWATER RESOURCES: APPLICATION OF INTEGRATED APPROACHES TO THE DEVELOPMENT, MANAGEMENT AND USE OF WATER RESOURCES

Decision-Making: The National Water Resource Committee is the government body at the national level responsible for coordinating water resource management and development. There are also governmental bodies for coordination of water resource management and development and policy at sub-national levels. Some of these are the regional offices of ministries related to water resource management including the Royal Irrigation Department, the Department of Mineral Resources, the Department of Rural Development and the Department of Health. At the state or district level there are : Provincial Governor Offices, and Local Administration Offices and sub-district Administration Organizations at the local level. The grass-root subdistrict administration organization is responsible for the management of their local resources and environment, with the financial support from the government. The general legislation and regulatory framework for water management includes the Water Quality Criteria & Standard in Thailand, 1977; the Ground Water Act, 1977; the Public Health Act, 1992; and the Public Cleansing and Orderliness Act, 1992. The Public Irrigation Act, of 1939 covers the use of water in agriculture while the Industrial Effluent Standards, 1996, the Public Health Act, 1992 and the Public Cleansing and Orderliness Act 1992 cover its use by industry. The Housing Estates Effluent Standards, 1996, Building Effluent Standards, 1994, Public Health Act, 1992 and Public Cleansing and Orderliness Act 1992 cover the use of water by households. Based on the "Polluter Pays Principle", the command and control approach has been complemented by several tools including economic incentives such as taxes, low-interest loans from environmental funds. In terms of pricing policies, industrial or commercial sectors drawing water from irrigation canals and groundwater sources are charged a certain fee. A number of measures for protecting the quality and supply of freshwater resources in Thailand have been applied. They range from the acceleration of development and provision of water from suitable sources (that is, atmosphere, surface and underground) to the allocation and utilization of seasonally available water resources. The environmental policy and action plan in Thailand is formulated with active public participation through seminars/workshops. The annual provincial environmental action plans are prepared by the local administrators and proposed to the central government for budget approval.

Programmes and Projects: The Department of Medical Service and the Office of Permanent Secretary under Ministry of Public Health has individually introduced Public Hospitals' infectious Wastewater Treatment and Garbage Disposal programmes. Almost all hospitals under the Ministry of Public Health have their own hospital waste treatment facilities including wastewater treatment plants and incinerators for infectious solid waste. In the meantime, the Bangkok Metropolitan Administration (BMA) has also carried out the Central Community Wastewater Treatment and Garbage Disposal programmes together with Drainage System Projects under its Environmental Quality Control Action Plan. Furthermore, under Ministry of Science, Technology and Environment, the Office of Environmental Policy and Planning has also provided the financial support for Municipalities' projects on the Central Wastewater Treatment and Garbage Disposal System nation-wide via the annual budget for the project on Action Plan for Provincial Environmental Quality Rehabilitation as well as partly via the Environmental Fund while Pollution Control Department has established the similar characteristic projects in the Pollution Control Areas. The Eighth National Economic and Social Development Plan supports the establishment of comprehensive waste water treatment and disposal facilities for the joint use of communities and neighbouring provinces especially in the five provinces of the Bangkok Metropolitan Region, the coastal cities and tourist destinations. For the hazardous waste generated by industrial factories, Ministry of Industry is in charge of the treatment especially in the industrial estate zones operated by Industrial Estate Authority itself or by GENCO, the private company given the concession for the industrial hazardous waste treatment.

Status: In total 278,350 cubic metres of waste water are treated daily which equals the full capacity of wastewater treatment plants in Thailand; 90% of hospital wastewater all over Thailand is treated. It is intended that 100% of the public hospitals have waste water treatment facilities by the year 2001 and incinerators by the year 1999. Under the full capacity of treatment plants, about 8% of urban sewerage is treated. With regard to targets for water supply it is envisaged that 70% of all villages in the country will be supplied with rural pipe water systems by 2001. At this time already 95% of households in the country have and use sanitary latrines. Dams and reservoirs are being

expanded in geographically suitable areas so as to augment freshwater supplies. All large dams and reservoirs will go through EIA studies and public hearing process; Small and medium reservoir development is accelerated; Rehabilitation of existing irrigation system is conducted regularly; Small water ponds for farm use are developed with the new diversified farming system approach. The industrial sector consumes a large amount of freshwater, but at present, the main source is not from the public water supply. Many factories in and around Bangkok use a lot of groundwater although the government has discouraged the use of groundwater due to serious land subsidence problems. The availability of freshwater can thus be a constraint to industrial development in the future. Alternative sources of water supply and/or less water-consuming technology should be developed. At present, the Thai government promotes the private sector to provide water supply to industry. The fact that there are so many agencies involved in water resource consumption is a major constraint faced by the Government in reaching its objectives in water management. The lack of coordination between agencies making integrated water resource management a formidable task.

Capacity-Building, Education, Training and Awareness-Raising: With regard to educating the public in conservation and management of water resources the following activities are being undertaken: education campaigns in sources of water supply; promotion of the awareness of efficient use, avoidance of water pollution generation or destruction of watershed areas. Poster, booklet and brochure have been produced and disseminated to the public regularly.

Information: The standards used to measure water quality, include the following: Surface Water Quality Standard, Ground Water Quality Standard, Waste Water Quality Standard, Drinking Water Quality Standard; WHO Drinking Water Quality Criteria 1984; Criteria of Drinking Water Quality for Rural Areas in Thailand (Recommended by National Rural Water Supply Programme Executive Committee) 1988; Drinking Water in Sealed Container (Notification of the Ministry of Public Health No. 135) 1991. Information on water is regularly published in the respective agencies' statistical reports. The information is also open to public and can be requested. Information on wastewater and current important major resources development is available on the internet.

Research and Technologies: No information available.

Financing: Most water resource management and development in Thailand is funded locally or by loans from international financial institutions such as the World Bank and the Asian Development Bank. For the Royal Irrigation Department, for example, the current funding from external sources is less than 0.5% as compared with the annual expenditure of approximately 35,000 million baht.

Cooperation: Technical cooperation is provided through bilateral and multilateral cooperation from Japan, European countries, ESCAP and international organizations. Grants are provided through bilateral and multilateral cooperation and are mainly for the project feasibility stage, sometimes at the detailed design stage, and rarely at the construction stage. Loans are received from international financial organizations such as the World Bank, the Overseas Economic Cooperation Fund, KFW, etc. Thailand provides ODA to other countries, especially in the Indochina region. Activities include training, expert missions, equipment and others under various programmes including infrastructure, science and environment. The total value of ODA in the 1995 fiscal year was 292.7 million baht. With regard to regional cooperation Thailand currently takes part in the Mekong River Commission. It also has a bilateral agreement with Malaysia on the Improvement of the Golok River Mouth.

CHAPTER 19: ENVIRONMENTALLY SOUND MANAGEMENT OF TOXIC CHEMICALS, INCLUDING PREVENTION OF ILLEGAL INTERNATIONAL TRAFFIC IN TOXIC AND DANGEROUS PRODUCTS

Decision-Making: The Committee on Hazardous Substances has powers and duties to give opinions to the Minister of Industry or other responsible Ministers regarding the prescription of announcements. The Information Centre for Hazardous Substances was established in the Department of Industrial Works as a coordinating centre for all kinds of information relating to hazardous substances. Ministerial Announcements (1994,1995) under the provisions of the Hazardous Substance Act B.E 2535 (1992) are relevant to the management of toxic chemicals. The purpose of this act is to prevent, mitigate or arrest the dangers that could be inflicted upon persons, animals, plants, property or the environment, as well as consider international conventions and covenants. Toxic and dangerous products were declared hazardous substances in the Ministerial Announcements. The production, import, export or possession of any hazardous substance must be in compliance with control measures. Control measures are covered in section 20 of the Hazardous Substance Act. The Port Authority of Thailand has provided facilities and measures to comply with the safety standards of the International Maritime Organization. PAT has enforced laws, regulations, and announcements related to the safe handling and storage of dangerous goods within the port area.

