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途上国における社会的環境管理能力の形成と環境協力

Environmental Center Approach:
Development of Social Capacity for Environmental Management in Developing Countries and Environmental Cooperation

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Social Environmental Management System in Thailand and Environmental Research and Training Center

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Thailand Environment Institute (TEI)

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Abbreviations

BIOTEC	National Center for Genetic Engineering and Biotechnology
DANCED	Danish Cooperation for Environment and Development
DEDP	Department of energy Development and Promotion
DEQP	Department of Environmental Quality Promotion
DSS	Department of Science service
EIA	Environmental Impact Assessment
ERTC	Environmental Research and Training Center
GAP	Green Aid Plan
GENCO	General Environmental Conservation Public Company Limited
GTZ	Deutsche Gesellschaft fur Technische Zusammenarbeit GmbH
JICA	Japan International Cooperation Agency
NGO	Non-government Organization
NRCT	National Research Council of Thailand
NSTDA	National Science and Technology Development and Promotion
OAEP	Office of Atomic Energy for Peace
OEPP	Office of Environmental Policy and Planning
PCD	Pollution Control Department
SIDA	Swedish International Development Agency
SoE	State of Environment
UNEP	United Nations Environmental Program
UNU	United Nations University
US-AEP	United States-Asia Partnership
VOCs	Volatile Organic Compounds

1. Introduction

1.1 Research Objectives

- To analyse the environmental management system in Thailand.
- To evaluate the roles of Environmental Research and Training Center (ERTC) and its contribution to environmental management in Thailand.
- To examine the direction appropriate to ERTC as a leader of social environmental management in Thailand.

1.2 Background

Since 1990, Thailand and Japan have been involved in a joint project called the control Environmental Quality and Laboratory Technology Project.[1] The purpose of this project was to identify effective means of promoting pollution control activities, to reinforce the function of environmental laboratory services at the national level, and to organize a system of research related to environmental pollution and its control.

The success of the initial collaboration between Thailand and Japan led to proposals for the establishment of the Environmental Research and Training Centre (ERTC) in 1991. The Government of Japan agreed to support the establishment of the Environmental Research and Training Centre with a grant of 2,314 million Yen, which at that time was equivalent to 463 million baht. Nowadays, ERTC is an agency under the Department of Environmental Quality Promotion, the Ministry of Natural Resources and Environment.[2]

The ERTC has the following major operating roles[3]:

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1 ERTC, http://www.ertc.deqp.go.th/ErtcInfo/backg_eng.html, "Background" [October 7, 2002]

2 In 1991, ERTC was under Office of the National Environment Board, The Ministry of Science, Technology and Energy, which was replaced by DEQP in 1992, and the ministry had been transformed to the Ministry of Science, Technology and Environment.

3 Environmental Research and Training Center, 2002. 'Roles of ERTC', http://www.ertc.deqp.go.th/ErtcINfo/Func_th.html (12/9/02).

1) Formulation of plans for the development of courses in training, conferences, or academic seminars concerning environmental technology;

2) Undertaking of research and development for monitoring methods in monitoring and checking environmental quality and co-ordination in international environmental checking cooperation programs;

3) Undertaking of research and development for appropriate technology for pollution control including research and development for recycling techniques and appropriate eradication;

4) Undertaking of research and development for environmental sample analytical methodology including production of standard references as well as giving advice on the use of scientific instruments and on environmental sample analytical methodology to agencies concerned;

5) Coordination in accuracy verification of information and data concerning pollution conditions from laboratories among agencies; and

6) Carrying out work in conjunction with or in support to the operation of other agencies concerned or as being assigned to.

During the past decade, environmental training, conferences, and seminars organized by ERTC were under various topics which included environmental monitoring, assessment, technology and environmental analytical equipment and instrument use, thus enhancing the skill of personnel involved. Over 5,000 personnel attended the training and seminars.

In order to enhance the potential and to develop the quality of the ERTC as well as to increase its roles as participant in the development of the quality of life of the people and the environment, it is necessary to look into the Center's roles towards the development of social and environmental management during the past decade to determine the advantages of the past performance which shall be beneficial to the improvement of the Center's operation towards Thailand's social and environmental conditions in the future.

1.3 Environmental Situation in Thailand

The environmental quality was stable at the time of economic crisis and went on the downward trend when the economy started recovering. This shows that the present

management was not efficient enough to control the environmental problems caused by economic recovery and by pressure from the world environmental rules.

1.3.1 Garbage

Community garbage tends to increase with population increase and economic expansion in each area especially in major cities and tourism destinations. Garbage disposal capacity in most areas is at 60% and thus uncollected garbage could be seen almost everywhere except in Bangkok where almost all garbage could be collected and disposed of. Recycled use was at 14% while recyclable garbage amounted to 40-60% of the total. Garbage disposal is a nuisance and unpleasant and garbage disposal plant project tends to receive resistance from the people. The Government undertaking does not deal with the problem at its cause but at its effects. With limited budget and personnel, local organization could not handle the project efficiently. At the same time polluters take no responsibility in garbage disposal. What should be done is to reduce amount of garbage at the culprits -- the consumers and the manufacturers. Garbage collection should be carried out according to sanitary principles. Community could participate by effecting garbage separation and recycling.

1.3.2 Water Pollution

Water quality in many rivers is deteriorating continually. Water in the lower part of Chao Phraya River has the BOD value at 6.2 milligram per liter whereas the standard calls for 4 milligram per liter. Tha Chin River is also facing the same problem. Major polluters are household, industry, and agriculture especially livestock.

In the past, focus was on the construction of central waste water collecting systems and waste water treatment systems. Upon completion, many facilities in many locations are inoperable as they lack budget and personnel. Treatment fees could not be collected as there is no law supporting fee collection from users. It is suggested that the constructed facilities should be put to work and fees should be collected so that the money could be used to run and maintain the systems.

1.3.3 Air and Noise Pollution

Air and Noise Pollution were on a downward trend at the time of economic crisis as construction work came to a halt. After the economy has picked up, the problem comes back.

Major pollutants are small dust particles and carbon dioxide which is the cause of greenhouse gas causing climate change, the world rated problem at present. Major air pollution source is transport sector especially the joint bus service and badly maintained passenger cars. Sulphur dioxide is also an air pollutant generated by energy generating sector. Air pollution management was very successful by the improvement of gasoline, energy conservation and substitute energy. Transport sector and energy generation sector should be under tight scrutiny. The country should be ready for climate change problem both implementation of policy and related measures. Study on greenhouse gas impact and potential for its elimination should be undertaken for prevention planning and as information for world level negotiation.

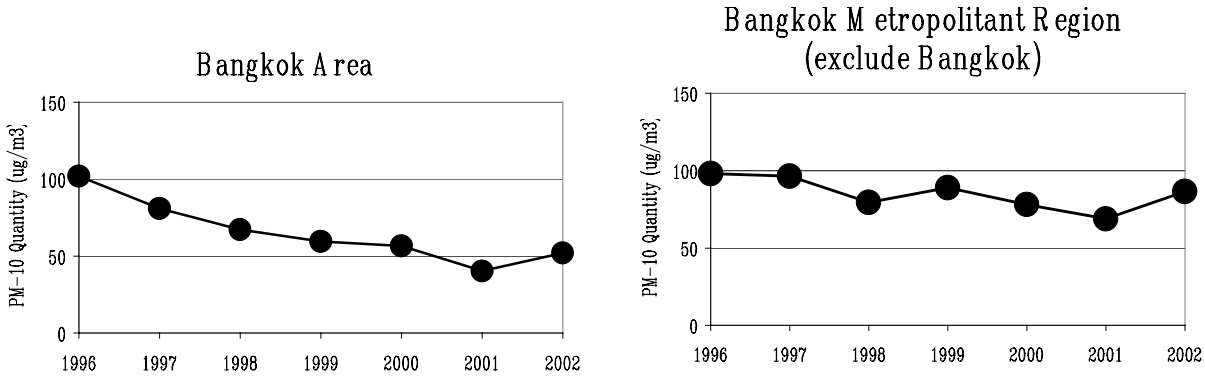

Figure 1.1 Average PM-10 Emission During 1996-2002

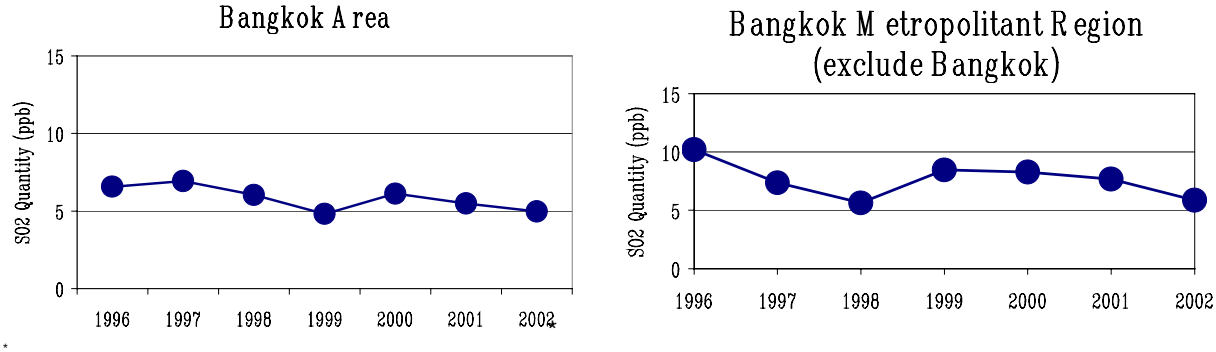

Figure 2.2 Average SO_2 Emission During 1996-2002

1.3.4 Hazardous Waste

78% of the hazardous waste is from industrial sector. The highest is electronics industry, 13.5% from business and service sectors. The remaining 8.5% is from agricultural sector,

communities, hospitals, port, laboratory, and shipping activities. Hazardous waste was on a downward trend since 1997 especially hazardous waste from industrial sector.

The Government made investment in 4 hazardous waste disposal centers capable of disposing of 15% of total hazardous waste. More investment received resistance from the people. Service fees are high and very small number of users come to the centers. Factories kept hazardous waste at their premises and stealthily dispose of them in public places when they had opportunity. Importance should be given to minimization of hazardous waste as much as possible. Economic measures should be employed to control discharge of pollutants from industrial works and for them to use environment-friendly production process. Environmental Management Systems (EMS for SMEs) should be considered. Recycling of hazardous waste including inter-factory exchange of hazardous waste should be set up and investment from private sector with hazardous waste disposal potential should be supported.

1.3.5 Hazardous Substances

More and more hazardous chemicals have been imported to Thailand for use in industrial and agricultural sectors. Lack of good management in transport, storage, and production often caused accidents. Improper agricultural use caused hazardous residual in products and environment affecting consumers' health and ecological balance. Although many laws have been enforced over this area, unclear practice guidelines made it one of the most significant problems of the country. Business operators are to be more responsible to storage report, transport and management of hazardous substances, provision of emergency operation in case of accident, provision of environmental and public insurance.

1.3.6 Central Environmental Management by the Government

Although the Government is the principal administrator, its mechanism and system are not efficient enough. Guidelines provided from central administration do not join forces with other associates. Operations cope with effects instead of prevention by focusing on investment in treatment and disposal of waste at the rate not fast enough to handle the amount of waste generated. For example, 16,612 - 77,426 million baht investment was spent on garbage disposal infrastructure but only 67% of garbage all over the country could be disposed of; 64,000 million baht investment for wastewater treatment plant but only 25% of wastewater could be treated; 4 hazardous waste disposal centers were constructed but they could handle only 246,500 tons of

hazardous waste each year or 15% of the total. All these are due to inefficient mechanisms of the Government:

Government organizations do not have clear understanding and unity in policy formulation and role determination of agencies concerned as they are scattered over many government offices without coordination and connection thus creating problems in overseeing. Local administrative organizations lack budget and personnel as well as transparency. Local influential figures and conflict of interest play important roles as well as community participation.

Inefficient law enforcement and lack of continuity thereof are due to lack of budget and personnel as well as specific law.

Other mechanisms such as economic tools dealing with environmental management are insufficiently employed as well as lack of social mechanisms.

2. Social Environmental Management System in Thailand

2.1 Policy Development for Social and Environmental Management and Market Sector

Operation plan for policy development for social environmental management and market sector in Thailand has been formulated under the existing Constitution of Thailand, which provides for the management of natural resources and environment citing the rights of the people to participate in the balanced and sustainable management, maintenance, and exploitation of natural resources of the country as a whole. The public sector's policy and plan concerning social, environmental, and marketing management are as follows:

2.1.1 The Policy and Plan for Enhancement and Conservation of National Environmental Quality for 1997-2016

The plan for the management of environmental quality transforming the enhancement and conservation of national environmental quality policy and plan into implementation has been formulated in accordance with the policy and plan for enhancement and conservation of national environmental quality for 1997-2016 which has been formulated under the Enhancement and Conservation of National Environmental Quality Act, B.E. 2535 (A.D. 1992). This is to ensure the conformity of the administration of the country's environmental

management with the principles and the spirit of the Constitution of Thailand, B.E. 2540 (A.D. 1997).

The policy and plan for the enhancement and conservation of national environmental quality focus on the integration management and enhancement of natural resources, and conservation of national environmental quality, sustainable economic and social development, to ensure quality of life. The policy includes necessary strategies to accelerate rehabilitation of renewable resources and application of mitigation measures to address water pollution, air pollution, noise and vibration pollution, and pollution from solid waste and night soil, hazardous materials and hazardous waste. In addition, guidelines for enhancement and conservation of national environmental quality are proposed.

The vision for the management of environmental quality relating to social and environmental management system includes:

1) Overall administration and management of environmental quality are decentralized for efficiency with delegation of power from central offices to local organizations. Therefore, all government agencies, private sector, NGOs and local organizations are now able to participate in policy and plan formulation as well as in a monitoring programme.

2) People have awareness and are willing to work together to protect and rehabilitate environmental quality.

To achieve this vision, the supporting policies to implement are as follows:

-Policy on Natural Resources

1) To enhance the administration and management of natural resources by systematic decentralization of power from central offices to regional offices, in addition to the strengthening of relationship among government agencies, private sector, NGOs, and local people.

2) To support the study, research, and establishment of a standardized database network for natural resources.

3) To increase conservation awareness of senior government officers, politicians at all levels, private sector, and the general public in order for the integration of concepts for development and conservation of natural resources to ensure movement in the same direction.

-Policy on Environment

To develop unified systems for the administration and management of pollution and for the formulation of pollution control policies, plans and implementation guidelines, under appropriate laws, institutions, and budgets, following the Polluter Pays Principle. In addition, the private sector should participate in pollution control investment. Cooperation among the government, private sector, and local people is required.

-Policy on Community Environment

To undertake management of community environment and green areas to continuously improve quality of life and to facilitate the functioning of natural ecosystem, economy, society, culture, and technology.

-Policy on Environmental Education and Promotion

To enhance the capacity of communities at all levels, and to establish strength and cooperation for effective environmental management.

-Policy on Environmental Technology

To develop and promote utilization of technology for management of environmental quality.

2.1.2 Policy of the Government

-Natural Resources and Environmental Policy

Pol. Lt. Col. Thaksin Shinawatra, presently the Prime Minister of Thailand, has been in office since February 2001. His administration has designated natural resources and environment as one of the sixteen policies of the government. The policy aims at the restoration of the conditions and quality of natural resources and bio-diversity, prevention of degradation and depletion of natural resources, recycling and reuse of natural resources and bio-diversity in a manner beneficial to the livelihood of the people. National development must be well-

balanced and provide a basis for sustainable economic and social development of the country. Towards this end, the following policies will be pursued:

1) Management of the environment, natural resources and bio-diversity to be carried out in an integrated manner by upholding the principle of good governance and participation by the people and the community.

2) Promotion and encouragement of participation by the people and the community regarding waste control and waste disposal, both of which affecting the health, welfare, and quality of life of the people.

3) Supporting the notion of taking social costs into consideration when conducting project evaluation of repercussions on the environment and natural resources. In the management of the environment and natural resources, supporting the principle that whoever causes pollution shall also bear the costs as well as the system of joint rights.

4) Promotion of technological research and development with a view to increasing Thailand's capacity to manage, conserve, and restore the environment. Supporting the beneficial use of natural resources from all sources, including the recycling of waste and other used materials.

5) Setting national environmental standards that are suitable for and compatible with Thailand's level of development in the scientific, economic and social spheres. At the same time, such standards should be in tandem with international environmental standards dealing with international trade.

6) Setting standards for the control on importation of chemicals, toxic and hazardous substances in accordance with the international standards set by developed countries with a view to preventing Thailand from becoming a test site or a commercial site for sub-standard hazardous substances and materials.

-Decentralization Policy

Sections 6 and 7 of the Enhancement and Conservation of National Environmental Quality Act, B.E. 2535 (A.D. 1992), empower NGOs and the people in the participation of environmental decision making at national and local levels. Chapter III of the Constitution of the Kingdom of Thailand, B.E. 2540 (A.D. 1997): Rights and Liberties of the Thai People, also recognizes the importance of the participating roles of the people by substantially providing that the people

and their local administration organization participate in the maintenance of natural resources and environmental quality. The provision supports the participation of the people by decentralization of power to localities. Section 290 thereof provides plan and process for power decentralization to localities, B.E. 2542 (A.D. 1999), by prescribing guidelines for task transfer and distribution of power between central administration and local administration organizations, and among local administration organizations themselves.

As power decentralization and systematic linking of development of infrastructure system, and transportation and communication systems as well as the building of adequate information technology networks to various regions in conformity with their respective development, is an important policy to the management of natural resources and environment, many agencies have conducted studies so as to formulate their own pilot project in order to develop knowledge and ability of their personnel. Operation pattern, methodology, and process of operation of local administration organization have been formulated in order to carry out efficient management of natural resources and environment suitable to the needs of locality and potential of local administration organization. Project presently studied are:

1) Project for the formulation of role patterns and pilot project for the management of natural resources and environment of local administration organization by the Office of Natural Resources and Environmental Policy and Planning, the Ministry of Natural Resources and Environment.

2) Project for the enhancement of capacity of decentralization of administrative power of industrial management to localities by Department of Industrial Works, the Ministry of Industry.

2.2 Command and Control

During the past 20 years, environmental problems were perceived as cause of the country's economic and social development hindrance. To prevent natural resources and environment from further degradation, a command and control system has been utilized to regulate and reduce negative environmental impacts. The system consists of several elements as follows:

1. a system of environmental quality standards;
2. a system for planning and financing environmental controls; and
3. a system for monitoring and controlling environmental quality.

Since 1939, Thailand had adopted several fundamental Acts governing the exploitation of environmental and natural resources. At present, it is the command and control system which is in effect as follows (see also Appendix 1):

- Water quality: Standard for Potable Water; Controlling Standard for Water Discharged from Buildings; Controlling Standard for Water Discharged from Housing Projects; Standard for Groundwater Drainage; Standard for Coastal Water Quality, Quality Standard for Water from Surface Source; Penalties for Failure to Treat Wastewater; Penalties for Unauthorized Extra-periphery Discharging of Wastewater;

- Air quality: Standard for Pollution Emission for New Vehicles during Operation; Standard for Emission of Pollution from Point Source; Quality Standard for Ambient Air; Standard for Emission of Sulphur Dioxide Gas from Fuel Burning of General Factories except Power Generating Pants; Controlling Standard for Air Emission from Garbage Incinerator; Controlling Standard for Emission of Dust from Stone Quarry; Concentration Standard for Cresol Emission from Factory; Standard for Benzene Vapour Emission from Oil Depot.

- Hazardous Substances: Criteria, measures, and methods controlling management of hazardous substances.

Experience from the past proved that Command and Control system did not attract or drive pollution point sources or people toward cooperation in pollution reduction and thus the environment became more deteriorated and natural resources increasingly degenerated. This is because Command and Control system requires (1) Constant monitoring and penalization thus resulting in large expenditure while the country, at the same time, needs development in other areas such as education, poverty, and infrastructure development; (2) Command and Control system requires competent officials for inspection while the number of the country's ex-personnel in environment, government officials, and consulting firms are limited resulting in inefficient inspection and apprehension, although there is an increase in the number of personnel, it is still insufficient and requires more operating budget; (3) Light penalties are not effective enough to change production and consumption behaviour; (4) Some sorts of pollution point sources have been in operation for a long period of time and are in great number, employing old technologies, being small family business, having low investment, operating in limited area before enforcement of law and regulations on standards, they being, for example,

factory, clinic, hotel, condominium; compliance with standards is therefore not possible (requires government's technological or investment assistance or other supporting measures); (5) Each point source has more than one type of environmental problem, enforcement of environmental standards forces the business to improve its production to reduce pollution, not only is it required to spend a large sum of money but it is also required to spend more to eliminate other type of pollution, for example, upon complying with wastewater treatment standard, a factory is faced with air pollution problem which requires a second production improvement to resolve such problem. However, with clean technology or eco-industrial concept or waste minimization, problems regarding energy consumption and all types of pollution would be reduced.

2.3 Economic Instruments

As Command and Control measures have failed to bring about compliance due to lack of monitoring personnel and light penalties, hazardous substances have been discharged into the environment in excess of the amount permitted by the standard. In some cases, polluters chose to pay penalties as it is less expensive than setting up hazardous substance treatment facility.

In order to increase the efficiency of the management of pollution and natural resources and to induce motivation for cooperation through willingness than Command and Control means, studies and research had been conducted in 1990 to employ economic instruments in the management of natural resources and environment.[4] At present, economic instruments employed in the management of pollution and in the conservation of natural resources in Thailand are as follows (see details in Appendix 2):

2.3.1 Economic Instruments for Pollution Control

1) Air pollution: Imposition of tax on substances that deplete the ozone layer

2) Water pollution: Wastewater treatment fees, reduction of duty on importation of machinery, equipment, tools, or appliances to be used in wastewater treatment

3) Hazardous waste: Registration fee for the registration and possession of hazardous material (B.E. 2535 (A.D. 1992))

4) Solid waste: Charge on solid waste disposal

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[4] Organisation for Economic Co-operation and Development (OECD), *Economic Instruments for Pollution Control and Natural Resources Management in OECD Countries: Survey*, Publication Service, 1998, 115p.

2.3.2 Economic Instruments for Natural Resources Management

1) Water quantity: Groundwater Drilling License (B.E. 2535 (A.D. 1992)); License for Draining Water into Groundwater Well (B.E. 2535 (A.D. 1992)); Fixing Charges for Use of Groundwater; Fixing Charges for Use of Water Supply

2) Fisheries: Fishery License (B.E. 2490 (A.D. 1947)); License for Harvesting Mussel and Small Mussel (B.E. 2490 (A.D. 1947)); License for Harvesting *Thianhoy* and Pearl Oyster (B.E. 2490 (A.D. 1947)); License for Aquatic Animal Trading (B.E. 2490 (A.D. 1947))

3) Forestry: License for Timber Business or Harvesting of Forest Products (B.E. 2507 (A.D. 1964)); License for Setting up of Wood Processing Plant using Machinery (B.E. 2518 (A.D. 1975)); Concession for Harvesting of Forest Products in Restricted Areas (B.E. 2518 (A.D. 1975)); License for Using Degraded National Reserved Forest for Reforestation (B.E. 2535 (A.D. 1992)); Tree Conservation and Planting Fund

4) Wildlife: National Park Entrance Fees (B.E. 2504 (A.D. 1961)); License for Trading or Possessing Protected Wild Animals (B.E. 2535 (A.D. 1992)); Wildlife Hunting License (B.E. 2535 (A.D. 1992)); Breeding License (B.E. 2535 (A.D. 1992))

5) Minerals: Mining License (B.E. 2510 (A.D. 1967)); Panning License (B.E. 2510 (A.D. 1967)); Ore Drilling License (B.E. 2510 (A.D. 1967)); Royalty on Mining (B.E. 2510 (A.D. 1967)); Petroleum Concession (B.E. 2510 (A.D. 1967))

However, effective employment of economic instruments should be used together with the Command and Control measures as the environmental standards will require polluters to comply. They would choose between the management of environment by voluntary reduction of pollution and enforcement of the law and regulations in case of pollution discharge does not meet the standard. Making such a decision, the polluters would have to take into account the investment, its readiness and future growth of their business.

In addition, law amendments require a long period of time. Government change interrupted work continuity. Politicians take no decision as it might adversely affect their constituent popularity from businesspersons and the people especially issues on large point source of pollution such as factory or Bangkok Metropolis.

For localities, even though economic instruments are ready to be employed by means of local ordinance such as collection of wastewater treatment fee or fee for management of garbage,

relatively few locations are employing such instruments as local politicians are afraid of losing their popularity affecting their forthcoming election.

Another reason making economic instruments inefficient is the fact that the fees do not represent real management cost although they have been collected for many years such as water supply charge and garbage management fee.

2.4 Voluntary Approach

Voluntary reduction of pollution is another approach of environmental management controlling pollution created by production and consumption activities under standards, or preventing pollution voluntarily such as those defined by ISO 14000, Eco-label (Green label), and Cleaner Production. These measures have been raised as international trade non-tariff barriers for the benefits of their countries such as

1) Agreement on Sanitary and Phytosanitary which is an agreement on agricultural products for the protection of the health of human beings, plants, and animals. Trade partner countries use this measure to bar Thailand's food trade in livestock, fishery, and fruit and vegetables claiming contamination with microbes and insect infestation, etc.

2) Agreement on Technical Barriers to Trade which is an agreement on technical regulations covering product specifications and quality, production process affecting the product quality, use of logo, and packaging, with objectives to protect the safety and health of human beings, animals, plants, and environment, such as ban on import of non-quarantined animals to prevent communicable diseases, or ban on certain chemicals used in growing plant for export which could contaminate environment.

Voluntary environmental standard is an alternative for exporting manufacturers as they can improve their product quality and make them environment friendly. The approach is sustainable and what have been carried out in Thailand are as follows:

2.4.1 ISO 14000

The first ISO 14000 certification in Thailand was made in 1996[5]. At present there are 628 establishments certified under this standard. There are 37 ISO 14000 consultancies and 14 ISO certification bodies[6]. Problems and obstacles in setting up of environmental management standard of Thailand are:

1) Lack or information on follow-up and evaluation as environmental projects such as alleviation of the effects of pollution and waste materials require follow-up and evaluation. Information obtained shall be genuine which is necessary to be used as base for decision making and to bring about real solution to problems. Thailand's industrial sector lack sound information keeping and collection system.

2) Unclear goals set by high level executives. ISO 14000 requires clear environmental goals and objectives to guide the organization and its personnel toward the right direction. Such goals should be realistic and flexible.

3) Lack of support or attention from high level executives resulting in the organization failing to reach its goal, for example, no support regarding financing, resources and technologies, or personnel, thus failing the operation.

4) Members of the organization lack awareness thus no cooperation is realized.

Although ISO 14000 is now widespread in Thailand, the country's trade partners in European Union are now trying to set up other standards as trade barriers. This is especially true for England as a new inspection called "site assessment" is being pushed forward. A site assessment is an assessment of risk against criminal and civil liabilities which carries a heavy fine if environment is found to be destroyed. A 14015.2 committee draft is underway which shall be used as standard for the site assessment and readiness for the maintenance of environment. In the future, the quality inspection standard and environmental management standard will be blended as one standard. If it is used to qualify Thailand's exporters, they would have problems in adjusting themselves.

2.4.2 Green Label

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5 Thai Environment, http://www.thaienvironment.net/update/article_txt/tq_detail.asp?txt_id=9fti012, "Environmental Measurement", [November 25, 2002]

6 1) Thai Industrial Standards Institute, Ministry of Industry, http://www.tisi.go.th/I14000/ 14000.html, "List of Certified Companies in Thailand", [November 25, 2002]
2) Management System Certification Institute (Thailand), http://www.masci.or.th/ 14001.html, "ISO 14001: Environmental conservation", [November 25, 2002]

Thailand is using "Green Label" to certify products having less impact on environment than products of the same nature.[7] Thailand Business Council for Sustainable Development has initiated the Green Label project in 1993 which came into existence by the cooperation between the government, private sector and other organizations. The Council has as the Secretariat, the Office of the Thailand Industrial Standards and the Thailand Environment Institute. Application for green label is the manufacturer's arbitrary choice and not required by law or regulation. Presently, requirements provides as conditions to obtain green label are set for 33 products. 30 products have received green label, they are:

- Environmentally sound paper
- Products made from recycled plastic
- Energy-saving fluorescent lamp
- Environmentally sound refrigerator
- Low-pollutant emulsion paint
- Water economizing flush toilet
- Low-energy air-conditioner
- No mercury added battery
- CFC-free spray
- Detergent

Encouragement to use more green label products not only preserving the country's environment but also benefit distributors as more profit is coming from higher consumption. This would motivate other manufacturers to improve the quality of their goods or service by taking into account the environmental impacts. Green label is therefore another instrument to help preserving natural resources through production and the people's consumption.

2.4.3 Cleaner Production

[7] Thai Environment, http://www.thaienvironment.net/update/article_txt/tq_detail.asp?txt_id=9tis099, "Green Label", [November 25, 2002]

Clean technology can be used as an instrument in creating sustainable efficiency and development and thus the environment can be protected at the same time the country is being developed[8]. Clean technology can also help reduce production waste, save waste treatment costs, reduce production costs as less raw material is used with higher production efficiency. It can also increase production and product quality, help save energy, reduce risk and accidents, increase competitiveness, and help enhance the image of the organization. In addition, clean technology is a compliance with the state's environmental law. Problems and obstacle in using clean technology are as follows:

1) The business operators do not understand the concept of clean technology thus creating problems in cooperation in the improvement of production process.

2) Personnel of the organization takes no participation. As clean technology requires changes in production behaviour, cooperation from all personnel involving in production is required.

3) Lack of information. Planning for improvement of production requires information on usage of water, energy, quantity of waste from production process, in order to reduce loss and waste. Such information is important in the planning and assessment of success of the project operation.

4) Lack of technology both for personnel knowledge and for the development of material, equipment, tools, machinery regarding environment. This is because production process for each product is different. Even for the same product in different factory, the process is also different due to the difference in size and type of machinery. It is difficult to prescribe specific technology and therefore specifying clean technology is also difficult.

5) There are not many successful concrete examples of clean technology as the evaluation of loss and waste reduced by it in terms of money is difficult.

6) Disclosure of successful clean technology is not widely made as improvement on clean technology is made on production process which is considered trade secret.

7) There are not many people who have clean technology knowledge and therefore clean technology promotion cannot be disseminated widely.

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[8] Cleaner Production Group, Bureau of Environmental Industry Technology, Industrial Work Department, http://www.thaienvironment.net/update_area/ article_txt/tq_detail.asp?txt_id=9ids013, "Cleaner Technology", [November 26, 2002]

2.5 Government, Market and Community as One Comprehensive System

The solving natural resources and environmental problems in the past came from the central government instructing local agency to take necessary action. Not only were the problems left unsolved, they were also increased in accordance with population and activities resulting from the country development. The government ended up spending more budget and using more manpower in rectifying the problems than in preventing them.

During the past 5 years, the government was trying to adjust its working mechanism by trying to tackle the problems at the cause. However, the outcome was rather slow as the cause or point source increased rapidly. Work therefore was carried out in the form of interrelation or more of a network like manner. Roles of the government in problem solving were adjusted by taking part in controlling and overseeing. Point sources of pollution were encouraged to reduce pollution and emission/discharge. Local organization or people of locality were given more roles in monitoring environmental quality. Although tripartite operation just came into focus in Thailand not many years ago, many cases became successful as follows:

2.5.1 Consumer's Pressure on Market

Hygienic Meat In 2001, the Ministry of Public Health persuaded the public to buy fresh meat from department store bearing hygienic meat logo to create popularity for hygienically slaughtered meat, cut, and packaging.

Hazardous-substance-free Vegetables Many years of implementation brought about popularity from consumers. At present, hazardous-substance-free vegetables are available at every department store and in some local markets.

No. 5 Power Saving Appliances The Electricity Generating Authority of Thailand initiated a program encouraging the public to choose power saving electric appliances by issuing *No. 5 Power Saving* logo to all appliances joining the program. The public is therefore becoming the mainstream in pressing the manufacturers to improve their production to achieve power saving status.

Energy Knowledge Campaign The Energy Policy and Planning Office (EPPO), one of the government agencies, spent 200-300 million baht in providing the public with knowledge concerning energy in its highly successful "Divided by Two" campaign. Apart from providing knowledge concerning energy, it also advises the public how to choose power saving appliances such as "*Thin* fluorescent light".

2.5.2 Pressure from International Market and Measures

Standard Farm Porcine farms in Thailand were pressured by exporters insisting they would purchase pork only from standard farms. In 2001, there were over 100 standard porcine farms all of which were large scale farms. (There were over 11,500 commercial scale porcine farms all over Thailand in 1999.[9])

Waste Electrical and Electronic Equipment: WEEE This measure shall come into force in 2004 and is expected to affect the manufacturers who export electrical and electronic products to European Union. They are required to (1) comply with regulations requiring them to bring the scrap back into the country thus incurring expense. (2) Thailand's manufacturers and exporters are required to adjust their production to comply with the regulations such as product design or choice of raw material to use so that they can bring the scrap back at the rate specified by the regulations. It is expected that domestic waste management could become more systematic and more efficient. (3) If hazardous heavy metal is banned in 2008, direction of management or formulation of policy for the management of domestic industrial waste will be directly affected. Thailand is required to set up strategies for the prevention and solution of problems caused by the use of new substance in the country's industrial sector.

Measures for Reduction and Discontinuation of Use of Ozone Layer Depleting Substances in Thailand The Montreal Protocol on Substances that Deplete the Ozone Layer is an international agreement in furtherance of the Vienna Convention. Its objective is to put a stop to the destruction of the ozone layer by means of reducing and discontinuing the use of ozone layer depleting substances. Thailand has become a member party since October 5, 1989. Presently, it is not the time for Thailand to stop using the substances according to the Protocol as the consumption is less than 0.3 kilogram per capita and is permitted to use the same when necessary. In fact, CFC use in some areas has reduced significantly reflecting the public awareness of the significance of information as well as awareness in environmental measures.

2.5.3 Roles of Locality

The Government has transferred, promoted, and provided more roles in the management of environment and natural resources to the locality and the organization of the locality.

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9 Pollution Control Department, 2002. Development of Economic Instrument for Pollution on Control from Agriculture Activities, pp 2-5.

Preparation of Environmental Operation Plan The organization of the locality is required to prepare an environmental operation plan and submit it to the Ministry of Science, Technology, and Environment[10] for approval and for budget allocation. Although the quality of such plan is not good enough as it focuses more on the investment of pollution problem solving than conservation and prevention of loss or replenishment of natural resources, it is the starting point for the organization of the locality to pay attention to environment and natural resources in their area.

Preparation of Environmental Impact Assessment Every EIA project is required to conduct public hearing to give the local people an opportunity to become aware of the development to take place in their area. They will be given opportunity to query and express opinion on the project including on impact reducing measures and environmental quality monitoring measures.

River and Stream Investigation for Youths is a project implemented by an NGO under the financial support from Danish government. The project designate schools as controlling centers to monitor water quality in water sources in the Northern region of Thailand through communities via young students. Simple locality knowledge is distributed among young students teaching them ecological system that indicate various level of water quality and ecology at different levels.

This concept has presently been adapted to various rivers and to other areas of environmental problems.

Mab Ta Put Bad Odor Problem Mab Ta Put is an area in the Eastern Coast of Thailand which became under industrial promotion in 1989. During the past 5 years, communities in the vicinities suffered from bad odor from a petrochemical factory and factories engaging in related industries. The problem has now been alleviated by various measures and one of which was the preparation of monthly report which was submitted every month to the a tripartite conference consisting of the state, private sector, and the community, mass media was also invited to observe.

2.6 Conclusion

Thailand's policy on natural resources and environment management can be classified into three stages. The first stage is the system-making stage (A.D. 1939- A.D. 1992) in which a number of development organizations were established after the country enjoyed its rapid industrial expansion.

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10 After restructuring, the name has been changed to The Ministry of Natural Resources and Environment.

Thailand's policy on management of natural resources and environment has been long included in the country's development plan since the 3rd National Economic and Social Development Plan (1972-1976). During the past 15 years, the degrading conditions of the environment, the destruction of natural resources, and the inclement weather, have made the public become more aware of the natural resources and environmental problem. This is reflected by the enactment of the Enhancement and Conservation of National Environmental Quality Act of B.E. 2535 (A.D. 1992) which was transformed to the 20-year Policy and Plan for the Enhancement and Conservation of the Environmental Quality B.E. 2540 - B.E. 2559 (A.D. 1997 - A.D. 2016)

The second stage is the system-working stage (A.D. 1992 – A.D. 1997) in which environmental legislation was in place. The system included command and control approach and economic instruments. Furthermore, the environmental operation undertaken in the past started from policy and plan formulation to implementation by applying command and control measures on polluters forcing them to comply with standards. When population increased as well as business activities and popular activities, command and control measures became limited by monitoring and inspecting personnel as well as by operating budget, and others. Economic instruments, therefore, have been used to manage pollution voluntarily and have become an alternative for polluters in managing their own pollution.

In addition, voluntary operation such as ISO 14000, Green Label, and Clean Technology have become other means of management of natural resources and environment as market has been created stimulated by consumers' demand. International market pressure and international measures also forced exporters to comply with various trade conditions employing environmental measures as requirements for imported goods standard.

The third stage is the system-management stage (since A.D. 1997) in which the new Constitution B.E. 2540 aimed at decentralizing power to people. This has provided an opportunity for local people to participate in local natural resource and environmental management.

In Thailand, the Government has begun to transfer authority to localities by providing them with more roles in the management of natural resources and environment. The organizations of the locality are to formulate plans for the rehabilitation and prevention of natural resources and environment, assessment of environmental quality, monitoring of water quality, and rehabilitation of coastal condition, for example.

All these policies, measures, instruments, and plans, reflect the awareness of the government sector and the public in the conservation of natural resources and environment.

Thailand is still in need of technologies, experts, as well as personnel development to support her management of natural resources and environment in the future.

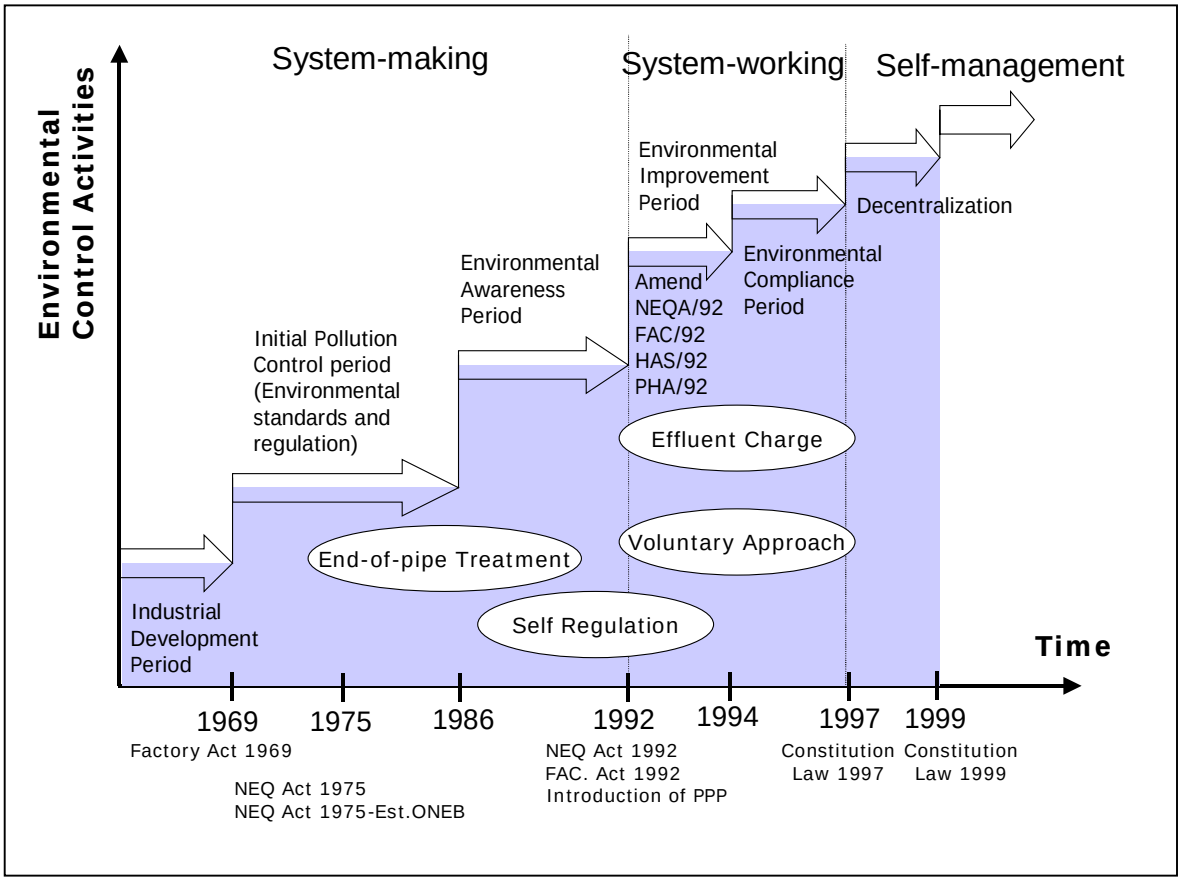

Figure 2.1: The Development of Environmental Enforcement and Compliance in Thailand

3. Environmental Research and Training Center in SEMS

3.1 ERTC during and after the JICA project

Since 1980, Thailand and Japan have been involved in a joint project called the Control of Environmental Quality and Laboratory Technology Project. The purpose of this project was to identify effective means of promoting pollution control activities, to reinforce the function of environmental laboratory services at national level, and to organize a system of research related to environmental pollution and its control.

The success of the initial collaboration between Thailand and Japan led to proposals for the establishment of the Environmental Research and Training Center (ERTC) in 1983. The Government of Japan agreed to support the establishment of ERTC with a grant of 2,314 million Yen, which at that time was equivalent to 463 million baht. It was agreed that the Government of Thailand would take responsibility for land preparation, construction of access roads and fences, installation of electricity, telephones and water supply to the site. The ERTC subsequently commenced its operations in November 1991.

ERTC is under the overall jurisdiction of the Department of Environmental Quality Promotion (DEQP), Ministry of Science, Technology and Environment which was transferred to the Ministry of Natural Resources and Environment in 2002. The fundamental purpose of ERTC is to carry out research and to provide technical support in the implementation of environmental training and to promote technology transfer relevant to environmental and natural resources management and pollution control. It carries out research to develop standard analytical methods for various types of environmental samples and certifies environmental testing laboratories of government organizations. ERTC is also the center of the ASEAN network of environmental monitoring.

-Objectives:

1) Formulation of plans for the development of programs in training, conferences, or academic seminars concerning environmental technology;

2) Undertaking of research and development for monitoring methods in monitoring and checking environmental quality and coordination in international environmental checking cooperation programs;

3) Undertaking of research and development for appropriate technology for pollution control including research and development for recycling techniques and appropriate eradication;

4) Undertaking of research and development for environmental sample analytical methodology including production of standard references as well as giving advice on the use of scientific instruments and on environmental sample analytical methodology to agencies concerned;

5) Coordination in accuracy verification of information and data concerning pollution conditions from laboratories among agencies; and

6) Carrying out work in conjunction with or in support to the operation of other agencies concerned or as being assigned to.

-Structure

ERTC is divided into 4 work groups as follows:

1. General Administration Work Group

2. Environmental Technology Transfer Work Group

- Training Section

  ERTC has developed training programs on environment with the cooperation of experts from Japan and Kasetsart University. A United Studies Graduate Education Project on Science and Environment was set up in 1992 and its curriculum has been used as the basis for training. Up to 2002, 5,027 people have completed ERTC training (see number of participants in Appendix 3).

  The personnel targeted for training are those whose work involving environmental pollution controlling systems as well as those who formulated environmental policy and planning, administrators and management, laboratory personnel carrying out research on environmental samples from public sector, state enterprises, private sector and private educational institutions throughout the country.

- Conference and Seminar Sub-section

Conference and Seminar Sub-section is under Training Section. Seminar topics selected were those currently significant. The seminars were organized to also disseminate various research works of the Research and Development Work Group of the Center.

Seminars organized were under the following topics:

Environmental Conferences

- ASEAN-cum-GMS State of the Environment (SoE) Database and Reporting
- Marine Pollution Research and Monitoring Training Workshop on Toxic Contaminants
- The Third Asian Symposium on Academic Activity for waste Management

Environmental Seminars

- Environmental Academic Seminar Projects
- Groundwater with Hazardous Substance Contaminants
- Management of Contamination Problem caused by Industrial Volatile Organic Compounds in the Environment
- Environmental Administration and Management Database Network System

3. Environmental Research and Technology Development Work Group

Since 1992, the ERTC has been undertaking environmental studies to promote and develop environmental quality within Thailand. These studies covered the analysis of water quality from different water sources contaminated by wastewater from different human activities, determining noise and air quality in order to study the concentration of air pollutants from industrial and vehicular sources, solid waste and wastewater management, developing a natural resources database and using geographic information system to improve environmental quality in provinces.

This research work group is divided into 3 sections, they are:

- Water Research and Technology Development Section
- Air, Noise and Vibration Research and Technology Development Section
- Hazardous Substance Research and Technology Development Section

(see research topics under each section in Appendix 4)

4. Environmental Standardization Work Group

The Environmental Standardization Group is responsible for the provision of standard methodology to analyze environmental samples, including standard reference materials. It coordinates the inter-calibration of environmental data among laboratories and assesses the accuracy and reliability of data. It provides recommendations for improvement, helps to ensure the quality of data in the laboratories, and certifies laboratories. This group consists of 3 Sub-sections: 1) Testing and Auditing Sub-section, 2) Standardization Development Sub-section, and 3) Statistics and Evaluation Sub-section (see major research works in Appendix 5).

3.1.1 During 1991-1997[11]

During 1991-1997, ERTC received technical cooperation from the Government of Japan through the Japan International Cooperation Agency (JICA), which provided Japanese experts, machinery, equipment and other materials, as well as capacity build-up training for ERTC officials in Japan.

In addition, the grant as provided by the Government of Japan included ERTC's office construction. There are 2 main buildings constructed with reinforced concrete. Each building has 3 storeys with connecting corridors. Total floor space is 8,156 square meters with the following details:

Facilities	Sq.m.
Administration Block	714
Training Block	1,908
Research and Monitoring Block	1,548
Dormitory Block	1,720
Services	2,216
Outdoor Facilities	88

The analysis of the grant received from JICA during the first 5 years conducted from the questionnaire interview of responsible personnel for various work groups of ERTC including its

[11] An interview with a government officials of Environmental Research and Training Center (September 2002)

Director and executive officers, revealed that the effects of JICA's assistance since the Center's inception to 1997 are as follows:

1) The Machinery, Equipment and Materials

Most of the machinery/equipment received from JICA under the cooperation since ERTC's inception were old and out of date. Parts are no longer available for maintenance and repair. Sometimes parts have to be ordered from overseas which is time consuming and not worth repairing.

In addition, as no training or manual of some of the machinery/equipment was available, the officials were unable to use it. Another important problem was that the scale precision of some of the machinery/equipment was insufficient to measure Thailand's pollution and thus they had never been used which is considered to be economically wasteful.

2) The Technicians

Initially, JICA's assistance granted was one-sided. JICA's experts transferred their know-how to the Center's researchers but there was no joint implementation. And thus there initially were gaps between the skill of JICA's expert and that of the Center's officials.

However, personnel development during that time was necessary for ERTC as it was the initial stage and the Center lacked technically experienced personnel for research and training.

Problems and obstacles were visiting experts were not in the same field of knowledge as the project under study by the Center. Experts did not clearly understand their roles causing loss of benefits and the Center's personnel were not given suitable knowledge to carry out the research projects.

Last point in this issue concerned technicians supported by JICA who were commissioned for a short-term period and thus time needed for exchange of knowledge was insufficient. Technician assistance in the future should be a long-term one.

3) The Building

The building which was constructed financially by JICA's assistance was more suitable for laboratories than offices thus making office arrangement difficult. As

most of the area was designed for laboratory activities, the offices of heads of the Environmental Research and Technology Development Work Group which adjoined the laboratories have always been affected by substances evaporated from the laboratories.

3.1.2 During 1997- present[12]

ERTC operation after support from JICA was withdrawn since 1997 can be seen in two separated scenes discussed as follow.

1) The Government of the Former Prime Minister Chuan Leekpai (1997-2000)

The operating budgets of the Center's since its inception to present were received mainly from the Thai Government. The largest portion of such budget was allocated for research work and next in importance is for training. In 2003, 20% of the total budget was allocated for research work while 12.4% for training (Table 3.1).

Table 3.1 Budget of the Environmental Research and Training Center

Year	Total Budget (Million baht)	Percentage of Research Work		Percentage of Training	
		Million baht	*%*	*Million baht*	*%*
1992	11.6	0.2	2.1	0.2	1.72
1993	20.4	7.5	36.8	0.3	1.72
1994	25.6	7.5	29.2	0.7	2.73
1995	41.3	5.0	12.1	7.9	19.0
1996	51.5	5.0	8.2	9.6	15.7
1997	53.8	8.4	15.7	7.0	13.0
1998	40.2	2.0	4.9	1.1	2.8
1999	39.5	1.8	4.6	1.1	2.9
2000	70.4	7.2	10.3	0.9	1.4
2001	55.0	7.9	14.4	1.1	2.0
2002	49.8	6.9	13.8	3.0	6.0
2003	85.5	17.1	20.0	10.6	12.4
1992-2003 Average		*6.9*	*15.6*	*3.9*	*7.3*

Source: Environmental Research and Training Centre, 2002.

[12]Ibid.

Since JICA have withdrawn its assistance in 1997, ERTC requested assistance for its research work from other organizations such as Swedish International Development Agency (SIDA), Danish Cooperation for Environment and Development (DANCED), United Nations University (UNU), United States-Asia Partnership (US-AEP), Green Aid Plan (GAP)[13], World Bank, Deutsche Gesellschaft fur Technische Zusammenarbeit (GTZ) GmbH, and United Nations Environmental Program (UNEP). Large part of the assistance was in the form of supplying of experts, equipment, training and partial financial support for research work.

Assistance from various organizations together with the Center's policy to develop the capacity of its personnel has given the Center's research personnel continual development and training whose research skills match those of overseas researchers.

2) The Government of the Prime Minister Thaksin Shinawatra (2000-present)

Since the present government is now focusing on decentralization to local level, the entire governmental sector is required to conform to the new political shift. Therefore, ERTC has been assigned to develop training courses on natural resources and environmental management for environmental governmental personnel throughout the country.

In addition, ERTC has planned to become the national center for environmental research and training while its role in environmental monitoring was subtled down and transferred to Pollution Control Department (PCD). Moreover, the center has also planned to shift its role from being a laboratory service provider to setting up laboratory standards and providing consultancy service to other agencies nationwide. Hence, the government's assistance alone would not achieve the Center's objectives. The Center is still in need of assistance from foreign organizations especially for personnel development and research support in the form of exchange programs, or on-the-job training, or network construction.

The assistance the Center needs from JICA's is a program for the exchange of knowledge, equipment, and resources among the 6 environmental research and training centers (Thailand, China, Indonesia, Mexico, Chile, and Egypt). This can be achieved by the setting up of a joint committee holding meetings annually with rotating chair-country undertaking joint research work to exchange experience in order to strengthen the Center of each participating country.

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13 Green Aid Plan or GAP was initiated in 1992 by Japan's Ministry of International Trade and Industry in response to growing of environmental problems in developing countries.

3.2 Relations with Government, Market, and Community

During the past ten years, ERTC undertook over 40 research works regarding water, air, and toxic substances (details in Appendix 4). Ten to thirteen training programs were given annually with more than 5,000 participants from central and regional agencies, private organizations, academic institutions, etc., since its inception to 2002 (details in Appendix 3).

The criteria to analyze importance of the Center towards the government sector, market, and community are as follows:

3.2.1 Relevance of the Project

-Training[14]

Training topics would be major environmental issue at the time or as mainly requested by would be training participants. Several topics were given more than once such as environmental studies, garbage management, and eco-tourism management.
In addition, some of the training topics were suitable for participants to implement in their daily life, for example, people participation in environmental management, suitable technology for the management of community waste, and how to resolve conflicts in public project. People participation in environment program would help forming the people's environmental knowledge base as well as environmental awareness and monitoring while community waste management and conflict resolution would be useful for management of community environment and resolving social problem concerning environment.

Table 3.1 reveals that (1) the government budget allocated to training is 2,100 baht per person on the average while private sector training cost 2,500 per person per day, or 10,000 - 30,000 baht per training; (2) the amount of government budget for training is not the same every year and neither is it on increasing nor decreasing trend. It depends on ERTC's request and on the government allocation. The budget could be categorized into three groups as follows:

1)	Small budget:	0.2 -1.1	million baht annually
2)	Medium budget:	3.0	million baht annually
3)	Large budget:	7.8 -10.0	million baht annually

[14]ERTC, http://www.ertc.deqp.go.th/Training/Train_eng.html, "Environmental Training", [September 12, 2002]

The above statement reveals that

- The budget allocated to ERTC and the money collected from training participants are operating expenses, not including cost of investment
- Training personnel may have worked under capacity in some years and over capacity in others.
- Budget variation of this nature makes planning for operation and training personnel development difficult.

-Research

Research topics were knowledge enhancing and can be implemented in environmental management such as Study on Health Effects of Noise to the People in Bangkok, Study on Lead Residue from Battery Factory in Pathumthani Province by Using Hair Samples, and Research on Environmental Impacts of VOCs Contaminated Groundwater in the Area of Northern Industrial Estate, Lampoon Province, etc.[15]

In addition, some of the research topics were presentation of impacts that had take place which led to the country's setting up of environment standards, for example, Technique for Investigation of Volatile Organic Compounds (VOCs) Contamination in Soil and Groundwater which led to the setting up of VOC standards by the Industrial Estate Authority of Thailand having listed the topic in its operation plan to solve groundwater contamination problem. As the problem also affects Thailand's air quality, ERTC also conducted related research work on Volatile Organic Compounds in Ambient Air in Maptaput Industrial Estate Case Study: General Environmental Conservation Public Company Limited (GENCO), and Study on Air Pollution in Bangkok Emphasis on Volatile Organic Compounds.

3.2.2 Efficiency

[15]ERTC, http://www.ertc.deqp.go.th/Research/AirNoise_eng.html, "Air, Noise and Vibration Research and Technology Development", [September 12, 2002]

Efficiency is measured by personnel development and the number of personnel increase in Research Work Group and Training Work Group from the Center's inception. Detail of personnel structure of ERTC is as follows:

Table 3.2 Number of Research, Development, and Training Personnel of ERTC in 2002

Work Group	Officials	Permanent Employees	Temporary Employees	Total
Environmental Technology Research and Development				
- Hazardous Substances	11	2	10	23
- Air and Noise	12	2	13	27
- Water	11	1	9	21
Technology Transfer	12	2	14	28
Environmental Standards	9	2	10	21
Total	***55***	***9***	***56***	***120***

According to the above table, there are 120 research and training staff members. 55 persons or 46% are government officials, 9 are permanent employees and 56 are temporary employees, or 7% and 47% respectively. Rate of increase in number of staff members during 1992 through 2002 for government officials is very minimal (Fig. 3.1 and Table 3.3) thus making ERTC's personnel development moving horizontally meaning development mainly had effects on officials and permanent employees. This is due to the government policy of not increasing the number of government officials which could cause problems to the Center in the future as present officials would be promoted to executive levels and there could be shortage of staff members at operation level.

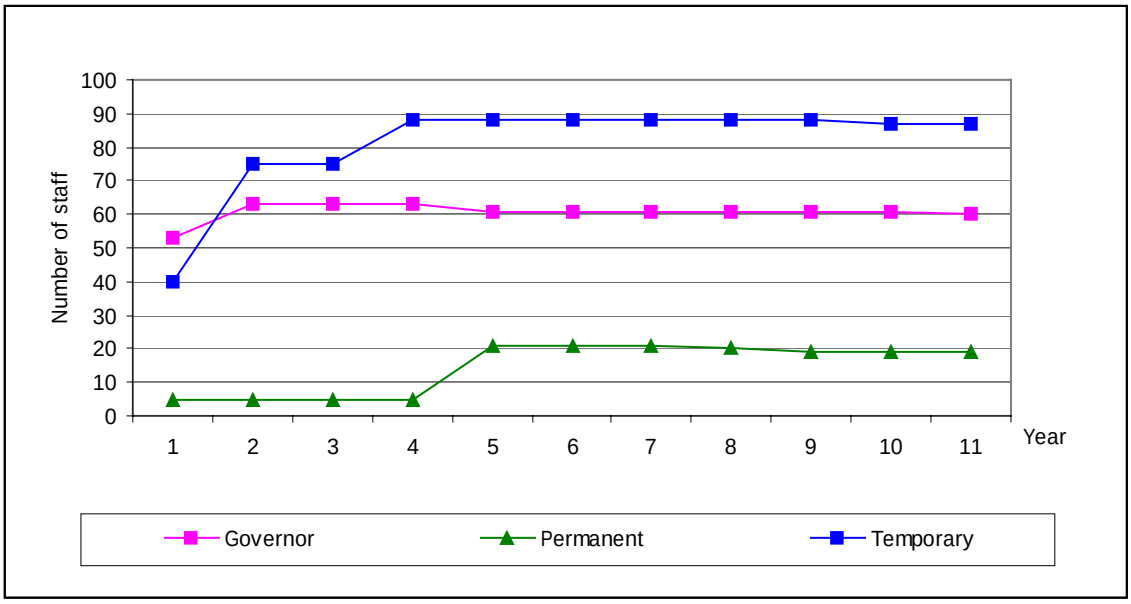


Figure 3.1 Number of ERTC's employers classified by employment status between 1st year and 11th year

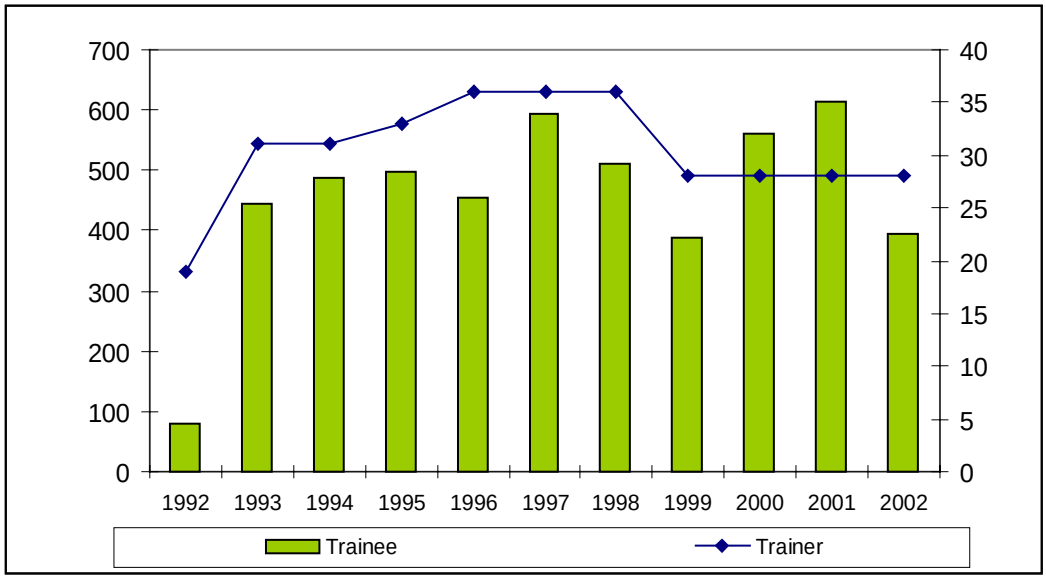
Table 3.3 Number of ERTC's officers during 1992-2002, classified by type of employment

Year	Governor			Permanent Staff			Temporary Staff			Total
	Research Group	*Training Group*	*Other*	*Research Group*	*Training Group*	*Other*	*Research Group*	*Training Group*	*Other*	
1992	29	7	17	1	0	4	14	12	14	**98**
1993	29	12	22	1	0	4	13	19	43	**143**
1994	29	12	22	1	0	4	13	19	43	**143**
1995	29	12	22	1	0	4	17	21	50	**156**
1996	35	12	14	6	2	13	39	22	27	**170**
1997	35	12	14	6	2	13	39	22	27	**170**
1998	35	12	14	6	2	13	39	22	27	**170**
1999	35	12	14	6	2	12	32	14	42	**169**
2000	35	12	14	5	2	12	32	14	42	**168**
2001	35	12	14	5	2	12	31	14	42	**167**
2002	34	12	14	5	2	12	31	14	42	**166**

Another problem of the Center is that training of research and training staff members requires continuity so as to make them experts. However, 50% of them are temporary

employees who would leave the Center after they have completed training. Because of no employment policy for permanent employees or officials, the Center is always in need of assistance regarding experts and it is forced to rely on outside resource persons for training. The Center has no potential with regard to its personnel development to accommodate future expansion of the training work group.

Comparing the number of training participants to the number of training staff members, changes during 1992-1999 were in the same direction. However, from 1999 to present, the number of training staff members remained the same while the number of training participants increased in 2000-2002. And the Center employed more outside resource persons such as personnel from academic institutions or environmental agencies as most of the training programs deal with administration and management of natural resources and environment, it is not really necessary to employ many technical resource persons (Fig. 3.2).



Unit: persons

Figure 3.2 Number of Trainees and Trainer between 1992 and 2002

However, as mentioned above, ERTC is still in need of personnel development in training to accommodate its future training programs in order to rely less on outside resources and especially to increase the potential of its personnel to achieve the status of being a principal training center for natural resources and environment of Thailand.

The analysis of research work efficiency conducted by comparing research work quantity to the number of the Center's researchers reveals that the average rate of production of research work of the three work groups (water, air and noise, and waste) is 5 projects a year. The number or researchers which was increased by a big leap in 1996 was constant from 1996 to 1998 and

was reduced slightly during 1999 through 2002 (Fig. 3.3). The number of projects was reduced to 2 a year in 1999, increased to 4 a year during 2000 through 2002 as they were 2-3 year projects in progress.

In summary, ERTC has efficiently disseminated knowledge of natural resources and environment to government sector, market and society. This is evidenced by the number of participants in training, the number of training staff members, and the number of researchers which are all increasing. It should be noted that 64% of the training participants being government officials who would apply what they received from the training to the management of natural resources and environment with which they involved.

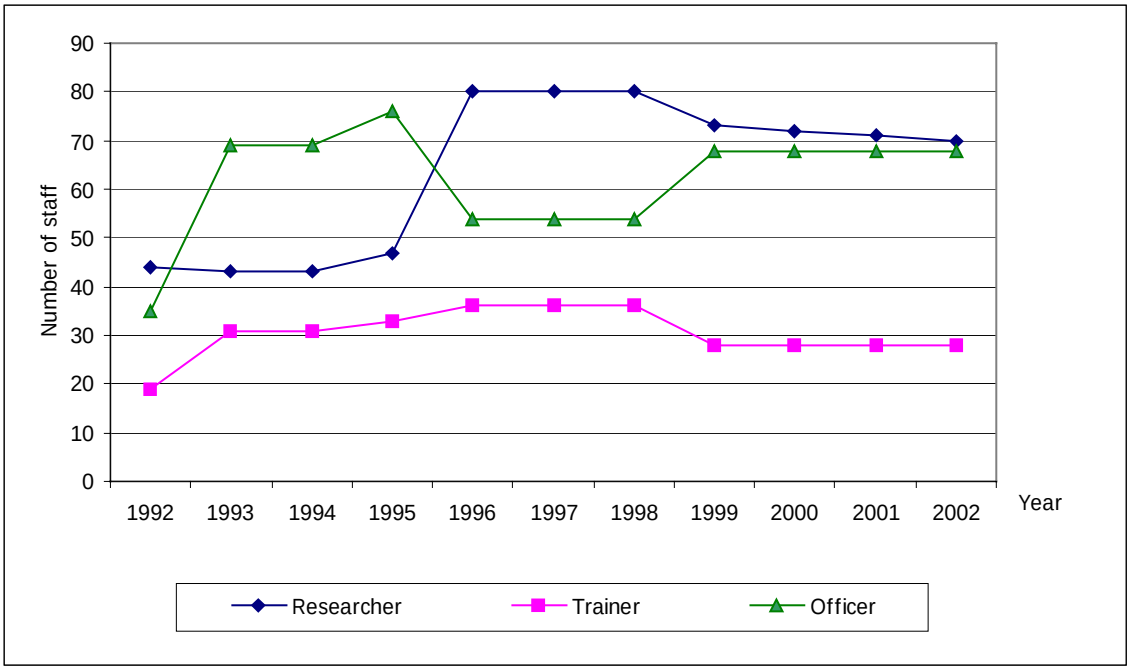


Figure 3.3 Number of ERTC's officers classified by group of work

3.2.3 Effectiveness

Effectiveness of the ERTC is measured by the benefits and concrete application of research work and training programs. Assessment was made by interviewing technicians and officials of the Ministry of Science, Technology, and Environment by questionnaire requesting opinion on the roles of the Center towards the Ministry personnel, opinion on the importance and advantage of the Center, and the opinion of former training participants of ERTC regarding the benefits they gained, and the opinion toward ERTC's development and its future pattern. The outcome is as follows:

-The Ministry of Science, Technology, and Environment's Personnel

The interview was conducted among 50 samples of personnel working in 9 agencies under the umbrella of Ministry of Science, Technology and Environment as follow.

1) National Research Council of Thailand (NRCT) - 4 samples
2) Pollution Control Department (PCD) – 13 samples
3) Department of Environmental Quality Promotion (DEQP) – 2 samples
4) Office of Environmental Policy and Planning (OEPP) – 11 samples
5) National Science and Technology Development Agency (NSTDA) – 4 samples
6) Department of Science Service (DSS) – 2 samples
7) Department of Energy Development and Promotion (DEDP) – 4 samples
8) Office of Atomic Energy for Peace (OAEP) – 4 samples
9) National Center for Genetic Engineering and Biotechnology (BIOTEC) – 5 samples

The interview reveals that 76% of the interviewed samples knew ERTC as an agency under the Ministry while 24% of that did not have that knowledge, including 2 samples from environmental agencies[16] accounted for 8% of 26 samples in total. 82% of the personnel who knew ERTC knew of its roles and duties. 68% of the personnel who knew ERTC worked in connection with it. 3% worked closely. However, 21% of this group did not know that ERTC carried out environmental research. The majority of the personnel knew ERTC by through its environmental training/seminar (95%) more than its research work (79%). Only 16% of them applied ERTC research work (Table 3.4). With regard to training/seminar, 30% of the total number of the interviewees participated of which 91% was satisfied with the training/seminar program. All those participated in training/seminar said that the programs were useful to society and environment and all would participate again if they have an opportunity.

[16] The environmental agencies under the former Ministry of Science, Technology and Environment include DEQP, PCD and OEPP.

Focusing on the Ministry's personnel working in environmental areas, 92% of the total 26 samples knew ERTC well, of which 42% indicated that they had joined ERTC's training, while only 25% had found ERTC's studies useful for their works. This may be an implication that ERTC's studies tend to be indept reseach on specific topics, which are not applicable to other agencies' tasks in general.

Table 3.4 Outcome of Interview of Officials of the Ministry of Science, Technology, and Environment

unit: %

Do you know ERTC?			
No	24		
Yes	76	**1. Do you understand ERTC's roles?**	
		Yes	82
		No	18
		2. Does your work relate to ERTC?	
		Yes	63
		No	37
		3. Do you know whether ERTC do research on environment?	
		Yes	79
		3.1 Have you ever used ERTC Research work?	
		Yes.	*16*
		No.	*84*
		Don't know environmental research available.	*21*
		4. Do you know whether ERTC organize environmental training/seminars?	
		Yes	95
		4.1 Have you ever participated in ERTC training/seminar?	
		Yes.	*31*
		(1) Your satisfaction in participating	
		High	63.6
		Moderate	27.3
		Indifferent	9.1
		(2) Do you think ERTC's training/seminar beneficial?	
		Yes.	100
		No.	0

		(3) Would you participate again if you have a chance?	
		Yes.	100
		No.	0
		No	*69*
		I don't know about ERTC's training/seminar	5

-Former Participants of ERTC's Training/seminar[17]

The evaluation of ERTC's 100 former training/seminar participants by random sampling from 9 programs during the past 10 years by questionnaire interviewing reveals that 53% graduated with a bachelor's degree and 72% worked in government sector. 47% of the samples participated in ERTC's training/seminar once and 94% of the samples had training/seminar expenses paid by their agency.

The correlation between various factors shows that the function of the agencies of the participants had relationship with the application of knowledge obtained from the training/seminar to their work. Training/seminar participants from government agencies joined training programs which were highly related to their work at 58% of the total number of government officials who answered the questionnaire or 73% of the total number of interviewees. For the participants from state enterprises, the programs they joined very highly and moderately related to their work received an equal rating of 50%. With regard to the participants from private sector and academic institutions, the programs they joined highly related to their work had the rating of 67% and 60% respectively. Participants from NGOs rated the program relationship to their work at 67%.

With regard to the application of knowledge from training/seminar program, it is found that 74% of the participants who answered the questionnaire from all organizations thought that the knowledge was very useful. The majority of them thought that the level the knowledge could be implemented is high both at the time of training/seminar (51%) and at present (58%).

With regard to overall picture of ERTC's roles, participants rated high level (80%) for issue No. 1: Relationship between the training/seminar program and the participants work; issue No. 2: Knowledge and benefits from training/seminar program received; issue No. 3: Knowledge could be implemented at the time; issue No. 4: Knowledge is beneficial to current work: and

[17]ERTC, http://www.ertc.deqp.go.th/Training/Seminar_eng.html, "Environmental Seminar", [September 12, 2002]

issue No. 5: ERTC's training/seminar programs are useful to personnel concerning with management of natural resources and environment. Only issue regarding participants' interest in rejoining training/seminar program received 100% or highest level from the majority (58%) of the participants, as shown in Table 3.5.

Table 3.5 Opinion of Former Participants to ERTC's Training/Seminar Programs

Unit: percent

Evaluation Issues	**Nothing (0%)**	**Little (20%)**	**Moderate (50%)**	**High (80%)**	**Highest (100%)**
Relationship between training/ seminar program and work	0	4	18	**57**	21
Knowledge and benefits obtained from training/seminar program	0	1	14	**74**	11
Knowledge obtained could be implemented at the time	2	3	35	**51**	9
Knowledge obtained is still beneficial to work at present	4	6	17	**58**	15
Opinion on benefits of training/ seminar program on agencies and personnel concerning environmental work	0	1	6	**59**	34
Would you participate again if you have a chance?	1	2	7	32	**58**

3.2.4 Impacts

-Social impact:

Either environmental research work or training/seminar conducted by ERTC creates positive social impact on Thailand, they are:

(1) Training programs help raise awareness of the people in the management and conservation of natural resources and protection of environment such as Eco-tourism

Management Training Program, and Strategies in Raising Community Environmental Awareness.

(2) Dissemination of natural resource and environmental knowledge from research work and training programs to community help creates cooperation and willingness in resolving the problems they are having. Examples in many countries show that the community has influence over environmental management of the locality through political process thus strengthens law enforcement.

(3) Enhancement of people participation in the management of natural resource and environment of the locality supports the government's policy of decentralization of power in that people of the locality carry out their own policy in the protection and conservation of their natural resources and environment. The programs are, for instance, Sustainable Town Development Program; Appropriate Technology for the Management of Community Waste Program; and People Participation in Project having Environmental Impact.

(4) There have been approximately 5,000 trainees participating in the ERTC training in the last 11 years which means that ERTC provides training to 460 trainees a year in an average.

(5) ERTC personnel is hired on the full-time basis, thus, they can fully devote their time in research activities, while other environmental agencies, such as OEPP, PCD and DEQP, practically distribute the jobs to sub-contracters due to a limitation of human resources. Compared to academic sector in which the staffs' job functions vary from teaching, conducting research and other activities, ERTC seems to be at the advantageous position as they are able to concentrate on their research activities and continuously develop their skills.

-Environmental impact:

Many ERTC's research works are positively beneficial to environmental rehabilitation and Thailand's environmental development such as the Study on Health Effects of Noise to the People in Bangkok, the Study on Air Pollution Problem in an Industrial Area of Pathumthani, Monitoring Heavy Metals in the Gulf of Thailand: Using Mussel Watch Approach and Development of Constructed Wetlands for Domestic Wastewater Treatment.

In addition, research works were also implemented by PCD as the prescription of groundwater standards in the year 2000 which was in continuation of a research on the Development of High Sensitivity Gas Chromatograph for Detecting Factories Causing Groundwater Contamination by Volatile Organic Compounds and the designation of pollution control area from a research entitled: Study on Arsenic Contamination in Dust and Rainwater at Ronphibun District Nakhon Si Thammarat Province.

Furthermore, ERTC's works are indept research studies that may directly lead to formulation of practical frameworks and action plans since the center is under the Ministry of Science, Technology and Environment which has a number of agencies with potential to deliver the studies to real world practices. For example, PCD had applied an ERTC's study to set up standard for VOCs contamination in ground water as mentioned earlier.

Environmental personnel were much interested in ERTC's environmental training/seminar programs which is evidenced by the increasing number of applicants applying for participation each year (Appendix 3). Some programs such as Eco-tourism Management, Community Waste Management, and Environmental Awareness Raising, interested a great number of prospective participants and had to be reopened for a second or third round in the following years.

3.2.5 Sustainability

ERTC's sustainability can be analyzed in three areas as follows:

1) ERTC's roles towards society and environment

ERTC has been established for more than 10 years and is well known for environmental training. ERTC is well staffed with resource persons, experts, and well equipped with tools and training venues. Besides, being an agency of government sector under the supervision of the Department of Environmental Quality Promotion, the Center has credibility and is accepted by personnel involved in the management natural resources and environment of the country.

Another major role of the Center is the research and development work on the follow-up and monitoring of environmental quality and the development of appropriate technology for the control of pollution. The Center's research works were acceptable and led to prescription of measures, formulation of policy, and implementation plan of environmental management of the country. It also plays important roles in locality

administration as it has been assigned by the Ministry of Natural Resources and Environment to prepare training programs for basic management and how to draw up environmental quality management plan to train environmental officials nationwide in 2003. This is to enhance sustainability of Thailand's management of natural resources and environment in the future.

2) Operating Budget

One of the factors enhancing ERTC's sustainability is the Center's operating budget which is presently provided 100% by the government. At present, 17% of the Center's annual budget is allocated to project management (Appendix 6). Each year, research budget would be cut down by more than 50% resulting in narrower scope of studies of several projects.

Besides, ERTC is now facing major problem of having to leave government agency system. The Center is engaging Thammasat University to carry out feasibility study regarding the problem. In addition, cooperation and assistance from private sector and overseas organizations are usually in the form of personnel development and tools/equipment rather than project expenditure. Such being the case, ERTC may have to face problems in its operation in the future because of the rising operating expense, if the organization is transformed into private enterprise.

3) Future Organization Development

A factor obstructing ERTC's sustainable development is personnel constraint. Although ERTC is assisted by overseas organizations and other bodies in building up the potential of Center's researchers by their supplying of experts giving expert advice or conducting joint research work, the government sector policy for not increasing the number of government officials resulted in no development of operating personnel having employee status. Resignation of employees who had been trained for a long period of time and had reached operation level caused loss and non-sustainable development to the Center. Another undertaking which has continuity both in the operation and long-term benefits to the society is the development of the Center's potential by the setting up of the Environmental Standardization Group. The Group coordinates the accuracy of information concerning pollution from laboratories among agencies. It also provides technical assistance to environmental laboratories including the setting up of environmental laboratory standards

serving government sector and private sector. ERTC's highlight is its experts who would provide service in setting up laboratory standards, the first of its kind in Thailand. A good opportunity to bring about sustainable development to the Center in the future.

3.3 Lessons and future direction

ERTC's problems since its inception until presents influencing its future direction are:

1. Personnel: As mentioned earlier, the government's policy not to increase the number of its personnel caused inadequacy in operating level officials as they are now moving on to senior level and executive level. The policy also affected personnel development as operating level officials are hired on a temporary basis. After having been trained and becoming competent, they would resign to a more secured job.

2. Privatization: Because the Center's development was rapid and it is better prepared than other agencies in the Ministry of Natural Resources and Environment together with the government's privatization policy, the Center is eyed as being capable of governing itself without having to rely on the government. If the Center is separated from the government system, it will have to charge research fee and training fee more realistically (at market price) which will make competition tougher as there are many consulting companies at present. Credibility would not be as high as before as it is now within the private sector.

3. Budget: Each year budget cut in research projects cancelled the purchase of research technology and research tools/equipment. Only the purchase of high priority tools was sustained. Scope of research had to be narrowed in accordance with budget allocated thus impeding the Center's research projects.

However, highlights in ERTC's future development are as follows:

1. ERTC's personnel expertise: Most of the officials of the Center have been working since its inception and are bound to it. They are specialized academicians in this field who will be the major force for the Center's future development.

2. Well-prepared: The objectives for the establishment of ERTC was to find effective ways to promote pollution control activities, to support administration of research in national level environmental laboratory, and to organize research and training

systems. These have made the Center well-prepared for premises, equipment, and personnel to accommodate such undertakings. ERTC therefore has unity and potential in conducting environmental research and providing services regarding environmental standard checking, setting up of laboratory standards and training effectively.

3. Connection: From its credibility and being well-known in research and training, the Center has joined international research network and has been given assistance from many countries and international organizations. Good relationship would lead to the building up of environmental network in the future.

From its advantages and drawbacks, the Center's future direction could be formulated by rectifying its drawbacks and highlighting its advantages, i.e., the Center should separate its administration from the government sector in order to fully effect personnel development. Staff members should be increased where necessary and decreased where it is not in order to create flexibility in administration and management as well as high level of efficiency in case of private sector type of administration if the policy is formulated as such. The Center can use its advantage in personnel resources to lead its personnel development at practical level. Its readiness in premises and equipment will enable the Center to continue its training development without having to start at square one.

In addition, market competition would be a significant factor propelling the Center's further and stronger development with real operating expenses and profit making. Projects could be launched without being affected by cut as when relying on government budget.

Good relationship with other organization not only is useful in searching for grants for the Center's research and operation but also is useful in its development in building up international environmental research and training network. Not only will it become the exchange of research technology, knowledge, tools/equipment among themselves, the cooperation will help set up environment standards or build up environmental market power against environmental measure trade barriers set up by other countries. If the cooperation could be made towards this direction, ERTC would play important roles in Thai society and Thailand's environment in the future.

4. Conclusion

The development of natural resource and environment management became clearer in the 7th National Economic and Social Development Plan (1992-1996) which added promotion in environmental personnel development especially in the fields of education and public health. This meant personnel shortage in such fields.

The setting up of Environmental Research and Training Center in 1992 helped build environmental personnel for Thailand under the 7th National Economic and Social Development Plan (1992-1996) which initiated the policy in this aspect in the same year. Ten years of operation proved that ERTC played the large part in producing environmental personnel by training and development of more than 5,000 people and by undertaking over 47 research projects important to the setting up of major measures in the management of natural resources and environment.

However, the indigence problem of the people and the economic crisis of 1997 were significant and had become the main target for the formulation of government policies. This somewhat deprived the budget for the remedy and protection of natural resources and environment. Thus, ERTC budget from the government was cut and did not receive full support. Moreover, ERTC faced personnel development problems as it was not able to increase its official staff members, shortage of experts, research tools/equipment, reduction of quantity of work due to limited budget. In this regard, foreign assistance is still highly necessary for the country's development of science, technology, and environment.

In order to reduce reliance on assistance from the government and overseas, ERTC's direction of operation in the future should be as follows:

1) Privatization: Separation from government will enable the Center to fully manage its affairs with more flexibility. Development and increase of personnel could be done efficiently and conveniently. In addition, ERTC will have enough potential to administer and manage its affairs especially its readiness with regard to personnel, equipment, tools, and training premises, etc.

2) Network: ERTC's long-standing credibility and reputation will support its building up of natural resource and environmental research network whether it is the building up of network among environmental and training centers supported by JICA in China, Indonesia, Mexico, Chile, and Egypt, or supported by foreign environmental agencies used to work together such as UN-AEP, SIDA, GTZ, etc. Cooperation within the network would be exchange of experience, tools/equipment which would reduce cost and speed up research work to better match current situation than work alone.

However, ERTC's policy for the next decade is to become the center of Thailand's clean technology and to set up laboratory standards. Feasibility study reveals that ERTC has sufficient potential and readiness to be the leader in this field besides research and training which presently bring good reputation to the Center. Whether ERTC decides to be under the administration of the Ministry of Natural Resources and Environment or to be fully privatized, these ERTC-formulated policies would help enhance the sustainable management of the country's natural resources and environment which shall be beneficial to Thailand's social and environmental development in the future.