Programmes and Projects: The UNDP funded *Program on Environment and Natural Resources Management* was implemented during the 1992-1997 period, to assist the Thai Government to implement programs and activities mandated by the National Environmental Quality Enhancement and Protection Act of 1992. Assistance was provided to the Ministry of Science, Technology and Environment (MOSTE), with the Office of Environmental Policy and Planning (OEPP) serving as Program Coordinator and a principal implementing agency. Among the projects funded by UNDP was the *Establishment of Information and Network System for Hazardous Substances and Waste Management* at the Pollution Control Department.

Status: Dangerous goods are ranked into 9 classes accordance to the IMDG Code. In 1995, 89.07% of class 4.2 and 7.46% of class 4.1 of a total of 723,523 metric tons passed through Bangkok Port; while 5.9% of class 1 and 7 and 94.1% of classes 2,3,4,5,6 and 9 of a total of 114,711 metric tons passed through Laem Chabang Port. The Bangkok Port, with an open storage area of 9,846 m², provides storage for dangerous cargoes and includes container box safety equipment. The Laem Chabang Port, a warehouse for the storage of dangerous cargoes with an area of 8,200 m², is under construction. It is expected be completed in June 1998.

Capacity-Building, Education, Training and Awareness-Raising: The Government believes that it cannot rate Thailand's capacity to control hazardous substances as "excellent" by world standards. However, the Government is proud of the fact that its capacity is rated "fair to excellent" among developing countries.

Information: *Establishment of Information and Network System for Hazardous Substances and Waste Management*: already being operated by the Pollution Control Department, that provides free information services to hospitals, fire police, industrial units and private transporters of hazardous substances. Website for the Pollution Control Department is: www.pcd.go.th

Research and Technologies: Specific actions have been taken in collaboration with the private sector to ensure the implementation and achievement of policy objectives. In particular, the Ministry of Industry has designated fourteen provinces with significant urbanization as areas in which hazardous materials cannot be used without prior authorization. Three private firms have been selected by the Ministry of Industry to construct facilities to treat and dispose of hazardous wastes, with two of the facilities being operational by 1998. Similarly, the Industrial Estate Authority of Thailand undertakes strict enforcement of regulations with factories using hazardous materials in industrial estates and requires all wastes to be treated at established facilities. In addition, the Pollution Control Department working in collaboration with the Ministry of Industry has established "principles for the treatment of hazardous wastes" for use by the private sector. The Pollution Control Department also has coordinated with other Thai Government agencies to formulate "guidelines for the management of used motor oil" for use by the private

sector. Further, the Bangkok Metropolitan Administration has established specific spaces for the disposal and treatment of hazardous wastes. All of these are routine activities of the agencies mentioned.

Financing: No information available.

Cooperation: The Association of South East Asia Nations (ASEAN) has sponsored a study on improving the handling of dangerous goods in ASEAN ports. The Swedish Government provided PAT with a grant to develop safety systems for the handling and storage of dangerous goods and for emergency preparedness. Regional cooperation has also taken place within the public sector.

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CHAPTERS 20 TO 22: ENVIRONMENTALLY SOUND MANAGEMENT OF HAZARDOUS, SOLID AND RADIOACTIVE WASTES

Decision-Making:

Hazardous wastes: The Ministry of Industry manages hazardous substances under the provisions of the Hazardous Substance Act BE 2535 (1992).

Solid wastes: The Environmental Quality Promotion Act, promulgated in 1992, has been the main framework for integrating Thailand's decentralized domestic waste management scheme into a more systematic approach. Several solid waste management regulations have been promulgated and waste disposal areas have been declared. Municipalities are encouraged to set up waste management action plans. Areas declared as environmental conservation or pollution control zones are being managed intensively. All hospitals have to separate contaminated wastes from domestic wastes and appropriate waste treatment facilities have been established.

Radioactive wastes: The management of radioactive waste in Thailand is the responsibility of the Office of Atomic Energy for Peace (OAEP). This agency is the functional arm of the Thai Atomic Energy Commission (Thai AEC), the policy-making organ of the Government of Thailand on nuclear energy. The Radioactive Waste Management Division (RWMD) serves as the National Waste Management Operating Organization of Thailand.

Programmes and Projects:

Hazardous wastes: General Environmental Conservation (GENCO) was organized in 1994 as Thailand's first industrial waste treatment facility. It began as a joint venture between the Ministry of Industry and a private group. It was listed on the Stock Exchange of Thailand in September 2000. GENCO was awarded contracts to manage two government waste treatment facilities in 1996, in addition to operating its own facility, using technology from the US-based firm, Waste Management International.

Solid wastes: In 1995, a public enterprise called the "Waste Water Management Organization" was established to run a comprehensive waste water management system in the Bangkok Metropolitan Region (BMR) and other areas designated by the Government. During the first half of the Seventh National Plan, Thailand finished constructing 40 projects, valued at more than 60 billion baht, for domestic waste water treatment plants in priority urban centers. By the year 1998, the BMR will be able to treat 50% of domestic wastewater, and other urban areas will be able to treat 25%. Investment in 45 hospital waste treatment plants is underway.

Radioactive wastes: No information available.

Status:

Hazardous wastes: Continuing industrial development has resulted in increasing industrial waste. The Ministry of Industry estimates that industrial waste grows by 12 percent annually. GENCO processes about 10 percent of that waste. The Ministry of Industry also operates waste treatment facilities in different regions of Thailand. The Ministry of Industry has designated fourteen provinces with significant urbanization as areas in which hazardous materials cannot be used without prior authorization. Three private firms have been selected by the Ministry of Industry to construct facilities to treat and dispose of hazardous wastes, with two of the facilities being operational by 1998. Similarly, the Industrial Estate Authority of Thailand undertakes strict enforcement of regulations with factories using hazardous materials in industrial estates and requires all wastes to be treated at established facilities. Thailand would like to address the need for further training in hazardous waste management. Thailand's capacity for hazardous waste disposal is approximately 100,000 tons/year. Relevant technology issues include physical treatment, chemical treatment, and landfills. The major hazardous waste groups are heavy metal sludge solids and oils. The total volume of hazardous waste produced annually from the industrial sector is estimated at 950,000 tons, of which about 530,000 tons can be treated. A total of 110,000 tons of infectious waste is generated annually, of which only 40,000 tons is burned in incinerators. Hazardous wastes from communities totalling about 360,000 tons per year is not properly collected and treated and are released into the environment with community solid waste. These wastes spread into the environment and impact on public health as well as degrade the ecosystem and natural landscapes. Facilities for the treatment and destruction of hazardous wastes from existing industries are inefficient. Mechanisms, standards, and practices for controls at all levels are not available at this time.

Solid wastes: Thailand has promoted solid waste management efficiency by improving existing solid waste management systems and promoting the private sector's involvement in solid waste management. The Bangkok

Metropolitan Administration (BMA) has expanded its organic fertilizer plant capacity and contracted the private sector to collect and sanitarily dump solid wastes.