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Appendix I

-Command and Control Approach

1. Air

Type	Command and Control Measures	Implementation and Enhancement Measures
1. Air Pollution	- Pollution emission standards for new vehicles and during operation - Pollution emission standards from point source - Ambient air quality standards - Standards for emission of sulphur dioxide from fuel combustion of factory excluding power generating plant - Standards for polluted air from old and new power generating plants - Standards for emission of polluted air from garbage incinerator - Standards for emission of dust particles from stone quarries - Standards for cresol concentration discharged from factory - Emission standards for gasoline vapour from oil depots	- Imposition of less tax on diesel fuel than tax on gasoline - Requiring all automobiles running on gasoline sold since 1992 be equipped with Catalytic Converter - Prescription for all Bangkok Mass Transit Authority's buses to have operating life not exceeding 10 years and switching over to low sulphur diesel fuel (0.05%) soonest. - Prescription of standards for buses operating in Bangkok and its greater area to use natural gas as fuel or EURO II - Setting up of controlling and monitoring systems for air pollution from point source - Follow-up of environmental impact alleviating measures - Prescription of criteria for construction of buildings and public utilities - Study of environmental impact - Formulation of plans for condition examination of joint service buses especially for fumes and noise; non-compliance means suspension until rectification - No-incineration policy as Thailand's air pollution is usually caused by open burning

2. Toxic Substances and Toxic Materials

Type	Command and Control Measures	Implementation and Enhancement Measures
1. Toxic substances, toxic materials, hazardous materials	- Criteria, measures, and methods controlling hazardous waste management	- Tax reduction for battery products using recycled lead from lead recycling facilities - Campaign for public awareness of toxicity and safe use - Announcement of list of names of highly toxic materials - Setting up of hazardous material information center - Imposition of penalties for operators in violation of Hazardous Materials Act, B.E. 2535 (A.D. 1992) - Industries manufacturing or using large quantity of hazardous materials are required to prepare Environmental Impact Assessment Reports and hazard risk assessment with strict control

3. Hazardous Waste and Community Waste

Type	Command and Control Measures	Implementation and Enhancement Measures
1. Hazardous waste	- Stipulation of criteria, measures, and methods controlling collection, safety, transport, removal, import into and export from the Kingdom, and management of treatment and disposal of hazardous waste - Coverage designation of hazardous waste - Introduction of hazardous waste manifest system	- Joint investment between government and private sectors in the construction of hazardous waste disposal center, and construction of hazardous waste disposal center at Samae Dam - Campaign for public awareness of toxicity and safe use
2. Community Waste (General)	- Designation of waste product and packaging types to be recalled to reduce scrap - Prescription of regulations, standards and laws for the product and packaging scrap recall - Prescription of regulations for disposal of waste electrical and electronic equipment (WEEE) product recall (2004)	- Setting up of Waste Reuse Information center - Prescription of operation criteria for appropriate management of waste and refuse from hygienic collection, haulage, and eradication including reduction of waste and waste reuse and recycling.

Appendix II

-Economic Instruments in Pollution Management in Thailand

Type of Environment	Economic Instruments	
	Presently implemented	**Under studies**
1. Water Pollution	1. Pattaya municipality wastewater management fee charged according to type of business activities and type of wastewater treated, fee is charged annually. 2. License fee for wastewater treatment by Amphoe Patong municipality, Phuket province according to type of business activities and area, fee is charged annually. 3. Saensuk municipality, Chonburi province, wastewater management fee computed at 80% of monthly water consumption at the rate of 2-3.50 baht /cubic meter according to type of business activities exempting temples and school 4. Wastewater management fee in industrial estates which was formerly charged at different rate in different industrial estate. 5. Tax and duty reduction for the import of machinery, equipment, tools and appliances for wastewater treatment to the rate of 9% since October 1, 2002. 6. Low-interest loans granted to porcine farmers for construction, installation, and improvement of wastewater treatment facilities with assistance from Department of Livestock and the National Energy Policy Office	1. In future, Pattaya municipality is expected to collect wastewater fee at the rate of 80% of the water consumption. The rate will be progressive and will be increased by 0.20 baht per year. 2. In 2003, Phuket plans to collect wastewater management fee at the rate of 100 baht per month per household for the whole province. 3. Designation of "Green Flag" for porcine farms which have passed environmental assessment with privileges in reduction of livestock operating license fee. 4. Project for collection of treatment management fee for wastewater from water supply within the area of Bangkok wastewater treatment plant and its greater area covering 12 administrative areas.

Type of Environment	Economic Instruments	
	Presently implemented	**Under studies**
2. Water Resources	1. Fixing of groundwater price to be payable by groundwater users at a rate of 3.50 baht per cubic meter in the area where water supply service is available and 25% reduction therefrom where water supply service is not available (farmers using groundwater for cultivation exempted) 2. Prices of water supply supplied by the Metropolitan Waterworks Authority and that supplied by the Provincial Waterworks Authority are fixed differently according to type of business activities and consumption in cubic meter. 3. Prices of water used in industrial estates and prices of water sold by private sector are fixed differently according to individual operating area.	1. Fixing of prices for water irrigation in irrigating waterways, weirs, reservoirs, and ponds in rural areas

3. Air Pollution	1. Imposition of different oil tax rate between – Leaded and non-leaded gasoline – high/low sulphur dioxide diesel fuel 2. Imposition of different rate of taxes on completely built up automobiles according to engine types: higher tax for high pollution engines and lower tax for low pollution engines 3. Exemption of tax for machinery or equipment used in treatment or eradication of waste in factory (mentioned earlier under water pollution heading) 4. Environmental Fund provides interest-free loans at 5% of loan facilities for the setting up of air pollution management system 5. Imposition of tax on ozone layer depleting substance of halogenated hydrocarbon derivatives type: operators pay 30% tax 6. Income tax exemption for foreign experts working on air pollution	1. Study carried out to determine potential of industrial zone potential in handling air pollution to determine level of air pollution emitted from point sources prior to acquisition of rights in emission of pollution. 2. License for emission of sulphur dioxide gas to reduce aggregate treatment cost of air pollution
4. Waste	1. Collection of fees for haulage and disposal of garbage and refuse from city, municipality, and *tambon* administration	1. Tax collection on packaging including recyclable waste

Type of Environment	Economic Instruments	
	Presently implemented	**Under studies**
5. Toxic materials, hazardous waste	1.Fees for registration and possession of hazardous materials 2.Fees for haulage, inspection, and eradication of industrial waste 3.Imposition of different tax rate for automotive storage battery, e.g., 10% tax for new battery and 5% tax for battery using recycled leading meeting standard requirements 4.Imposition of import and business taxes for dry chemical battery, lubricating oil	1.Collection of excise tax for battery and lubricating oil which are hazardous to environment 2.Setting up of fee collection and guarantee deposit for hazardous waste into a fund set up for overseeing, administration and management of hazardous waste
6. Land and forest resources	1.Building and Land Tax, Locality Maintenance Tax, fees for registration of rights and juristic transaction concerning transfer of immovable property for land holders 2.Fund supporting sustainable forest management financially, including equipment, seedlings, seed for planting, training for sustainable 3.Support the setting up of savings group lending money to group members collecting membership fee for maintenance of community forest	1.Tax collection on concession granted to forest area exploitation 2.Imposition of higher fee collection in the event of land ownership transfer or use the land for purposes other than reforestation
7. Fisheries	1.Fishing registration license. Collection of fee determined by fishing equipment	1.Setting up of Fishery Rights Exchange
8. Coastal resources		1.Prescription of license fee for shrimp farming 2.Imposition of penalties in the event of violation of regulations on discharge of slush and high salinity water 3.Collection of tax on shrimp farming in mangrove forests
9. Marine and coral resources		1.Setting up of Exchange for Pollution Emission License in Coral Reefs

10. Tourism attractions and national park areas	1.Collection of admittance fee	

Appendix III

-Number of Participants in Environmental Training (1992-2002)

Unit: Number of Participant

Year	Central Government	Local Government	Private Sector	Educational Institite	Others	Total
1992	39	20	22	-	-	**81**
1993	119	227	38	60	-	**444**
1994	129	212	51	95	-	**487**
1995	105	171	88	133	-	**497**
1996	110	168	78	100	-	**456**
1997	196	159	164	59	16	**594**
1998	149	91	116	118	38	**512**
1999	107	108	53	119	-	**387**
2000	208	201	78	71	4	**562**
2001	241	136	84	152	-	**613**
2002	42	296	37	18	1	**394**
Total	***1,445***	***1,789***	***809***	***925***	***59***	***5,027***

Source: ERTC, 2002.

Appendix IV

-List of Research Papers Classified by section]

Air, Noise and Vibration Research and Technology Development

- Road Traffic Noise Prediction Model , 1995.
- Determination of Hydrocarbon Composition in Exhaust Gas from 4-stroke gasoline engine, 1995.
- Study on Environmental Noise in Bangkok , 1995.
- Feasibility Study of Short-term Method for Environmental Noise Measurement in Bangkok, 1995.
- Chemical Compositions of Precipitation in Thailand, The Environmental Research and Training Center (ERTC), 1996.
- Study on Chemical Composition of Rain Water in Pathumthani Province, 1997.
- Regional Background Acidity and Chemical Composition of Precipitation in Thailand, 1997.Investigation of PAHs in Ambient Air in Industrial and Urban Area, 1998.
- Data Collection and Verification of Wet Deposition Monitoring, 1998.
- Study on Health Effects of Noise to the People in Bangkok, 1998.
- Airborne Polycyclic Aromatic Hydrocarbon (PAH) In Bangkok Urban Air I. Characterization and Quantification, 1999.
- Study on Volatile Organic Compounds in Ambient Air in Maptaphut Industrial Estate Case Study: General Environmental Conservation Public Company Limited (GENCO), 2000.
- Pollutants Emissions from Biomass Combustion Industry in Thailand : A Case Study of Sugar Refinery Industry, 2000.

- Study on Air Pollution Problem in an Industrial Area of Patumthani, 2000.
- State of Air Quality in Trang Municipality, Trang Province, 2000.
- Airborne Polycyclic Aromatic Hydrocarbon (PAH) in Bangkok Urban Air II. Level and Distribution, 2001.
- Study on Air Pollution in Bangkok Emphasis on Volatile Organic Compounds, 2002
- Photochemical Ozone and Secondary Aerosol Formation from Vehicles Emissions in Bangkok Urban Area (on going)

Hazardous Substance Research and Technology Development

- Accumulation and Distribution of PCBs around a Used Capacitors Storage of Bangkok Electricity Authorization, 1993.
- Development of a Quantification Methodology for Polychlorinated Biphenyls by using Kenecholor Products as Secondary Reference Standard Fersenius, 1993.
- Study on Lead Residue from Battery Factory in Pathumthani Province by Using Hair Samples, 1994.
- Study in Water Quality Classification by Biological Index based on Aquatic Insects, 1994
- Development of Recovery Factors for Analysis of Organochlorine Pesticides in Water Samples by Using a Micro-Extraction Technique , 1995.
- A Study of Arsenic Contamination in Pak Pa-Nang Bay Nakorn Sri-Tammaraj Province, Thailand, 1995.
- Persistent of Organochlorine Pesticides in Green Mussel (Perna virides) from Marine Estuaries in Thailand, 1999.
- Study on Arsenic Contamination in Dust and Rainwater at Ronphibun District Nakhon Si Thammarat Province, 2000.
- Study on the Distribution of Polycyclic Aromatic Hydrocarbon (PAHs) in Water Resources of Urban Areas of Thailand, 2000.

- Mornitoring of Organocholorine Pesticides in Green Mussel (Perna virides) from the Coastal Areas of Thailand, 2001
- Monitoring heavy metals in the Gulf of Thailand : using mussel watch approach, 2002.
- Project on Human Health Risk Assessment of Arsenic Contaminant at Ron Phibun and Problem Solving, 2002.
- Correlation of Benthic Invertebrates and Heavy Metals in the Chaopraya and Nakon-nayok River, 2002.
- Study on Zooplankton Species in the Arsenic Contamination Water Resource, (on going).

Water Research and Technology Development

- Development of High Sensitivity Gas Chromatograph for Detecting Factories Causing Groundwater Contamination by Volatile Organic Compounds, 2000.
- Development of Constructed Wetlands for Domestic Wastewater Treatment, 2001.
- Use of Isotope Techniques to Trace the Transformation of Volatile Organic Compounds in Polluted Ground Water in the Area of Northern Region Industrial Estate, Lampoon Province, 2001
- Application of Detector Tube to Detect Area Having Groundwater Contaminated by Volatile Organic Compounds, 2001.
- Isotope Application for Improved Numerical Ground Water Flow Model in Arsenic-polluted Area of Rhonpibul District, Nakhon Si Thammarat, 2002.
- Research on Environmental Impacts of VOCs Contaminated Groundwater in the Area of Northern Industrial Estate, Lumpoon Province, 2003.
- Research on Development of Free Water Surface and Vegetated Submerged Bed Constructed Wetland for Domestic Wastewater Treatment, 2003-2005.
- Development of Aerobic Fix-film Bioreactor for Trichloroethylene Degradation, 2003-2005.

- Research on Impacts of Intensive Black Tiger Prawn Farmings on Water Quality of Natural Water Body by Application of Deterministic Numerical Modeling, 2003-2005.

Appendix V

- Measure Research of Environmental Standardization Group

1. Research on Groundwater Pollution by Volatile Organic Compounds Used in Industry
2. Research on Application of Isotope Techniques to Study Groundwater Pollution
3. Research on Bioremediation of Groundwater Contaminated with Trichloroethylene
4. Development of Constructed Wetlands for Domestic Wastewater Treatment Surface Water Quality Monitoring
5. Surface Water Quality Monitoring
6. Distribution of Polycyclic Aromatic Hydrocarbons (PAHs) in Water Resources in Urban and Industrial Areas
7. Development of Analytical Method for PAHs
8. Monitoring of Toxic Chemical Residues in the Gulf of Thailand by Using Green Mussels (Perna viridis)
9. Environmental Management Planning Survey for Arsenic Contaminated Areas of Nakhon Sri Thammarat provinces, Thailand
10. Air Pollution in Pathumthani Industrial Areas Using Dispersion modeling
11. Mathematical Model for Aircraft Noise at Airports
12. Acidification in Thailand
13. Investigation of Volatile Organic Compounds in the Atmosphere in Bangkok
14. Mathematical Model for Elevated Road
15. Mathematical Model for Factory Noise
16. Establishment of Quality System in Environmental Laboratories
17. Inter-laboratory Comparison on Determination of Heavy Metals in Water II

Appendix VI

-Budget Allotment of ERTC during 1993- 2004

Budget Allotment of ERTC during 1993-2004

Year	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2003**	**2003**	**2004**
Total Budget	11,649,700	20,385,900	25,645,100	41,398,600	61,541,800	53,805,900	40,238,700	39,534,300	70,439,800	55,008,300	49,775,900	85,503,290
Salary					6,996,600	7,812,000	6,683,568	10,514,400	10,727,200	10,975,400	10,937,600	12,160,400
Temporally Salary	2,848,200	3,745,500	1,890,960	1,890,900	5,752,100	5,926,000	5,036,868	5,025,600	6,153,400	6,153,400	6,153,400	6,330,400
Infrastructure	2,260,000	2,712,000	2,712,000	1,920,000	1,917,000	2,000,000	1,646,700	1,564,400	1,984,400	1,984,400	2,014,600	1,908,900
Research	250,000	7,500,000	7,500,000	5,000,000	5,029,860	8,467,300	1,964,370	1,800,000	7,250,200	7,909,820	6,893,370	17,098,800
Training	200,000	350,000	700,000	7,900,000	9,650,000	7,000,000	1,125,000	1,125,000	956,200	1,125,000	3,000,000	10,632,000
Durable Objects	767,400	2,401,500	2,472,500	8,073,000	16,012,800	16,000,000	2,606,500	-	7,034,000	7,573,000	2,744,000	4,745,000
Construction			6,000,000	9,000,000	6,720,000	2,808,900	14,287,000	6,253,000	19,851,000	942,600	-	12,000,000
Asia-Europe								8,920,000	11,651,000	11,651,000	11,000,000	7,347,000
Management					10,242,100	3,791,700	3,641,662	4,331,900	4,711,900	6,693,680	7,032,930	13,280,790
Percentage of training	1.72	1.72	2.73	19.08	15.68	13.01	2.80	2.85	1.36	2.05	6.03	12.43
Percentage of research	2.1	36.8	29.2	12.1	8.2	15.7	4.9	4.6	10.3	14.4	13.8	20.0

Research Paper No.5 [Indonesia]

Development of Social Environmental Management System in Indonesia

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1. INTRODUCTION

1.1. Background of the Study

Indonesia has committed itself to developing and implementing strategy for environmental management. It is also in the process of decentralizing. There are concerns that a centrally environmental management policy strategy will have little relevance to, or ownership by, autonomous region in determining policy facing their local condition and problem. For one thing, the central government faces the challenge of outlining a management policy framework that moves from a centrist, physical project oriented, to more holistic, sustainable base approach that is truly locally defined. Environmental policy making has traditionally been a central government function since when issuant of the Law Number 22/1999, and the tendency is still devise central framework for local application.

The Japan Society for International Development (JASID) Evaluation Team on Environmental Cooperation is undertaking a study to evaluate the Japan International Cooperation Agency (JICA)'s cooperation of Environmental Management Center (EMC) to improve environmental management in Indonesia, and to utilize the results of the study for the improvement of the planning and management of JICA's related projects in the future. It is so important to understand the perception and the ideas of Indonesian expert's viewpoint on the social environmental management system in Indonesia and the role of EMC in the system.

1.2. Objective of the Study

The main purpose of this study of the Development of Social Environmental Management System (SEMS) in Indonesia is to produce an analysis of environmental donor agency policy, especially from JICA side, that concludes the current situation and condition. A further purpose of the study is to build a social environmental management approach and framework that can add value to research and policy about environmental management in Indonesia.

The objective of the study is to evaluate the JICA's cooperation of Environmental Management Center with an analysis of roles of the Center in/to social environmental management system in Indonesia with a view to improving its planning and management and to enhance effectiveness of JICA's related projects in the future.

Using a qualitative analysis method within interview, survey, desk study and report assessment, the study aims to assess SEMS context and strategies for Indonesia. The research finding is intended to provide insight into pattern, model and relationship that influence these SEMS concept, including those that influence it implementation.

1.3. SEMS Definition for this Study

We want to disengage this study from the debates about definitions of SEMS and its application on Indonesia situation. An interesting as social environmental management was, it intended to focus attention on narrow social-based definition and diverted attention from physical based orientation on environmental management system. In fact that all approach physical or social has impact each other. Nevertheless, the outcome of these debates, perhaps encourages by growing tendency among social scientists, economist and ecologist to see SEMS more holistically approach, seems to be a greater willingness by environmental executives to focus on wider and more dynamic dimensions of environmental management concept.

This study does not attempt to ascertain how SEMS can be implemented in Indonesia, but focused on the question of what is Indonesia concept of SEMS, and within a framework of issue and questions of environmental problem suggested by the SEMS approach.

As mention, this study both contribute to and draw from JICA activity in Indonesia. The position put forward in that document concerning SEMS is consistent with the approach and findings in the study. The key points are:

Environmental Management System (EMS) is a practice of management and it consists of all aspect of environmental consideration such as physical, social, cultural, economical, and also political ways.

Sustainability is a key factor. *Sustainable Development* is basically in three dimensions: social dimension, economic dimension and environmental dimension. Environmental sustainability is related subsequently to the environmental functions that sustain human life.

Social Environmental Management System is a system for social management approach within environmental management, and consists of actor (stakeholder), legal constitutional, institutional, policy (including program and project) and all key parameter to ensure environmental management objective.

1.4. Organization of the Report

This report is divided to two parties, first book and second book. First book of the report is main report and consist of five sections. Section one has provided an introduction and background to the study. Section two explains of organization of research study. Section three outlines the current situation and environmental condition facing the reformation era and decentralization. It also explains: (I) the role and function of JICA at the present situation, (ii) economic perspective of decentralization and reformation era, (iii) ecological situation and perspective of decentralization

and reformation era. Section four is the fruit of the report that analyses the social system and it implication on the SEMS model for Indonesia.

The second book (data book and appendix) provides all detailed information that used for the study. In this second book covered the Environmental Management Law in Indonesia (Law Number 23 of 1997), JICA report and questionnaire form for this study.

2. RESEARH METHODOLOGY

2.1. Research/Study Approach

The Japan Society for International Development (JASID) engages the services of the Center for Research on Human Resources and the Environment - University of Indonesia (CRHRE), subject to the following term of references:

1) Analyze the social environmental management system (SEMS) in Indonesia
2) Evaluate the roles and contributions of Environmental Management Center in the development of SEMS in Indonesia.

To achieve the objective of the study, CHCRE conduct:

1) Collect and provide the necessary information and data (past and the present situation of: JICA's project in Indonesia, EMC activities, Environmental Management System in Indonesia and its application, Institutional framework of the Bapedal/State Ministry of the Environment, role of industry and public/private sector in the environment, public participations, community development etc.)

2) Discuss the issues with the entire stakeholders and resources person from Indonesian side (experts, professor from universities, high-ranked government officers, top executives, NGO leaders, non-formal leaders etc.) and from Japanese side (JICA Indonesian office and the members of JASID), to get the idea of SEMS and the related role of JICA and EMC.

3) Analysis the social environmental management system (SEMS) present situation in Indonesia and to evaluate the roles and contributions of EMC in the development of SEMS in Indonesia.

4) Conduct a report and all the data correspond as apart of work output. The report outlines are background of the study, present situation of EMC and JICA's project, fact and findings of JICA and EMC roles in SEMS, institutional framework of EMC to SEMS in Indonesia (past, present and recommendation), stakeholder role and participation toward sustainable SEMS in Indonesia, development of policy-program-and project (3P) recommendation of SEMS etc.

5) Conduct the presentation of the report for JICA and JASID.

2.2. Organization of the Research Team

Number of research staff from CRHRE was contributing on the performance of the study report. Name of persons and expertise for this study are: Dr(s). Setyo S. Moersidik (Environmental Engineering & Management), M. Hasroel Thayib (Ecologist), M. Suparmoko (Environmental Economics), Mr.Bambang Widianto (Sociologist & Anthropologist), Andreas Pramudianto (Environmental Law), Handiko (Lawyer, Sociologist – NGO's expert)

2.3. Research Activity

A chronological activity has been done, and some are in progress and to be completed for the purpose of finalization of the study report. Teams have conducted series of meetings and dialogues for the exchange of views on supporting SEMS and environmental management system concept. Dates, activities and remark(s) for this study are mention on the table.

Table 1. Time Schedule and Research Activities

	Date	Activity (s)	Result/Remarks
1	7 August 2002 11 August 2002	Discussion on the outline of the report and analysis methods upon the meeting during the main survey of JASID mission on August	• Frame work of the study • Out line of the report
2	11 August 2002	Signing the contract between JASID and CRHRE	Contract of study until 30 January 2003
3	September 2002	• Starting to discuss within team and preparation of data and information necessary. • Informal meeting with the key person of SME on social matter	• Secondary data collection • Information of SME project and activity on social perspective
4	9 October 2002	Formal meeting with surveyor and supporting staff on JASID project	Proposed agenda for social workshop organized by CRHRE
5	October 2002	Preparation of material and the organization for social workshop at Semarang, Bandung and Jakarta	Proposed paper and speakers for workshop
6	1 November 2002	Dr. Suparmoko contact with Mr. Gustami and Mr. Dana from SME (Special discussion on economic perspective linkage to SEMS)	
7	5 November 2002	Workshop on Partnership mechanism, Social Anatomy and Strategic Alliance at Santika Hotel, Semarang, Central Java (Chaired by Bambang Widianto)	Social perspective for the development of SEMS from stakeholder (Central Java case)
8	15 November 2002	Workshop on Partnership mechanism, Social Anatomy and Strategic Alliance at CRHRE Jakarta (Chaired by Bambang	Social perspective for the development of SEMS from stakeholder point of view (Jakarta case) and resource

		Widianto)	person
9	20 November 2002	Time arrangement with JICA representative	Proposed meeting with Dr. Suparmoko at 27 November 2002
10	27 November 2002	Meeting between Dr. Suparmoko and team with Mr. Unishuga (JICA)	Information about JICA project, progress and problems
11	28 November 2002	Meeting between Dr. Suparmoko and team with Mr. Kuwata (JICA project) and Mr. Unishuga	Information and data concerning JICA project in Indonesia
12	29 November 2002	Meeting with Mr. Imam Hendargo (EMC Director)	Information about EMC activities and confirmation concerning 30 Province Bapedalda proposed meeting at Serpong (EMC) for 18 December 2002
13	December 2002	Report construction	
14	16 December 2002	Dr. Setyo meeting with Mr. Imam Hendargo (EMC Director)	Consultation on questionnaire and interview form for Bapedalda meeting at 18 December 2002
15	19 December 2002	Interview with Bapedalda staff (organized by Mr. Andreas)	Cancellation from SME with the reason of objective survey framework
16	20 December 2002	Additional survey for JICA office (organized by Andreas)	Additional data from JICA
17	3 January 2003	Additional survey for EMC staff concerning of SEMS point of view	Confirmation and acceptance of SME and EMC for this survey
18	January 2003	Report writing	
19	10 January 2003	EMC confirmation concerning survey result	Data with regard of bureaucrats perception on SEMS
20	10 – 12 January 2003	Final preparation for the JASID meeting on 13 January 2002	Draft report (progress report) and perception of SEMS model
21	13 January 2003	Meeting with JASID team	Report evaluation and decision of Final Report content
22	28 January 2003	Workshop on Partnership Mechanism, Social Anatomy and Strategic Alliance – SEMS model; at Padjadjaran University, Bandung West Java (Chaired by Bambang Widianto)	• Simulation of SEMS model with stakeholder • Social perspective for the development of SEMS from stakeholder point of view (West Java case)
23	30 January 2003	Completion of report	Final report for JASID

3. ENVIRONMENTAL MANAGEMENT PRINCIPLE REGARDING LAW NO. 23/1997

1. The Indonesian environment which was bestowed by the Almighty God upon the Indonesian community and people constitutes God's gift and blessing the capacity of which must be preserved and developed so that it continues to be a resource and life support for the community and people along with other living creatures of Indonesia for the continuation and increase of the quality of that life itself.

Pancasila, as the basis and philosophy of the nation, constitutes a whole and complete unity which gives the conviction to the Indonesian community and people that contentedness will be attained if it is based on harmony and balance both in the relationship of humans with the Almighty God and humans with humans, humans with nature, and humans privately, in the scheme of achieving external progress and spiritual happiness. There are reciprocal relations between humans, the community and the environment, which must always be fostered and developed so that a dynamic harmony, proportion and balance are maintained.

The 1945 Constitution as the constitutional basis makes it mandatory that natural resources are used for the greatest possible prosperity of the community. This prosperity must be enjoyed sustainable by current and future generations.

Development as a conscious effort in processing and exploiting natural resources for increasing community prosperity, both for achieving external prosperity as well as spiritual satisfaction. Therefore, the use of natural resources must be harmonious and balanced with environmental functions.

2. The environment in ecological terms recognizes neither national region nor administrative region borders. However, the environment which is involved with management must have clear regional demarcation for the management authority. The environment which is meant is the Indonesian environment. Legally, the Indonesia environment covers the space in which the nation of the Republic of Indonesia carries out sovereignty and the right to sovereignty along with its jurisdiction. In this respect the Indonesian environment is none other than the region, which occupies a cross position between two continents and two oceans with a tropical climate and weather and seasons which confers natural conditions and position with a highly valuable strategic role as the place the Indonesian community and people carry out community life, be a nation and be a state in all its aspects. In this way, the concept in carrying out Indonesian environmental management is the Archipelagic Concept.

3. The Indonesian environment as an ecosystem consists of various subsystems, which have social, cultural, economic and geographic aspects with differing features which cause a varying supportive and carrying capacity of the environment. Such a condition requires the building and developing of the environment based on the fact that the presence of supportive and carrying capacity of the environment increases harmony and balance of subsystems, which also means an increase in the endurance of the substance of that very subsystem. In this way, the building and development of one subsystem will influence other subsystems, which finally will influence the endurance of ecosystems in their entirety. Therefore, environmental management demands the development of a system with integrated ness as its primary feature. Needed, then, is a national environmental management policy which must be implemented in strict accordance with principles and consequences from the centre to the regions.

4. Development continuously exploits natural resources for increasing community prosperity and quality of life. Meanwhile, the supply of natural resources is limited and uneven, both in quantity and quality, while requests for such resources accelerate as a result of the increase in development activities to satisfy accelerating and increasingly diverse needs of the population. On the other hand, the environmental carrying capacity can decline.

Accelerating development activities carry environmental pollution and damage risks with the result that the structure and function of the ecosystem which acts as a support to life can be damaged. This environmental pollution and damage will become a social burden, the cost of reparation of which will ultimately be borne by the community and government.

The maintenance of the sustainability of environmental functions constitutes a community interest, so that it demands responsibility, openness, and a role for members of the community, which can be channeled by people individually, environmental organizations, such as non-government organizations, traditional community groups, and others, for maintaining and increasing environmental supportive and carrying capacity which becomes a mainstay of sustainable development. Development, which incorporates the environment, including natural resources, is a medium for attaining sustainable development which is a guarantee of prosperity and quality of life of present and future generations. Therefore, the Indonesian environment must be managed by a principle of preserving environmental functions which are harmonious and balanced for supporting environmentally sustainable development for the increase in prosperity and quality of life of present generations and future generations.

5. The along range direction of Indonesian development is toward economic developed based on industrial development, which among other things uses various types of chemical materials

and radioactive substances. As well as producing products which benefit the community, industrialization also gives rise to excesses, among others the production of hazardous and toxic waste, which if disposed of to an environmental medium can threaten the environment, health, and the continuation of human and other forms of life.

Globally, knowledge and technology has increased the quality of human life. In reality, lifestyles of industrial society marked by the use of products based on chemicals has increased the production of hazardous and toxic wastes. This matter constitutes a large challenge to a method of disposal which has a small risk toward the environment, health, and the continuation of human and other forms of life.

Conscious of this matter, hazardous and toxic materials need to be well managed. What needs to be given attention is that the area of the Unitary Republic of Indonesia must be free of disposal of hazardous and toxic wastes from outside the Indonesian area.

6. The acceleration of development efforts causes an accelerating impact on the environment. This situation boosts an increasing need for efforts to control environmental impacts such that the risk to the environment is held down as much as possible.

Efforts to control environmental impacts are inseparable from supervisory measures to ensure compliance with stipulations of laws and regulations in the environmental field. A legal instrument of a preventive nature is a license to carry out a business and/or other activity. Therefore, a license must explicitly contain conditions and obligations which must be complied with and implemented by the party responsible for a business and/or other activity. What has been put forward above implies the participation of various agencies in environmental management such that there is a need to clarify limits of authority for every agency which participates in the environmental management field.

7. Appropriate with the essence of the Unitary Republic of Indonesia as a legal state, the development of a system of environmental management as a part of environmentally sustainable development must be given a legal basis which is clear, explicit and comprehensive to ensure legal certainty for environmental management efforts. This legal basis is under laid by a basis of environmental law and the compliance of every person to the norms of environmental law which is in its entirety based on Pancasila and the 1945 Constitution.

Law Number 4 of 1982 regarding Basic Principles of Environmental Management (Number 12 of the State Gazette of 1982, Supplement to State Gazette Number 3215) was an early sign of the development of legal instruments as a basis of Indonesian environmental management efforts as an integral part of the effort of environmentally sustainable development. In the more than one decade since the promulgation of this Law, environmental awareness of the community has rapidly increased, as indicated among other things by the increasingly many types of community organizations other than non-government organizations which are active in the environmental field. Also evident is the increasing community initiative in preservation of environmental functions such that the community does not merely participate, but is also able substantially to play a role. Meanwhile, the set of problems of environmental law which have emerged and developed in the community require regulation in the form of law for the guarantee of legal certainty. On the other hand, global environmental development and international aspirations will increasingly influence Indonesian environmental management efforts. In reflecting this situation, it is regarded as necessary to perfect Law Number 4 of 1982 regarding Basic Principles of Environmental Management.

This Law contains norms of environmental law. Apart form this, this Law will be a foundation for evaluating and adopting all applicable laws and regulations which contain stipulations on the environment, that is laws and regulations regarding irrigation, mining and energy, forestry, biological and ecosystem resource conservation, industry, human settlement, spatial ordering, land use, and others.

Increase in the effectiveness of various legal stipulations, including administrative law, civil law and criminal law, and efforts to give effect to alternative methods of dispute settlement, namely out of court dispute settlement to achieve agreement amongst the parties in dispute (sic). Apart from this, there is also a need to open the opportunity for the bringing of class actions. With such a method of settlement of environmental dispute settlement it is hoped that the compliance of the community to the system of values regarding the importance of preservation and development of environmental capacity in present and future human life will be increased.

As a support to administrative law, application of criminal law continues to attend to subsidiary principles, namely that criminal law should be used if sanctions in other fields of law, such as civil and administrative sanctions, and alternative environmental dispute settlement are not effective and/or the level of blameworthiness of the party concerned is relatively serious and/or the results of the activity are relatively large and/or the action gives rise to uneasiness in the community. In anticipation of the possibility of increasing emergence of criminal actions carried out by a corporation, this Law also regulates the responsibility of corporations. In this way, all such laws and regulations mentioned above can be included in one system of Indonesian environmental law.

4. CURRENT SITUATION

4.1. Current Status of JICA in Indonesia

4.1.1. Japan's Basic Policy for Economic Cooperation with Indonesia through JICA

The Japan's basic development theme for assisting developing countries is **"**Act Together and Advance Together – for – Poverty Reduction and Sustainable Economic Growth in Developing Countries"**,** which is focusing on 4 main principles: (1) ownership and partnership (2) poverty reduction through economic growth (3) human centered approach and (4) promotion of south-south cooperation. As for future economic cooperation with Indonesia, the Government of Japan has determined its basic policy based on the latest bilateral consultation in September 2001, by focusing on the three following pillars (1) support for economic stabilization, (2) support for various reforms and (3) response to the urgent needs.

An Economic Policy Supporting Team has also been established by the Japanese Government to contribute to the advisory of making a useful proposal on Indonesia's overall economic policy program. To make a smooth mutual dialogue on the economic cooperation with Japan, President Megawati has established and Indonesia – Japan Economic Working Team led by the Minister for State Enterprises Development through the presidential Decree No. 12/2002. The Japanese and Indonesian teams have conducted series of meetings and dialogues for the exchange of views on supporting the Indonesian economic reforms under six headings: (1) macro economic policy, (2) banking sector reform, (3) private investment promotion, (4) small & medium sized enterprises development, (5) decentralization and (6) democratization.

4.1.2. Restructuring Operational Modality for Technical Cooperation

To response to severe financial circumstances that Japan has been facing in recent years as well as the changing social economic condition in Indonesia, JICA needs to attach prime importance on its basic operational modality concerning the implementation of effective, efficient and prompt technical cooperation based on a precise perception of the actual and urgent needs of the Indonesian nation.

- JICA has formulated a Country Program for Indonesia, which consists of the priority issues and sectors as reference for the arrangement of a cooperation program as well as an annual cooperation project formulation.

- JICA has been continuing to improve the mechanism of need survey to establish a better coordination at entry stage for the formulation of new programs and projects through dialogue and consultative meetings with the National Development Planning Agency (BAPPENAS) and the Office of the State Secretariat (SEKNEG) as coordinator and main counterpart agencies for JICA in handling the overall technical cooperation in Indonesia.

- JICA has restructured its cooperation system to become a more flexible cooperation by using a new terminology called “Technical Cooperation Project” instead of ”Project Type Technical Cooperation (PTTC)”. In Indonesia, this restructure has been conducted through the process in the need survey mechanism since April 2002 particularly for the formulation of new projects for next fiscal year 2003. Through this new restructure, it would be possible to formulate a project with a flexible component of intervention based on the need, flexibility to identify the size and

the period of the project implementation based on the setting of the objectives for each project laid on the Project Design Matrix (PDM).

- JICA has considered formulating its priority program in challenging areas and sound soft oriented approach such as economic reforms, good governance, social development and poverty reduction through various forms of cooperation programs in Indonesia. Meanwhile, other infrastructure developments shall also be considered as one of the priority areas to contribute to the increasing economic growth.

- JICA Indonesia is enhancing grassroots monitoring and an ex-post evaluation system to provide a feed back for maintaining the quality of development assistance by collaborating with research institutes and local consultants to objectively maintain the result and progress of the project or program. On the other hand, JICA emphasized a quick impact of intervention to the target beneficiaries in the grassroots through the implementation of community empowerment programs (CEP) in collaboration with Non Government Organizations while facilitating partnership between Indonesian and Japanese non-profit organizations for the contribution to the welfare of the Indonesian people.

- JICA has emphasized to implement transparency and accountability on every single project operation by using a bidding and tender system for a more efficient and effective budget, while strengthening the examination on cost estimation at entry stage and inspection of every item of the budget as a responsibility for the execution of the project or program.

- To promote the sustainability, JICA has given opportunities to the Indonesian side to propose their own priority programs and projects, which match with the JICA Country Priority Program for Indonesia. As a one tool for such promoting sustainability, JICA has also tried to conduct mutual discussions to allow a more active participation of the Indonesian counterpart in the project formulation, implementation as well as sharing budgeting matters to maintain the sustainability of the project in the future.

4.1.3. Features of the latest initiated JICA Cooperation Project in Indonesia for 2002

In accordance with the urgent priority developments in Indonesia, in 2002, JICA actively responded to challenges in new fields and issues particularly focusing on a soft oriented approach comprising of the policy formulation and management system improvement including the implementation of new projects in diverse forms of cooperation.

4.1.3.1. New Initiated Project for Supporting Economic Reforms

In support of the program for economic policy and its implementation, since 2002, JICA has assisted the implementation of the *Economic Policy Support Program* by delivering policy advisory through dispatching Japanese Professor to Indonesia and making arrangements for consultation meetings with Indonesian Economic Team as well as studies and research activities. In relation to this Economic Policy Support Program, JICA has expedited to promote the implementation of *"Research Grant Aid on Fiscal Decentralization"*, as a join collaboration research between the Japanese Hitotsubashi University and the University of Indonesia. This research grant aid scheme is a new

development scheme of capital grant aid, which formerly only focused on building constructions and equipment supplies.

As an intervention for strengthening industrial structure, especially in the framework of the "program for creating favorable environment on economic activities", JICA has started to implement a new cooperation project concerning the *"Capacity Building Program on the Implementation of the WTO (World Trade Organizations) agreements*" in cooperation with the Ministry of Industry and Trade. The objective of this project is to set the policy recommendation and provide advisory and training for enhancing their overall Indonesian administration capacity in implementing the WTO agreement. Other new project related to this program is the implementation of the *"Project for Establishment and Capacity Building of Regional Export Training and Promotion Center"* in cooperation with the Ministry of Industry and Trade. This project is intended to establish regional export training and promotion center in several regions such as Surabaya – East Java, Medan – North Sumatera, and Makassar – South Sulawesi to promote export development from the regions.

Meanwhile in support to the program for the promotion of small and medium enterprises, JICA has conducted a *"Study on Strengthening Capacity of SME Clusters in Indonesia"*, which is intended to find appropriate an approach for the development and engagement of the character of SME Clusters in Indonesia.

4.1.3.2. New Initiated Project for Achieving Good Governance

With regard to supporting the program for reform of Indonesian National Police, JICA has implemented the *"Project for the Enhancement of Civilian Police Activities"* in collaboration with the Indonesian National Police located in Bekasi, West Java.

While, in support to the program for legal and judicial reform, in 2002 JICA dispatched Indonesian Judges to Japan to attend seminars and exchange views on the judicial system with Japanese Judges to obtain a better knowledge in challenging fields.

In support to the program for capacity development of local governance, JICA has implemented the *"Project for Human Resources Development for Local governance",* which is intended to strengthen the capacity of local government administrators, practitioners as well as local parliament members in the field of promoting a better regional development planning and implementation.

4.1.3.3. New Project in the area for Supporting Social Development and Poverty Reduction

In supporting for the promotion of village development and stable supply of the food, JICA has introduced a comprehensive study on agriculture and fishery sectors program, namely *"Support Program for Agriculture and Fisheries Development in Republic of Indonesia"*. This broad study is intended to formulate prospective projects and activities, which have a mutual linkage through intensive dialogue with several related institutions such as the Ministry of Agriculture, the Ministry of Marine Affairs and Fisheries, the Ministry of Settlement & Regional Infrastructure, and the Ministry of Cooperatives coordinated by the National Development Planning Agency (BAPPENAS).