Radioactive wastes: The radioactive waste produced in Thailand is categorized as low level waste and spent radiation sources. The emissions of the low level wastes are in the range of 3.7-37 Bq/l for liquid, and about background level to 20 microsievert per hour for solids. Conditioned waste drums have been kept in temporary storage at the present OAEP site. Since the main radioisotope users are from the medical sector, most Thai radioactive wastes originate from this quarter and are estimated to be 60% of the total volume of radioactive waste produced annually. Wastes from the agriculture and industrial sectors account for less than 5%. The remainder is generated by OAEP. Liquid wastes are predominantly aqueous solutions with low concentrations of salts and small amount of organic liquids. The quantity of untreated waste is approximately 200 cubic meters per year. Raw solid wastes constituting refuse or debris contaminated with radionuclides as well as biological waste are about 45 cubic meters per year. There is also a small volume of the spent radiation sources of Co-60, Kr-85, Sr-90, Cs-137 and Ra-226 sent to OAEP for further handling every year. For liquid waste, a chemical co-precipitation process has been employed. For solid waste after separation, the burnable waste is incinerated and non-burnable waste is packaged in a compactor. Treated waste such as resin is then transferred to a conditioning processor, using cement as a means of deactivation. The spent sealed radiation sources are kept in lead-shielding and packed in high-density concrete containers. The end product in the concrete container is kept in temporary storage at the OAEP site.

Capacity-Building, Education, Training and Awareness-Raising:

Hazardous wastes: During the year 2000, the Pollution Control Department conducted or cooperated with other agencies to arrange the training or workshop program on hazardous waste as follows:

- Training course on Hazardous Waste Manifest System on 14, 16, and 18 February 2000;
- In house training on Waste Management in the Laboratory in March 2000;
- Infectious Waste Management Workshop, 11-12 May 2000, with the Ministry of Public Health, Kenan Institute Asia, US-Asia Environmental Partnership, and the Institute of International Education; and
- Workshop on PCB Inventory and Management, 20 July 2000.

Solid wastes: No information available.

Radioactive wastes: No information available.

Information:

Hazardous wastes: The Pollution Control Department working in collaboration with the Ministry of Industry has established “principles for the treatment of hazardous wastes” for use by the private sector. The Pollution Control Department also has coordinated with other Thai Government agencies to formulate “guidelines for the management of used motor oil” for use by the private sector. Further, the Bangkok Metropolitan Administration has established specific spaces for the disposal and treatment of hazardous wastes.

Focal Point: Director-General, Pollution Control Department, Ministry of Science, Technology, and Environment, Phaholyothin Centre Building, 404 Phaholyothin Road, Phayathai, Bangkok 10400, Thailand; telephone: (66-02) 619-2200; fax: (66-02) 619-2297; email: mingquan.b@pcd.go.th

Competent Authority: Director-General, Department of Industrial Works, Ministry of Industry, 75/6 Rama VI Road, Ratchatewi, Bangkok 10400, Thailand; telephone: (66-02) 202-4228; fax: (66-02) 202-4015; email: basel@narai.diw.go.th

Solid wastes: No information available.

Radioactive wastes: No information available.

Research and Technologies:

Hazardous wastes: Technologies being used are from the US-based firm, Waste Management International. Fifty factories in five categories have introduced clean technologies and waste minimization methods in the following industries: plastics, food, electroplating, pulp and paper, and tanning.

Solid wastes: No information available.

Radioactive wastes: Through the Thai Government’s Office of Atomic Energy for Peace, routine activities supported through the budget include research and development of uses for nuclear energy; the development of nuclear inputs; and, research on radiation applications. The Thai Government is providing funding for the establishment of a centre for nuclear research and to expand research and development of rare elements.

Financing:

Hazardous wastes: Hazardous waste management is financed by The Royal Thai Government budget.

Economic Measures and Initiatives Offered by the Thai Government:

- Tax differentiation: different excise tax rates for recyclable batteries and unleaded gasoline;
- Tax exemption on equipment for the control, treatment or elimination of pollutants;
- Deposit refund system: bring back program for return of remains of products containing hazardous substances;
- Thai Environmental Fund is available for the establishment of environmentally sound activities; and
- Application of the Thai Green Label project for developing criteria for clean products or products that minimize waste.

Solid wastes: No information available.

Radioactive wastes: No information available.

Cooperation:

Hazardous wastes: The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal was signed by Thailand in 1990. The latest information provided to the Basel Convention Secretariat was in 1996. The Government participates in bilateral cooperation with France, England, and Finland. There is no regional cooperation in this area.

Solid wastes: No information available.

Radioactive wastes: Thailand receives assistance in the management of radioactive waste from the International Energy Agency (IAEA).

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CHAPTERS 24 TO 32: STRENGTHENING THE ROLE OF MAJOR GROUPS

Women: Decision-making: Gender integration is one of the prime objectives of the Thai Government in terms of human resource development and the enhancement of the role of major groups. In its Seventh National Plan, Thailand promoted the role of women in social and economic development through the improvement of laws and regulations. Policies to strengthen the role of women in sustainable development have been intensified in the Eight National Plan. Women's participation in decision making levels of the public and private sector has increased. In addition, Thai women in the public and private sector enjoy maternity leave with pay for 60 to 90 days; Capacity-Building, Education, Training and Awareness-Raising: Training has been regularly provided to rural women's groups to increase their ability to earn additional non-agricultural income.

Children and youth: Decision-making: Youth are ad hoc participants in national process related to sustainable development. The Department of Public Welfare provides useful services to improve children's growth, such as special courses for children who have low intelligence quotas. For environmental services, the Government provides environmental projects such as the Environmental Development Campus in order to let children understand and implement environmental conservation activities. Agenda 21 is consistent with the Children and Youth Development goals incorporated in the National Economic and Social Development Plan which aims to develop children and youth to their fullest potential. In this regard, children and youth will be the centre of national development policies. All sectors of society will play an active role; Status: Youth unemployment was 4,564,000 and 3,751,000 in 1992 and 1995 respectively; Capacity-Building, Education, Training and Awareness-Raising: The Government is committed to ensuring that by year 2000 more than 50% of youth, gender balanced, have access to appropriate secondary education or vocational training.

Indigenous people: Decision-making: Thailand has no indigenous people. Tribal groups are recent migrants into Thailand. At present, programmes for their development are included in the Master Plan of Environmental Community Development as well as drug control projects for mountainous areas. The objectives of these projects are to improve and manage permanent settlements to encourage Hilltribe participation in community development and national resource conservation. The people participate in operational planning and implementation at the local level. Thailand's experience has shown that tribal groups and their communities tend to protect their resources effectively when they realize the contribution of the resources to their livelihood, and vice versa. Thailand has increased the role of local communities in resource management in many ways. In many cases, the Government has issued regulations to safeguard resources for the benefit of local communities. The Government encourages NGOs to facilitate and support local communities in the management of resources. Capacity-Building, Education, Training and Awareness-Raising: The Government also provides training to local communities to optimize their resource utilization. Many of these groups are dependent on renewable resources and ecosystems to maintain their well being and have, evolved a holistic, traditional scientific knowledge of their land, natural resources, and environment. The Thai Government recognizes the unique contribution that these people can make to society and thus operates programs to facilitate their participation in shaping national laws and policies on the management of resources or other development processes that affect them.

Non-governmental organizations: Decision-making: In accordance with the Enhancement and Conservation of National Environmental Quality of 1992, NGOs that have legal status under Thai foreign law and are engaged in activities concerning environmental protection or natural resources conservation are entitled to register with the Ministry of Science, Technology and Environment. By the end of 1996, there were 65 NGOs registered, including 61 Thai and 4 international NGOs. Registered NGOs may request government assistance and support for their activities that are aimed at environmental protection and natural resource conservation. Mechanisms already exist to allow NGOs to participate in the conception, establishment, and evaluation of official mechanisms to review Agenda 21 implementation. Thailand expects to include major group representatives in its 1997 delegation to the Commission on Sustainable Development (CSD), and Habitat II. NGOs and other major groups have been represented in delegations to major conferences (for example, Rio, Cairo, Copenhagen, Beijing, and Istanbul;

Financing: The Department of Environmental Quality Promotion cooperates closely with a number of NGOs and educational institutions to support major groups. Specific disbursement amounts are not available at this time; **Cooperation:** Thailand also collaborates with international NGOs and other international organizations of major groups in national and regional sustainable development programmes such as the World Conservation Union (IUCN).

Local authorities: **Decision-Making:** The 1997 Thai Constitution provides for decentralization of public service functions to local governments to facilitate their delivery and to ensure that they are responsive to the needs of the community. The Ministry of Interior is implementing a major program to strengthen the capacity of local governments and local administration activities. The strengthening of provincial administrative organizations and municipal governments are included in this program. Major investments are being made in human resources development that include the accelerated training of local government personnel and the upgrading of their capacity to provide quality services to local citizens.

Workers and trade unions: **Decision-Making:** Labour Relations Law of Thailand has recognized the right of labour unions to organize and bargain collectively. So far, Thailand has established and promoted bipartite and tripartite bodies in dealing with safety, health, and sustainable development. Bipartite bodies are encouraged to be aware of and deal with working conditions and the environment, though collective agreements are mostly concerned with wages and the welfare benefits of workers. The government has implemented policies and taken measures to reduce occupational injuries and disease with a 2001 target of no more than 26 cases per thousand. Workers take part in National Agenda 21 discussions and implementation; **Cooperation:** Thailand has ratified two International Labour Organization (ILO) Conventions, excluding Conventions 87 and 98 on Freedom of Association and the Right to Organize.

Business and industry: **Decision-making:** There are government policies to increase the efficiency of resource use, including reuse, recycling, and reduction of waste per unit of economic output. Government policies requiring recycling are in place; **Programmes and Projects:** Among the first initiatives of the Federation of Thai Industries to promote sustainable development, was the launching of the Industrial Environmental Management Programme (currently named as IEM Office) in March 1990, under a cooperative agreement with the United States Agency for International Development (USAID). One of its major objectives was to provide technical assistance to industries in the areas of industrial pollution prevention and control, toxic and hazardous waste management, and worker health and safety. The core of the programme is the promotion of "clean technology" and effective environmental management in Thai industries. Two examples of projects under this programme are waste water treatment technology for Electroplating, and Wastewater Control and Minimization in Small and Medium Textile Dyeing and Finishing Industries; **Status:** Even though Thailand's economic growth has been rapid and moved the country away from poverty, environmental concerns still require the attention of domestic and international partners. A clear and consistent policy on pollution prevention and a positive regulatory climate may encourage more enterprises to implement pollution prevention; **Financing:** A Pollution Prevention Fund for small and medium scale industry is expected to serve as a catalyst for moving industry towards a more sustainable pattern of development.

Scientific and technological community: The Thai Government allocates budget funds on a routine basis for the general administration of several units that support scientists and technologists, namely: the Department of Science Services; the Thailand Institute for Technical and Scientific Research; and, the National Research Council of Thailand. In addition, centers are operated that provide science information services and nuclear science and technology information services. Research and development programs are supported for technology extension and for applications of science and technology for development. Increased funding for science and technology research and development has been provided through establishment of a National Research Fund and restructuring of the National Research Council of Thailand. The National Energy Policy Office also operates an energy fund that supports research in energy efficiency and aspects of renewable energy technology. Numerous specialized research and development programs are being implemented in support of the Eighth Plan, including: plant material technology and biotechnology; materials technology; and, electronics and computer technology. A special Biological Pest Control Center is being established to undertake research and development on non-toxic methods of agricultural pest control. In addition, a national GIS program continues to be operated, which is being enhanced

with the implementation of a remote sensing project for management of natural resources.

Farmers: The Ministry of Agriculture and Cooperatives has operated programs to strengthen the capacity of farmers to compete in world markets for several decades. These routine programs focus on agricultural development policy and planning; agricultural economics research, including domestic regional level research, and technical training for personnel. Related to soils and land, the Ministry of agriculture is supporting routine programs related to research on land and soils development; soils and fertilizer management; agricultural soils improvement; and, land reform. Related to research and development of agricultural products, the Ministry supports general agriculture research; agricultural pest control; livestock and livestock feeds research and development; fisheries research; and, plant material production. Agricultural extension programs are focused on horticulture, silk and para-rubber, including rubber replanting in southern and eastern Thailand; irrigated agricultural production; agricultural mechanization; livestock raising; and, fisheries. Agricultural support services include research on artificial rainmaking, a Royal Projects initiative; agricultural plant regulation and quarantine; agricultural information dissemination; promotion of agricultural occupational groups; livestock and fish export promotion; livestock breeding; and, agricultural cooperatives operations. Related to irrigated agriculture, the Ministry supports routine programs related to improving irrigation water quality and improving on-farm irrigation water delivery. In pursuit of making agricultural development more sustainable, and having learned lessons from several decades of accelerated commercialized agriculture, the Ministry of Agriculture and Cooperatives is supporting numerous programs to ensure that Thai agriculture remains competitive in world markets, while meeting immediate food security and income needs of rural communities. A major program is being implemented in compliance with the Eighth Plan that will restructure agricultural production in all sub-sectors. The “new theory” of agricultural development, a Royal Projects initiative, is being implemented as part of the sustainable agricultural development process. In addition, several research and development programs that will contribute to making agricultural development more sustainable include: research on artificial rainmaking; farming systems research; and increasing production efficiency and quality of agricultural products.

Assistance to vulnerable groups includes: support for poor farmers; natural disaster relief activities; and income generation in land reform areas. Special activities related to conservation and improved management of natural resources include:

- agricultural extension in highland areas;
- integrated agricultural research, extension and land development, a Royal Projects initiative;
- research on the reduced use of agricultural pesticides;
- agricultural products quality improvement;
- marine shrimp research and development;
- upland agricultural research; and,
- installation of piped water systems for irrigated agricultural development.

Ecosystem rehabilitation projects include:

- land rehabilitation on the Weeping Plains of northeast Thailand;
- coastal land use development;
- rehabilitation of abandoned shrimp ponds; and
- basin-level management for natural resources conservation in Pak Panang and Khon-Chi-Mun river basins.

Agricultural support services in support of sustainable agricultural development include:

- agricultural development information and coordination;
- promotion of farmer skills;
- support for farmer agricultural production plans;
- promotion of agribusiness activities;

- raising of bees and agricultural insects;
- pest control and development of crops for export;
- agricultural cooperatives marketing;
- quality certification of fisheries products;
- development and extension of plant material germination technologies; and
- pumped water for irrigated agricultural development

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CHAPTER 33: FINANCIAL RESOURCES AND MECHANISMS

Decision-Making: The Ministry of Finance has established a working group chaired by the financial advisor to study the environmental tax and related measures. The working group supports the use of taxes to protect the environment. In terms of new economic instruments, a 7-satang charge (equivalent to a small fraction of one US cent per litre) is levied on all petroleum products and made available to the Energy Conservation Fund. Other fees and pollution charges are under consideration. Regulations governing foreign direct investment in Thailand are governed by the Investment Promotion Act of 1977, amended in 1991. With regard to making foreign direct investment (FDI) more environmentally friendly, the investment promotion policy of the government requires investors to prepare measures and control their activities so as not to affect environmental quality (article 10, Investment Promotion Act, 1976). The Office of the Board of Investment offers incentives provided to foreign investors. Priority activities promoted by the Board of Investment include environmental protection and / or restoration.