4.1.3.4. Promoting a New Grant Aid Scheme for Human Resources Development

Since 2002 JICA has also facilitated to promote the *"Japanese Grant Aid for Human Resources Development Scholarship "referred to as" Japanese Development Scholarship (JDS)"* to offer opportunities for Indonesians to study at post-graduate level in several fields at universities and other higher

educational institutions in Japan. The JDS is intended as a means to support Indonesian human resources development as well as to strengthen bilateral relationship between Indonesia and Japan. It is predicted that this program could be launched in next 2003 upon getting bilateral agreement on its scholarship implementation procedures.

4.1.3.5. Strengthening Relationship between Japanese and Indonesian Communities

Beside Community Empowerment Program through collaboration with Indonesian non-government organizations, JICA has also introduced "JICA partnership program" aims to support the sustainable development of Indonesian government and community organizations through the contribution of the Japanese non-profit organizations (NPO) including universities, local government and non-government organization. Since 2001, three Japanese NPOs have started cooperation with their counterparts as Indonesian non-profit organizations to conduct several projects, (1) *Project for Malaria Control in Lombok and Sumbawa Island* – cooperation between Nagasaki University of Japan and Airlangga University located in Surabaya, East Java, (2) *Project for the Establishment and Management of Appropriate Technology Center for Waste Water Treatment* – cooperation between Asian People Exchange (APEX) of Japan and Yayasan Dian Desa, Yogyakarta, and (3) *Aqua Environment Improvement Project for a Model River Basin in the City of Semarang* – cooperation between Kitakyushu International Techno – Cooperative Association (KITA) of Japan and Bintari Foundation.

As regard to strengthen relationship between Indonesian and Japanese communities, JICA is initiating *JICA-Japan NGO Desk*, to facilitate a wider collaboration between Japanese and Indonesian civil society in several social and humanitarian activities, through the encouragement

of KAPIJA – alumni of ex-Indonesian participant for JICA Youth Invitation Program as implementation component of this activity.

4.1.3.6. Supporting South – South Cooperation through Indonesian Contribution

Japan is keeping actively support south-south cooperation, as this is a form of international cooperation in which the developing countries are taking the initiative. It is hoped that through this initiative, Japan could contribute to bolstering global aid resources and will also stimulate intra and inter-regional cooperation. East Asia Development Approach is now being introduced to promote the participation of several related countries that have received assistance from Japan, which addresses a principle approach of poverty reduction through economic growth, to share experience and applied knowledge to other countries such as Africa, Latin America, or new Indo China Countries such as Cambodia Laos Myanmar Vietnam (CLMV) and also for the newest established country, East Timor.

JICA is willing to continue to support Indonesian institutions to develop their capacity to be participate in promoting south-south cooperation through several activities, such as support for conducting international training program called as *"Third Country Training Program (TCTP)"* in Indonesia by inviting participants from other countries, dispatching Indonesian experts to other countries such as Expert on Agriculture for Myanmar, Tanzania, Madagascar etc. to share applied knowledge and skills.

JICA also supports for regular annual regional meeting of focal point implementing institutions of third country training program in Asian region. As one of the results of regional meeting discussion, recently, Indonesian Government initiates to promote special attention for CLMV by inviting their officials to observe the implementation of TCTP in Indonesia.

4.1.3.7. Strengthening Networking and Coordination with Other Donors

To build a better networking and relationship with other donors that contributed for the development of Indonesia, JICA has participated actively in an acknowledged internationally of *Consultative Group for Indonesia (CGI) Meeting*, coordinated by the World Bank. This CGI Meeting has been expanded to several consultation process through the establishment of several issues related working groups that conduct regular consultation process between donors and all stakeholders such as government, civil society and private sectors. In particular progress of the working group activities, Japan has been appointed as donor coordination for "CGI Working Group for Small & Medium Enterprises Development". Through a better relationship with other donors, it is hoped that we could share our program and activities continuously to avoid even overlapping and promote greater effective and efficient of assistance for Indonesia.

4.1.3.8. Statistics of ODA and JICA Budget for Indonesia

Table2 Performance of Japanese ODA Budget for Indonesia (1998 – 2000)

			1998	1999	2000
Loan Aid		(Mil.USD)	589.88	1,374.49	773.43
Grant Aid		(Mil.USD)	114.59	100.54	49.79
Technical Assistance		(Mil.USD)	123.99	130.8	136.15
Contents of Technical Assistance through JICA					
	Training	(Person)	2,522	3,880	3,587
	Expert	(Person)	416	678	604
	Survey Team	(Person)	563	428	523
	JOCV	(Person)	22	91	137
	Donating Equipment	(Mil.Yen)	1,523.7	1,539.73	1,178.25
		(Project)	28	23	24
	Development Survey	(Project)	20	10	10

4.2 The Roles and Contributions of JICA on the Development of EMC in Indonesia

JICA's role in environmental management in Indonesia that is to develop project which consists of provision of 4 (four) long term experts namely the chief of JICA's environmental projects in Indonesia, (i) an expert in environmental monitoring, (ii) an expert in environmental analysis, (iii) an expert as coordinator for environmental training. In addition the project also provides short-term experts, equipments, and training courses. Furthermore JICA also gives grants, development study, and supports NGO assistance programs.

Now there is a new EMC project which is called Decentralized Management System (DEMS) as the second phase or EMC project Phase II. The EMC Phase I project was started in 1993 and ended in 1997 but then was extended to March 2002.

The EMC project Phase I was mainly in the form of technical cooperation by building the center which is called Pusat Sarana Pengendalian Dampak Lingkungan (*Environmental Management Center*) in Serpong, West Java Province, in 1993, but then now is called Banten Province. The main purpose of the EMC was to provide monitoring services for the industrial society. The JICA supports were in the form of building construction and the facilities, provision of monitoring instruments and machineries, and human resource trainings for managerial and technical skills.

In fact JICA's Projects are scattered in many different places in Indonesia. Besides EMC in Serpong, among others are:

a) Management Project for Forest Fire Prevention

b) Conservation for Biodiversity Project

c) Study on the Management of Solid Waste in Jakarta, and

d) Conducting Courses for Human Resource Development.

Mr. Kuwata and Mr. Unishuga explaining that besides the EMC in Serpong there are about 59 laboratories scattered in 30 provinces in Indonesia. These laboratories are under several institutions such as the Ministry of Public works and now are called Ministry of Settlement and Regional Infrastructures (KIMPRASWIL), the Ministry of Trade and Industry, and privately owned laboratories. The laboratories mostly have been underutilized and in poor condition. The laboratories were built mainly with the support of the Japanese Bank for International Cooperation (JABIC) in the form of foreign loans. But of course there are some laboratories with equipments and facilities provided by different donor agencies other than Japan.

At present, starting with the Phase II Project (July 2002 – June 20, 2006) the EMC with the support of JICA is conducting a pilot project at Deli river of North Sumatera Province. The aim of the project is to monitor the water quality of the Deli River which is now considered very dirty. Many factories and households damp their waste into the river. However, it has been recognized that besides the technical problems, the social awareness of the people and the industrial community as well in the Deli river area are still very poor.

Concerning the local laboratories that are still scattered in different institutions, but with the JICA support EMC in Serpong attempts to combine and centralize the scattered laboratories into one location and to be supervised by the Local Environmental Impact Agencies (BAPEDALDA). The problems at this time are still low knowledge of the personnel, because most staffs are still new and some machinery are broken. JICA support is also to rehabilitate the machineries and other equipments of the laboratories.

In conducting the pilot project, JICA staff visits the project in Deli River, North Sumatera twice a month, and supervises the staff of BAPEDALDA to find countermeasures to reduce wastes and

improve the water quality of Deli River. The experiences from the Deli river pilot project of the monitoring system and its implementation for counter measuring the environmental impacts will be disseminated to other provinces.

JICA is also strengthening the EMC functions. The EMC functions mainly are to:

1)Provide reference laboratories

2)Formulate and enforce the natural environment programs,

3)Collect and analyze the environmental information,

4)Enforce training programs for local governments, staff.

DEMS is now planning to conduct two workshops in December 2002. 100 persons of BAPEDALDA will attend the workshop from all provinces in Indonesia. The first workshop will discuss the concept of monitoring and management of the environment; and how to make communication or network among the laboratories, the EMC and the BAPEDALDA. The second workshop will be aimed to trained persons for the actual work in environmental monitoring and its environmental management. For the following years there will be always 2 (two) workshops for the same types; so that after four years here will be about 800 people trained in the field of environmental monitoring and management.

In addition, EMC with the support of JICA will provide training for about 90 participants from the BAPEDALDA of the whole provinces in Indonesia to be trained in the EMC in Serpong. The training will include environmental management, sampling and analysis of waste, environmental monitoring system. JICA will provide instruments and materials for the training.

JICA has supported the development of EMC and EMC programs since the beginning of the project. Unfortunately JICA only provides physical and technical support, but never provides any

fresh money. It seems that JICA is expecting the Government of Indonesia could share a budget for the operation and the maintenance of the EMC and its programs and projects. Unfortunately since environmental sector is still being considered as the non-priority sector compared to the other real sectors like agriculture, mining and energy, forestry, industry, tourism, trade, banking, etc., therefore very low budget is allocated to the environmental sector. This is why there are many laboratories still not fully functioned. In addition, since the government's employees are very lowly paid, it has an impact on the low efficiency of both the laboratories as well as the employees. It is necessary for the Indonesian Government to revise the payment systems for the government's servants. Otherwise they will be very inefficient in terms of time use but perhaps they are efficient enough at per unit of rupiah paid to them.

One of the weak pint of the JICA support to EMC, although it is not always the case, was the misplaced of long term and short term experts, which is indicated by the inconsistency between the curriculum vitae (CV) of the expert with the real expertise he has. The second thing is that the Indonesian Government will be dependent on the Japanese's products for waste treatments and monitoring. However, as long as the quality of the instruments, machineries and other apparatus for environmental management is comparable and even better than from the other countries, both for quality and prices, it is not a problem.

4.3. Priority Areas for JICA Cooperation in Indonesia for 2003

In accordance with the current Japanese Government's basic policy for economic cooperation with Indonesia, JICA has taken initiatives to restructure its priority assistance program to meet the demand and to respond to the changes of the situation in Indonesia. With regard to this progress, JICA has considered that economic structural reforms should be put as an urgent priority for

supporting the achievement of recovery and stabilization of economy. Meanwhile, Social Development and Poverty Reduction as well as Environmental Protection shall be considered as long-term development program. Based on the urgency level of the development, JICA has decided to set up its priority issues for cooperation in Indonesia for next 2003, are as follows:

- Assistance for Economic Structural Reform
- Assistance for Good Governance
- Assistance for Economic Development Foundation
- Social Development and Poverty Reduction
- Environment Protection

4.3.1 Assistance for Economic Structural Reform

As an emergency area for contributing to the recovery and stabilization of economy, JICA has laid primary importance to the process of economic structural reforms in Indonesia, which shall be focused for two (2) main development priority issues, there is:

4.3.1.1 Improvement of Financial and Fiscal Sustainability

JICA has developed one program, namely “program for economic policy management”, which is focused on macro economy, taxation and banking management.

4.3.1.2 Strengthening Industrial Structures.

JICA has developed two programs in this issue: (1) “program for creating favorable environment on economic activities” and (2) “program for small and medium scale enterprises development”.

4.3.2 Assistance for Good Governance

As a contribution to good governance in Indonesia, JICA has emphasized on capacity building for institutional and human resources management, which shall be focused on two main priority issues as follows:

4.3.2.1 Addressing Civil Service and Legal Reform

JICA has developed three programs to support this aspect, namely (1) “ program for supporting civil service development” that focusing for the improvement of statistical data and gender mainstreaming, (2) “program for legal and judicial reform” and (3) “program for reform of Indonesian National Police”

4.3.2.2 Support to the Human Development of Regional Government

In support for the human development of regional government process, JICA has developed one particular program that is the “program for capacity development of local governance”.

4.3.3 Strengthening the Foundation of Economic Development

Strengthening the foundation of economic development is very important to ensure a sustainable economic growth in Indonesia. In this priority area, JICA has focused on the three following priority issues:

4.3.3.1 Strengthening Human resource Development for Industrial Sector

JICA has developed one particular program in this issue, namely the "program for higher education in engineering" which concerns on higher engineering education system to promote a qualified engineer and also polytechnic development to strengthen a better skilled of technical worker for supporting industrial sector development.

4.3.3.2 Supporting Infrastructure for Industry and Economic Activities

JICA has developed two programs in this issue, being (1) "program for mining and energy", to be focused on electricity and mining sectors and (2) "program for transportation and traffic", concerning sea transportation, aviation traffic, road and land transportation.

4.3.3.3 Promoting Information Technology

In this issue, JICA has decided to set up one program, called the "program for Information Technology Support" that shall be focused on information and communication technology (ICT) including broadcasting (radio and television management development) and telecommunication sector".

4.3.4 Social Development and Poverty Reduction

In the contribution for social development and poverty reduction in Indonesia, JICA will emphasize on five main priority issues as follow:

4.3.4.1 Basic Education

In the basic education issue JICA has focused on one program, called the “program for improvement of primary and secondary education”.

4.3.4.2 Basic Health Care and Medical Services

JICA has developed the following two programs on this issue (1) “program for improvement of regional health care and medical services” and (2) “program on infectious disease control”.

4.3.4.3 Promotion of Village Development and Stable Supply of Food

Four programs have been developed related to this issue, namely (1) “program for community development” that will focus on community empowerment through partnership between government and non-government organization, (2) “program for rural infrastructure development” that focusing on basic infrastructure to support village development such as water supply, rural electricity etc, (3) “program for stable food supply and improvement of nutrition” concerning improvement of institutions and production in agriculture and fisheries, and also sustainable utilization of fisheries resources, (4) “program for raising income of farmers and fishermen and vitalization of rural economy: which will focus on the promotion of community-based processing

industry in agriculture and fishery sector, and followed by the improvement and strengthening of the market for agricultural and fish product.

4.3.4.4 Social Infrastructure Development

This issue will be focused on two programs (1) “program for adjustment of regional infrastructure” focusing on water resource management and development and (2): program for urban development” that concerning housing development, land management and spatial planning.

4.3.4.5 Improvement of Social Security

In response to social security issue, JICA will focus one program, namely “program for enhancement of social welfare” which will strengthen several aspects such as supporting for employment promotion of disabled and socially weak, enhancement of manpower policy and labor management relations particularly on occupational health services (OHS).

4.3.5 Environmental Conservation

A contribution to the environment protection area in Indonesia, as one of the global issues, will be emphasized by JICA in two main issues: nature conservation and improving environmental management.

4.3.5.1 Nature Conservation

JICA has developed two programs on this issue (1) “program for conservation of biodiversity” and (2) “program for forest and nature conservation” that covers also for natural disaster management.

4.3.5.2 Improving Environmental Management

JICA has developed one program on this issue namely “program for living environmental management” which covers some areas such as drainage and waste water management, solid waste management including improving quality of air and water environment.

4.4 Feature of Environmental Management Center (EMC)

4.4.1. Vision and Mission of EMC

Vision: To become environmental reference laboratory and environmental quality monitoring center

Mission:

- To undertake the role of environmental reference laboratory;
- To undertake environmental quality monitoring activities and to provide environmental data quality based on scientific evidence;
- To manage environmental laboratory network system;
- To provide professional public services in environmental laboratory fields.

Sustainable development is the way to satisfy the needs of improving a quality of life. Based on that perspective, a good quality of environmental laboratory will support effectively the effort of

environmental management activities by presenting reliable data that will be applicable as a tool for policy decision-making.

PUSARPEDAL (Center for Environmental Impact Control Facility) or best known also as EMC (Environmental Management Center), was established in August 12, 1993 granted by JICA (Japan International Cooperation Agency); with the main function the reference environmental laboratory. Through Presidential Decree No. 02 and 04, 2002, PUSARPEDAL changed to SARPEDAL (Environmental Impact Control Facility) under the management of Deputy Assistant for SARPEDAL, Deputy Minister for Technical Infrastructure Development for Environmental Management.

SARPEDAL role as a reference laboratory was certified by accomplishing certificate of accreditation as a testing laboratory from KAN (National Accreditation Body) on February 7, 2001.

SARPEDAL undertake the responsibility to develop and improve the capability of other environmental laboratory in Indonesia, and also as a center for environmental quality monitoring. Besides, SARPEDAL is expected to become a professional laboratory to provide public services in environmental laboratory fields.

4.4.2. Role and Task of EMC

The roles of EMC/SARPEDAL are as follows:

- To undertake the measurement of environmental quality parameter;
- To undertake the calibration of laboratory equipment;
- To provide standard reference material (SRM) and to conduct laboratory proficiency test;
- To develop and improve environmental laboratory network system;

- To undertake environmental monitoring activities;
- To develop and improve internal capacity.

All of the above activities are run under the coordination of some divisions as follows:

1. Environmental Testing Laboratory Division;
2. Environmental Laboratory Network Division;
3. Environmental Monitoring Division;
4. Facility and Support Services Division.

4.4.3. Activity and Services

- Measurement of environmental quality parameter specifically in waste water, solid waste, ambient air and emission;
- Calibration of equipment, Proficiency test, provision of SRM and testing material for environmental quality parameter and resin regeneration;
- Provision of technical competence recommendation for environmental laboratory, development of environmental Laboratory Network System, provision of technical assistance and implementation of quality system referred to SNI 19-17025-2000;
- Environmental Quality Monitoring, research and study on environmental problems in Indonesia, which output as recommendation for policy decision maker;
- Development of library and information services in environmental fields including of SARPEDAL activities, to offer benefit for public in printed matters (reports, brochures, etc.), VCDs, web site and other things;

- To provide professional public service in environmental laboratory fields;
- To conduct research collaboration with other institutions are Bapedalda (Regional Environmental Impact Management Agency), National Science and Research Institute (LIPI), National Petroleum Company (PERTAMINA), National Atomic Agency (BATAN), Universities (UI, ITB, Trisakti, etc.), and also NGOs. And as for International institutions are Japan International Cooperation Agency (JICA) in development human resources and environmental facilities, United Nations University (UNU) in cooperation with East Asia for environmental monitoring (EDCs monitoring). Acid Deposition And Oxidant Research Center (ADORC-EANET) in cooperation for Acid Deposition monitoring, International Atomic Energy Agency (IAEA), Overseas Environmental Cooperation Center (OECC), Canadian Association For Environmental Analytical Laboratory (CAEAL), etc.

4.4.4. Facility and Equipment of EMC

SARPEDAL consist of some laboratories as follows: Air Quality testing laboratory, Water Quality Laboratory, Biology Laboratory, Soil and solid waste Laboratory, Noise and Vibration Laboratory, Calibration Laboratory, and also library and information system unit.

Some of the main equipment in SARPEDAL are GC-MS, AAS, X-Ray Fluorescence Spectrophotometer, HPLC, IR, and FTIR. Scanning Electron Microscope, Mercury Analyzer, Flash Point Tester, TCLP, LC and LD-50, Sound Level Meter and also Main Center Calibration (MCC) the calibration facilities for continuous air monitoring.

4.4.4.1. Environmental Laboratory

Living Environment Management would be effective and efficient if it supported by environmental laboratory which capable and able to produce a legal data, and scientifically approved. This is an ideal situation that proved the real condition as reflect of the real environmental condition, and it can be used as evidence for a legal manner. A correct data coming from a good laboratory is base information for planning, evaluation and monitoring purposes that served for policy making for environmental planning.

Environmental laboratory is a laboratory which is capable and has authorization to determine and do the examination of chemical/physical/biological parameters for the environmental matter and comply with regulation. Capabilities for the laboratory mean its competence to produce 'environmental quality data' in a legal manner, accurate, clear, and objective. Authorization for the laboratory means a formal authorization issued by State Ministry of Environment and/or the Governor. It can be used as a reference as environmental laboratory, to do and to work with environmental parameters to serve for environmental management.

Criteria to complete as environmental laboratory are:

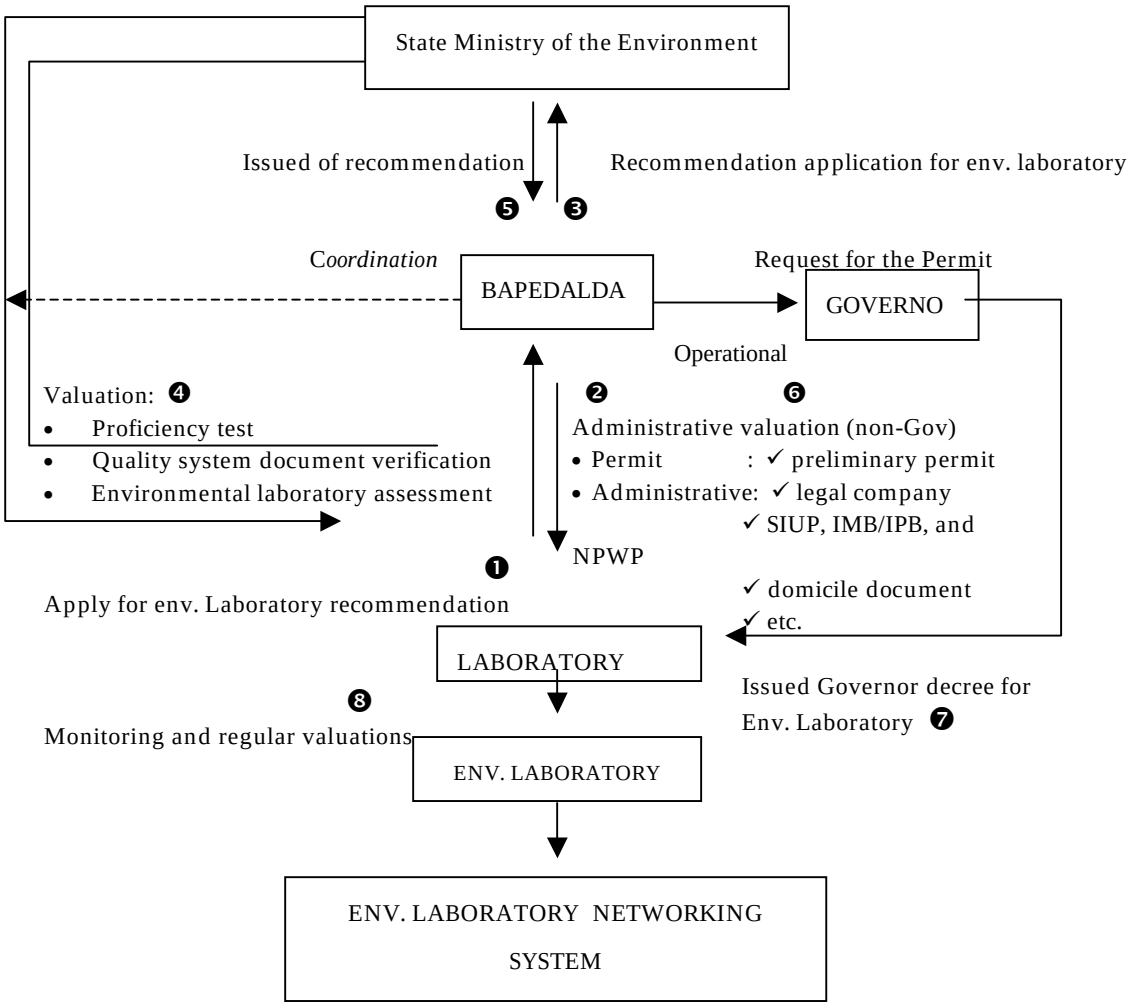
1. Fulfill all administrative obligations by local authority
2. Comply with the criteria as SNI 19-17025: 2000 about: Standard and criteria for Calibration and Analyze laboratory'
3. Comply with the Decree of the Head of Environmental Impact Management Agency No 113 year 2000 about General Guideline and Technical Guideline for Environmental Laboratory.

Certification and/or recommendation for environmental laboratory is for the purpose of the local government (Province/City/Municipality), as the authority and responsibility of control for this laboratory, to give a level of its competence. According to the recommendation, issued by State

Minister of the Environment, it can be used as reference laboratory by the Governor and/or Major for the local laboratory choice.

Certificate/recommendation for Environmental laboratory are giving to:

1. Laboratory who has capability of environmental parameters examination and certified by National/International Accreditation Body.
2. Laboratory, who has capability to analyze environmental parameters, certified by State Ministry of Environment but didn't have any certification from National/International Accreditation Body.
3. Laboratory who has capability to analyze environmental parameters suggested by State Ministry of Environment and must have comparison with other certified laboratory (reference laboratory)



Environmental laboratory recommendation by EMC

Notes:

1. Surface water
2. Sea Water
3. Waste Water
4. Solid waste
5. Soil, sludge and sediment
6. Air ambient quality
7. Point source of air emission
8. Non-point source of emission
9. Odor
10. Vibration
11. Noise
12. Microorganism

Environmental laboratory Developed by State Ministry for the Environment
(in collaboration with other Department/Minister)

NO.	PROVINCE	CITY	LOAN								TOTAL
			OECF				AUSAID				
			INSTITUTION / LABORATORY				INSTITUTION / LABORATORY				
			DEP KES	DEP PU	DEP IND	BAPEDAL	DEP KES	DEP PU	DEP IND	BAPEDAL	
1	DI ACEH	BANDA ACEH	BLK	PU	BPPI	-	-	-	-	-	3
2	SUMUT	MEDAN	BLK	PU	BPPI	-	-	-	-	-	3
3	SUMBAR	PADANG	-	-	-	-	BLK	PU	BPPI	-	2
4	RIAU	PEKANBARU	BLK	PU	-	-	-	-	-	-	2
5	JAMBI	JAMBI	-	-	-	-	BLK	PU	-	-	2
6	BENGKULU	BENGKULU	-	-	-	-	BLK	-	-	-	1
7	SUMSEL	PALEMBANG	BLK	PU	BPPI	-	-	-	-	-	3
8	LAMPUNG	TANJUNG KARANG	BLK	PU	BPPI	-	-	-	-	-	3
9	DKI JAKARTA	JAKARTA	-	-	-	EMC	BTLK	PU	-	EMC	2
10	JABAR	BANDUNG	BLK	PU	BBS	-	-	-	-	-	3
11	JATENG	SEMARANG	BLK	PU	BPPI	-	-	-	-	-	3
12	DI YOGYAKARTA	YOGYAKARTA	BTLK	PU	-	-	-	-	-	-	2
13	JATIM	SURABAYA	BTLK	PU	BPPI	-	-	-	-	-	3
14	KALBAR	PONTIANAK	BLK	PU	BPPI	-	-	-	-	-	3
15	KALTIM	SAMARINDA	BLK	PU	BPPI	-	-	-	-	-	3
16	KALTENG	PALANGKARAYA	-	-	-	-	BLK	-	-	-	2
17	KALSEL	BANJARMASIN	BLK	PU	BPPI	-	-	-	-	-	3
18	BALI	DENPASAR	BLK	PU	-	-	-	-	-	-	2
19	NTB	MATARAM	-	-	-	-	BLK	PU	-	-	2
20	NTT	KUPANG	-	-	-	-	BLK	-	-	-	1
21	SULSEL	UJUNG PANDANG	BLK	PU	BPPI	-	-	-	-	-	3
22	SULTENG	PALU	-	-	-	-	BLK	-	-	-	1
23	SULTRA	KENDARI	-	-	-	-	BLK	-	-	-	1
24	SULUT	MANADO	-	-	-	-	BLK	-	BPPI	-	2
25	MALUKU	AMBON	-	-	-	-	BLK	-	BPPI	-	2
26	IRIAN JAYA	JAYAPURA	-	-	-	-	BLK	PU	-	-	2
Total			**14**	**14**	**11**	**1**	**12**	**5**	**3**	**1**	**59**
TOTAL			**39**				**20**				

SME : State Ministry of Environment

DEPKES : Departement of Health

DEPPU : Departement of Public Works

DEPIND: Departement of Industry and Trade

BAPEDAL: Environmental Impact Agency

BLK : BALAI LABORATORIUM KESEHATAN (Health Laboratory Institute)

BPPI : BALAI PENELITIAN DAN PENGEMBANGAN INDUSTRI (Research and Industrial Development Laboratory)

BTLK : BALAI TEKNIK KESEHATAN LINGKUNGAN (Environmental Sanitation Institute)

PU : PEKERJAAN UMUM (Public Works)

BBS : BALAI BESAR SELULOSA (Research Institute of Cellulose)

4.5. Institution Development and the Financing of the Environmental Management

In managing the natural resources and the natural environment it is pertinent to question what kind of institution and how much of the authority is given to it.

Before answering the question it is necessary to understand the functions of the natural environment such as providing the natural resources to be processed further to produced goods to fulfill human needs, as the source of *natural amenity which is directly consumed by human or animals, and also as a natural assimilator.*

Furthermore we need to understand the characteristic of the natural environment:

a. As *public goods*

b. It has *externalities*

c. *Common property and common access*

d. *Priceless.*

Our experience tells us that both the poor and the rich private sectors both have been exploiting the natural environment. Therefore based on the characteristics of the natural environment it is

appropriate to assign the government to be the responsible institution for managing the natural environment.

The private business sector is always profit oriented (*profit motive),* whereas the characteristics of the natural environment cannot guarantee to produce profits to the initiator, because it is public goods and has more externalities. This is called *the market failure.* Hence, the government has to take care of the environmental function. However, there are also government failures, since there are always pressure groups in the country and private interests that may cause the government to fail to manage the natural environment.

The managerial function for the natural environment according to the Law No. 23 Year 1997 on the Management of the Natural Environment is given mostly to the Ministry of Environment as an institution to determine the policy for environmental management which is intersectoral in nature.

Formerly the responsibility to control the development of activities that affect the environmental quality was under BAPEDAL. At the beginning this institution was directly responsible to the President Republic of Indonesia and not under the Ministry of Environment, even though the Head of the BAPEDAL also the Minister of Environment. But with the Presidential decree No.2 Year 2002, the State Ministry of Natural Environment was changed to be the Ministry of Natural Environment. BAPEDAL is no longer to be a separate institution, but is merged to be under the minister of environment. Under the minister of environment, there are now seven deputies to the Minister of Environment.

Since the implementation and the impact on natural environment are found in the local region, therefore it is important to form BAPEDALDA as local government apparatus to manage the local natural environment. Formerly the formation of the BAPEDALDA was related to the existence of the Central BAPEDAL. With the disappearance of the Central BAPEDAL, the Regional BAPEDALs in

Jakarta, Riau, Makasar and Denpasar are still maintained. Also the BAPEDALDA in each province and Kabupaten and Kota (Municipal) are still in function.

The main task of BAPEDAL first of all is to develop staff and experts in the field of engineering, management, administration, library, and main laboratories. Therefore the environmental management center (PUSARPEDAL) as now called SARPEDAL was established. The EMC's role is to support the development of laboratories in many regions. The regional laboratories were located separately in different offices such as in the Department of Public Work, Department of Industry and Trade, and Department of Health. Now all those laboratories are planned to be under the Provincial BAPEDALDA.

Japan International Cooperation Agency (JICA) has supported the establishment and development of the EMC (SARPEDAL), from the building construction and other physical development including the machines and technical instruments as well as the development of the human resources through training and education.

In managing the natural environment the role of the local government both at the provincial and tabulate levels are very important. The provincial BAPEDALDA and the *kabupaten/kota BAPEDALDA* are not under the direct instruction line with the minister of environment, but they are under the instruction line of the governor and the Pupate/Mayor respectively. With the decentralization system the role of governor is more as coordinator and not instructor to *Bupati* and *Walikota.*

Horizontally the sectoral department such the Department of Forestry, Department of Energy and Mineral Resources, Department of Agriculture, and Department of Ocean and Fishery, and Department of Industry and Trade are assigned besides to increase production also to manage the balance between the natural resource availability and the preservation of the natural environmental functions. Thus, the main actors to manage the natural environment at the national level are those

sectoral departments. The horizontal relationships formerly was through the regional offices, but now are directly to the local government's sectoral offices whish are under the authority of the *Bupati* or *Walikota.*

The consultancy line is from the Minister of Internal Affairs to the Governor to Bupati and Walikota. Then from Bupati and Walikota there is instruction line to Camat as the head of districts and directly to the village heads. Again under the decentralization system there is no instruction lines from governor to Bupati or Walikota. Under the Bupati and Walikota there are Sectoral service offices (Dinas), Planning Board (BAPPEDA), BAPEDALDA, and Local Government Secretariat as the responsible institutions for the management of the natural environment. See Diagram 1 and Diagram 2 attached.

Note that the Environmental Management Center (EMC) was under the CENTRAL BAPEDAL, but since the year 2000 with the new Cabinet structure, the EMC position was restructured to be under the Deputy VII on Environment Infrastructure. The BAPEDAL itself does not exist at the central level, but still exists both at the regional level and local level. This new structure we think will not be effective in the control and management of environmental quality. In the United States of America the role for controlling and managing the environmental quality is with the Environmental Protection Agency (EPA) and institution similar to the former BAPEDAL in Indonesia. Why it is not effective, because the line of instruction becomes too long. Environmental management is in fact according to the Law No. 23 1997 is on the hand of the President of the Republic of Indonesia. So in fact BAPEDAL was directly responsible to the President, but now to the Minister of Environment.

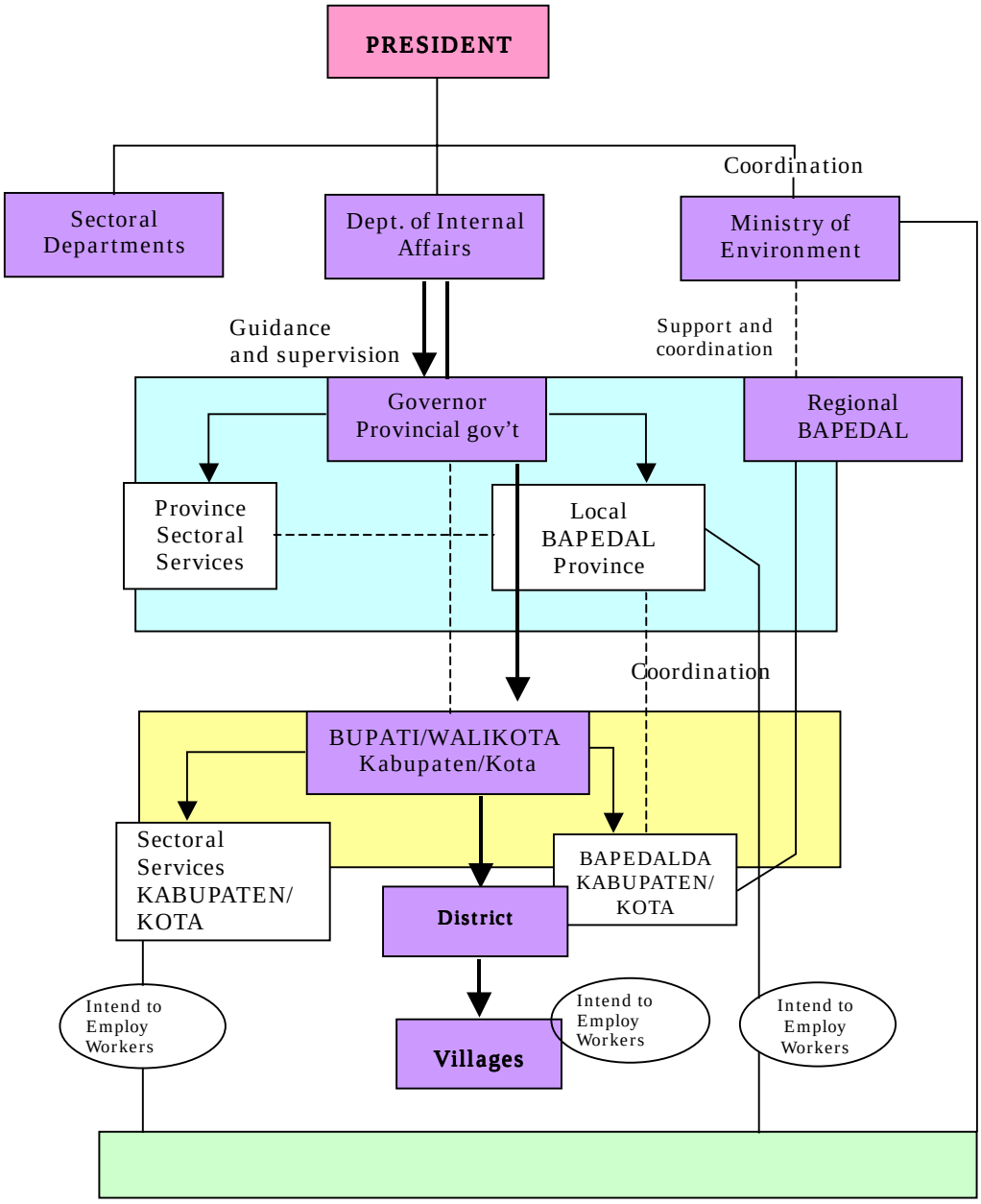


Figure 1: Government Structure and Environmental Management

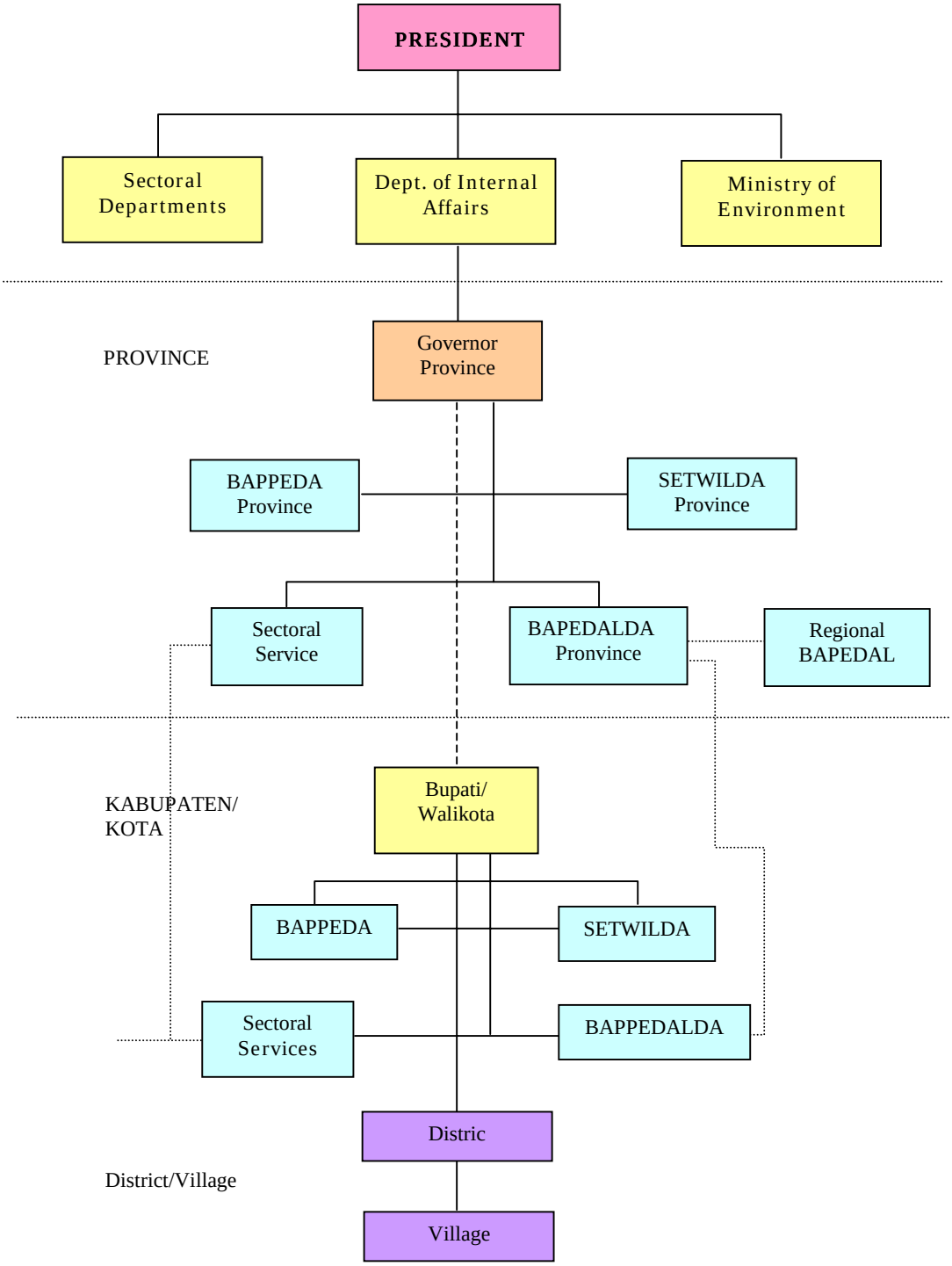


Figure 2: Function Relationship between Institutions

4.6. Environmental Condition and Problems in Indonesia

4.6.1. Economic Crisis facing Environmental Condition

Though, starting mid 1997 a severe financial crisis hit most of the Asian countries, including Indonesia. The crisis has significantly changed almost all aspects of life in the country. The economy that constantly grew in the last few decades, suddenly contracted by 13% in 1998, and within a short period of time, the shock has caused impacts on the welfare of the population. In the first place, it directly raised unemployment which resulting in the decrease of household's income and, hence, reducing their purchasing power.