Programmes and Projects: Over the period 1999 to 2001, the Ministry of Agriculture and Cooperatives is implementing an agriculture sector reform programme that supports pilot projects in which irrigation schemes are upgraded and cost recovery will be undertaken. The Department of Environmental Quality Promotion supports the provincial administrative organizations in formulating annual provincial Environmental Quality Development Plans. These are used to assist the grant programs of the Environment Fund as well as helping to guide provincial programming in these matters. The 117 registered Thai and foreign NGOs can then use these provincial development plans as part of their proposals for grants from the Environment Fund. Sub-district administrative organizations are being encouraged to prepare Environment Situation Reports. The Department is employing regional training institutions or technical colleges to monitor this process.

World Bank funds are being used to support the Social Fund Office of the Government Savings Bank (GSB). The Social Investment Fund (SIF) for rural activities is financed by a World Bank loan of US\$130 million through FY 2002. A similar SIF for urban development is financed by a World Bank loan of US\$30 million. Both are managed through the SIF Office of the GSB. The program operates through rural Social Capital and Social Reform activities via a network of 76 Provincial Offices. A similar program is supported by a Regional Urban Development Fund. A second loan from the World Bank for these two activities is now under negotiation. This program is making an effort to get community organizations to conform to provisions contained in the 1997 Constitution. By June 2001, the SIF had expended US\$69 million countrywide, on several thousand social investment projects planned and operated by community groups. There remains an unexpended balance of \$44 million. A further shift is now under preparation at national policy-planning levels and will apply, if adapted, to a “Civic Engagement for Empowerment in Thailand” scheme. The emphasis will be increasingly upon establishing self-sustaining community enterprises. Financing streams will be tied to the World Bank, and the various funds financed by the MOF including the new Village Fund. This would all be part of a “Thailand Plaza” civic-based National Empowerment Strategy with a much stronger focus upon creating viable village and community investment, savings and welfare fund activities. The Government Savings Bank, with the help of the Social Fund Office, is implementing a “four-step” program to assist communities and villages implement the Thai Government’s Village Fund Program, which provides US\$20,000 per village to support sustainable development activities.

In addition, the Ministry of Finance has established the Community Organization Development Fund and Institute (CODI) to build and support a network of community organizations and women’s groups in 19 provinces of northeastern Thailand, focusing on environment, small enterprise group loans, creation of village development funds, health programs, community profit-making enterprises, housing construction, reviving waterways, milk production, etc. It has 10,000 members in 19 provinces and plans to encourage their development in various kinds of self-help proposals. The program is funded through a series of Thai Government revolving funds, the World Bank Social Investment Fund (SIF), and an Elderly People’s Development Fund, totalling US\$82 million.

Status: At present, there is no specific environmental tax law, levies, or other charges. Thailand is working on streamlining the tax structure taking into account the environment. The case of leaded and unleaded gasoline is an example where tax differences are used to penalize those using leaded gasoline. Financing mechanisms used in Thailand to combat poverty include Funds under the Ministry of Finance, Ministry of Defense, Ministry of Agriculture and Cooperatives, the Government Savings Bank, and Ministry of Labor and Social Welfare.

Capacity-Building, Education, Training and Awareness-Raising: The Department of Environment Quality Promotion, Ministry of Science, Technology and Environment promotes public awareness of good environmental practices; develop human resources that can work on improving the environment; and developing an environmental data base for each province (43 completed and remainder to be finished in 3 years). It contains 19 layers of information helpful to planning/evaluation and is on web-sites. The Department offers training to the provincial and sub-district administrative organizations and municipalities, on solid waste management. Courses are offered 15 times a year lasting for 1 week, plus a study tour. There are 55/60 students in each class. They also operate 2-day seminars twice a year on environmental disaster problems. The seminars are focused on environment issues and they are generally attended by district chiefs and chairmen of sub-district administrative organizations. They also operate local campaigns with NGOs and sub-district administrative organizations on reforestation and climate change. They work with the Ministry of Education on creating Environmental Education Centers at the secondary school level. These have specific curricula for different areas, e.g. coastal zones, hill country, the northeastern area etc. There are now 33 Centers (one in each province) and all 75 provinces will be covered within the next 3 years.

The Thai Environmental Fund was established in 1992 with an initial capital of U.S.\$ 130,000,000, which has since been increased from time to time. Its objectives are promotion and conservation of the quality of the environment. This includes support to local administrations, state enterprises and the private sector by providing loans with a low interest rate. In particular, air pollution, wastewater and solid waste projects are preferred. The Fund also provides grant support to any NGO registered with the Ministry of Science, Technology and Environment that is concerned with the protection of the environment and conservation of natural resources or the promotion and protection of the quality of the environment. In the case of grants to NGOs the amount is not to exceed US\$ 110,000 per project and be not more than US\$2,200,000, covering a number of projects to a single NGO in one year.

Information: Information related to financing sustainable development is made available to potential users by the Office of the Board of Investment and Office of the Prime Minister. The Internet web site address for the Board of Investment is: www.boi.go.th.

Research and Technologies: The Thai Research Fund is one of several new autonomous public organizations. It is allocated approximately US\$80,000,000 annually to support activities in: agriculture, scientific, community, industrial, natural resources/development and foreign relations research and development. The fund supports a Community Research Program in 1996. It concentrates on supporting research and development for community strengthening. In this program, they do not just make grants, they manage the research. In so doing, they help to assure practicable quality in design and scheduling of the research and completion of a quality, useful and deliverable product.

Cooperation: After the United Nations Conference on Environment and Development (UNCED), the Royal Thai Government's Ministry of Finance and the Department of Technical and Economic Cooperation (DTEC) have agreed with the Asia Development Bank (ADB), the International Bank for Reconstruction (IBRD), the United Nations Development Programme (UNDP) and other development cooperation agencies to give priority to pollution control, natural resources management, urban improvement, and similar sustainable development projects. Thailand is a recipient country of Official Development Assistance (ODA). The ADB, the Canadian International Development Agency (CIDA), the German Agency for Technical Cooperation (GTZ), Danish Cooperation for Environment and Development (DANCED), UNDP, the United Nations Environment Programme (UNEP), and the World Bank are among the most active providers of sustainable development funding and technical advisory

services. This is only a partial listing since records are not yet well organized to distinguish different kinds of assistance.

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CHAPTER 35: SCIENCE FOR SUSTAINABLE DEVELOPMENT

Decision-Making: The National Science and Technology Development Agency facilitates dialogue among the scientific community, the Government and the Public. Related to the regulation of pollution and environmental management, the government allocates funds for the following activities:

- human resources development for pollution control and enforcement of pollution regulations;
- operation of regional environmental offices;
- administration of environmental quality control operations;
- development of environmental quality control measures in communities and specially designated areas;
- regulation of fisheries environment;
- prevention of toxic waste pollution; and,
- pollution control.