Adding to the macro-economic severe situation, the long draught caused by *El-Nino* in 1997 has also reduced employment opportunity in agricultural sector. The situation was worsened by high inflation rate (reached 77.6% in 1998) which decreased the purchasing power event further. It the social sectors, a steep price hike has reduced the service quality of important sectors such as health and education. Secondly, at the household sector, the lower level of income forced them to change their consumption pattern, where women and children were usually the most vulnerable family members – particularly in the poor ones- as the households' consumption pattern changes.

In the beginning of 1998, when the secondary impacts were more evident, some experts warned the possibility of "lost generation: in the future if no interventions were taken to lessen the impact. Future physically and intellectually weak generation would be resulted from today's children who are malnourished and whose parents could not afford education and health services for them. Furthermore, a drastic change in living standards had built up more conflict and social unrest. It usually started from household level (domestic violence), which accumulated at community level

(higher crime rate), and even in the society (higher political tension). In Indonesia, this tertiary impact of the economic crisis had changed overall political constellation only within 9 months after the depreciation of its currency *(Rupiah)* to US Dollar in August 1997.

Since the Independence Day, natural resources has been depleted at an accelerating rate and reached the highest rate during the last decade. Consequently the quality of the environment as the side product of the economic activities has been worsening too besides the poor awareness of the people about the environmental functions, loose environmental laws and regulations, plus the economic crisis, globalization and decentralization.

Since January 2000, the administration system of the Indonesian government has changed from centralization system to decentralization system. The central government has encouraged the local governments to increase their own local source of revenues since the central government has faced severe budgetary problems. The central government had always run the deficit budgets but covered it with foreign debts. As the result, the central government of Indonesia became one of the largest foreign debtors in the world.

Since the central government does not provide any subsidy to local governments, but let the local governments share the revenues that come from the exploitation of the natural resources (*Law No. 25, 1999 on the Sharing of Revenues between Central and Local Governments*). This new law causes the local government to enjoy a high share of revenues from the exploitation of oil, gas, and other mining resources, and even forestry and fisheries, and gives incentives to even further exploit the natural resources found in their own regions. The non rich natural resource local governments attempt to introduce new source of local taxes and fees to maintain their survival due to short of the local finance. The environmental quality is threatened very badly.

This decentralization system coincides with the economic and political reformation of the country. Indonesian people demand high freedom and more democratic lives after being convinced in a very tight rules and laws. The result is that this nation adopts very low discipline and people lost their self-control and respects. Industrial workers demand higher wages and more leisure. Workers strike very often and more frequent. Together with inconsistency in laws and regulations and high country risk for investment have caused foreign companies to quit from Indonesia (look at the case of Sony electronic company and Nike Shoes Company). Investment tends to be less and less in the near future and caused the Indonesian economy to become weaker.

In fact before the 1998, Indonesia had enjoyed a high rate of economic growth (7% per annum). But after the financial and economic crisis, the Indonesian economy was hit very severely. The growth rate of the economy dropped 14% in the 1998, but then recovered very slowly and reached about 2.0% in 2002. It means that our economy is still worse compared to the year 1997. The government of Indonesia has maintained high level of foreign debt. About 40 –45% of the national budget was allocated to the payment of the foreign debt, while more than 15% of the national budget come from the exploitation of natural resource. There is no other source of revenues to run the economy of the country other than exploiting the natural resources. Low income of the people means low government tax revenues and low private savings. As a consequence, the government has to increase the revenues from the working contract of natural resource exploitation by increasing the rate of resource depletion or increase the foreign debt which both result in poorer condition for the country. Increasing the flow of foreign direct investment seems impossible, because economic incentives do not work well due to the high risk for foreign capital to be invested in Indonesia. So Indonesia is in a big dilemma now.

In addition to the above problems is that the government and the parliament seem to have short sighted. There is no long term plan for the country's recovery. Both institutions are busy with their

own business how to survive in their positions. The coming election for the government and parliament members in 2004 is the short term target for them to win. Environmental quality is the last priority compared to other needs. So the environment standard is regulated, but in practice is loosened.

4.6.2. Reformation Era: on Democratization and Decentralization (Ref: Max Pohan, 2002)

The democratization process in the *reformasi* agenda has begun earlier than decentralization, in May 1998, when Soeharto's regime collapsed. The general election that took place in 1999 is widely regarded as the first free and fair election ever performed in the country for more than four decades. The elected representatives have more authority in the political decision-making process and build-up a more balanced system of power sharing. Furthermore, the *reformasi* has put an end to the censoring of the mass-media and press licensing system, allowing a free public debate covering whatever issues needed to be discussed.

Another demand echoed through the *reformasi* is decentralization, which is rather an expression of dissatisfaction *vis-à-vis* the Central Government after more than three decades seen as *injustice* by provincial/local governments those with abundant natural resources. Indonesia has been administrated by Jakarta since its proclamation in 1945 and since 1950, traumatic of regional resentment which threatened the unity of the country, the successive governments continuously believe that a unitary state is more secure in maintaining unity than a federal system.[1] Based on Law No. 5/1974 on Principles of Regional and Local Governments, the government is divided into provinces, currently 30 provinces (2002), and provinces are subdivided into districts *(kabupaten)* and municipalities *(kotamadya).* Districts, in the rural areas are also subdivided into sub-districts

[1] United Nations, idem, p.8.

(kecamatan) and kecamatan into *desa* (villages), while municipalities, as urban areas, the villages are called *kelurahan*.

This system, despite some advantages such as the effectiveness of handling and delivery system from the central government down to village level, has major disadvantages of extended and often inefficient, bureaucratic chain of command, very 'top-down' approach which tends to discourage local initiatives. The Law No. 5/1974 has also stipulated the regional autonomy to some extent. However, the subsequent government regulation (*Peraturan Pemerintah)* was only issued in 1992 (PP. No. 45/1992 on Decentralization at Daerah Tingkat II), after almost 20 years later. The central government has been charged by the local governments as not serious in this matter, although almost none of the governments voiced this charged openly.

Decentralization as a strategy for economic and social development and for nation building has become accepted around the world. Most developing and transition nations have by now adopted a decentralization program in one form or another.[2] Decentralization could well be the right policy for Indonesia because it moves government decisions closer to the people, a crucial ingredient of governance in a country that is so large and so diverse. And, with local elections it will lead to better public services and better public servants, and more participation. In the long run, decentralization could make Indonesia a stronger, more stable, and more democratic nation.[3]

The two laws, Law No. 22/1999 on Regional Government and Law No. 25/1999 on 'Fiscal Balance Between the Central Government and the Regional Governments' constitute a break-through from a centralistic government administration to a more balanced distribution of power and functions between central and local government, as well as development funds. The two new laws have

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[2] Alm, James and Roy Bahl, Fiscal Decentralization in Indonesia: Prospects, Problems, and the Way Forward, paper, USAID, Sept. 2000, p.l.

[3] Alm (et al.), idem. P.2.

officially been implemented starting January 1, 2001, and give wide-ranging autonomy to the district/municipal government full-authority in planning-cycle process and control over their finances (revenue and spending), civil services, and organizational setup.

Related to the democratization process, the Law No. 22/1999 clearly divides the executive and legislative body at the local level. As a consequence, head of district/municipality is elected by the local parliament (although the winner still need approval by the president) and accountable to the legislative body only. However, in the Law there is no clear connection between the government and civil society in general.

Through the Law No. 25/1999, in addition to the regional government's own revenue, the regions will receive "the equalization funds" that consist revenue sharing from taxes and natural resources exploitation, a general allocation grant (DAU), and specific grants (DAK). The regional governments may also receive funds from external loan or grant, although this entitlement has been suspended in both fiscal year 2001 and 2002 for the state's balance of payment reason. This cancellation by a letter from Minister of finance early in the year 2001 has to some extent has triggered dissatisfaction from some local governments accusing the central government as reluctant to help the regional and local governments in their economic recovery.

To implement the decentralization policy the government has divided the implementation stages into 4 (four), namely: initiation period (2001), installation (2002-2003), consolidation (2004-2006), and stabilization period (2007 – onwards). Initiation period covers the development of the new regulations, guidance, etc including their dissemination. This stage also includes the efforts to deal with risks in the context of initial implementation of regional autonomy and response to be given – by the central government – to deal with several problems that are arising in implementing the regional autonomy. Installation period includes the continuation of all not-yet-finished activities in

the first period and the development of activities for strengthening, elaborating work, and adjusting to the existing and the newly developed system.

5. DEVELOPMENT OF SEMS IN INDONESIA

Social Environmental Management System is a concept that developed within environmental management context at this moment.

Basically the environmental problems are not only physical problems such as pollutions, floods, drought, etc. Within various things, the visible environmental problems are characterized to physical. The problems on physical environment have an implication on social problems and in the opposite, the social – economic-cultural problems had an implication on the physical problems. Thus these problems are influenced mutually and influenced within one unit known as a systems approach.

Within the grand concepts as said in Act 23 1997 for Environmental management (Article 1, No. 1), environment as a unit of space with all materials, energy, condition, and living organism and its behavior, that influenced the existence of living things and its welfare of other living things. Thus, the environmental problems will be determined by human attitudes and behaviors within social environment can change the ecosystem into man-made environment. Within this concept there are three dimensions of living environment that should be integrated within every human action and deed that characterized and known as holistic.

When there is a complete understanding on human role on the environment, then there is an impact of each action conducted by human within/on behalf to answer the needs through developmental activities can be managed wisely and responsibly.

Based on that, all policies, programs and activities within existing environmental areas should be arrive such as estuary, on the interest of social system enhancement, that give the meaning to the

change of thinking pattern, understanding and behavior which sound environmentally sound. Referred to those things what became the program and policies, all of government, private sectors, community, and also other stakeholders with interest on development of environment should be able to put their own activities within all existing dimensions of environments.

5.1. Indonesia, As Part of the Indo-Malaysian: a Unique Ecosystem That Needs Unique Solution

Just as a reminder, Indonesia is a vast and archipelagic country of south-east Asia with around 13,700 islands stretches from west to east along the equator, among them: Sumatra, Borneo (Kalimantan), Celebes (Sulawesi), Java, Moluccas, and West Papua. It has population around 210 million where male is less than female. Indonesia is a part of the Indo-Malaysian Archipelago with its unique ecosystem. It is geographically located in between two oceans: the Pacific and Indian Ocean, two continents Asia and Australia, and divided in two almost equal halves by the equator. This world's largest archipelago spread over a distance of more than 9000 km. Its geographical position and physiographical shape had caused a very humid tropical climate on most of the archipelago. Its warm and extreme wet environment is paramount the year round. Maximum temperature rarely exceeds summer temperature of the subtropical and temperate regions. It is the high water vapour content of the atmosphere which prevent mid-day's maximum from soaring, while keeping the minimum at night from dropping to freezing or chilling colds. High precipitation throughout the year on most parts of the archipelago resulting most parts of the archipelago do not have pronounced dry season, except in cases of El Nino. On most parts of the Indo-Malaysian Archipelago, dry season is merely a season with relatively less rain, not pronounced dry season except in cases such as climatic deviation of El Nino. This extreme wet climate facilitates formation

of dense tropical rainforests such as still be found in parts of the forests where man has not interfere with timber logging and conversion to annual crop agriculture.

Ecologically, converting natural rainforest with its high biodiverse communities into mono species annual crop agriculture will create environmental problems, since this type of agriculture contradict ecological principle. This type of agriculture will have to neutralize natural forces of homeostasis and ecological succession, causing a high cost agriculture. Excessive use of chemical fertilizers, pesticides and soil conditioners will create impact to the environment that has to be rehabilitated.

Physiographical setup of the Archipelago with its undulated landscape consisting not only hills and mountains but also active volcanoes, does not allow the conversion of all terrestrial land, since this will disturb the hydrological function of the mountain forest system. Contour land cultivation such as usually practiced in highlands with excellent results to prevent erosion and degradation of the aquatic ecosystem of rivers, lakes and coastal waters, are presently abandoned, resulting in the loss of productivity of freshwater and marine waters.

Population of more than 220 million is the fifth largest in the world, is unevenly distributed with 60% of the population (currently around 124 million) lives on the island of Java, an island with only 16 % of the whole country's area. Annual population growth rate of 1,7% will increase population on the island of Java with almost 6000 humans, creating immense socio-economic and environmental problems. Current estimates shows that around 60% of the population living on the island of Java depend on agriculture for living. This percentage leads to the figures of 74 million, far above the agricultural carrying capacity of the island which is estimated at 15 million. Miss-interpretation of this condition will lead to incorrect solution which will create environmental problems. It should be realized that only 80%, at the utmost, of the land area of Java could be converted into agricultural lands, since at least 20% of the area must be conserved to maintain its hydrological function.

To develop and establish Social Environmental Management System in Indonesia, capacity of society to perform environmental management is needed in all three social sectors such as identified by Matsuoka (2002) i.e. governmental, market (entrepreneurs) and community (NGO's, education and academic institutes)

Development of social capacity to such level that it can participate in the environmental management must firstly be the establishment of understanding of environmental concepts and principles since this relates to the ability to correctly evaluating environmental problems such as existed in Indonesia. Unruly, chaotic and inconsistency in the environmental management could lead to the impression that this is more or less due to misunderstanding and misinterpretation of the principles and laws of nature and its implication on the environment. This could have been avoided if environmental evaluation is based upon three aspects:

1. understanding of the general environmental condition or environment set-up in Indonesia and its implication
2. knowledge of ecological principles governing the environment
3. awareness of the necessity to apply methods and technology appropriate for the Indonesian ecosystem

Environmental degradation such as experienced by Indonesia is basically due to the neglection of those three points mentioned above. It would be impossible to obtain good results of environmental management if these environmental conditions are not taken into consideration. Unexpected results could also obtained if management is conducted by applying system or methods developed in places or countries having different ecological condition. Therefore, to establish environmental management system involving the society, what should firstly be conducted is to develop social

capacity in the management of the environment and this could be initiated by the existing network of Environmental Studies Centers currently already established throughout the country. Unfortunately, almost all Centers mentioned above are staffed by personnel which tend to have insufficient understanding in the ecological and environmental principles leading to miss-understanding, miss-interpretation and miss-management causing confusion in the solution of environmental issues and problems. Many environmental cases were incorrectly solved, which later produced new problems.

Capacity in the management of the environment also needs adequate, sufficient and appropriate facilities so as to enable correct investigations, consistent research and accurate evaluation of findings. Without adequate facility, management will not yield expected results, due to inaccurate and miss-processed field and laboratory findings. Correct interpretation of incorrect data could end up in incorrect management.

Development of social capacity such as mentioned, will be greatly enhanced by systematic publication, communication and dissemination of knowledge and information, using mass-media, scientific seminars and practical workshops. Therefore organized efforts must be established.

Development of SEMS in Indonesia will proceed in stages as follows

1. Preparatory period – establishment of knowledge at the social level by dissemination of information on
    a. unique environmental condition of Indonesia and its implication to the environment, management of the environment
    b. ecological laws governing the environment and their implication to the Indonesia environment

Dissemination of knowledge mentioned will be conducted through workshops, seminars, lectures, courses for several education levels, mass media and other existing mass communication methods. To avoid confusion due to probable different views, environmental concept, perception and interpretation of environmental laws and its implication should not be contradictive

2. Advanced preparatory period – establishment of appropriate facilities to enable social participation in the environmental management. Formation of Environmental Management Center Network could be initiated, by expanding existing established Management Center.
3. Progressive period – where government on sectoral basis could review policies which proved to be inadequate for management of the environment, adopt and implement policy responses against environmental issues raised by society
4. Consolidation period - such as described by Matsuoka 2002

5.2. Prospect of Social Development: Democratization and Decentralization Perspective (Ref: Max Pohan, 2002)

Social development and the supply to basic needs of the people are clearly now the task of local governments as stipulated in the Law 22/1999. However, experience during the fiscal year 2001 and 2002 showed that local governments are less responsible in this matter for the reason of lack of funds. In addition to that, it seems that sectoral ministries do not want to lose their grip on the sector they are dealing with after more than three decades.

It is necessary to open wide-range opportunity for public participation from the village level to vanguard the local autonomy not being a transfer of centralistic and authoritarian approach from central to local government. Both laws has fostered the authority of local parliament, wider scope of

participation in decision-making process is however nor clearly defined in the new legislation, except an “urban forum” which consists all stakeholders of development at the local level.

An attempt to form a multi-stakeholders forum at district level all over Indonesia however had been exercised by the Government since 1999 through Social Safety Nets program. Despite success achieved in some regions, the exercise was hampered by lack of consciousness at the community level and civil society as a whole, and that the forum is mainly financed by local governments. Once the budget is not allocated them the forum is diminished.

The problem-related to the previous political practices-is how to encourage the civil society to be more involve in the development process. In general, non-governmental organization (NGOs) or community based organizations (CBOs) has very important role in enhancing participation at the local level. At the grass-root level, they can be a facilitator and mediator of the empowerment of local community; facilitating the community to be organized, increasing their capacity in decision-making process, and improving their access to information and resources. At the municipal/district level (or even at the provincial or central level), involvement of civil society in decision-making process may give a wider perspective of development needs. On the other hand, wider participation requires (and implies) a more *transparent* and *accountable* public administration.

All these issues, democratization, decentralization, good governance are issues relatively new to most Indonesian and surely it needs some more years to see the good result of those exercises, if it continuously implemented.

5.3. Lesson Learnt: the Basic of Partnership to Build SEMS (Ref: CRHRE, 2002)

Partnership is the important part of environmental management that related to Agenda 21 of Rio. Partnership relates to section III of this agenda (that is strengthening the role of the major groups)

which related to Agenda 21 Rio. This foundation is built and motorized by government and various relevant stakeholders. The government should consider the youth groups, native people/aborigine, NGO, technological community, scientists and labor groups and industrial and business groups.

5.3.1. Good Governance as a Base of Partnership

United Nations Development Programme (UNDP) defined Governance as an implementation of political authority within the national management context. The good Governance is a good and soundly or effective and efficient management which based on the involvement of the public its accountability and transparency in management.

Referred to the idea of Good Governance, it can be interpreted as an optimal and effective function of governing elements. Those elements are: Government, people's representative, judicial bodies, after that private sector includes industry, banking and business, and the actors of civil society such as NGO, professional groups, and universities.

Those three elements of nations (State, private sectors and society) should create check and balances in which each component can assess and control mutually in order to reach and keep stability among the elements.

To reach the state of Check and Balance it requires the existence of representative bodies, which able to implement the control function and effective speaker of people aspiration, self-standing independent judge, clean and professional bureaucrat, which have integrity strong and responsive to the need of the people. Other requirement is a strong civil society. These requirements allow the implementation of civil society to implement the public control and decentralization, also the strong local representative.

5.3.2. The Decentralization of Environmental Management as a Basic of Partnership

Decentralization within the good governance context is a management of local things by the people and also the local people itself. Decentralization is the main elements of Good Governance caused it starting from the assumption that the people itself better conduct the public sector management. Local Policy as consequent of decentralization assumed that it would be easier to absorb the local people aspiration compare to the policy that implemented at the central government. Based on Theoretical of public policy the products of decentralization can be interpreted as more participative o aspirated.

5.3.3. The Structure and Social Interaction as a Basic of Partnership

To build a partnership on behalf of the environmental management can be analogues to construct a big cooperative group. The big group is a complex social system consists of various sub-systems that had specific orientation. The orientations are values, goals, perspectives, experience, lifestyles, and motivations. Relation or elaboration between partnerships as a form of social interaction with the social structure, in realization become the dynamic process and attach in the social system. Alvin and Helen Gouldner explained that partnership formed by an action and reaction process is a social interaction which contained a mutual contact process or inter stimulation.

The social interaction in partnership can be seen as:

1. There may be between groups or group to person
2. There is groups to interaction)
3. There is person to person interaction

Partnership formed to serve various intentions and goals. Based on this condition, partnership can be developed when we can coordinate various orientations. This thing (orientation) can sharpen the focus on identification of problems and also support the solution alternatives, which followed by the strategies.

This partnership can be based on few things. First is based on profit, as said by Gerhard Lenski, there is also a symbolic exchange within communication. (Peter Blau).

The partnership itself can be separated of conflict potential and cooperation potential. Lewis Coser said that conflict could be occurred as a part to complete an order and harmony in social relation. Erving Goffman himself see a conflict as thing which is temporary and can be changed Then, Amitai Etzioni saw that human relation between actors formed a group, and develop group, and group inter-relation. This group had knowledge and intended goals and awareness. To reach the goals a partnership, there is a requirement. When there are an awareness of the goals, and approved through various involvement activities, a partnership had already developed.

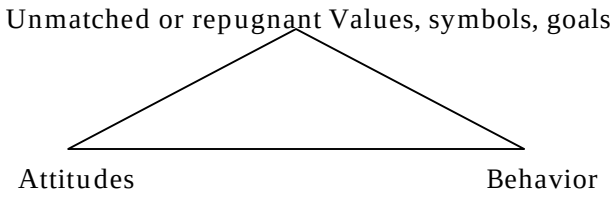
5.3.4. Partnership Mechanism

In short way the form of partnership can be seen in two levels. The first is at conceptual levels and the other at the action levels. Partnerships for environment basically are dynamic system, which the existence determined by the interaction between the arrangements of the components. Partnership includes basic aspects such as human include its values, norms, behavior its politics and culture.

Partnership Mechanism appears as cooperative relationship with the mutual information flows or two directions. It followed with the role distribution based on function and capability and supported by agreement. The Partnership can be separated from few approaches such as: a) conflicts theory; b) exchange theory; c) symbolic interaction; d) participation theory.

Conflict. Various social scientists had been tried to study the conflicts. Ralph Dahrendorf Dahrendorf saw a conflict as a "Contests, competitions, disputes, and tensions as well as for manifest clashes between social forces".[4] 'Conflict is a clashes of interests' that can be seen as Johan Galtung's triangle. The potential of collision can be identified at abstract levels as situation (with conflicted values, norms, ideas) and attitudes. At this condition, the potentiality of conflict is big when there are an abhorrence different ideas or symbols added with abhorrence attitudes. The conflict appears when there is abhorrence behavior. [5] Galtung's triangle can be seen bellow.

Situation that had a potential of conflict



Beside Galtung, Douglas Amy[6] saw the conflict caused by:

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[4] "Contests, competitions, disputes, and tensions as well as for manifest clashes between social forces". Look at, Jonathan Turner. 1978. The Structure of Sociological Theory. Dorsey Press. Illinois.

[5] Audrey Armour. Workshop on Conflict Management. Jakarta, April 9-ll, 1991 University Consortium on the Environment. Jakarta.

[6] Douglas Amy. The Politics of Environmental Mediation. Columbia University New York 1987.

1) Miscommunication or misunderstanding;
2) Conflict of interests;
3) Conflict of principles.

Ahmad Santosa said that conflict could be separated between vertical and horizontal conflicts. A vertical conflict is between powerless and powerful.[7] Horizontal conflict can seem as ethnic conflicts, the indigenous and newcomers, conflict between different autonomy areas and between different religions. Starting from the interpretation he suggest few things which can be used as supporting steps.

1. Method of conflict prevention, the ability to use the instrument of conflict preventions.
2. The teaching of tolerant on different, reject discrimination, violence.
3. Development of ability to identify analyze, the source of conflicts
4. Designing dispute resolution.
5. Training and pooling conflict revolver.
6. Development of conflict intervention pattern such as convening facilitation, negotiation, mediation, and
7. Development of regulation on conflict and also reconciliation and rehabilitation.

In nutshell Ahmad Santos suggestion can be separated into: a) prevention of conflict, b) identification and analysis of conflict potential; c) designing the instrument to solve the conflict; d) intervention and implementation of conflict solution. Furthermore he suggest about warning system on conflict.

[7] Mas Achmad Santosa SH, LLM, Good Governance & Hukum Lingkungan ICEL. Jakarta 2001.62-66, 137-139

Exchange in community life had been the focus of study of various social scientist and anthropologist.[8] Until now, there are two form of study within the context of exchange theory, which are an exchange at individual level and an exchange between group levels. Individual exchange referred to psychological problems, and at the group level includes reciprocal relation of more than three persons. The basic is the beliefs and values that followed by members. This reciprocal process becomes a basic of partnership mechanism.

Symbolic Interaction. This approach acts an additional to functionalism that promoted by sociologist. There is an individual communication, and society. The interlace of this communication supported by symbols which used for interactions. There is a requirement for uniformed symbols interaction for communication.

Participation is a series of process conducted to achieve agreement, implement it, evaluate it and improve it. Participation related to partnership within the context of "eight ladders of participations" (Arnstein 1969). Arnstein as a planners and consultants she was a member of Academy for Contemporary Problems in Washington. She classified the type of participation in the planning process into eight ladders, which grouped furthermore into three main patterns. Those three main patterns are:

1. Nonparticipation level.
2. Level of tokenism
3. Level of citizen power.

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[8] Nicholas Abercrombie, Stephen Hill and Bryans Tumen Dictionary of Sociology. Penguin Reference London. 1988.

Nonparticipation is a level, which have tendency to manipulate or therapy the target groups. It assumes that the people are 'sick' or 'uneducated' and 'naughty'. The effect is an act to manipulate or treat the people as sick persons

Tokenism is a level where the processes of informing, consulting were conducted and placation (or to calm down) conducted. At this level just two ways of information flow. The people had no guarantee that their opinion will be heard or to be considered. The authority holds the decision[9]

Level of citizen power is a level where the partnership delegation of power, and citizen control located and operated. Those eight levels can be seen on bellow picture.

Degree	Form	Classification
8	Pengendalian oleh masyarakat (Citizen control)	Tingkat-tingkat Kedaulatan pada Rakyat
7	Pendelegasian kekuasaan (Delegated Power)	
6	Kemitraan (Partnership)	
5	Peredaman/Pembungkaman (Placation)	Bentuk dan tingkat yang sifatnya basa-basi (tokenisme)
4	Konsultasi (Consultation)	
3	Pemberian Informasi (Informing)	
2	Terapi (Theraphy)	Bukan peranserta
1	Manipuasi (Manipulation)	

[9] Bambang Widianto. 'Public Participation as Reflected in Planning Theories' Lingkungan dan Pembangunan. Volume 13 no. 2 1993 (hal. 93-101).

The ideas in the citizen power patterned into three types. The first is partnerships, second delegated power, and the third citizen control.

Participation that involved community is unavoidable of environmental condition with its various ecosystems. Few problems in implementation of public participation are the form of participation that un-match with the type of planned ecosystem. Within a village in an island, the citizen control can be implemented. Within a river catchment area which started from the mountain to the river delta on coastal area, may be the delegated of power can be conducted. But, the overlapping issues but attached with the environmental problems, the control of citizen or delegation of power will be difficult to be conducted.

The control conducted by the people will be difficult to be implemented on one state with various province and types of ecosystems. Maybe the power delegation can be implemented based on the type of ecosystems. The existence of various types of ecosystem needs a flexible pattern which can develop into participation. At this point, partnership can be used as a flexible form of participation which can be operated for the bigger area such as national level, and at a regional level (*regency or district*).

Partnership even though as part of various levels of participation is a bridging for the genuine participation. This partnership is bridging the point of conflict to the point of partnership and then to the point of participation. Starting from this partnership the process is moving into participation in decision-making process as public legitimacy. Partnership can help the work of local autonomy in government and between locals. The position of partnership can be seen on bellow diagram.

Conflict potential → Partnership → Participation

5.3.5. Social Anatomy

Anatomy is the structure and form of biological organisms and their study. The subject has three main divisions: gross anatomy dealing with components visible to naked eyes; microscopic anatomy dealing with microstructures seen only with the aid of an optical microscope; and submicroscopic anatomy dealing with still smaller ultra structures. Since structure is closely related to function, anatomy is related to physiology. [10]

Social Anatomy is a description of social components (such as institutions, organization, and activities) that illustrate the relationship among persons, components of social environment within one area. This relationship attached to the structure and function. There is an exchange and symbolic interaction.

The analysis had conducted until it reached at the component level (not sub-component). This component called as social component that have two forms. The forms are formal organizations and non-formal organizations. These components can be seen as government, NGOs, and interest groups. The groups related with the partnership. The approach to study these components is based on theoretical base of social study. The deeper the analysis it will require special study operational definitions.

Social Anatomy as a description on social components pictured the relationship between individuals and groups and among themselves (as individual and groups) within one area. This term reflects an idea which based on biological pattern which related to the though on evolutionary as said by Herbert Spencer.

Herbert Spencer had made an analog on society as social living organisms and individual organisms that have similarities. This analogue show few characteristics: 1) both have the beginning

[10] The New American Desk Encyclopedia. Completely revised and Updated. Signet Book. New York. 1993: 59.

and development; 2) the increasing of the size followed by the growing of complexity and differentiation; 3) separation that influenced the structure followed differentiation or separation of functions; 4) both (structure and function), mutually interdependent 5} both are part of entity, and formed as micro society or organism inside and for itself; 6) The life all will be diminished but there is also another things which survive.

Above explanation has influenced on functionalism approach by Talcott Parsons. Talcott Parson himself develop it furthermore to develop social systems which will arrange in component such as adaptation, goal attainment, integration, latency.[11]

These social components within the social system, the activities had been arranged in various actions which part of body activities, thinking process and attitude, interaction process, and also the internalization or culture norms. These social components with the individuals who act as the elements, move with motivation to fulfill the end of its institutional and its organization.

The goal of its organizations are related to the environment, and directing its activities for the preservation or conservation of the environment. In simple way, it can be divided into an approach in anthropocentric approach and eco-centric approach. Based on the goal of these approaches, integrated environmental management requires a partnership that related to its organization and its relations with environments.

Robyn Eckersley saw that a lot of environmental organizations movements are based on the assumption that they have a relationship with the environment. It can be looked on their annual agenda and statements. Even though the acts is in the named of and for environments, the main goals are: a) conservation for production; b) Efforts to reach human welfare ecologically; c) environment protection for preservation on its flora; d) preservation for its fauna; e) preservation on

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[11] Jonathan Turner and Alexandera Maryanski *Funtionalism.* Benjamin/Cumming Pulishing. London, 1979.

its botany and zoological aspect include the non living things (soil, water and air) called eco-centric.[12] The thought above showed a continuum which started from anthropocentrist into an eco-centrist value orientation. All above things can be interpreted as the effects of problem in justice. The map of various ideas can be seen in bellow table.

Program and working agenda					
Justice principle	b) environmental conservation for production	c) social welfare ecologically	d) reservation with focused on botanical aspects	e) Animal liberation	f) Eco-centrism
Similar access					
Different/diversity					
Protect the weakness					

The interpretation of injustice problems saw it as a potential of conflict as clash that can be said as " burning coal inside the *hays (jerami)"* (in Indonesia called as *("api dalam sekam")* which can be grown and explode. The just or fair process had been seen only as rhetoric rites. This interpretation caused by inconsistency, and responded by an apathy reaction by the public and social distrust. Social distrust can appear when we failed in fulfilling or show: a) a commitment, 2) competence, 3) to caring, 4) predictability.[13]

Few NGOs and Walhi during PPSML research workshop said that they are suspicious about existing partnership. The reasons are:

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[12] Robyn Eckersley Environmentalism and Political Theory. UCL Press. London, 1995.

[13] Roger Kasperson, Dominic Golding, Seth Tuler, "Social Distrust as a Factor in Siting Hazardous Facilities and Commnuicating Risks" dalam Journal of Social Issues Vol. 48, no. 4, 1992.

1. Manipulative
2. There is no fair information dissemination
3. The strong group objectified the people or society.

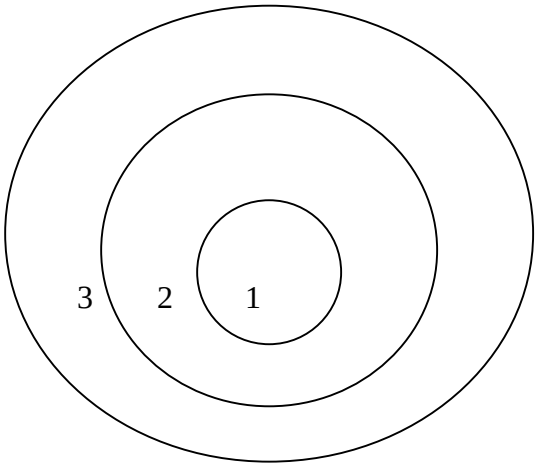
The responses to this reality influence reactions in decision-making process. The influence can divided along the continuum as seen bellow:

1. To grasp or get the people/social right
2. Push the policy which oriented to the people and its environment
3. Reach consensus and/or solution to accommodate stakeholder interest.

The NGOs and Walhi expected few things inside the partnership relationship:

a. No victim or lost among the stakeholders
b. Equality among the stakeholder
c. Concern on women
d. There is a consideration on the belief and the weakness
e. Right to participate or right to involve (during the stage of planning, implementation and controlling)

The workshop said that this social anatomy relevant and move directly into a state of Civil Society. Few cases showed a conflict on the used of natural resources can be seen as a conflict of the hidden interest which are bigger or stronger. So, one small local conflict can be interpreted into bigger or higher position of interest.



Notes :

1. Local interest
2. Regional interest
3. National or international interest

The statement of the participants (personally) of workshop said that they:

a. Reject the male domination of though on environmental relationship (emphasis on the ethic of cares)
b. Put emphasis on self organize on local level and emphasis on consistency of regulation from central to local.
c. Capitalist productional patterns should be replaced by democratically economics activities which sharing the ownership of productional means, and local democracy.
d. Put emphasis on the rationality, emancipatory and communicative actions
e. Emphasis on natural resources management socially among its users. as seem in Subak.

That statement reflects different perceptions on human interaction that emphasized environmental management. The environmental management awards as Kalpataru divided the award into pioneering actions, the server/servant of the environment *(pengabdi),* and environmental developer.

5.4. Development of SEMS (bureaucrats' perception and expectations)

This questionnaire arranged as an instrument to search the data on within the framework to give an input to organize concept of Social Environmental System in Indonesia and get a picture about the support of Japan's government and JICA to *Sarana Pengendalian Dampak Lingkungan (Sarpedal).*

Questioners distribution conducted on 9 to 10 of January 2003 located in the office of SARPEDAL The respondents is the structural official staff Sarpedal, about the description can be seen below:

Line of the head of the staffs in Sarpedal consists of 12 people who 1 person acts as Deputy Assistant (bellow the Deputy VII). Head of section are 4 people and head of sub-section are 8 people. To be clear it can be seen on the diagram of organization of SARPEDAL.

Questionnaire distributed to 12 persons who held structural position in the institution of Sarpedal. The answered questionnaires were nine, and returned to the team three questionnaire unreturned.

Educational backgrounds of respondents generally are from exact science (non-social science), the one can be categorized as geography. Above all, only one person got a master degree.

The concept of SEMS referred into a system in environmental management that will consider the implementation of this idea. This aspect referred to the knowledge and interpretation, and evaluation, and also priority on the idea. The priority refer to the urgency on improvement, need on

equipment and support. The evaluation will judge about good or bad condition also with the priority and interpretation refer to the expectation on the future as reflected in the vision.

The knowledge on SEMS is limited, but they have sensitivity on its relation to physical environment (six respondents). One expects the urgency about the introduction of SEMS is important, that it needs socialization. At this point, even though it is to clear there is a consciousness and awareness among them. There is an agreement on SEMS institutionally with its limitation and possibility. That limitation covers socio-cultural, socio-economic, educational and political aspects and then coordination between institutions. To solve these constrain there were few suggestion to work with Universities, NGOs, and other economic institutions and also ministry of environment.

The concepts related to the implementation of the relevance program with its original role with physical aspects of environment through its laboratory works of SARPEDAL. There is a question "Should Sarpedal take an action or involve (taking role) in development of SEMS" There were three answer that agree, four respondents agree with warning to consider the need to make boundary of main task and function, appropriate with its role and time of implementation. The procedure for appropriate application of SEMS needs socialization, preparation of clear (jelas) program, financial support, readiness to cooperate or collaborate.

The cooperation with Japan Government and JICA can be evaluated as success or failures. Eight respondents said that the cooperation was success. The expectation of the future cooperation referred to the human resources enhancement, expand the area of activity, and support on technical aspects in laboratory and include the expansion of working area, and an expectation of laboratory equipment. The expected supports in application include flexible supports that appropriate with the needs, then financial support, the other (four persons) prefer on non-social technical equipments, Fund, human resources, and library and information.

The belief on the vision is one of various supporting foundation for works. The respondents knew exactly the vision of Sarpedal (five knew it exactly, and four knew it deeply) and think it is good (five respondent said it is good, one said very good, one did not answer, and one said enough). They expressed that Sarpedal has been able to implement its visions. (six respondents said as capable, three said capable enough). They believe that Sarpedal had implemented the Environmental Management system, even though without social aspect. It was operated with support of its resources, in human and equipment, and approval on ISO 17025. When there was a question about asking their opinion to insert social consideration in the vision, dominantly disagree (seven respondents disagree, and two did not answer). One person who agrees said that it should be put in the message in mission of sarpedal.

They also knew and recognized the function and role of Sarpedal and said sarpedal able to do it. They said that Sarpedal able to do it maximally (two said it is capable, and six said enough). If the function and role of Sarpedal added with SEMS, they dominantly (7) disagree, one agreed and one did not agree. The one who agree the application of SEMS in Sarpedal is to monitor the environment.

The working program as role application should be known by it staff. All respondents knew it exactly and said it was okay (six enough and three said as good) and capable to implement it (six enough and two said as good). When there is a question about the acceptance of SEMS in the program dominantly said their disagreement (five respondents were disagree, three respondents did not answer it, one agree). The people who accepted it said that program should be a pilot project.

The program was as the implementation of the role and visions related to the structure of Sarpedal. The staff knew it exactly (8 respondents) and one said knew it deeply, and said that it is enough (five respondents) and good (three respondents) and one did not answer it. The additional structure of Social branch in the structure were rejected by seven respondents, and accepted by two respondents. The new part of the structure should not be separated and its function or substance can

be inserted in the existing structure (there were eight respondents did not answer to this question, only one person agree).

Furthermore about the supporting equipment or infrastructure for the works, the staff knew it exactly and one knew deeply. The availability of the equipment to support the work is complete (said by seven respondents, one did not answer it and one said almost complete). When there is a question that was asking on the addition of new equipment for Social Environmental Management it was rejected (five respondents), there two which agree and other two respondents who did not answer it. Only one respondent said the type of supporting infrastructure. It is equipment and room and space.

About the experience in working with the other institutions the staff dominantly said that they had experienced it. It consist of lab survey and consultation, various analytical tests, development and enhancement of human resources such as training and writing documents, research, technical supervision, constructing an example of comparative tests.

Based on that experience the respondent said that it gave them enough satisfaction and it was good, even though they did not explain the example.

The conclusion showed that there is a limitation of knowledge on SEMS and limited possibility to implement the SEMS, even though they were sensitive. Furthermore, even though they are sensitive enough about the relationship among environment and society and technology seem that they cannot apply and put their sensitivity of social aspect in the function and role in Sarpedal. It showed that only one person concerned on the social aspect.

5.5. The Roles and the Contributions of EMC in the development of SEMS in Indonesia

In examining the roles and contributions of EMC in the development of social environmental management system (SEMS) of Indonesia, first of all we must examine other factors that might affect the SEMS. Since Indonesia consists of many different islands and tribes, we will examine the common type of the SEMS, especially related to the pilot project of the EMC in North Sumatera and the EMC itself in Serpong.

When we talk about the SEMS, we should have in our mind that what we meant by social environment is related to the social interactions between individuals to form organization as to maintain the social agreements and justice related to the natural environment. The social institution can be in the form of family or a group of individuals or companies as a society where interactions among the members including the rules and regulations for maintaining the good quality of natural environment take place.

The SEMS has been developing in such a way that formerly the local wisdom was adopted by the local society mainly to meet the basic needs. However with the development of the needs as a function of modernization, the societies were forced to change their wisdom and become unfriendly to the natural environment. Both the rates of depletion of the natural resources and the levels of pollution have been increasing. This phenomenon has been occurring since the year of 1970's when the oil bonanza came to Indonesia and the foreign investments were accelerated to exploit the Indonesian endowed natural resources. The local SEMS were destroyed by the new systems of profit-oriented types of management. However, it seems that the awareness of the Indonesian people has come to start to see the negative impacts of economic development which may not guarantee the sustainable development for the country.

Starting with the growing awareness of the government and the hole society (the people and the business firms), it is imperative to reverse the environmental condition from the present exhausted natural resources (both the renewable resources and the non renewable resources) and the poor

quality of the environment into a new condition with better natural resource stocks and better quality of the environment. For the start we must have a good monitoring system as the result will be useful to prove as evident to the polluters and they must be responsible for the negative burdens for the society.

Environmental Management Center, to be created or already existed but with additional function, will greatly enhanced the development of SEMS in Indonesia by playing role as agent to develop social capacity for environmental management. Environmental concepts developed elsewhere will tend to fail if used as basis for environmental management in Indonesia or other countries in the Indo-Malaysian Archipelago (Malaysia, Brunei, Indonesia, South Philippines, Papua New Guinea) since environmental setup of most parts of the Archipelago could be considered almost unique.

The most important factor determining the social capacity is the member of society and manpower having the knowledge and understanding of the environment, its principles and the implications in environmental management. Consequently, the Center must have education and training programs conducted routinely and staffed by environmental competent personnel.

To perform its role, the Center has to be additionally equipped with Education and training facilities such as audio visual aids, appropriate field laboratory for exercises in environmental analyses, librarian facilities, workshops and seminars.

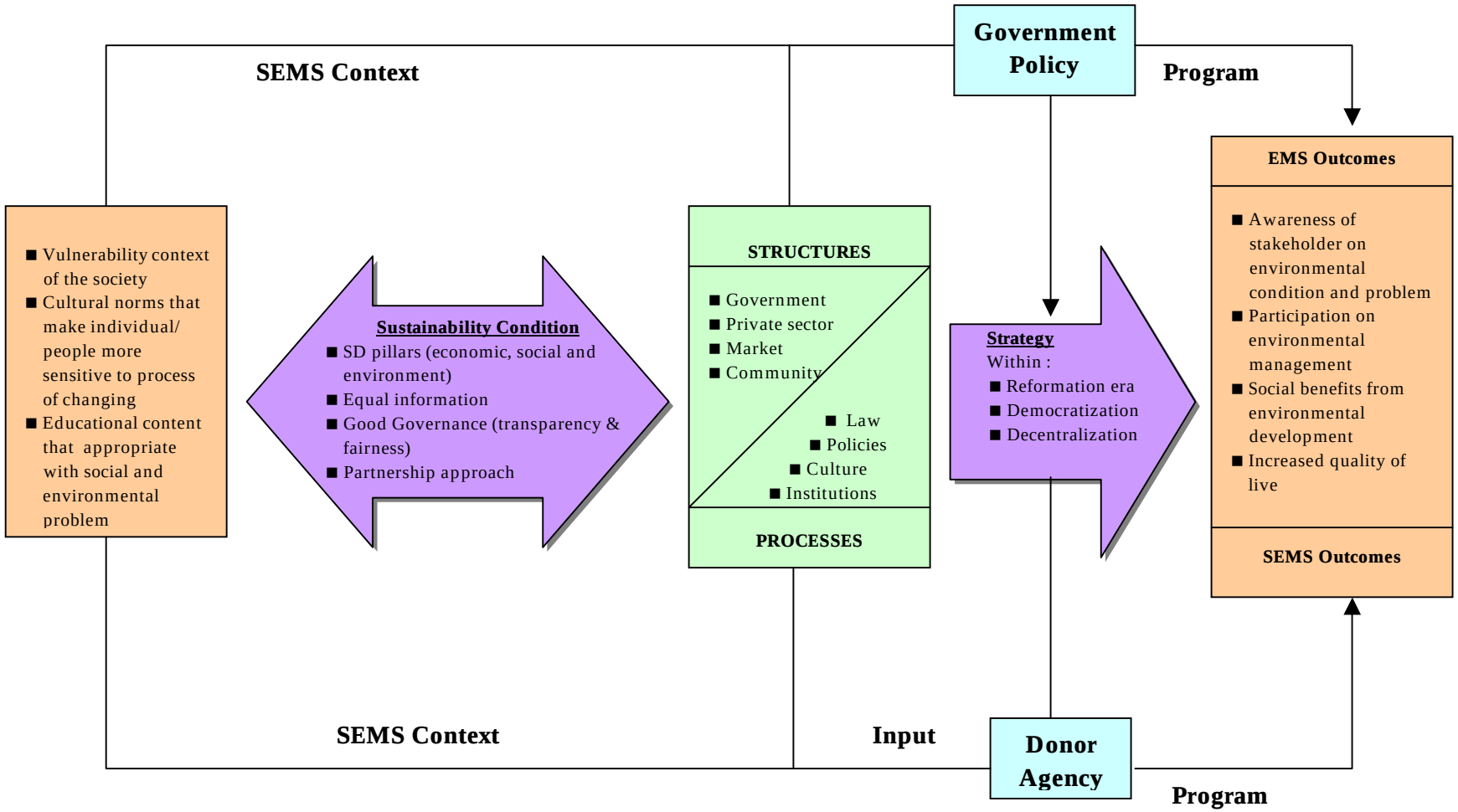
To further stimulate widespread egomaniacs among the society, the Center will have to be in the capacity to organize eco-science-tours for junior and senior citizens, integrating tourism and outdoor funs with environmental management to produce, not necessarily immediate, environment- and eco- conscious citizens.

The Indonesian Department of Education has already initiated the so-called Environment-conscious Elementary Schools Program appointing several Elementary Schools as models. Several years' evaluation shows that in some areas little effect has been obtained and some even tend to fail.

5.6. SEMS Model and Its Application

SEMS as a concept built of conditions and findings that followed the result of this study. It seems the concept of development is still not appreciated by various stakeholders includes the bureaucrats as decision and policy maker on the environment. This thing started of the individual understanding, and various institutions and communities which divided on environmental problems that interprets as related only into the physical problems. Beginning from this existing constellation and problems, the concepts of SEMS built with various consideration and explanation as explain in bellow picture

SEMS FRAMEWORK
INDONESIAN CASE STUDY (CRHRE, 2002)



SEMS should be built of the structural and transformation process that related or knotted mutually. On the structure relates the stakeholder problems:

1. Government
2. Private Sector and Market
3. Community

Existing Stakeholder should be represent all sides (interest) in carrying out their environmental program through the process and understanding on:

1. Law
2. Policies
3. Cultural
4. Institutions

Which articulated in legal consideration, formed in policies (by government that accepted by the people), and adapted based society culture that also accepted by the stakeholder and institutionalized.

The context of SEMS applications needs a precondition that guarantee the sustainability which based on:

1. Pillar of Sustainable Development that interpreted as the existence of elements that covers on economic and environment that also ensure the sustainability socially
2. Equal information, that interpreted as a privilege on information access that ensures the transparency during the implementation of the development activities that is sustainable.
3. The executor of Good Governance requires transparency and fairness in the management of governance and environmental management
4. Partnership approach that interpreted that during the implementation of policies and programs consider on the equity and sharing in conducting the tasks.

Meanwhile in the SEMS context the things that become the constraints (ganjalan) should be consider are:

- Vulnerability context of society
- Cultural norms make individual /people more sensitive to the process of change, that cause on the stagnant of the social change itself
- Educational content in appropriate with social and environmental problem.

Meanwhile, if the context of SEMS already known with its prerequisites and conditions, then it can be applied to arrange or organize the strategy to arrive at the objectives of environmental management through social management. It should be remember that this strategy should be framed within the context of democracy and decentralization in the era transformation. Its mean that on that era, the strategy in environmental management should be prevented of the trap such as the exploitation of natural resources by local government in order to fulfill the target on local income. On the other side, when applied the strategy, the democracy principles should be put as a foundation in policy application especially that came of the government

If there is an alternative strategy that is applicable or match within the environmental context in its country, then the target within the EMS or also SEMS and be made as reflected in the messages of environmental management such as:

- Awareness of stakeholder on environmental condition and its problems
- Participation of stakeholder on environmental management
- Social benefits from environmental development
- Increased quality of live

Then where is the position of JICA as donor agency? Donor agency functions as a bridge between the programs that are cross-spatial and cross-cultural with focused on the empowerment of the community through:

- Enhancement of understanding on the right and duty of the human on their environment
- Improvement on the skill on handling the environmental problems
- Enhancement of role and involvement on the planning of environmental programs
- Improvement of quality of social economic quality through the environmental development activities such as community development

What JICA had been done in 2002 and the plan on 2003 showed the picture of JICA's perception on the problems of environmental management in the present. Based on that condition, the existing facility such as existing EMC can be increased on its role to improve the capacity of its human resources for the need of environmental development in the country (such as province, sub-province/kabupaten, and city). JICA should put the budgeting and grants that had characteristics not only to physical things, but also opened access to the possibilities on educational improvement and environmental wisdom.

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Introduction to Interview

This questionnaire is designed as an instrument to collect the data on behalf to get an input in arranging the concept of Social Environmental Management (SEMS) in behalf to get an input to organize a concept of SEMS in Indonesia and to get a picture about the support of JICA and its Japan provision especially on SARPEDAL. Until now the social touch (or social approach) has been ignored dominantly, especially technical support which implicated on social aspect. This thing will influence the forming of SEMS in Indonesia.

Based on above intention, we ask you to give a time for fill in this questionnaire. We will appreciate the efforts of you when fill in the questionnaire honestly and sincerely. The answer can be used as an objective and useful data in this study.

At the end, we hope that this cooperation will develop good understanding to support the success of this study within the framework of successful environmental management in Indonesia.

Jakarta January 2003

With best regard
Head of the Centre for Research of Human resources and environmental
Universitas Indonesia

Dr. Ir. Setyo M. Moersidik
NIP. 131. 476.493

Address : Gedung C Lt V- Jl Salemba Raya 4, 10430 Indonesia
Telp (021) 330318 – 330309 Fax (021) 330266

I. RESPONDENTS IDENTITY

1. Name : .....
2. Age : .....
3. Sex : Man/women
4. The latest education : ……..
5. The area of Education : ……
6. Present
   office : .....
   .....
   .....
   Telp .....Fax .....
7. Position and responsibility : .....

II. Concept of SEMS or Social Environmental Management Systems. (please fill in short sentence and clear)

1. Do you know about concept of SEMS in according environmental management?

_____
_____
_____
_____
_____
_____

2. Do you think SEMS is important/urgent to be applied in environmental management in Indonesia?

_____
_____

_____
_____

3. According to your opinion, what kind of items of can be prepared or carry out to make SEMS applicable in environmental management in Indonesia?

_____
_____
_____
_____

4. What are the problems or constrain when SEMS applied in environmental management Indonesia

_____
_____
_____
_____
_____

5. Which Institutions or groups or persons can be involved or taken role in the implementation of SEMS in Indonesia?

---------/---

III. Development of Sarperdal Within the concept of SEMS *(Social Environmental Management System)*

6. Has Sarpedal conduct or implement its roles in environment management?

_____
_____
_____
_____

7. Shall Sarpedal involve or taking role in application and development of SEMS?

_____
_____
_____
_____
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_____

8. What kind of action should be conducted to make Sarpedal apply and develop the concept of SEMS in good way?

_____
_____
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_____
____ _____

IV. Cooperation/Collaboration with JICA and government of Japan.

10. Did the cooperation among Sarpedal and JICA and government of Japan success ?

_____
_____
_____
_____
_____

11. What is your expectation for the future facing the possibility of collaboration between Sarpedal JICA and Government of Japan?

_____
_____
_____
_____
_____

12. If Sarpedal apply and implement and develop SEMS, then the support of JICA will include?

a. Technical equipment of non-social laboratory.
b. Technical equipment of social laboratory
c. Fund
d. Human resources
e. Library and information
f. Others please explain it…….

V. INSTITUTION OF CENTER FOR ENVIRONEMNTAL MANAGEMENT (SARPEDAL)

VISION

To make Sarpedal being an environmental laboratory which acts as reference and center for monitoring environmental quality.

MISSION

1. To conduct the function as reference environmental laboratory.
2. To do a monitoring activities and give data about environmental quality and have scientific and legal responsibility.
3. To manage a network system of environmental laboratories
4. To give public service within the context of environmental laboratory professionally and independent.

13. Do you know the vision of Sarpedal?

a. Very know
b. Know
c. Know enough
d. Un recognize
e. Very un recognize

14. Is the Vision of Sarpedal Good?

a. Very good
b. Good
c. Enough
d. Bad
e. Worst

15. Please explain your opinion

_____
_____
_____
_____
_____

16. Has the center of environmental management system been able to implement its vision

a. Has very good ability
b. Has the ability
c. Has enough ability
d. Unable
e. Very unable

17. Please explain the reason:

_____
_____
_____
_____
_____

18. Do you agree if the vision of SARPEDAL to add problem in social environmental management?

a. Very agree
b. Agree
c. Almost agree
d. Disagree
e. Very disagree

19. If you agree then what kind of social environmental problems did you expect to be insert into vision and mission of SARPEDAL

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.....
.....
.....
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.....
.....

20. Do you know the function and role of SARPEDAL

a. Know very good
b. Know

c. Know enough
d. Don't know
e. Very know

21. Do you think that the function and role of SARPEDAL is good enough and appropriate within the environmental management.
    a. Very good
    b. Good
    c. Enough
    d. Bad
    e. Worst

22. Have SARPEDAL been able to implement the function and role maximally ?
    a. Very good ability
    b. Able
    c. Able enough
    d. Disable
    e. Very disable

23. Do you agree if the function and role of SARPEDAL to added with the function and role within the SEMS*?*
    a. Very agree
    b. Agree
    c. Rather almost agree
    d. Disagree
    e. Very disagree

24. If you agree, which role and function do you expected to implement by SARPEDAL within SEMS
    .....
    .....
    .....
    .....
    .....
    .....
    .....

25. Have you a good knowledge about the working program of SARPEDAL
    a. Yes, very good
    b. Yes good
    c. Enough

d. Bad
e. Worse

26. Is the working program of SARPEDAL good?
    a. Very good
    b. Good
    c. Enough
    d. Bad
    e. Very bad (worst)

27. Has SARPEDAL been able to implement the program in good way
    a. Very able
    b. Able
    c. Able enough
    d. Unable
    e. Mostly unable

28. Do you agree if the program of Sarana Pengendalian Damapak Lingkungan to be added with the program about social environmental management
    a. Very agree
    b. Agree
    c. Almost agree
    d. Disagree
    e. Very disagree

29. if you agree what kind of program do you expect to put in the program of SARPEDAL
    .....
    .....
    .....
    .....
    .....
    .....
    .....

30. Do you have a good knowledge on the structure of SARPEDAL
    a. Yes very good knowledge
    b. Good knowledge
    c. Good enough
    d. Bad knowledge
    e. Very bad knowledge

31. Do you think that the institutional structure of Pusat SARPEDAL is good
    a. Yes it is very good
    b. Good
    c. Enough
    d. No, it is Bad
    e. Worst

32. Do you agree if the institutional structure of SARPEDAL to be added with the field or branch which will handle the social environmental management?
    a. Very agree
    b. Agree
    c. Almost agree
    d. Disagree
    e. Very disagree

33. When you agree, what kind of institutional structure to be inserted into the institutional structure of SARPEDAL
    .....
    .....
    .....
    .....
    .....
    .....
    .....
34. Do you have a good knowledge on the infrastructure or structure (sarana dan prasarana) SARPEDAL
    a. Very good
    b. Good
    c. Enough
    d. Bad
    e. Very bad worst knowledge

35. Is the supporting system in the Pusat SARPEDAL complete?
    a. Very complete
    b. Complete
    c. Almost complete
    d. Incomplete
    e. Very uncompleted

36. Do you agree if the supporting system of sarana pengendalian damapak lingkungan to add the equipment to implement the role in social environmental management system?

a. Very agree
b. Agree
c. Almost agree
d. Disagree
e. Very disagree

37. When you agree, what kind of equipment or supporting equipment (sarana dan prasarana) will you expected to be added in SARPEDAL

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VI. Cooperation or collaboration with other stakeholders (in Indonesia)

38. Does SARPEDAL have an experience of cooperation or collaboration with other stakeholders (institutions)?

a. Yes it has

b. No, it does not have

39. If yes, have an experience, within what context is the cooperation?

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40. Based on your idea, is the cooperation between the SARPEDAL with other stakeholders successful and satisfactory?

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41. If not what is your explanation?

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Research Paper No.6 [Mexico]

Social Environment Management System in Mexico

FEBRUARY 28, 2003

QUADRI Gabriel
Executive Director, CESPEDES

OROPEZA Adriana
Program Manager, CESPEDES

ABSTRACT

Whatever definition considered, sustainability implies respect for ecosystems carrying capacities and the provision of substitutes for depleted non renewable natural resources, in the context of acceptable levels of social equity, welfare and quality of life. On the backstage of sustainability there should always be a balance between population, technology and consumption patterns, but the needed balance cannot be achieved spontaneously because of usual and pervasive problems of market failure, government failure and mismanagement of public goods or common pool resources.

These problems need to be addressed through collective action undertaken by the State, firms and communities or civil society, by means of command and control or/and voluntary initiatives or instruments. Nowadays, Mexico has a full set of environmental policy instruments that includes mandatory regulation (laws, by-laws, *Normas Oficiales Mexicanas*, direct permitting), self regulation by business and business organizations, economic instruments, international standards, community action and cooperation, education, training, research and development.

Mexico has come a long way trying to build institutional, regulatory, analytical and information capacities to address the multiple problems and challenges that pose sustainable development in general and environmental policy in particular. Even though environmental policy as such is relatively young in this country, in some sectors there is a significant historical experience (although not always successful) as is the case with national parks which have been decreed since the beginning of the twentieth century or controlling air pollution in Mexico City.

These achievements are the results of the joint work of several actors, agents and institutions (both national and international). A partnership specially to be mentioned is the *Centro Nacional de Investigación y Capacitación Ambiental* which is the outcome of the Japanese technical cooperation and the interest of Mexican Government to create analytical infrastructure and enhance the capacity building on environmental matters. This project has strongly encouraged the monitoring of air pollutants and hazardous waste and also has been pushing a capacity building process for firms, testing laboratories, government officials and other social organizations.

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LIST OF ABBREVIATIONS

CENICA	National Environmental Research and Training Center	Centro Nacional de Investigación
CNA	National Water Commission	Comisión Nacional del Agua
COA	Annual Operation Report	Cédula de Operación Anual
EIA	Environmental Impact Assessment	Evaluación de Impacto Ambiental
EPA	Environmental Protection Agency - USA	Agencia de Protección Ambiental. EUA
IMTA	Mexican Institute of Water Technology	Instituto Mexicano de Tecnología del Agua
INE	National Institute of Ecology	Instituto Nacional de Ecología
JICA	Japanese International Cooperation Agency	Agencia Internacional de Cooperación Japonesa
LFMN	Federal Law Metrology and Standardization	Ley Federal de Metrología y Normalización
LFPA	Federal Law of Environmental Protection	Ley Federal de Protección al Ambiente
LFPCCA	Federal Law of Pollution Prevention and Control	Ley Federal para Prevenir y Controlar la Contaminación Ambiental

LGEEPA	General Law of Ecological Balance and Environmental Protection	Ley General de Equilibrio Ecológico y Protección al Ambiente
LAU	Single Environmental License	Licencia Ambiental Única
MIA	Environmental Impact Report	Manifiesto de Impacto Ambiental
NAFTA	North American Free Trade Agreement	Tratado de Libre Comercio de América del Norte
MAMC	Metropolitan Area of Mexico City	Área Metropolitana de la Ciudad de México
NAAEC	North American Agreement on Environmental Cooperation	Acuerdo de Cooperación Ambiental de América del Norte
NGO	Non government organizations	Organizaciones no gubernamentales
NOM	Mexican Official Standards	Norma Oficial Mexicana
OECD	Organization for Economic Cooperation and Development	Organización de Cooperación y Desarrollo Económico
PEMEX	National Oil Entity	Petróleos Mexicanos
PROFEPA	Federal Attorney for Environmental Protection	Procuraduría Federal de Protección al Ambiente
SAHOP	Ministry of human Settlement and Public Works	Secretaría de Asentamientos y Humanos y Obras Públicas

SARH	Ministry of Agriculture and Water Resources	Secretaría de Agricultura y Recursos Hidráulicos
SEMARNAP	Ministry of Environment, Natural Resources and Fisheries	Secretaría de Medio Ambiente, Recursos Naturales y Pesca
SEMARNAT	Ministry of Environment and Natural Resources	Secretaría de Medio Ambiente y Recursos Naturales
SEDESOL	Ministry of Social Development	Secretaría de Desarrollo Social
SEDUE	Ministry of Urban Development and Ecology	Secretaría de Desarrollo Urbano y Ecología
SIRG	Integrated Direct Regulation and Management System	Sistema Integrado de Regulación Directa y Gestión Ambiental de la Industria
SMA	Under ministry of Ecology	Subsecretaría de Mejoramiento
TSP	Total Suspended Particles	Partículas Suspendidas Totales

1. Objective

This document intends to describe the Social Environment Management System in Mexico (SEMS) and assess CENICA's impact on it. These objectives will be pursued by means of analyzing the evolution of the environmental policies, the environmental institutional framework, its actors, agents and environmental policy instruments.

In this context, the institutional performance of CENICA will be evaluated in relation to those agents, actors and institutions involved in environmental policies within the private sector, government, academia and civil society.

2. Sustainable Development in an Emerging Economy

Whatever definition considered, sustainability implies respect for ecosystems carrying capacities and the provision of substitutes for depleted non renewable natural resources, in the context of acceptable levels of social equity, welfare and quality of life. On the backstage of sustainability there will always be a balance between population, technology and consumption patterns, but the needed balance cannot be achieved spontaneously because of usual and pervasive problems of market failure, government failure and mismanagement of public goods or common pool resources, usually known as *The Tragedy of the Commons* (Hardin, 1968).

These problems need to be addressed through some sort of collective action undertaken by the State, firms and communities or civil society, by means of initiatives or instruments specifically designed to reconcile individual, groups and private sector self interest and decisions with the long term social desire or expectation for sustainability (Ostrom, 1990).

Those instruments include state regulation, voluntary initiatives by business and business organizations, economic instruments, international standards, community action and cooperation, education and training, research and development, new markets and specific financing mechanisms.

Mexico has come a long way trying to build institutional and regulatory capacities to address the multiple problems and challenges that pose sustainable development in general and environmental policy in particular. Even though environmental policy as such is relatively young in this country, in some sectors there is a significant historical experience (although not particularly successful) as is the case with national parks which have been decreed since the beginning of the twentieth century.

The seventies marked the first formal approach in Mexico towards environmental policy, given the considerable political impulse of the 1972 Stockholm Summit. In this context was enacted the first environmental law and was created the first institution within the Federal Government wholly devoted to environment: *Subsecretaría de Mejoramiento del Ambiente*; within the Ministry of Public Health. Similarly to what happened in those years in other countries this incipient effort had a clear but limited public health perspective. National parks were (very poorly) managed from the Ministry of Agriculture, which was a daunting endeavor, and still is, because of budget scarcities and the complexities of the Mexican agrarian system. By the way, it is worth to point out that the vast majority of Mexican National Parks and other protected areas are not public property, but property of private owners, *ejidos* and communities.

The raise of civil society organizations in Mexico during the eighties, as well as an important lobbying by several conspicuous Mexican scientists, and not least the global momentum produced by the *Brundlandt Commission* in the international context, laid the necessary conditions for the creation of the first governmental entity chartered to conduct a comprehensive environmental policy.

It was the *Subsecretaría de Ecología* within the Ministry of Urban Development and Ecology, which integrated in its time all the relevant policy instruments, from air quality to hazardous waste and environmental impact assessment, to natural protected areas. However, legal weaknesses, budget constraints and outside political interests maintained a very limited scope for environmental policy in Mexico.

There are two farthest reaching events that catapulted environmental policy in Mexico. The first one was the enacting the *Ley General del Equilibrio Ecológico y Protección al Ambiente* in 1988 which for

the first time consolidated in a single law an integrated vision of principles for environmental policy, as well as a comprehensive array of policy instruments.

The second was the North American Free Trade Agreement (NAFTA), which forced the Mexican government to strengthen law enforcement and to extend significantly the environmental regulatory framework in order to avoid accusations of *environmental dumping* and *pollution havens* from US NGOs in coalition with protectionist interests in that country.

From 1992 and so far, Federal Governmental institutions in charge of environmental policy have experienced notorious changes driven by fashionable international ideas about sustainability, by a *trial and error* process and by political meddling. That was why the *Secretaría de Desarrollo Social* was created in 1992 which included the *Instituto Nacional de Ecología (INE)* and the *Procuraduría Federal de Protección al Ambiente (PROFEPA)*; both seceded from the dismissed *Subsecretaría de Ecología.* The rationale of the time was that the struggle against poverty should be hand in hand with environmental policy.

In the early nineties, the Mexican accession to the Organization of Economic Cooperation and Development (OECD) meant another important landmark in the evolution of environmental policy. OECD launched an ambitious country assessment that compelled the government to streamline public policies.

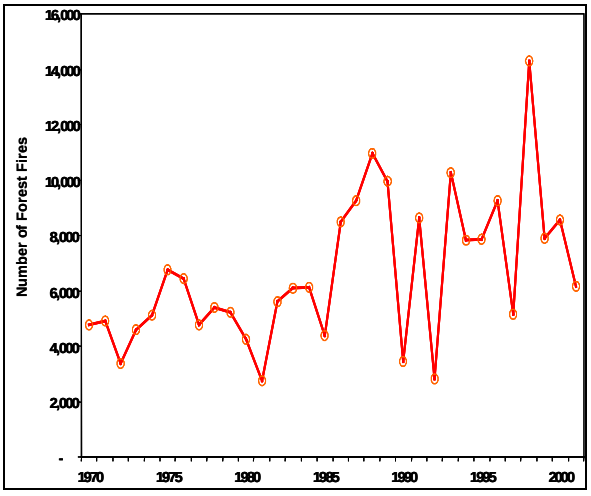
Later on, in 1994 INE and the PROFEPA were lumped together in a new ministry: *Secretaría de Medio Ambiente, Recursos Naturales y Pesca,* along with natural resource management (water, forestry and fisheries). Even though the idea was initially appealing, very soon the problem of *regulatory capture* by vested interests in the fishing industry as well as in water and forestry made itself evident.

This was why in 2000 the new federal administration decided to transfer fisheries management to the Agriculture Ministry, what led to a change in name and organization. The new ministry is called *Secretaría de Medio Ambiente y Recursos Naturales.*

The private sector felt the influence of the new conditions. The evolving institutional framework and a more global and competitive business sector now can mediate more complex economy–environment relationships. Business is expected to contribute in a socially and ecologically sound way by self-regulation, observance of international standards, voluntary initiatives, compliance with national regulation, employment, training and capacity building, but specially by being highly sensitive to social perceptions, which will ultimately shape the way in which society develops.

Specifically in regards to the state of the environment in Mexico, any analysis of the environmental evolution must be done over a long time frame. Structural changes have put the setting for higher environmental standards and the promotion of cleaner technologies, particularly in big firms and multinational companies. However, Mexico faces enormous environmental liabilities that belong clearly to a developing country: market distortions, institutional limitations and failure and lack of strong environmental preferences amongst the majority of the population. Still having 30% of its population living from agriculture, mainly subsistence *slash and burn* shifting cultivation and extensive cattle grazing, Mexico observes a very high deforestation rate.

FIGURE1. FOREST FIRES (1970-2001)



Source: SEMARNAP, 2000.

FIGURE 2. DEFORESTATION IN MEXICO (1976– 2000)

VEGETATION	AVERAGE ANNUAL RATE (%)
FORESTS	0.2
TROPICAL FORESTS	0.8
XEROPHYTES	0.3
TOTAL	**0.4**

Source: SEMARNAP, 2000.

Since the rule of law and environmental law enforcement is concentrated virtually only in big firms, small and medium firms are responsible for a considerable flow of hazardous waste and highly polluted waste water discharges.

Arguably, within the precarious and worsening state of the environment, air quality is poised to be labeled as one of the few documented successes. Ozone pollution has declined steadily from the early nineties as well as in other large metropolitan areas like Guadalajara and Monterrey.

FIGURE 3. MEXICO CITY OZONE DAILY PEAKS (AVERAGE)

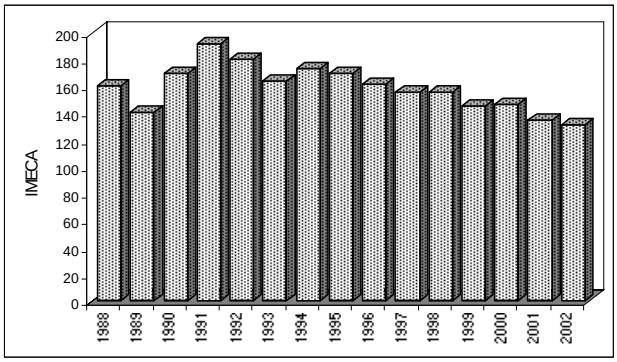


FIGURE 4. MEXICO CITY PM10 DAILY PEAKS (AVERAGE)

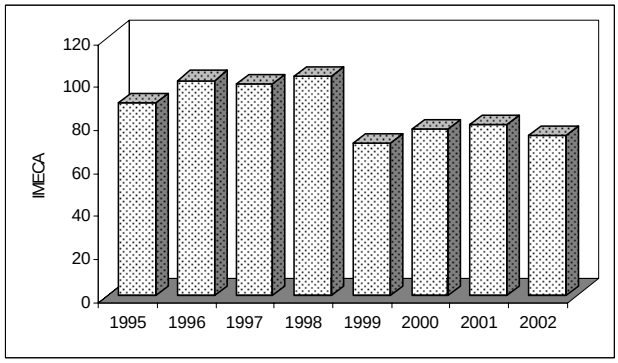
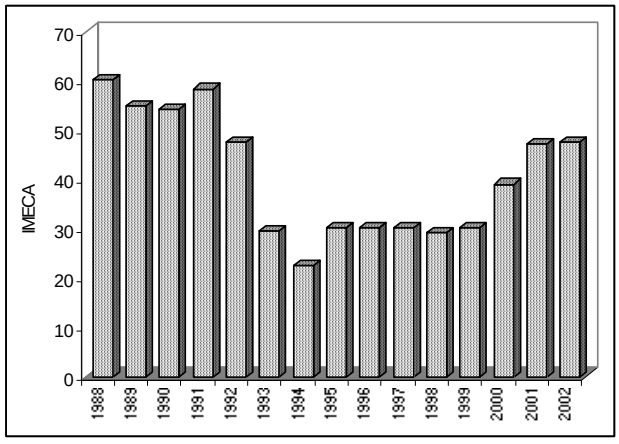


FIGURE 5. MEXICO CITY SO_2 DAILY PEAKS (AVERAGE)



Source: SEMARNAT et al. 2002.

Only PM10 is regarded with concern even though atmospheric concentrations are significantly less than they were in the past decade. This is a result of new regulations, industry restructuring, economic liberalization, free trade and foreign direct investment which account for new technologies; and important shift towards natural gas in substitution of fuel oil has also played an important role. In Mexico City more stringent car emissions standards along with mandatory catalytic converters in new vehicles since 1992, a decent inspection and maintenance program, unleaded gasoline, and low sulphur diesel can be praised for a visual and statistically notorious improvement in air quality; though, there has been a policy relaxation since the second half of the nineties.

The new political setting in the country, characterized by decentralization and plurality poses an extraordinary challenge for the Federal Government, since states and municipalities tend to go by their own way, enjoying and testing the limits of their new autonomy. However, especially municipalities should be accountable, because they are currently one of the most prominent actors in environmental degradation. They are responsible of urban waste water, which generally is discharged without any treatment to rivers, lakes, estuaries and the ocean; they also have to deal with urban waste management. Nevertheless, they lack the capabilities and the political will to build and properly operate waste water management systems and landfills. They wield the instruments to control air pollution in their jurisdictions. In terms of the federal regulation, many norms and standards apply to municipalities and theoretically, they should comply with them. However, the Federal Government lacks the political clout and the fiscal and/or regulatory means to enforce environmental laws and standards on local governments. That is a pity and an utter defiance for policy makers.

3. Evolution of Environmental policies in Mexico

3.1 First Stage. Inexistence of environmental policy proper (up to 1972)

Environmental policy was absent in Mexico until 1972, even though since 1936 the Federal Government created a Forest Department and a National Parks Office. Several national parks were established between 1936 and 1940, but were virtually abandoned to squatters and land tenure conflicts. Many of them all but disappeared by the force of urbanization, agriculture and cattle ranching. Those that survived languished without budgets and personnel in a context of an ever shifting governmental organization that diluted responsibilities, lacked objectives and behaved without any meaningful public accountability. Ironically, many national park lands were given away to ejidos and communities at the peak of the agrarian reform process during the thirties. That was all about environment, besides some workplace health regulations oriented to protect workers in certain hazardous activities, and a number of local restrictions about fumes and noise, that very seldom were abided by.

3.2 Second Stage. Initial Institutional Development (1972-1982)

During the early seventies, environmental regulation evolved from health standards aimed to protect workers and the general population. Only in 1972 was enacted the first environmental law in Mexico: *Ley Federal para Prevenir y Controlar la Contaminación Ambiental* (LFPPCA- Federal Law of Pollution Prevention and Control). This law for the first time mandated emissions controls for air and water and gave jurisdiction to a well defined government entity: *Subsecretaría de Mejoramiento del Ambiente* (SMA- Under ministry of Environmental Protection) within the Ministry of Health. This entity assumed new responsibilities that enabled it to inspect and sanction industries that were out of compliance. Later on the new Health Code in 1973 introduced more specific regulations related to hazardous waste atmospheric emissions and industrial waste water. Additionally, new by-laws were enacted in regards to air pollution prevention by fumes and dust and to water.

Environmental planning has its first precedent in the *Plan Nacional Hidráulico* elaborated by the Ministry of Water in 1975. This plan had an innovative comprehensive strategy that bonded together water availability, water demand and water balances at a regional level. Afterwards, the national *Plan Global de Desarrollo* promulgated in 1980 was the first national planning initiative that

highlighted the need of a solid environmental policy in terms of prevention and control of water, air and soil pollution.

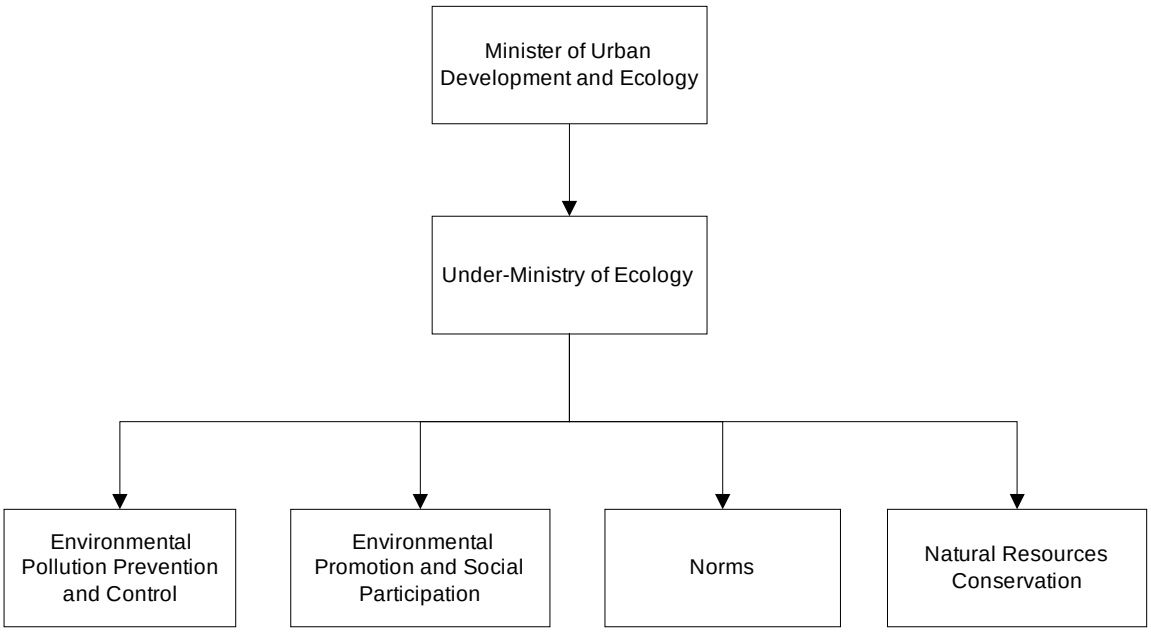
Moreover, during these years must be underscored visible efforts to protect natural areas and biodiversity. The first biosphere reserve was created in the *Lacandon* rainforest in *Chiapa*s as well as in the northern central Mexican deserts. Notwithstanding, national parks continued languishing, but now under two different and capricious institutional settings. Some national parks were transferred to the *Secretaría de Asentamientos y Humanos y Obras Públicas* (SAHOP - Ministry of Human Settlements and Public Works) while others remained under the *Secretaría de Agricultura y Recursos Hidráulicos* (SARH - Ministry of Agriculture and Water Resources).

It must be recalled during the late seventies and early eighties the first awakening of environmental interests from civil society. The anti-nuclear movement gained a considerable momentum as well as strong voices from university professors who protested against governmental projects that were destroying some of the most precious tropical rainforests in southern Mexico.

3.3 Third Stage. Institutional and regulatory development (1982-1987)

In 1983 the Mexican Constitution was amended in its Article 25, in order to introduce environmental protection as an obligatory component of governmental economic planning. A new *Ley Federal de Protección al Ambiente* (LFPA- Federal Law of Environmental Protection) was enacted substituting the 1972 outdated law and a new government entity was created, which intended to concentrate in a comprehensive way all the federal competences and policy instruments: *Subsecretaría de Ecología* (Under ministry of Ecology) within the Ministry of Urban Development and Ecology (SEDUE).

FIGURE 6. STRUCTURE OF THE UNDER MINISTRY OF ECOLOGY
(1982-1992)



Not only a new institutional setting was put in place, but also the first formal and really enforceable environmental standards were issued, in regards to air quality, emissions and water discharges. Also, were established several strategic biosphere reserves which led the foundation for the modern national system of natural protected areas. It is important to draw attention to the fact that these biosphere reserves were supported by universities, research centers and conservation organizations, which created the first inter-institutional partnership for the environment.

3.4 Fourth Stage. Impulse to environmental policy (1987-2003)

Environmental policy really gained momentum during the last years of President de la Madrid administration, when SEDUE was headed by an outstanding politician closely related to the new *president to be* Carlos Salinas de Gortari. A comprehensive set of environmental norms was formalized and a new body of legislation was enacted, which at the time was considered by law practitioners as a truly advanced legal framework: *Ley General del Equilibrio Ecológico y Protección al*

Ambiente (LGEEPA - General Law on Ecological Balance and Environmental Protection). This innovative legislation was made possible by new constitutional amendments in Articles 27 and 73, enabling the Nation (the State) to explicitly limit property rights in order to protect the environment and conferring the National Congress clear attributions to legislate on it.

The LGEEPA included precise statements about principles; State, Municipal and Federal responsibilities; planning criteria; norms or standards; other policy instruments; enforcement and community action on:

- Water, air and soil pollution;
- Hazardous waste, pesticides, and industrial chemicals;
- Environmental impact assessment;
- Land use planning;
- Protected natural areas and wildlife;
- Pollution prevention (air, water and soil);
- Biodiversity and wildlife;
- Natural protected areas.