Programmes and Projects: A programme called "Science and Technology for Sustainable Rural Development" has been established to integrate the modern technology and indigenous local knowledge for sustainable rural development. The present goals of National Science and Technology Development Agency (NSTDA) are the three "I"s, that is, to Induce, Implement and Invest:

- NSTDA induces *RD&E* by giving support in three main areas, viz. : *biotechnology, metal and materials technology and electronics and computer technology*.
- Implementation involves in-house RD&E in these three areas, preferably on demand from industry and services to meet industry's needs.
- Investment is envisaged to include technology upgrading of the *private sector*, S & T commercialization and investment in *technology ventures*.

Four operational plans are laid out to meet the above goals:

- Administration, Planning and Information Development
- *S & T for Commercialization*
- *S & T for Innovation and Public Benefits*
- *Human Resource Development*.

NSTDA operates 3 national R&D centers:

- National Centre for Genetic Engineering and Biotechnology (BIOTEC)
- National Metal and Materials Technology Centre (MTEC)
- National Electronics and Computer Technology Centre (NECTEC)

NSTDA is engaged in several *major programs*:

Categorized by NSTDA as "strategically important", these programs strive to enhance the national technological strength (Science Park.); significantly contribute to human resources development and institutional strengthening (e.g., TGIST); or simply lead to the harnessing of appropriate S&T for most-needed economic and social benefits (Tropical Diseases Research).

Computational Science and Engineering Program: Computational Science and Engineering Program is an education program to promote and strengthen the teaching of the relatively new area called "Computational Science and Engineering" into Science or Engineering curriculum among Thai universities. Although the definitions of CSEP are different from place to place, in general they share the same understanding of using computers to analyze scientific problems. In 1996, the Computational Science and Engineering Programme Consortium was established as a cooperative effort among Thai universities and the National Science and Technology Development Agency (NSTDA). A group of people, mostly from academic area who frequently use computation resource as tools in doing their research in the Science and engineering has formed a special interest group called HPC-SIG.

Status: Computational Science is an emerging new area that brings computer and science together to a new frontier, with numerical computations and graphics visualization playing key role in scientific investigations. *Computational Science* is interdisciplinary. It uses the technology of the computer to study problems in mathematics, physics, chemistry, biology, other applied science and engineering fields.

Computational science techniques are used to simulate physical events and to process large amounts of generated or collected data. The use of simulation in research and development is now established as a third basic methodology of doing scientific research, in addition to theory and experiment. The importance of computer simulation is illustrated by the *grand challenge*, *new drug design* and *new product design* problems, whose solution is beneficial to society but will require vastly more powerful computers and more scientists in this field. While computer science departments have been well established with a relatively well defined curriculum in our universities for many years, computational science remains an emerging curriculum. For that reason, it requires the development of new courses not offered by traditional departments. The role of computer science departments to meet the requirements of computational science education is particularly critical.

Capacity-Building, Education, Training and Awareness-Raising: The Technical Information Access Centre (TIAC): Since 1989, TIAC serves the information needs of users from public and business sectors in the fields of science, technology, business and industry. It is recognized as a vital information service for those who need information in biotechnology, material sciences, electronic and computer technology, information technology, science and technology policy, and today's development as well as progress of science in the future.

Austrian-Thai Centre for Computer-Assisted Chemical Education and Research (ATC): Computational Chemistry was first introduced to Chulalongkorn University in 1983 through lectures given by Professor Dr. B.M. Rode within the university cooperation programme established in that year in the form of a partnership agreement between Chulalongkorn University and the University of Innsbruck in Austria. A programme of joint research was soon developed on a small scale within the given technical and computational possibilities, consisting of one terminal and access to the Chulalongkorn University computer. For larger computations, computer time was allocated at University of Innsbruck, and staff members of Chulalongkorn University worked in Austria on research stays or doctorate studies. These activities were subsidised by the Austrian Federal Government in the form of scholarships and a university cooperation budget, while Chulalongkorn University allocated the budget for visiting Austrian professors and researchers. Despite very limited facilities, the first research publications were submitted after a short time and were accepted by international journals.

A Computational Chemistry Unit Cell (CCUC) was founded at the faculty level and, as its success continued, it was upgraded to university level in 1988. Since its inception, the Computational Chemistry Unit Cell has taken on a number of responsibilities in teaching, research and workshops. Becoming a centre of attraction for students, CCUC served as host for several senior projects and master theses, which were all finalised in the form of one or more publications in international journals -- quite an unusual advance in standards when compared with other fields. As new staff members of Ph.D. level were also recruited to the Unit Cell, the number and quality of lectures and practical exercises offered in quantum chemistry and computational methods increased. These innovations, together with the widening of research fields, led to new demands for equipment and computational facilities, which were met through budget allocations from Chulalongkorn University as well as by further contributions from Austria. Research, initially centred on quantum chemical calculations of small molecular systems, soon advanced to the ab initio level and to the implementation of statistical mechanics methods such as Monte Carlo simulations and molecular dynamics. Finally, electronic structure/activity relationships of drugs was added to the subjects under investigation. When the forum of Theoretical Science (FTS) was established as a unit within the faculty of Science at Chulalongkorn University in 1987, CCUC took responsibility for the Chemistry Section of this Forum. The Chemistry Section of FTS was founded in July 1988. A small but powerful Austrian-Thai Centre for Computer-Assisted Chemical Education and Research was established based on the structure of CCUC.

Information: The results of research are disseminated to the public through seminars, science and technology fairs, newsletters etc.

Research and Technologies: In general, research in Thailand is conducted in public and private academic institutions as well as public research centers and is mainly funded by the government budget. Research on the management of natural resources and protection of the environment that is funded on a routine basis includes research on:

- coastal resources management and marine fisheries;

- river basin management;
- remote sensing applications;
- use of chemicals;
- industrial safety;
- livestock health research;
- applications of nuclear energy; and
- development of nuclear material.

Scientific research support services for which budget funds are allocated include:

- testing and certification of standards and technologies;
- university-based research on science and technology;
- dissemination and promotion of scientific research results;
- international coordination for scientific research; and
- weather investigations.

Research applications include:

- artificial insemination;
- prevention of toxic chemical pollution; and
- human resource development in environmental sciences.

Financing: Funds have been allocated for environmental rehabilitation in environmentally protected areas and environmental conservation areas. Further, the budget provides funds for the application of advance warning technologies to enhance weather forecasting capabilities.

Cooperation: The Government of Austria is supporting the Centre for Computer-Assisted Chemical Education and Research (ATC) at Chulalongkorn University in Bangkok.

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CHAPTER 36: PROMOTING EDUCATION, PUBLIC AWARENESS AND TRAINING

Decision-Making: The Department of Environmental Quality Promotion (DEQP), the Ministry of Science Technology and Environment (MOSTE), and the Ministry of Education, all full members of the National Coordinating Body for Sustainable Development jointly prepared The National Education Plan (1997-2001). In addition, the Department of Environmental Quality Promotion is preparing a national plan on environmental education to be submitted to the National Environment Board. In the meantime, the Departments of Curriculum and Instruction (Ministry of Education) cooperate with DEQP/MOSTE to ensure that environmental topics and sustainable development concepts are included in national curricula at all school levels. MOSTE regularly conducts environmental training for various agencies. There is a single national curriculum which has been reviewed to address environment and development as a cross-cutting issue in vocational schools and at college and university levels utilizing a combination of printed material, audio visual tools, special classes, workshops and seminars. A network of environmental educators from both government and non-governmental organizations is being established. The Asian Institute of Technology, Ministry of Interior, and provincial development offices organize workshops to promote local and grass roots level participation.