TABLE 1. GENERAL LAW OF ECOLOGICAL BALANCE AND ENVIRONMENTAL PROTECTION (LGEEPA)

TITLES	CHAPTERS	SECTIONS
I. General dispositions	1. Principles 2. Federal Government, States and municipalities' responsibilities 3. Environmental policy 4. Policy instruments	• Ministry's responsibilities and institutional coordination • Environmental planning • Ecological land use planning • Economic instruments • Environmental impact assessment • *Normas oficiales mexicanas* • Self regulation and environmental audits • Environmental education and research • Information and monitoring
II. Biodiversity	1. Natural Protected Areas 2. Restoration zones 3. Wildlife	
III. Sustainable use of natural resources	1. Sustainable use of water and aquatic ecosystems	

TITLES	CHAPTERS	SECTIONS
	2. Preservation and Sustainable land use 3. Non renewable resources exploitation	• Classification • Management
IV. Environmental Protection	1. General principles 2. Air pollution prevention and control 3. Water pollution prevention and control 4. Soil pollution prevention and control 5. Environmental risk activities 6. Hazardous waste management 7. Nuclear energy 8. Noise and vibrations	• National Protected Areas System • Restoration Zones • Conservation and management
V. Social participation	1. Social Participation 2. Access to information	
VI. Enforcement	1. General principles 2. Compliance 3. Safe measures 4. Sanctions	
VII. Administrative order	1. Inconformity process 2. Civil action 3. Criminal liabilities	

To complement and operationalize the LGEEPA a set of by-laws was enacted that included:

- Environmental Impact Assessment,
- Hazardous waste and
- Air Pollution Prevention and Control.

The creation of the *Comisión Nacional del Agua* (CNA- National Water Commission) deserves a special recognition since it was the result of an honest attempt to manage water in Mexico from a consolidated organization. However, given the formidable water problems and mounting conflicts about water rights in agriculture and growing needs of drinking water supply to urban and rural populations, the environmental dimension of water was neglected. Water pollution kept a disturbing

upward trend in rivers, aquifers, estuaries, and coasts, affecting crucial ecosystems with pesticides and fertilizers and reducing the already stressed supplies for human use. Agriculture has increased its water consumption in an extremely wasteful pattern, contaminating soils and ecosystems, depleting aquifers and affecting wetlands and watersheds. Water treatment facilities in municipalities are still an oddity, as well as in whole industrial sectors like sugar mills.

The Salinas administration gave an additional impulse to environmental policy. In his inauguration address to the National Congress he gave a remarkable instruction to the new governor of Mexico City (the former minister of SEDUE) to fight air pollution in the Metropolitan Area aiming at clear results in a few years. As we already mentioned, this plight was fulfilled, to the point that from 1994 on, ozone, which was the most deleterious culprit began a downward trend that still holds.

In 1991, President Salinas launched the idea of a free trade area in North America initiating intense negotiations with the United States and Canada. During the process a powerful coalition of environmental NGOs, trade unions and protectionist interests exerted strong political pressures on the Mexican government with legitimate (and not so) concerns about the impact of NAFTA on the environment. Mexico's reaction was to strengthen regulation and law enforcement in an unprecedented way. Moreover, the *Subsecretaría de Ecología* underwent a profound structural change, giving birth to two new entities: *Instituto Nacional de Ecología* (INE-National Institute of Ecology) and the *Procuraduría Federal de Protección al Ambiente* (PROFEPA-Office of the Federal Attorney for Environmental Protection). The former was the regulatory agency and the latter the enforcement one. SEDUE itself disappeared and both new entities were put under the umbrella of a new ministry called *Secretaría de Desarrollo Social* (SEDESOL-Ministry of Social Development), mainly in charge of poverty alleviation, regional development, housing and urban development. Poverty alleviation was strongly linked to environmental policy; that was *d'esprit du temps* in the context of Rio'92.

The regulatory framework was broadened and an extraordinary law enforcement effort was undertaken between 1992 and 1994. For the first time private firms experienced real regulatory pressures, sanctions and multiple closures. It must be said that a *big stick* with almost *no carrot* at all worked out an impressive change in firms' performance and attitudes towards environment. The foundations were laid for new market initiatives, voluntary instruments and environmental

management systems that became so common after the late nineties. This strategy gave results, much more with the North American Agreement on Environmental Cooperation (NAAEC) (a parallel agreement to the NAFTA) which created new regional institutions chartered to level the environmental playing field and to promote a regulatory *raise to the top*. Honestly, it must be acknowledged that Mexico is still enjoying the virtuous inertia that NAFTA created for environmental policy.

At the end of 1994, the new president, Ernesto Zedillo, showed real interest on environmental policy, in spite of the economic havoc wreaked by the December 1994 devaluation and the financial crisis that caused GDP to plummet 7% in 1995. A new ministry was created with the pretension of integrating environment to natural resource management. The *Secretaría de Medio Ambiente, Recursos Naturales y Pesca* (SEMARNAP-Ministry of the Environment, Natural Resources and Fisheries) summed up the INE and the PROFEPA to new under ministries of forestry, fisheries, planning and to CNA.

This new institutional design was driven by the belief that sustainable resource use would hold the key for sustainable development. However, pervasive and entrenched interests and sheer political realities confronted this belief to severe operating problems. Arguably, the most relevant one was the phenomenon of *regulatory capture* which prevented environmental regulation to effectively reach natural resource use and exploitation; particularly fisheries and water. Fishing industrialists proved to be extremely proficient lobbyists posing for the new Ministry an ineluctable conflict of interest between regulating them and promoting their economic activity. Moreover, since a significant quota of political legitimacy for the Ministry was derived from building a mutually supportive relationship with them. In water policy and management CNA could not confront municipalities and powerful industries (like sugar mills) as an assertive regulator, since it is bonded to them with very strong *client-supplier* links.

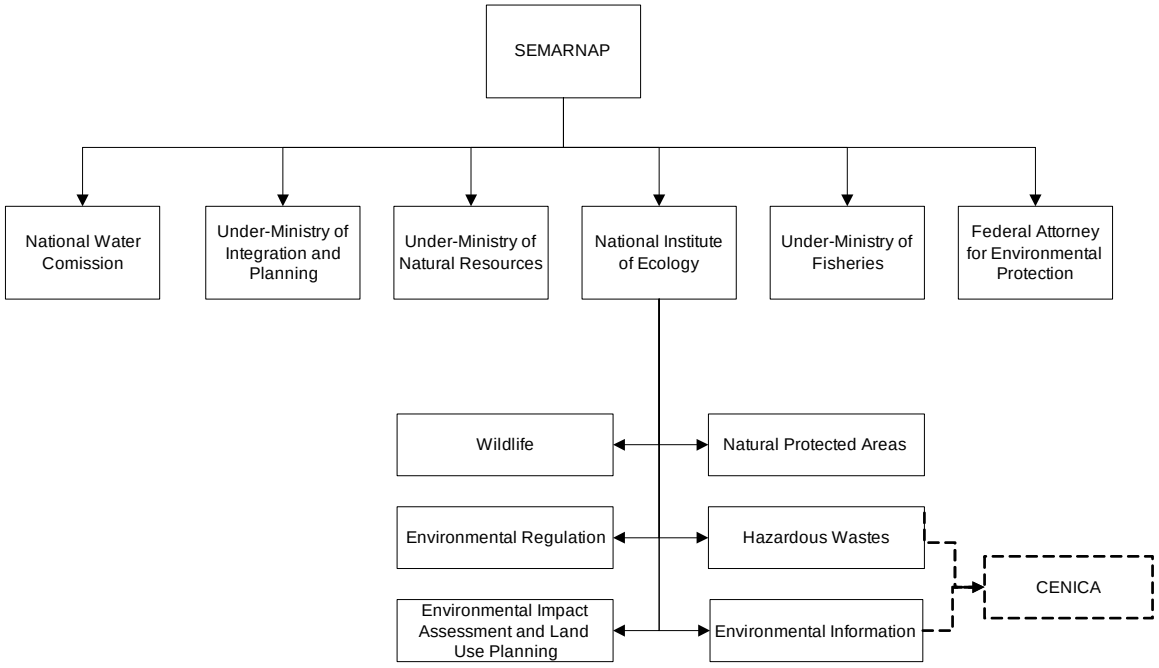
It should be remembered that CNA keeps all the federal competences towards law enforcement on water discharges, while PROFEPA is responsible for the enforcement on the rest of the environmental agenda. This is a weird kind of institutional design that means an insurmountable impediment for an integrated multimedia enforcement policy; particularly, knowing that up to

seventy percent of hazardous waste are liquid, and presumably disposed off illegally through sewages and water discharges in rivers, lakes and coasts. Probably, this is one of the reasons that explain why Mexico is a noticeable laggard on waste water treatment.

Besides the obstacles and limitations underlined above, INE and SEMARNAP must be praised for some important achievements. That is the case of wildlife management, natural protected areas, environmental impact assessment, voluntary agreements, industrial permitting and public environmental information systems. With the personal support of President Zedillo, the National Protected Areas System was significantly enlarged and supplied with new budgets and staff.

The *Centro Nacional de Investigación y Capacitación Ambiental* (CENICA-National Center for Environmental Research and Training) was also created by INE during the Zedillo administration over a covenant and partnership among the INE, the Japanese International Cooperation Agency (JICA) and the *Universidad Autónoma de México* (UAM). CENICA was devoted to offer scientific and technical capabilities in air pollution and hazardous waste management.

FIGURE 7. STRUCTURE OF THE MINISTRY OF THE ENVIRONMENT, NATURAL RESOURCES AND FISHERIES (SEMARNAP 1994-2000)



Until 1994, environmental problems were addressed basically through command and control measures. However, later on, environmental authorities have sought a new strategy that includes preventative criteria by sensitizing stakeholders, training of interested parties, transferring technologies, and disseminating information. We should remember that up from 1992 the Federal Government began to promote the environmental audit program which is a voluntary initiative.

Important progress was achieved towards the implementation of the *Sistema Integrado de Regulación Directa y Gestión Ambiental de la Industria* (Integrated Direct Regulation and Management System-SIRG) established by the Federal authorities. Its main objective was to integrate policy instruments, information and related environmental management in the industrial sector. It introduced the *Licencia Ambiental Única* (LAU- Single Environmental License) and the *Cédula de Operación Anual* (COA-Annual Operation Report). However, it still needs to be consolidated and strengthened to improve data management and coordination within the Ministry itself and among the different government levels (federal, state, local).

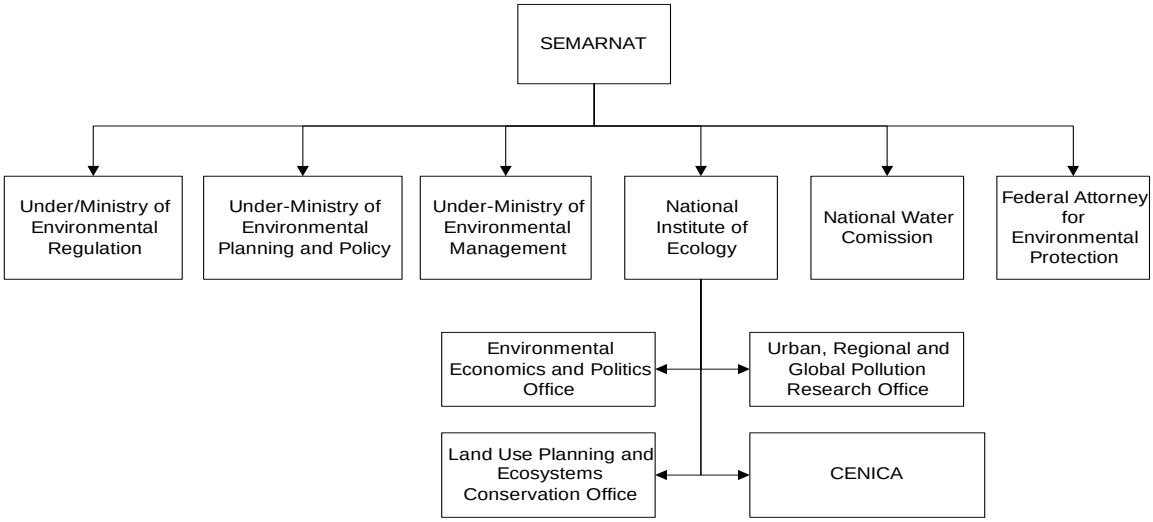
In 2000, for the first time in 73 years a political party different from the PRI won the presidential election. Vicente Fox, from a conservative party, *Partido Acción Nacional* (PAN), became the helm of a significant democratic drive that had *change* as a major banner. Almost a totally new administration got in charge of government, initially backed with huge expectations and support from a vast majority of the population. *Change* itself has proved to be elusive and in short supply. Moreover, probably is the cause of a worrisome coordination problem, recurrent dubitative decisions and limited executive abilities across the board in the Federal Government. Compounded with a confrontation mood that pervades State Governors and Congress and an extreme fiscal stringency, the Fox administration faces a tough environmental policy challenge.

At taking office, President Fox changed once again the Ministry responsible for the environment. SEMARNAP was stripped off the Under Ministry of Fisheries as a consequence of genuine concerns about regulatory capture in that sector. Fortunately, this decision has lived up to its promise, and recently the *Secretaría de Medio Ambiente y Recursos Naturales* (SEMARNAT -Ministry of the Environment and Natural Resources) has embarked in an unprecedented effort to regulate the fishing industry. Hopefully it would be successful.

Thanks to the new administration, CENICA was upgraded and conferred with the formal hierarchical status of *Dirección General*. This move came along with a budget and personnel raise and with a more visible institutional position within SEMARNAT.

Figure 8. Structure of the Ministry of the Environment and Natural Resources

(SEMARNAT 2000-2003)



The evolution of the Mexican environmental policy can be easily recognized in the current legal framework. As can be seen in the next chart Mexico has given itself a broad and substantially coherent legal architecture.

TABLE 2. RELEVANT ENVIRONMENTAL LAWS AND BY-LAWS

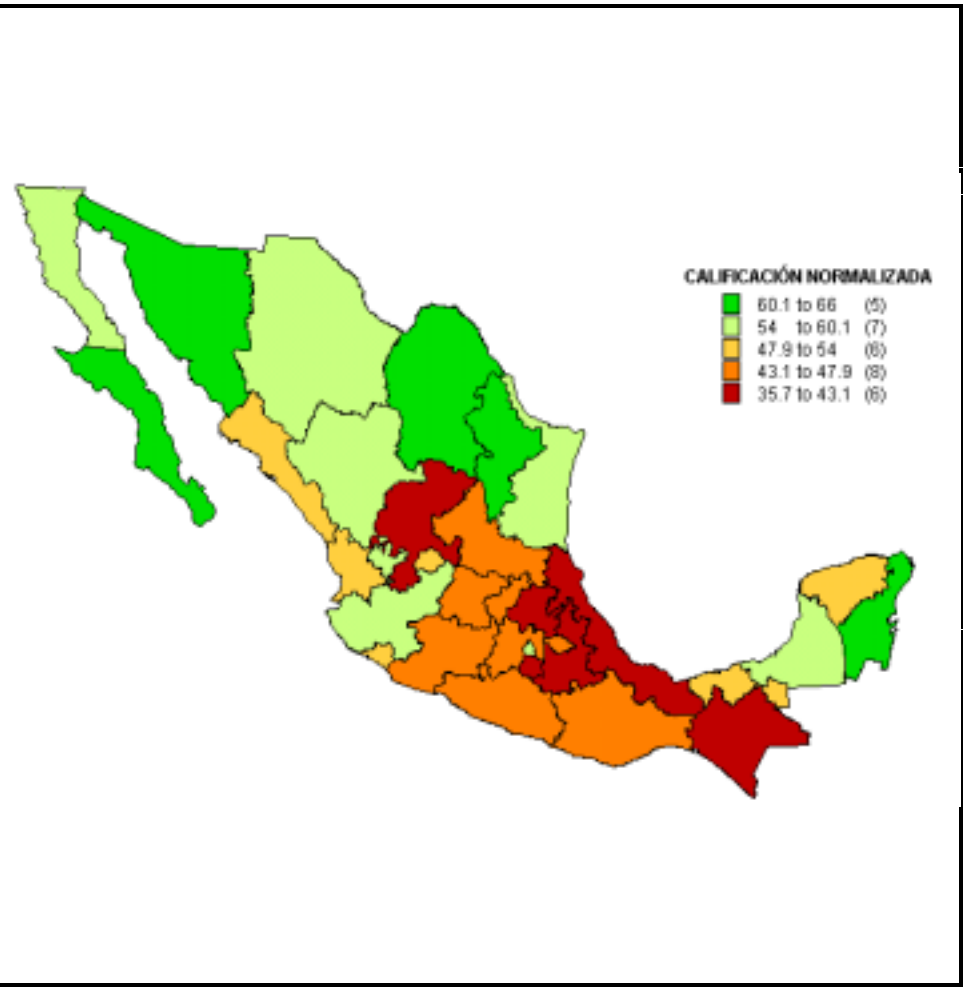
LEGAL FRAMEWORK	LAW/BY-LAW/CODE	EXPEDITION DATE
• LGEEPA	Law	Dec.31.2000 (last modification)
• Environmental Impact Assessment	By-Law	May.30.2000
• Hazardous waste	By-Law	Nov.25.1988
• Air Pollution Prevention and Control	By-Law	Nov.25.1988
• Environmental audits	By-Law	Nov.29.200º
• Air Pollution Prevention and Control (caused by vehicles in the Mexico City Metropolitan Area and the Federal District)	By-Law	
• Noise Control	By-Law	Dic.06.1982
• Natural Protected Areas	By-Law	Nov.30.2000
• Hazardous waste and substances transport	By-Law	Apr.07.1993
• Wildlife	Law	Jan.10.2002
• Fisheries	Law By-Law	Sep.29.1999

LEGAL FRAMEWORK	LAW/BY-LAW/CODE	EXPEDITION DATE
• National Waters	Law By-Law	Jan.12.1994
• Forests	Law By-Law	Sep.25.1998
• Criminal Code (Federal District)	Code	Dec.13.1996

Although Mexico has achieved considerable progress in developing a multi-media environmental policy, there are national disparities between the northern states and the central-southern region of the country. The former has a strong economic development and had created institutional, political capabilities to respond to environmental pressures. Meanwhile, the latter despite of being extremely rich in natural assets and biodiversity, its economic and social lag has impeded them to create the mechanisms to reverse environmental degradation. This can be observed in the following figure which shows how each state performed in the Environmental Sustainability Index in 2001.

FIGURE 9. ENVIRONMENTAL SUSTAINABILITY INDEX FOR MEXICAN STATES (2001)

STATE	ISA
1. BAJA CALIFORNIA SUR	65.944
2. NUEVO LEON	62.393
3. COAHUILA	62.157
4. QUINTANA ROO	61.122
5. SONORA	60.283
6. TAMAULIPAS	58.068
7. DURANGO	58.044
8. BAJA CALIFORNIA	56.654
9. JALISCO	55.346
10. CHIHUAHUA	55.332
11. DISTRITO FEDERAL	55.173
12. CAMPECHE	54.317
13. SINALOA	53.992
14. COLIMA	53.479
15. YUCATAN	53.180
16. NAYARIT	49.944
17. AGUASCALIENTES	49.705
18. TABASCO	48.940
19. QUERETARO	47.563
20. GUERRERO	45.990
21. OAXACA	45.682
22. SAN LUIS POTOSI	44.198
23. TLAXCALA	44.101
24. MEXICO	44.055
25. GUANAJUATO	43.845
26. MICHOACAN	43.742
27. PUEBLA	42.975
28. ZACATECAS	42.625
29. VERACRUZ	41.732
30. MORELOS	41.724
31. CHIAPAS	39.286
32. HIDALGO	35.709

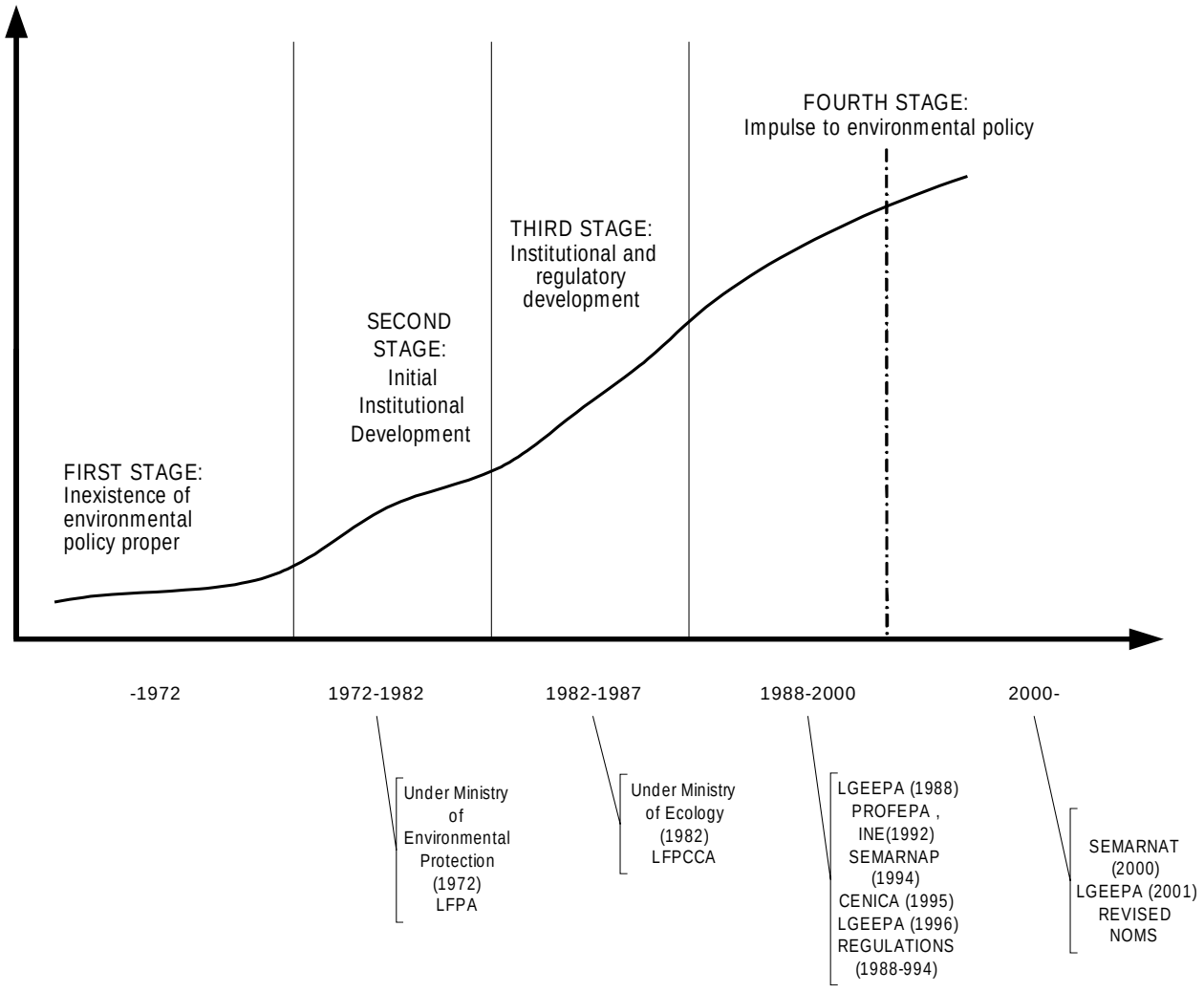


Source: EDES. 2001.

It could be said that the pervasiveness of environmental problems in Mexico is much more related to institutional and policy failures, rather than to the absence of adequate legal instruments.

To wrap up the above discussion we can make use of a graphical representation in the following:

FIGURE 10. EVOLUTION OF ENVIRONMENTAL POLICIES IN MEXICO (1972-2003)



4. ACTORS, AGENTS AND INSTITUTIONS AND THE SOCIAL ENVIRONMENTAL MANAGEMENT SYSTEM

4.1 GOVERNMENT

In Mexico there are three governmental hierarchies; each one has its own environmental competences and policy instruments at its disposal.

TABLE 3. HIERARCHIES OF GOVERNMENT AND ENVIRONMENTAL POLICIES IN MEXICO

HIERARCHY OF GOVERNMENT	INSTRUMENTS
1. FEDERAL	• Standards (Mandatory and voluntary). • Direct Regulation (Permitting). • Environmental Impact Assessment. • Natural Protected Areas. • Ecological Land-Use Planning • Information disclosure • Monitoring • Economic Instruments • Enforcement • Environmental audits • Administrative orders • Criminal orders
2. STATE (LOCAL)	• Local Ecological Land Use planning • Direct regulation • State permitting • Environmental Impact Assessment • Economic Instruments • Environmental Audits • Enforcement • Natural Protected Areas • Administrative orders • Enforcement
3. MUNICIPALITIES	• Land use planning • Property taxes • Building permits • Voluntary agreements • Enforcement

- ***Federal Government.***

The competences of the Federal Government on environmental policy are clearly defined in the LGEEPA. Broadly speaking the Federal Government is in charge of almost every relevant process and policy instrument, like environmental impact assessment of a large array of projects and activities that include infrastructure, industry, tourism, forestry, etc. It is also the only one capable of enacting environmental official standards and bestows operating permits to large industries. Moreover, its competences extend to wildlife management licenses, hazardous waste management, national parks and biosphere reserves, and to enforcement on all projects and sectors under Federal jurisdiction. The Federal Government is also chartered to design and implement economic instruments and to decree ecological land-use plans in federal lands, waters and oceans. It has the competence to emit by-laws that precise and develop in more detail the contents of general laws. The Federal Attorney has a specialized prosecutor for environmental felonies.

- ***Local Environmental Authorities.***

All 31 of the Mexican states and the Federal District have enacted their own environmental legislations and established a local entity charged with the administration of such laws. Article 7 of the LGEEPA establishes the states' jurisdiction over a range of environmental issues within their territories that do not interfere with competences specifically granted to the Federation by the LGEEPA itself and the Mexican Constitution. For instance, within their competences state governments are responsible for:

- Designing and evaluating environmental policy;
- Establishing and operating environmental policy instruments;
- Preventing and controlling local air from pollution stationary and mobile sources;
- Regulating municipal solid waste;

- Enforcing social participation in environmental issues;
- Establishing state policy on environmental information.

⏩ *Municipalities*

In Mexico there are almost 2,500 municipalities which have very diverse social and economic conditions. Some of them are sparsely populated, extremely poor and rural; others are rich, industry driven and totally urbanized with several million inhabitants. These jurisdictions have competences over those environmental issues not specifically granted to the federation or the states. Article 115 of the Mexican Constitution and LGEEPA's Article 8 set the environmental municipal responsibilities, which include:

- Land use planning;
- Municipal waste management.
- Water and waste water management.
- Urban parks.
- Local permitting for industries and services.
- Building permits.
- Local provisions dealing with the prevention and control of air pollution, noise, vibrations, light and odors.
- Enforcement.

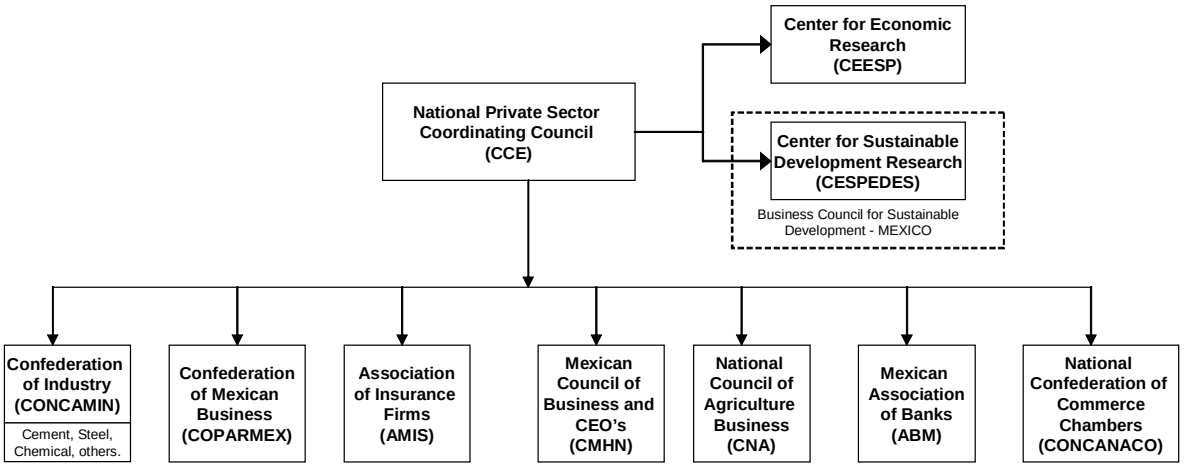
- ***Congress***

Mexico has a lower chamber composed by 500 representatives (*Cámara de Diputados*) and an upper chamber (*Senado*) with 128 senators which according to Article 73 of the Mexican Constitution can legislate about environment. Moreover, representatives and senators of all political parties now participate actively in promoting or bashing projects, in evaluating and criticizing the Federal Government performance and in the media.

4.2 Private Sector

The Mexican private sector is well organized for environmental lobbying by means of sectoral confederations or federations of chambers of industry, commerce, agriculture and banking. Within industry there is a broad array of chambers that represent specific branches like cement, steel, paper, etc. Almost every chamber has a working group on environment while a group of the most important Mexican and multinational companies have created the Business Council for Sustainable Development-Mexico (CESPEDES-BCSD Mexico).

FIGURE 11. PRIVATE SECTOR STRUCTURE IN MEXICO



Many individual firms, especially large Mexican firms and multinationals have been engaged in voluntary initiatives and self regulation and/ or in environmental management systems like ISO 14000 and environmental auditing. It is important to say that a number of private firms or manufacturing groups, during the nineties, entered in different covenants with the government aimed to improve environmental performance beyond compliance of *Normas Oficiales Mexicanas* (NOMs-Mexican Official Standards). However, it must be pointed out that since the mid nineties the enforcement effort by the Federal Government has been somehow relaxed, which, among other symptoms is reflected in a more sluggish demand for environmental services offered by consultancy firms and for environmental hardware. A relevant example is the hazardous waste management market that suffers a feeble demand and very low prices. Undoubtedly, this is a consequence of frail enforcement. However, an optimistic but still rough estimate of the potential environmental market in Mexico for the next 10 years is presented in the following figure.

FIGURE 12. ENVIRONMENTAL INFRASTRUCTURE NEEDS UP TO 2010

ENVIRONMENTAL ASPECT	INVESTMENT COSTS (Million USD)	OPERATION COSTS (Million USD)
• Urban waste water treatment	5,551.0	946.0
• Industrial waste water treatment	2,436.0	473.0
• Municipal solid waste management	728.7	1,249.0
• Hazardous waste management	3,365.0	5,760.0
• Biological waste management	14.4	73.5
• Air pollution abatement equipment	368.5	99.8
• Wind energy	1,000.0	
• Solar energy	1,000.0	
TOTAL	**14,463.6**	**8,601.3**

Source: CESPEDES. 2001.

The Mexican private sector can command several policy instruments in order to pursue its own environmental interests. The next figure summarizes the most significant.

TABLE 4. PRIVATE SECTOR AGENTS, INSTITUTIONS AND ENVIRONMENTAL POLICIES IN MEXICO

PRIVATE SECTOR AGENTS AND INSTITUTIONS	INSTRUMENTS
1. LANDOWNERS, COMMUNITIES AND *EJIDOS*	• Contracts • *Amparo Constitucional* trial • Administrative orders • Appeals • Lobbying
2. FIRMS	• ISO 14000 Standards • Self-regulation • Environmental Audits • Corporate Environmental Reports • Voluntary Covenants • Voluntary Standards • Environmental Management Systems • Lobbying • *Amparo Constitucional* trial • Administrative orders • Appeals
3. PRIVATE SECTOR ORGANIZATIONS	• Self-regulation • Reporting and Information • Voluntary Covenants • Voluntary Standards • Lobbying

4.3 Civil Society and NGOs

There are relatively few Mexican NGOs that militate actively on environment. However some of them could be quite outspoken and have strong influence in the mass media, and

recently in Congress. Their favorite targets or *sitting ducks* are the Mexican oil state monopoly (PEMEX) and big Mexican firms. Curiously they very seldom harass big multinationals. Their preferred topic is now dioxins generated by incinerators and cement kilns that use alternative fuels, as well as genetically modified foods and biotech companies. Greenpeace exercises an outstanding leadership over the rest of visible and politically active NGOs. There are also several environmental law practitioners that specialize on civil action against infrastructure and big tourism projects, which have been quite successful in the recent past. It is interesting to note that a vast majority of Mexican environmental NGOs are *left wing* in their political preferences and, as could be expected, are enthusiastic supporters of anti-globalization, anti-business and pro-indigenous people movements.

TABLE 5. PUBLIC PARTICIPATION AND ENVIRONMENTAL POLICIES IN MEXICO

CIVIL SOCIETY	INSTRUMENTS
NGOs	• Lobbying • Information • Citizen petition • Administrative orders • Civil action • Criminal suits • Blockades and street demonstrations (very rare)

4.4 Academia

Ever since the late seventies, when outstanding university professors lobbied against big governmental projects, Mexican academic institutions have been increasingly involved in environmental issues. Besides their prestige that translates into a significant political clout and influence in the media, very often they conduct research in support of environmental policy decisions. It is very frequent their participation in standards design, monitoring,

environmental impact assessment, project validation and consultancy. Many private firms now look after prominent academicians to legitimate their projects.

TABLE 6. ACADEMIA AND ENVIRONMENTAL POLICIES IN MEXICO

ACADEMIA	INSTRUMENTS
RESEARCH INSTITUTIONS	• Research • Monitoring • Consulting • Expertise • Training

4.5 International Agencies

Sometimes international agencies play a very relevant role on environmental institutional processes in Mexico. Through financial support and technical assistance frequently they have the ability to make things happen. They also promote international networks and help to capacity building. However, often they have a very disperse approach and tend to allocate inefficiently their resources. The most outstanding agencies acting in Mexico are GTZ (Germany), AID (USA), World Bank, Quebec Representation, Canadian Embassy, EPA (USA), ODA (UK) and JICA (Japan), besides foundations and international NGOs like the WWF, Conservation International, The Nature Conservancy, Ford Foundation, Rockefeller Foundation, etc. Obviously their instruments are capacity building, finance and technical assistance.

5. Environmental policy instruments

Mexican authorities as well as other relevant actors within Mexican society may utilize a rich array of policy tools to confront environmental problems. Each one of these instruments is used in specific conditions and processes and belongs to a given jurisdiction.

The effectiveness of any particular instrument depends on the number of actors or activities and the type of processes involved, as well as on transaction costs, available information and institutional capacities for implementation, monitoring and enforcement.

Thanks to the evolutionary course of the Mexican legal framework, and because of its broad scope, government and the rest of society are able to count on a potentially and effective set of policy instruments. Here, once again, one should acknowledge that pervasiveness of Mexico's environmental problems has little to do with a lack of legislation or policy instruments. It can be easily explained through institutional failure and a very limited rule of law. Anyway, it is interesting to offer a general overview of the Mexican environmental policy toolbox.

5.1 Natural Protected Areas

Creation, financing and management of natural protected areas is beyond doubt, the critical instrument for biodiversity protection in Mexico. In essence, is a very strong land use regulation that restricts explicitly property rights of land owners (*ejidos*, communities and individual proprietors). Remember that in Mexico the vast majority of the natural protected areas are established over private lands that have never been expropriated or bought by the government. That is why protected areas management is very complex and conflictive. The most important types of natural protected areas are *national parks* and *biosphere reserves*, which, along with other protection categories amount to around 9-10% of the national terrestrial territory. Federal natural protected areas are established through a presidential decree and have to be preceded by a long consultation and bargaining process with landowners and local communities.

5.2 Wildlife management and permitting

In terms of the Constitution, the LGEEPA and the wildlife legislation the Federal Government has under its jurisdiction all wildlife in Mexico. However, thanks to the most recent piece of legislation enacted in the late nineties, land owners now have an important say in wildlife management, which almost amounts to a formal property right. Nonetheless, the Federal Government is the only actor capable of authorizing wildlife management on particular tracts of land (Unidades de Manejo y Aprovechamiento de Vida Silvestre -UMAs). By the way, this wildlife management system has been quite successful since the second half of the nineties, and Mexico owes it the preservation of natural ecosystems, the conservation of many endangered species and even the bounce back of species that were on the brink of extinction (i.e. big horn sheep, black bear, mule deer, etc.). The Mexican Government also restricts to itself the capability of hunting permitting and of any other kind of exploitation of wildlife.

5.3 Ecological Land-Use Planning

Ecological land-use planning is very often taken as an instrument within the competences of the Federal Government. In fact, this administration and the two previous ones devoted a good deal of human resources and budgets to develop and promote ecological land-use plans for different areas of the national territory. However, besides the oceans, coasts, federal water bodies and a number of other small patches of federal lands, the competences for land use planning are very clearly embodied by the Mexican Constitution (Article 115) within the jurisdiction of the municipalities. This is the reason why, one should not expect to much from this instrument, especially in the very complex political pluralism that characterizes the Mexican Federal, states and municipal governments. Now, as never before the transaction costs and political difficulties to design, consult, approve and enact an ecological land-use plan are almost insurmountable. Indeed, since more than 10 years of ecological land-use planning initiatives, actually one single plan works at all: *Tulum-Cancún,* in the southeastern state of Quintana Roo; and that is only because of the very peculiar social, political and economic conditions of the region.

5.4 Environmental Impact Assessment (EIA)

Environmental Impact Assessment is a prime environmental policy tool, one that draws much of the attention of developers, NGOs and civil courts. It is pretty well established as a working legal and technical procedure, with a solid methodological structure and consistent public screening mechanisms. EIA is the most contentious policy instrument with spillovers on the media, civil society, state governments and the judiciary. Almost every important infrastructure and industrial project under the Mexican law should pass under the EIA procedure.

This instrument has a very impressive litigious track. Actually, a large number of very well known infrastructure projects have failed such a tricky process at a high cost for government, society, private investors and even the environment. If successful, the EIA culminates in a Federal Government permit that conditions construction and operation to a more or less complex set of technical and environmental parameters. Its most important weakness comes from the highly discretionary nature of these parameters and conditions which sometimes opens the door for litigation and even political strife around some projects.

5.5 Risk Assessment

Risk assessment is a broadly used policy instrument, which now is well rooted in the legal framework. It is mandatory and conducted parallel to EIA in the case of industrial, energy and hazardous waste management projects. Also the technical and methodological foundations of this instrument are quite well established among firms and consultancy practitioners.

5.6 *Normas Oficiales Mexicanas* (NOM- Official Mandatory Technical Standards)

These instruments are the centerpiece of the command and control policy scheme in Mexico. They can be praised for delivering must of the policy successes achieved during the last two decades. They apply mainly to industrial processes, hazardous and municipal waste,

vehicle emissions, air quality, water discharges and some natural resource management activities. Up to now, 58 NOMs have been fully enacted. Unfortunately, enforcement is the feeblest link of the regulatory chain commanded by NOMs, particularly in regards to wastewater and municipal waste landfills.

NOMs are pretty concentrated in pollution control, leaving others environmentally strategic sectors of the Mexican economy outside the reach of the regulatory endeavors of SEMARNAT. Clearly, new NOMs are a big necessity and a considerable environmental policy opportunity in sectors like fisheries and agriculture, now that regulation through NOMs in the industrial sector is almost complete. Nevertheless, urgency is felt to update obsolete NOMs and to streamline and modernize this basic framework.