Programmes and Projects: Cooperative efforts exist between the public and private sector to provide environmental education. The Good Morning Project involves cooperation between the Ministry of Education, the National Energy Policy Office and the Thailand Environment Institute to develop education in energy and environment conservation at primary and secondary school levels. The Wildlife Fund Foundation of Thailand and the Office of the National Primary School Committee conducted a project called "Green School" as a demonstration project to develop and promote environmental management and conservation habits among national youth. Programmes have been reoriented to foster full understanding of sustainable development policies. The Ministry of Education has trained teachers, administrators, educational planners, and non-formal educators through inviting experts, arranging workshops, and undertaking field studies. Several agencies have organized projects/campaigns, through different media, exhibitions, posters, etc., which are geared towards raising public awareness. For instance, in the Thai Environmental Day 1997, radio and television spots were used to promote environmental awareness. An example of innovative education and public awareness activities related to sustainable development is a Management of Science and Environment course in Hard Amra Aksornluckvittaya, Amphoe Muang Changwat Samutprakan searching for options and solutions and preparing work plans for action. As a result, teachers and students replanted the mangroves in the Asokaram temple and used the area as a study site. Another example is a workshop held to adapt for Thai teachers, teaching materials for sustainable education prepared by UNESCO-ACEID.

Thai business leaders have taken an active interest in participating in the global efforts to participate in the sustainable development process. To this end, the Thailand Business Council for Sustainable Development (TBCSD) was established in 1993 by a group of leading figures in the Thai business community. The TBCSD is a non-profit organization that promotes sustainable development through business leadership. In the capacity of Secretariat to the TBCSD, the Thailand Environment Institute (TEI) works closely with TBCSD members and counterparts to implement TBCSD initiated projects.

The objectives of the TBCSD include:

- to promote the concept of "Sustainable Development" amongst business leaders;
- to disseminate information on sound environmental practices to the business community and the general public;
- to encourage the business community to adopt a leading role in preventing and solving environmental problems; and
- to promote the spirit of corporate citizenship in enhancing the quality of the environment.

Among the projects the TBCSD has completed in recent years are the following:

- *TBCSD Guidelines for Sustainable Development:* This project promoted the concept and practice of sustainable development among the business community in Thailand by encouraging the private sector to adopt a proactive role towards society and the environment.

- *Pesticide-Free Agricultural Villages*: This project aimed to decrease the use of chemical pesticides in agricultural villages while promoting the use of natural products and other alternative methods to control insects and pests, and to improve the sustainability of pesticide-free produce.

Presently the TBCSD is implementing the following programs:

- *Green Labelling*: This project aims at providing reliable guidelines to distinguish genuine environmentally friendly products, to encourage the production of green products using clean technology, energy conservation and recycling, as well as to promote environmental awareness amongst manufactures and consumers;
- *Pilot Project for Implementation of ISO 14000 and Sequential Training of ISO 14000*: These projects aims to promote the adoption of the ISO series prior to the official launch in an effort to reap the benefits of proactive management and support the goal of sustainable development, and to encourage TBCSD members to become leaders in the implementation of ISO 14001.
- *Environmental Conservation Circle (EEC)*: This project aimed to benefit from the Quality Control Circle (QCC) principles for creating environmental awareness in the private sector , to foster a change in employee attitudes and practices towards environmental conservation, and to promote environmental consciousness and concern for future generations through group dynamics and worker participation;
- *Coal and its Impact on the Environment*: This study analyzed current and future trends of coal production and consumption, coal's impact on the environment and environmental protection through the use of control technologies.
- *Renovation of Khlong Lod*: In conjunction with the Bangkok Metropolitan Authority (BMA), the project aims to improve both the environment and the landscape surrounding this important historical canal, as well as to raise the level of environmental awareness amongst local residents and the general public.
- *Promotion of the Preservation and Development of the Historical City of Ayutthaya*: This project aims to facilitate the implementation of the Fine Arts Department's master plan to preserve and restore the historical city.
- *TBCSD Public Relations*: This project aims to develop a positive corporate environmental image of the participating business leaders who have initiated concerted efforts to protect the environment through raising environmental awareness amongst the general public, in addition to informing others about TBCSD activities and achievements.

Status: In Thailand, primary school (grades 1 to 6) is compulsory and free of charge for all Thais. At present, the government has a policy to extend compulsory education to 12 years to cover the secondary level. The government also provides 30 schools to the rural poor in remote areas under the responsibility of the Special Education Division, of the Ministry of Education. In addition, informal education from primary to vocational level is also provided. Courses in informal education are prepared to suit the local conditions with the basic objectives of promoting quality of life. The Thai Government provides routine funding for a comprehensive educational program at the primary, secondary, and tertiary levels. The budget allocates funds for education in science and technology at the university level, as well as for vocational, technical and non-formal education at the secondary level. Other routine educational curriculums include studies in the following:

- | | |
|---------------------------|-------------------|
| ▪ Industrial engineering | ▪ Technology |
| ▪ Agricultural technology | ▪ Science |
| ▪ Handicrafts | ▪ Art and culture |
| ▪ Tourism | ▪ Health |

Information: Thai schools and Ministries also make increasing use of the Internet, management information systems (MIS), geographic information systems (GIS), and other computer-based data networks. On a regional basis, the government is establishing a Mekong Environmental Data Network to facilitate the exchange of technical information and the dissemination of technologies appropriate for countries in the Mekong River basin.

Research and Technologies: Funds are made available in the government budget on a routine basis to support scientific research, to promote research in science and technology, and to disseminate the results of research and

development of appropriate technologies. The government also allocates a budget for the promotion, use, and upgrading of computer systems for research purposes. In addition, the government budget allocates funds for research and development of new agricultural technologies on a regular basis. Approximate percentage of budget: 2.48 percent. The transfer of technology is a high priority for the Thai Government, in its efforts to ensure that Thai products are competitive in world markets and that quality standards are maintained. Several centers and institutes are being established by the government to strengthen the capacity of public sector agencies to transfer technology, namely: a science and technology development park; industrial technology research and development centre; and a biotechnology research and development unit that concentrates on the improvement and replication of plant material. The Thai Research Fund operates to finance specialized research on high priority technologies for immediate application in the industrial, agricultural, or manufacturing sectors. Support is being received from the Japanese Government for the Thai-Japan Technology Transfer Project, focusing on research and development of appropriate industrial, manufacturing, and agricultural technologies

Financing: Funds have been allocated for education via radio; promotion and dissemination of issues related to intellectual property rights (IPR); and, the conservation and development of tourist sites. In addition to the comprehensive routine educational program, the budget allocates funds to support scholarships for Thai students following science and technology curriculums. A significant portion of the funds allocated for environmental science education is aimed at youth and students, namely: a youth focused environmental information program; nature studies; promotion of natural science education; environmental education; and the establishment of libraries and knowledge networks throughout the country, as well as support for regional vocational technical institutes. Environmental issues in fragile ecosystems also are addressed through programs that support the education of people living in highland areas; and funds for a mountain community education program. In addition, funding is provided for an elephant conservation centre.

Cooperation: Assistance is being received from the Government of Japan and the German Government.

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CHAPTER 37: NATIONAL MECHANISMS AND INTERNATIONAL COOPERATION FOR CAPACITY-BUILDING IN DEVELOPING COUNTRIES

This issue has been covered either under Chapter 2 or under the heading **Cooperation** in the various chapters of this Profile.

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CHAPTER 38: INTERNATIONAL INSTITUTIONAL ARRANGEMENTS

This issue deals mainly with activities undertaken by the UN System.

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CHAPTER 39: INTERNATIONAL LEGAL INSTRUMENTS AND MECHANISMS

This issue has been covered under **Cooperation** in the various chapters of this Profile. However, you will find below a list of International Legal Instruments.

International Convention for the Prevention of Pollution of the Sea by Oil, London, 1954 (as amended on 11 April 1962 and 21 October 1969); Agreement Concerning Cooperation in Marine Fishing, Warsaw, 1962; International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (as amended), Brussels, 1971; Convention Concerning the Protection of the World Cultural and Natural Heritage, Paris, 1972; Convention Concerning the Protection of Workers Against Occupational Hazards in the Working Environment Due to Air Pollution, Noise and Vibration, Geneva, 1977; Convention on the Conservation of European Wildlife and Natural Habitats, Berne, 1979; Protocol for the Conservation and Management of the Protected Marine and Coastal Areas of the South-East Pacific, Paipa, 1989; Association of South East Asian Nations (ASEAN) Agreement on the Conservation of Nature and Natural Resources, Kuala Lumpur, 1985; Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention, Vienna, 1988; Agreement on the Network of Aquaculture Centres in Asia and the Pacific, Bangkok 1988; Convention Concerning Safety in the Use of Chemicals at Work, Geneva, 1990; Convention on Environmental Impact Assessment in a Transboundary Context, Espoo, 1991; United Nations Framework Convention on Climate Change, New York, 1992; Montreal Protocol on Substances that Deplete the Ozone Layer, Montreal, 1987; Convention Concerning Occupational Health Services, Geneva, 1985; Agreement on the Action Plan for the Environmentally Sound Management of the Common Zambezi River System, Harare, 1987; Convention on the Regulation of Antarctic Mineral Resource Activities, Wellington, 1988; Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, Basel, 1989; Convention on the Prohibition of Fishing with Long Drift Nets in the South Pacific, Wellington, 1989; Convention on Civil Liability for Damage Caused During Carriage of Dangerous Goods by Road, Rail and Inland Navigation Vessels, Geneva, 1989; International Convention on Salvage, London,, 1989; and International Convention on Oil Pollution Preparedness, Response and Cooperation, London, 1990.

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CHAPTER 40: INFORMATION FOR DECISION-MAKING

Decision-Making: Two agencies responsible for decision-making at the ministerial and national levels have primary responsibility for the collection, analysis, management, and dissemination of information and data related to sustainable development. They are the Office of the National Economic and Social Development Board, and the Department of Environmental Quality Promotion, Ministry of Science, Technology, and Environment. The Public Relations Department, which is responsible for the collection, coordination, management, and dissemination of information on behalf of the government, has offices and representatives in every province of the country, as well as independent individuals located at many district and sub-district levels who collect and submit information for analysis and re-distribution, and who disseminate information to communities. The Thai Constitution of 1997 provides the legal, regulatory, and political framework for the management of information for decision-making in Thailand. The Chapters of the Eight Plan include policies and strategies such as: restructuring and reorienting development administration systems; promoting popular participation in implementation of the Plan; developing an effective monitoring and evaluation system; and bridging the data gap and upgrading access to and quality of information. The key to successful implementation of these strategies is development of information systems that can be updated annually for the use of all relevant parties. The 1997 Constitution emphasizes human rights, people's participation in decision-making, the redress of complaints against officials and the monitoring of activities of politicians and officials. Relevant to this item is the right of access to information that is in the public domain and which is possessed by a government agency, including plans, projects, and budgets. All major groups contribute to the collection, assessment, management and dissemination of information and data for decision making for sustainable development.

Programmes and Projects: The government's Policy for Community Environment calls for the integration of plans for basic services that are necessary for communities at all levels. This will be achieved by supporting the dissemination of information, news, and the availability of basic services for integration of community development plans prepared by the government and private sector. In addition to that, promoting public access to information and public empowerment will be augmented by the creation of a standardized database system for community environment and green areas that is linked through a data network. Working with local universities, the Office of the National Economic and Social Development Board, and the Ministry of Interior have developed a computer based database system to monitor socio-economic development of the country. Database and information systems also are operated for commercial and business data. The government operates a Tourist Information Centre, which includes information related to cultural and natural recreation sites.

Status: The central government is undergoing reform, restructuring, and bureaucratic re-orientation in the context of the reforms mandated by the 1997 Constitution, and its new role as coordinator and facilitator, rather than initiator, of development activities. Information systems that were developed to channel information from the top down are being re-engineered to operate from the bottom up. The objective is to facilitate the free flow of information in both directions. In Thailand, sustainable development indicators are still in the early stages of development. However, some socio-economic and environmental indicators have been generally used as key components of a reporting system on the state of the environment. Some limited areas of the northern and northeastern regions of Thailand may be isolated and have minimal access to information.

Capacity-Building, Education, Training and Awareness-Raising: To ensure the sustainable management of Forestry Resources, Water Resources, Mineral Resources, and Hazardous Materials, among other resources, the government will establish standardized information networks, provide information, and educate officials, politicians, local people, and personnel of all agencies to understand the value of these resources. The Eighth Plan details measures and guidelines for strategies for human development, promotion of education and awareness-raising.

Research and Technologies: Information technologies, including GIS, expert systems, models, etc., are used by many agencies of the Thai Government, academic and research institutions, and by many private companies, for the continuous and accurate storage, management, and assessment of data.

Financing: The government allocates a budget for the promotion, the use, and the upgrading of computer systems for research purposes. In addition, the government budget allocates funds for research and development of new agricultural technologies on a regular basis. The budget also includes funds for information dissemination through various media and public relations. The transfer of technology is a high priority for the Thai Government, in its efforts to ensure that Thai products are competitive in world markets and that quality standard are maintained. Several centers and institutes are being established by the government to strengthen the capacity of public sector agencies to transfer technology. It includes a science and technology development park; industrial technology research and development centre; and a biotechnology research and development unit that concentrates on the improvement and replication of plant material. The Thai Research Fund operates to finance specialized research on high priority technologies for immediate application in the industrial, agricultural, or manufacturing sectors. Support is being received from the Japanese Government for the Thai-Japan Technology Transfer Project, focusing on research and development of appropriate industrial, manufacturing, and agricultural technologies. Approximate percentage of budget: 30 percent.

Cooperation: On a regional basis, the government is establishing a Mekong Environmental Data Network to facilitate the exchange of technical information and the dissemination of technologies appropriate for countries in the Mekong River basin. Support is being received from the Japanese Government for the Thai-Japan Technology Transfer Project, focusing on research and development of appropriate industrial, manufacturing, and agricultural technologies. The Thai Government has been providing assistance through the Department of Technical and Economic Cooperation (DTEC) to the government and people of the Lao PDR on aspects of sustainable agricultural development and educational reform. Also, Thailand participates in technology exchange programmes with ASEAN Member Countries on various aspect of agricultural, environmental, and industrial technology.

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CHAPTER: INDUSTRY

Decision-Making: No information available.

Programmes and Projects: No information available.

Status: No information available.

Capacity-Building, Education, Training and Awareness-Raising: No information available.

Information: No information available.

Research and Technologies: No information available.

Financing: No information available.

Cooperation: No information available.

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CHAPTER: SUSTAINABLE TOURISM

Decision-Making: No information available.

Programmes and Projects: No information available.

Status: No information available.

Capacity-Building, Education, Training and Awareness-Raising: No information available.

Information: No information available.

Research and Technologies: No information available.

Financing: No information available.

Cooperation: No information available.

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