TABLE 7. NOMS. AIR POLLUTION. CONTROL AND MONITORING

STANDARD NAME	ENVIRONMENTAL ASPECT OR ACTIVITY	DATE ISSUED
1. Pollutants concentrations		
NOM-034-ECOL-93	Carbon monoxide	18-10-93
NOM-035-ECOL-93	Total suspended particles.	18-10-93
NOM-036-ECOL-93	Ozone.	18-10-93
NOM-037-ECOL-93	Nitrogen dioxide.	18-10-93
NOM-038-ECOL-93	Sulphur dioxide.	18-10-93
2. Emissions controls in stationary sources		
NOM-039-ECOL-93	Sulphur dioxide emissions limits in sulphur production facilities.	22-10-93
NOM-040-ECOL-93	Emissions control in cement production facilities.	22-10-93
NOM-043-ECOL-93	Total suspended particles control in stationary sources.	22-10-93
NOM-046-ECOL-93	Sulphur dioxide in stationary sources.	22-10-93
NOM-051-ECOL-93	Sulphur content in industrial oil fuel.	22-10-93
NOM-075-ECOL-95	Volatile organic compounds in oil refineries.	26-12-95
NOM-085-ECOL-94	Total suspended particles, sulphur dioxide	02-12-94

STANDARD NAME	ENVIRONMENTAL ASPECT OR ACTIVITY	DATE ISSUED
NOM-086-ECOL-94	Environmental technical specifications for fuels used in stationary and mobile sources.	02-12-94
NOM-092-ECOL-95	Abatement equipment for gasoline emissions	06-09-95
NOM-093-ECOL-95	Efficiency in vapor recuperation in gas stations	06-09-95
NOM-097-ECOL-95	Particulate matter in glass making processes.	01-02-96
NOM-105-ECOL-96	Total suspended particles.	02-04-98
NOM-121-ECOL-97	Volatile organic compounds in vehicles plants	14-07-98
NOM-123-ECOL-98	Volatile organic compounds in paintings	11-06-99
3. Emissions from mobile sources		
NOM-041-ECOL-99	Vehicles emission controls.	06-08-99
NOM-042-ECOL-99	Gasoline vehicles. Emission controls	06-09-99
NOM-044-ECOL-93	Fuel oil vehicle. Emission controls.	22-10-93
NOM-045-ECOL-96	Fuel oil vehicles. Smoke limits.	22-04-97
NOM-047-ECOL-99	Vehicles. Emission controls.	10-05-00
NOM-048-ECOL-93	Motorcycles. Emission controls.	22-10-93
NOM-049-ECOL-93	Motorcycles. Emission control.	22-10-93
NOM-050-ECOL-93	Natural gas and other fuels vehicles. Emission controls.	22-10-93
NOM-076-ECOL-95	Fuel oil vehicles. Emissions controls.	26-12-95

TABLE 8. NOMS. WASTE MANAGEMENT (MUNICIPAL AND HAZARDOUS)

STANDARD NAME	ENVIRONMENTAL ASPECT OR ACTIVITY	DATE ISSUED
NOM-052-ECOL-93	Hazardous waste characterization.	Oct. 22.93
NOM-053-ECOL-93	Hazardous waste characterization. Toxicity.	Oct.22.1993
NOM-054-ECOL-93	Hazardous waste characterization. Extraction test.	Oct.22.1993
NOM-055-ECOL-93	Hazardous waste. Confining sites selection requirements.	Oct.22.1993
NOM-056-ECOL-93	Hazardous waste. Confining sites building requirements	Oct.22.1993

STANDARD NAME	ENVIRONMENTAL ASPECT OR ACTIVITY	DATE ISSUED
NOM-057-ECOL-93	Hazardous waste. Confining facility design	Oct.22.1993
NOM-058-ECOL-93	Hazardous waste. Confining sites operation requirements	Oct.22.1993
NOM-083-ECOL-96	Municipal waste landfills requirements	Nov.26.1993
NOM-087-ECOL-95.	Biological and infectious waste management.	Nov.07.1995
NOM-133-ECOL-01.	Polychlorinated biphenyl (PCB) waste management	Dec.10.2001.
NOM-138-ECOL-02	Land remediation for hydrocarbons polluted soils.	Sep.09.2002

By the way, CENICA has provided reliable analytical information in design and review various hazardous waste and air pollution NOMs by providing emissions criteria, technical parameters, etc. In the following table there is a summary of this contribution.

TABLE 9. CENICA'S PARTICIPATION IN NOM-MAKING

ENVIRONMENTAL ISSUE	NATIONAL OFFICIAL STANDARD
HAZARDOUS WASTE MANAGEMENT	• NOM-052. Hazardous waste characterization. • NOM-087. Biological waste management. • NOM-098. Incineration. • PROY-NOM-133. PCB's Handling specifications. • NOM-138. Emergency regulation for hydrocarbon spills. • PROY-NOM-XX. Polluted soils with metals, criteria and methodologies for remediation. • PROY-NOM-004-ECOL-2001. Sludge, limits of pollutants content for their final disposal.
AIR QUALITY	• NOM-040. Emissions criteria in cement facilities. • NOM-045-ECOL-1996. Diesel vehicles exhaust limits. • NOM-044-ECOL-1996. Diesel vehicles exhaust limits. • NOM-050-ECOL-1993. Vehicle exhaust gases limits. • NOM-080.Noise limits in automobiles and motorcycles. • NOM-085. Air quality. • NOM-021-SSA1-1993. Air quality evaluation criteria.

Source. CENICA-INE.2002

NOMs have proved to be effective in controlling pollution in big firms inducing technological change and promoting an important environmental services and hardware market. It must be pointed out that enforcement is also very frail or inexistent in the realm of small and medium firms that operate outside the scrutiny of public opinion and/or within the jurisdiction of state governments and municipalities.

5.7 Direct regulation (Permitting)

Permitting is particularly important as a policy instrument in the industrial sector. New firms or industrial activities that find themselves under the regulatory arm of the Federal Government need to apply for a formal license to operate. It consists on a series of conditions and environmental parameters imposed by the authorities. During the second half of the nineties, INE embarked in an ambitious administrative reform that strived to integrate industrial permitting under a single procedure: *Licencia Ambiental Única* (LAU). The LAU has as complement the *Cédula de Operación Anual (*COA-Annual Operation Report) that assess multimedia emissions and transfers of pollutants that conform the *Registro de Emisiones y Transferencia de Contaminantes (RETC),* which is the Mexican version of the *Toxic Release Inventory* in the United States. Its implementation is a commitment assumed by Mexico within the NAFTA CEC.

This whole regulatory mechanism, however, still lacks of a proper legal foundation since there is not a NOM or by-law that explicitly accounts for the specific contents and scope of the LAU and the RETC.

5.8 Economic instruments

Economic instruments have been up to now an unchartered frontier for environmental policy in Mexico. Public opinion, firms, NGOs and Finance Ministry officials are not sufficiently acquainted with them and they enjoy a broad prejudice. Things are less favorable given the fiscal turmoil brought by political parties in Congress. It can be said that Mexico is ill prepared for the introduction of economic instruments for environmental policy, besides

limited water charges, a very short-lived experience with a small surcharge over gasoline prices in Mexico City during the mid-nineties, and some fiscal incentives for environmental equipment. A very ambitious NOM (NOM-085) was designed also during the mid-nineties which provided for a cap and trade system of SO_2 emissions in large industrial facilities. However, it was never implemented. Green taxes are still anathema for most of the Mexican private sector, even if they are proposed as part of a neutral green fiscal reform where income taxes could be reduced.

So far, economic instruments are almost absent in Mexico, despite being conspicuously established in the legislation (LGEEPA). There is no doubt that Mexico is loosing an extremely potent environmental policy instrument and a big opportunity to broaden the tax base and combat tax evasion. We should remember that green taxes can be regarded frequently as a peculiar form of a sales tax. Sales taxes are much more efficient, cost-effective and easier to administer than income taxes.

5.9 Enforcement

As was stated previously, during the eve of NAFTA and a short period afterwards there was an impressive surge of enforcement efforts in Mexico, concentrated in big industrial facilities. The environmental pay-off was large and easy to document, in spite of numerous grievances from the private sector. Enforcement detonated a brisk market for environmental consultancy and hardware and helped to launch the first serious move to build environmental infrastructure in Mexico. Environmental policy is still relying on the compliance inertia that followed those years of enforcement euphoria. Since the mid-nineties a more tolerant mood has pervaded and a more relaxed approach predominates within PROFEPA. The *sharpest teeth* of environmental policy have been removed, and the strong drive towards the rule of law seen up to the mid-nineties has all but stalled. The good news is that most of the big Mexican firms, multinational and even the state oil monopoly (PEMEX) have acquired enduring environmental responsibilities, driven also by NAFTA, globalization, foreign direct investment, environmental management systems and an incipient public scrutiny.

5.10 Voluntary initiatives and Self-regulation

Voluntary initiatives and self-regulation have flourished in Mexico as in the rest of the world in recent years. Two kinds of these instruments should be underscored. The first one is official environmental auditing conducted by PROFEPA. Even if it is formally voluntary, this auditing process spread quickly over the Mexican industrial sector during the nineties as a preemptive move by firms to avoid costly sanctions and closures by PROFEPA.

Practically, this official auditing is in a certain way a bargain around compliance. Many firms got a *virtual license to operate* while auditing was in process even if they were ostensibly out of compliance. If successful, official auditing ends in an *action program* signed by the firm and PROFEPA under a covenant that obliges the firm to improve environmental performance by means of introducing abatement technologies or changes in processes. After achieving the targets established in the agreement, the firm receives the *Certificado de Industria Limpia (Clean Industry Certificate*) by PROFEPA.

Also, a few covenants were signed in the mid-nineties between INE and some industries which contemplated emissions reductions further than what was commanded by NOMs. The chemical industry pursued as elsewhere its *Responsible Care Program* and a group of multinationals have engaged in a Mexican version of the *Global Environmental Management Initiative* (GEMI). Meanwhile, ISO 1400 has become a very appealing environmental management system that provides firms with international recognition and prestige. Unfortunately it is not integrated formally with official environmental auditing procedures and other policy instruments.

Environmental reporting it still in its infancy in Mexico. Only a handful of firms dare to issue sustainability or environmental reports. The oil state monopoly (PEMEX) is among them, arguably, issuing the best report.

5.11 Information disclosure to financial markets

Very recently the *Comisión Nacional Bancaria y de Valores* (CNBV-Mexico's peer of the United States Securities and Exchange Commission) has prepared a proposal for new disclosure procedures for firms that participate in the stock market. This includes explicit provisions for *material information* related to environmental risk, environmental compliance and environmental performance. It is expected that this new rules, when enacted, will become an important incentive to large firms towards improving their environmental profile. Banks, financial intermediaries, investment funds and insurers will have new information available to enhance their assessments. There is an incipient initiative within NAFTA CEC that is poised to promote standardized disclosure in North America.

6. Social environmental management system in Mexico

The next figure depicts graphically the structure of the *Social Environmental Management System* in Mexico, identifying the most important actors, instruments and linkages as established in the preceding text.

FIGURE 13. SOCIAL ENVIRONMENTAL MANAGEMENT SYSTEM IN MEXICO

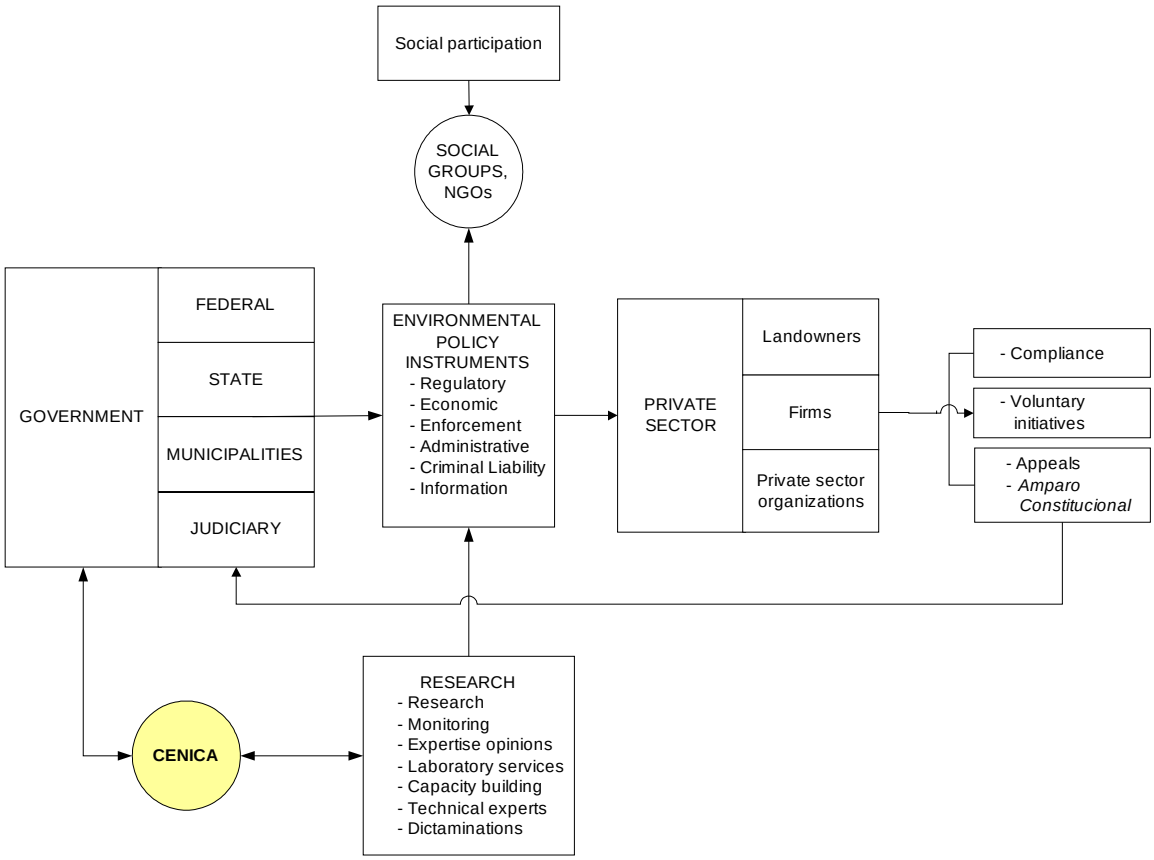


TABLE 10. FEDERAL GOVERNMENT'S ENVIRONMENTAL POLICY INSTRUMENTS

INSTITUTIONS	INSTRUMENTS		TOPICS, PROCESSES, ACTIVITIES	SECTORS
1. MINISTRY OF THE ENVIRONMENT AND NATURAL RESOURCES (SECREATARÍA DE MEDIO AMBIENTE Y RECURSOS NATURALES - SEMARNAT)	1.1 REGULATORY	• Standards	• Water • Hazardous wastes • Air quality • Biodiversity and natural resources • Noise and vibrations	• Industry • Services • Transport • Agriculture • Forest • Mining • Tourism • Energy
		• Direct Regulation (Permitting)	• Licenses, Permits	• Oil • Petrochemical • Chemical • Steel • Paper • Sugar • Automotive • Cement • Electric industry facilities
		• Environmental Impact Assessment	• Environmental Impact Assessment Procedure	• Oil, • Petrochemical, • Chemical, • Steel, • Paper, • Sugar, • Automotive, • Cement and • Electric industry facilities • Waste treatment and hazardous waste disposal facilities. • Infrastructure projects (roads, railways, water infrastructure, pipelines, etc.) • Land use changes in jungles, arid zones and forest areas • Real estate developments in coastal areas • Projects within any federal natural protected area • Fishing, aquaculture, farming activities that may harm endangered species or the environment • Forest plantations
		• Natural Protected Areas	• Biosphere reserves • National parks • Natural monuments • Wildlife protection areas • Sanctuaries	
		• Ecological Land-Use Planning	• National • Marine	

TABLE 11. LOCAL GOVERNMENT'S ENVIRONMENTAL POLICY INSTRUMENTS

INSTITUTIONS	INSTRUMENTS		TOPICS, PROCESSES, ACTIVITIES	SECTORS
1. LOCAL MINISTRIES OF THE ENVIRONMENT, LOCAL INSTITUTES OF ECOLOGY, PROFEPA'S STATE DELEGATIONS	**1.1 REGULATORY**	• Ecological Land-Use Planning	• Regional • Local	
		• Direct Regulation (Permitting)	• Local licenses and permits	• Industrial issues not reserved to federal jurisdiction
		• Local Natural Protected Areas	• Natural monuments • Wildlife protection areas • Sanctuaries • Local parks and reserves	
	1.2 PROMOTION OF ECONOMIC INSTRUMENTS	• Fiscal Credits • Taxes • Subsidies • Deposit/refund • Emissions trading • Credits • Guarantees • Insurances • Funds • Fideicomisos	• Air • Water • Municipal solid wastes • Biodiversity • Noise and vibrations	• Industry • Services • Transport • Agriculture • Forest • Mining • Tourism • Energy
	1.3 ENFORCEMENT	• Environmental Law	• General law in issues not reserved to federal authorities • Local environmental laws on issues not reserved to federal authorities	• Issues and sources not reserved to federal jurisdiction
		• Environmental Regulation	• General regulations issues not reserved to federal authorities • Local environmental laws on issues not reserved to federal authorities	
		• Inconformity process (recurso de revisión)	• Incidents, acts or omissions within the local government's jurisdiction that harm or may harm the environment or natural resources	
		• Fees and sanctions		
		• Local environmental auditing	• Industrial, other commercial, services and retail facilities within local jurisdiction.	
	1.4 ADMINISTRATIVE ORDERS	• Civil action • Inconformity process (recurso de revisión) • Fees and sanctions	• Incidents, acts or omissions within the local government's jurisdiction that harm or may harm the environment or natural resources	

	1.5 INFORMATION	• Information disclosure	• Local environmental information requirements	

TABLE 12. MUNICIPAL GOVERNMENT'S ENVIRONMENTAL POLICY INSTRUMENTS

INSTITUTIONS	INSTRUMENTS		TOPICS, PROCESSES, ACTIVITIES	SECTORS
1. MUNICIPAL AUTHORITIES	**1.1 REGULATORY**	• Land use and human settlement planning		• Municipal issues of all economic activities and sectors
	1.2 ECONOMIC INSTRUMENTS	• Land tax reductions		
	1.3 VOLUNTARY	• Voluntary agreement with other municipalities	• Local environmental issues	
	1.4 ENFORCEMENT	• Environmental issues not reserved to federal or state environmental authorities		

TABLE 13. JUDICIARY INSTRUMENTS.

INSTITUTIONS	INSTRUMENTS		TOPICS, PROCESSES, ACTIVITIES	SECTORS
1. CIVIL COURTS	**1.1 CIVIL LIABILITY**	• Out of pockets	• Civil penalties (closing of facilities)	• Any individual can be prosecuted if civil offenses made
2. PROSECUTORS, PGR	**2.1 CRIMINAL LIABILITY**	• Criminal prosecution	• Criminal penalties (deprivation of liberty)	• Any individual can be prosecuted if criminal offenses made

TABLE 14 PRIVATE SECTOR'S ENVIRONMENTAL INSTRUMENTS

PRIVATE SECTOR AGENTS AND INSTITUTIONS	INSTRUMENTS		TOPICS, PROCESSES, ACTIVITIES,	SECTORS AND AGENTS
1. LANDOWNERS, COMMUNITIES AND EJIDOS	1.1 CONTRACTS	• Forests' ecosystem services valuation • Land purchasing • Clean development mechanism • Land leasing • Land trusts		
	1.2 AMPARO CONSTITUTIONAL TRIAL	• Criminal liability	• Criminal penalties	• Any individual or citizen can prevent, suspend or retract any act of authority that violates his or her civil rights (constitutional rights) but the outcome of the resolution or sentence will only suspend the action or return the situation to its prior state.
	1.3 ADMINISTRATIVE ORDERS	• Inconformity process (recurso de revisión)	• Appeal authorities' resolutions on environmental issues	• Appeal to federal, local and municipal resolutions
2. FIRMS	2.1 VOLUNTARY INITIATIVES	• ISO 14000 Standards	• Certification of Environmental Management Systems	• 120 Companies
		• Gestión ambiental rentable	• Environmental Management System	• SMALL, MEDIUM AND MICRO ENTERPRISES
		• Self Regulation	• Self-assessment program - gemi	• Bristol-Myers Squibb de México
				• Colgate-Palmolive, S.A. De C.V.
				• Dow Química Mexicana, S.A. de C.V.
				• Janssen-Cilag de México, S.A. de C.V.
				• Nestle México, S.A. de C.V.
				• Compañía Procter & Gamble de México, S.RL. de C.V.
				• Productos de Maíz, S.A. de C.V.
				• TETRAPAK, S.A. de C.V.
		• Environmental audits	• Industrial, commercial, services and retail facilities can be certified as "clean industry" (certificado de industria limipia).	• Industrial Facilities
		• Reporting and information	• Corporate environmental reports	• CEMEX
				• PEMEX
				• PEÑOLES
		• Voluntary agreements	• Air pollution mitigation program (change to electric vehicles)	• BIMBO

			• Air pollution mitigation program (vehicles emissions)	• Coca Cola- FEMSA
		• Voluntary standards	• Soil and land remediation	• General Motors facilities in Mexico City and suppliers located in the northern border

PRIVATE SECTOR AGENTS AND INSTITUTIONS	INSTRUMENTS		TOPICS, PROCESSES, ACTIVITIES,	SECTORS AND AGENTS
2. FIRMS	2.2 AMPARO CONSTITUTIONAL TRIAL	• Criminal liability	• Criminal penalties	• Any individual or citizen can prevent, suspend or retract any act of authority that violates his or her civil rights (constitutional rights) but the outcome of the resolution or sentence will only suspend the action or return the situation to its prior state.
	2.3 ADMINISTRATIVE ORDERS	• Inconformity process (recurso de revisión)	• Appeal Authorities' Resolutions On Environmental Issues	• Appeal to federal, local and municipal resolutions

3. PRIVATE SECTOR ORGANIZATIONS	3.1 VOLUNTARY INITIATIVES	• Self regulation	• Responsible care	• National Chemical Industry Association (Asociación Nacional de la Industria QUÍMICA)
			• Self-assessment program	• General Environmental Management Initiative - GEMI
		• Reporting and information	• Ecoeffiency Yearbook	• Private Sector Studies Center for Sustainable Development (Centro de Estudios del Sector Privado para el Desarrollo Sustentable - CESPEDES)
		• Voluntary agreements	• Energy recovery program (waste refusal fuels)	• Cement Industry
			• Air pollution mitigation program (during production processes)	• Asociación de Fabricantes de Aceites, Grasa y Detergentes
			• Environmental Infrastructure	• CESPEDES
			• Energy Efficiency	• Steel Industry
			• Waste reduction program (specially lead wastes)	• Mexican Mining Chamber
		• Voluntary Standards	• Volatile organic compounds control	• Mexican Automotive Industry Association (Asociación Mexicana De La Industria Automotriz - Amia)
			• Organic Compounds Monitoring	• Asociación de Fabricantes de Aceites, Grasa Y Detergentes

TABLE 15. SOCIAL ENVIRONMENTAL INSTRUMENTS.

	INSTRUMENTS		TOPICS	PROCESSES, ACTIVITIES
NGO'S	1.1 LEGAL	• Participation in law-making process	• Air • Water	• Lobbying • Working groups • Comments on draft standards
		• Participation in rule-making process		
		• Participation in standards-making process		
		• Participation in the national environmental protection standardization committee	• Hazardous Wastes Management	
		• Implementation of environmental policy	• Municipal solid wastes • Biodiversity	• Consultative councils • Consent orders and settlements (environmental impact assessment and clean development mechanism projects)
		• Enforcement of environmental law	• Natural resources • Noise and vibrations • Wildlife • Renewable energy • Biotechnology	• Civil action • Citizen petition • Citizen suit • Criminal suit • Injunction procedure (amparo)
	2.1 INFORMATION	• Workshops • Web Pages • Books and articles • Conferences	• Environmental Management Systems	

TABLE 16. RESEARCH INSTITUTIONS' ENVIRONMENTAL INSTRUMENTS.

	ACTIVITIES	TOPICS	SECTORS
ACADEMIA AND RESEARCH INSTITUTIONS	1.1 RESEARCH 1.2 MONITORING 1.3 CONSULTING 1.4 EXPERTISE OPINIONS 1.5 LABORATORY SERVICES 1.6 TRAINING 1.7 TECHNICAL EXPERTS	• Air • Water • Hazardous Wastes Management • Municipal Solid Wastes • Biodiversity • Natural Resources • Noise and Vibrations • Wildlife • Renewable Energy	• Industry • Transport • Agriculture • Tourism • Services • Energy • Forest • Mining • Ngo's

	DICTAMINTATIONS	• Biotechnology • Environmental Management Systems	• Federal Government • Local Governments • Municipalities

TABLE 17. INTERNATIONAL ENVIRONMENTAL COOPERATION PARTNERSHIPS

INSTITUTIONS	PROJECTS, PROGRAMS, TOPICS
COMISSION FOR ENVIRONMENTAL COOPERATION	• Environment, economy and trade • Conservation of biodiversity • Pollutants and health • Law and policy • Electricity and the environment • Ribbon of life • Continental pollutants pathways • Silva reservoir
JICA	• CENICA. Research and Training Center
USAID	• Energy efficiency, renewable energy, and pollution prevention • Cleaner Production Mexican Center (in partnership with UNIDO) • Forestry and biodiversity • Environmental institutions
GTZ	• Water and waste water management • Municipal solid waste and hazardous waste management • Environmental management in small an medium enterprises • Air quality protection • Training and education
UNEP	• Biodiversity
UNIDO	• Cleaner Production Mexican Center (in partnership with USAID)
EPA	• Border cooperation • Air quality protection • Climate change • Cleaner production

7. AIR POLLUTION POLICY IN MEXICO

Official Japanese technical and financial cooperation on environment with Mexico has had air pollution control as a priority, particularly in Mexico City. Having being also a very sensible environmental issue and one with a documented policy success, it deserves a special treatment in this report.

Since the early seventies México has undertaken efforts to confront its air pollution problems. First, a rudimentary air quality monitoring network was operated in Mexico City, initially with no regards to policy. This network failed to function over a credible and continuous basis, and finally, it suspended operations due to maintenance shortcomings and the lack of a permanent commitment on the part of governmental entities and of meaningful interest by public opinion. This failure can also be explained by extremely limited budgets, absence of enough technical capacities, and a low hierarchy and scarce political leverage of the government agency in charge of environmental protection.

However, these initial experiences induced a close partnership between government and universities and gave momentum to a growing academic involvement in the subject, which, later on, facilitated real progress.

The creation, in the early eighties, of SEDUE, gave the definite thrust to air quality management. Several university researchers and professors were recruited by the new agency, who, in coordination with international consultants, created the first automatic air quality monitoring network for Mexico City, promulgated the first air quality standards and built the first metropolitan air quality index and reporting system.

The mid eighties testified the exacerbation of air quality problems in the Mexican capital, to the point that, during early 1986 the first emergencies were declared. Ozone concentrations peaked at nearly 0.4-0.5 ppm and it is thought that total suspended particles (TSP) and particulate matter (PM10) reached extremely high levels, probably near 1000 micrograms/cubic meter.

This emergency had the immediate effect of mobilizing public opinion; for the first time, environmentalists demonstrated on the streets demanding public response.

In 1986 the government reacted with preliminary actions including the substitution of natural gas for fuel oil in a number of industrial and electric utilities, and took several commitments to improve automotive fuels in Mexico City. However, the magnitude and complexity of the problem exceeded the limited scope of the new policies.

Petróleos Mexicanos (PEMEX) started an effort to reformulate gasoline, gradually removing lead by means of oxygenates, aromatics and other hydrocarbons that, later on, proved to be more photo reactive leading to an increase in ozone concentrations. In the late eighties public awareness grew, and more important actions were undertaken.

Broadly speaking, policy implementation lagged behind a mounting problem derived from very high motor car registration rates and the subsistence of a large fleet of old and outdated cars that accounted for a big proportion of total emissions; so government actions were outpaced. In 1992 and 1993 the worst ozone pollution episodes ravaged Mexico City.

Meanwhile, other metropolitan areas became aware of air quality problems. Particularly Guadalajara and Monterrey and border cities like Ciudad Juarez and Tijuana. The early nineties saw the development of the first efforts to monitor air quality and to build emissions inventories in a number of other urban centers besides Mexico City. But air pollution problems became sensitive public issues only in Guadalajara, Monterrey and Ciudad Juarez, so exclusively there they gave rise to slow but permanent policy commitments.

FIGURE 14. POLLUTANTS MONITORED AND NUMBER OF AIR MONITORING STATIONS IN MEXICO'S MAIN URBAN AREAS (2001)

URBAN AREA / CITY	STATE	POLLUTANTS MONITORED							AUTOMATIC MONITORING STATIONS	MANUAL MONITORING STATIONS
		O_3	CO	SO_2	NO_2	NO_x	PM 10	PST	NUMBER	
Metropolitan Area of Mexico City	Federal District	19	24	26	18	18	10	12	32	19
Metropolitan Area of Guadalajara	Jalisco	8	8	8	8	8	8	-	8	-
Metropolitan Area of Monterey	Nuevo León	5	5	5	5	-	5	-	5	-
Metropolitan Area of Toluca	México	5	4	7	7	-	7	5	7	5
Cd. Juárez	Chihuahua	3	3	-	-	-	6	-	3	6
Tijuana	Baja California	4	4	4	4	-	6	-	4	6
Mexicali	Baja California	4	4	4	4	-	6	-	4	6
Tecate	Baja California	1	1	-	1	1	1	1	1	-
Cananea	Sonora	-	-	5	-	-	-	-	5	-
Cumpas	Sonora	-	-	5	-	-	5	-	5	5
Nacozari	Sonora	-	-	6	-	-	-	-	6	-
Querétaro	Querétaro	-	-	6	-	-	-	6	-	6
San Luis Potosí	San Luis Potosí	-	-	10	-	-	-	9	10	9
Aguascalientes	Aguascalientes	1	2	2	2	2	1	2	2	2
Coatzacoalcos	Veracruz	1	1	-	1	-	-	-	1	-
Nogales	Sonora	-	-	-	-	-	1	-	-	1
Manzanillo	Colima	-	-	3	3	3	3	3	3	3
Salamanca	Guanajuato	3	3	3	3	3	3	1	3	1
Celaya	Guanajuato	1	1	1	1	1	-	-	1	-
Irapuato	Guanajuato	1	1	1	1	1	1	-	1	1
Silao	Guanajuato	1	1	-	1	1	1	-	1	1
Puebla	Puebla	4	4	4	4	4	4	-	4	-
Torreón	Coahuila	-	-	-	-	-	1	5	-	5

Source: CENICA/INE/SEMARNAT.2001.

However, up from then, air quality pressures started to loosen up. A new plan was explicitly committed to achieve air quality objectives within a given time horizon and was structured over a framework of goals, strategies and instruments oriented to industry, vehicles, land use planning and transport. Responsibilities were clearly attached to specific institutions, making them compatible with explicit budgetary appropriations. This plan made detailed reference to the liquefied petroleum gas issue raised by two Nobel laureates, who attributed a significant share of ozone precursors emissions to the domestic and vehicle use of this fuel.

We must remember that the national environmental plan adopted by President Zedillo´s administration in 1995 made unprecedented clear cut references to the need of tailoring air quality plans not only for México City but also for other priority metropolitan areas. Therefore, within the next months Guadalajara, Monterrey, Toluca and Ciudad Juarez were endowed each one with its own plan which resulted form a direct involvement of the federal environmental agency in coordination with local authorities and after a more or less intense information and negotiation process with other local stakeholders.

But, in any case, the problem remained a very big source of public debate and grievance because in excess of 90% of the days ozone surpassed (very often by far) air quality standards. In the mid nineties health and environmental authorities and research institutions like CENICA initiated systematic monitoring and characterization of criteria pollutants and epidemiological research about health hazards related to ozone and PM10 exposure, that some time later were the basis for important policy decisions.

So far, air quality problems were regarded almost exclusively as a technical topic, unrelated to urban development processes, transport structures and in general to an emerging debate within the OCDE about urban sustainability.

In 1996 a new air quality plan for México City was drafted and promulgated, which not only claimed continuity in regards to previous policies, plans and efforts but supplied a broader conceptual framework in which urban and transport policies were integrated with emissions controls.[1] In 1996 CENICA and the Federal District government began the systematic monitoring of TSP and PM10 by means of automatic equipment. PM10 revealed itself as a growing concern, perhaps even more important than ozone because of its known and deleterious effects on morbidity and mortality. So far, these monitoring activities are strongly supported by CENICA's equipment and training personnel which are considered as a reference laboratory.

[1] Programa para Mejorar la Calidad del Aire en el Valle de México 1995-2000

FIGURE 15 . NUMBER OF AIR MONITORING STATIONS INSTALLED MAIN URBAN AREAS

AÑO	NUMBER OF MONITORING STATIONS (ACCUMULATED)	AÑO	NUMBER OF MONITORING STATIONS (ACCUMULATED)
1970	34	1987	177
1971	34	1988	183
1972	42	1989	186
1973	42	1990	193
1974	42	1991	196
1975	77	1992	218
1976	77	1993	256
1977	77	1994	260
1978	77	1995	268
1979	77	1996	274
1980	77	1997	277
1981	87	1998	279
1982	101	1999	298
1983	108	2000	304
1984	123	2001	307
1985	123	2002	310
1986	139		

Source: CENICA/INE/SEMARNAT.2001.

The number of monitoring stations can be used as a proxy to estimate the technical capacities of environmental management in Mexico. However, it should be mentioned that changes of local governments have impeded the consolidation of a national monitoring and information system, which is expected to be fully accomplished by 2005. It must be pointed out that the figure above considers only equipment installed and operating, however it does not differentiate from automatic or manual stations.

It must be said that CENICA has undertaken several research initiatives to trace the specific origin and nature of PM10 and PM2.5, in order to build a reliable emissions inventory and has been actively involved in partnerships with other institutions in regards to human exposure to ozone, carbon monoxide and total suspended particles.

8. CENICA AND THE DEVELOPMENT OF SOCIAL CAPACITIES FOR ENVIRONMENTAL MANAGEMENT

8.1 Project Partnership

In 1995 CENICA began an intense capacity building process supported by three partners involved: JICA, INE and UAM. JICA was in charge of providing equipment and outstanding analytical capabilities for the technical staff. Twelve Japanese experts were responsible of installing the needed equipment and training sixteen technicians and researchers that INE assigned to CENICA. UAM committed to build the adequate facilities to support lab, training and research activities.

CENICA was chartered to be an environmental policy facilitator by *"providing strategic and reliable technical information and assistance to support authorities and private sector agents in an institutional change towards a better environmental performance"*. CENICA was intended not only to have the technical and analytical capabilities and infrastructure, but also political and organizational skills to carry out specific research and training, to foster policy management, to develop information systems and to conduct training programs focused in two specific environmental issues: air pollution and waste management.

CENICA was meant to have *state of the art* technology and equipment to characterize precisely hazardous waste and air pollutants. Its findings would be used to enforce new regulations and to validate sampling, monitoring and reporting protocols. Moreover, it would evaluate the environmental performance of different technologies and promote those who may help to reduce waste generation and emission discharges.

These tasks would enhance the environmental performance of several agents (federal, local and municipal authorities, firms, laboratories and social groups) and help to establish new emission standards and regulations.

8.2 CENICA's capability maturity model

Growth of international cooperation from industrialized countries to developing ones, demands to appraise the value of individual projects, in order to justify investment and budgets. In the past, this goal was pursued mainly through anecdotic evidence.

In order to assess the performance of CENICA within the *Social Environmental Management System* in Mexico, a Capability Maturity Model (CMM) will be used to describe the evolutionary improvement path of CENICA (from an ad hoc, immature research center to a mature, disciplined institution). Although this framework was created to evaluate software development, it is a valuable tool that can be used to describe the key elements of any effective process, including a capacity building one as CENICA.

The word *maturity* implies that capabilities must be grown over time in order to produce repeatable success in project management. The process below describes a CMM proposal for CENICA and shows five stages of progressive maturity.

- ***STAGE 1. Resource allocation.***

Usually, at the initial level of any organization it cannot provide a stable environment for research studies or for tangible results as it spends its time and allocates the available resources in its own capacity building process. At his stage CENICA had to look for:

- Human resources (analytical capabilities, necessary staff).
- Infrastructure and technology (facilities, lab equipment).
- Financing.
- Internal Institutional linkages.
- External Partnerships.
- Organization Management (structure).

CENICA chose air pollution and hazardous waste management as priorities in the national environmental agenda. It also set 3 target activities to work on: analytical infrastructure, capacity building and research and information. Its projects and programs were designed to support SEMARNAT, some local governments (specially the Federal District and other main urban areas), firms, and other academic institutions.

CENICA was endowed with equipment that enabled it to monitor precisely, timely and continuously criteria pollutants, to start the characterization of hazardous waste and develop the validation protocols. Despite being devoted mainly to its own capacity building process, CENICA and its partners must be praised for some early achievements. In 1996 with JICA's support, CENICA organized 5 technical international seminars on air pollution and hazardous waste management and contributed to the first assessment of air quality in the most important urban areas of Mexico. Additionally, several studies on human exposure and pollutant characterization were begun. It must be said that this analytical infrastructure has had a strong impact on the capacity building process of air pollution monitoring across the country.

Besides training and information, technology transfer by JICA enabled CENICA to have sound analytical capabilities to operate air monitoring stations and to improve the quality of their readings and reports in Mexico City. These capabilities have been spread to other main urban areas of the country and have been complemented with research meant to characterize emissions and their impact on human health.

- ***STAGE 2. Strategy development***

It is assumed that currently CENICA is still at stage 2. Therefore, this section deserves a more detailed description of CENICA's achievements and challenges.

- ***Analytical infrastructure***

In 1997 the *Ley Federal de Metrología y Normalización* (LFMN- Federal Law of Metrology and Standardization) was amended to introduce new concepts, processes and institutions into the standardization and conformity evaluation arena. Since technology is likely to play a key role in the design and implementation of abatement strategies, it is crucial that policymakers have reliable information about factors and mechanisms that promote or hinder technological change.

The above discussion has led CENICA's activities towards the Mexican analytical laboratories system. CENICA *pushed* environmental analytic labs to install a quality assurance system and to use new validation and monitoring protocols. CENICA has participated in a dynamic process of formal accreditation and established a *market-pull* for accredited labs. Calibration labs were compelled to participate in an analytical testing program.

Nowadays, a formal procedure for labs accreditation has been established and CENICA has participated in it, both as member of the Evaluation Committee and as an accredited laboratory for 10 significant tests. These accreditation procedures have had a strong impact in the *Social Environmental Management System* in Mexico, not only because of new higher technical requirements, but probably even more important, since firms and labs now participate in screening process and must put in place quality assurance systems.

As a result of the recent changes in SEMARNAT (Internal by-law, January 20th 2003), the next steps for CENICA as a designated environmental government entity, will be to establish and consolidate a public, transparent and efficient procedure for labs approval.

All these activities had been highly efficient in breaking a *path dependency* or constrained evolution of waste and pollutant characterization, and so far have improved method validation in several analytical procedures. Also, analytical capabilities have *pushed* technical development and review of 14 NOMs and 9 voluntary standards (validation protocols for sampling, characterization, etc.), which, as previously mentioned are the basic and (until now) most effective environmental policy instruments with an enormous national impact over industry, vehicles and fuels. CENICA has worked intensely in emissions limits for vehicles and cement production facilities, incinerators performance, polychlorinated biphenyls (PCBs) management and land remediation. CENICA has

been very effective as a technical information provider to develop regulation in these relevant environmental aspects.

- ***Research and development within policy-making***

CENICA has been involved in a huge set of research activities that includes the assessment of air quality in several urban areas, the analysis of total suspended particles, the human exposure to CO, NOx, ozone and particulate matter (PM10 and PM2.5) in Mexico City and within several on almost any in scientific journals. Most of the publications are internally financed, which restricts the dissemination of results and consumes financial resources that could be reallocated for research or other relevant projects.

Furthermore, these results are not been linked to the most recent air pollution policy framework. Not any single reference to CENICA is made in the *Programa para Mejorar la Calidad del Aire de la Zona Metropolitana del Valle de México 2002-2010*. However, the latter does not mean CENICA has not participated in the working groups.

There is an issue that deserves special consideration: Incinerator's ashes characterization and environmental performance. Incineration has become controversial and very sensitive since Greenpeace has led an aggressive public campaign and a strong lobbying effort with the Green Party aimed to prohibit incineration. This radical position precludes energy recovery from refuse lubricants in cement kilns and has delayed the enacting of the norm. This scenario calls for a more active and technically based participation of CENICA in helping SEMARNAT.

As early mentioned, the RETC is a powerful tool to monitor pollutant releases. This year firms will be compelled to report on them. Here, CENICA has an extraordinary opportunity to strengthen its position as a national and regional reference laboratory and to support SEMARNAT to review the substances that will have to be reported. Also, CENICA may help to analyze all the information provided by the RETC and to characterize the real waste streams produced by the Mexican economy.

CENICA has established several strategic partnerships, both in Mexico and outside the country. Besides JICA and UAM there are two other key institutional links: the National Institute of Public Health (INSP- in the national context) and the Commission of Environmental Cooperation of North America (CEC).

The former has propped up several human exposure studies which try to estimate health risks caused by pollutants, while the latter has been a productive, ongoing partnership that brought new ideas and resources to CENICA, particularly in regards to dioxins and other toxics. This partnership has helped to position CENICA as a key member of a regional network of analytical laboratories that are tracking toxic substances like mercury and dioxins soon, as part of the *Continental Pollution Pathways Initiative* of the NAFTA CEC.

Finally, although the CENICA has strong capabilities in land remediation, it is not supporting SEMARNAT in the CROMATOS project undertaken by federal, local and municipal authorities. This site has been polluted with chrome wastes and has been abandoned for more than 20 years.

- ***Capacity building***

CENICA has done a considerable work in capacity building, not only in Mexico City but in several states of the country and has also collaborated with various institutions in Central (Honduras, Costa Rica, Colombia, El Salvador) and South America (Chile). The scope of these activities reaches almost 100 training courses, seminars and conferences with 3,700 attendants.

Moreover, CENICA has collaborated with local governments to increase its technical capabilities to operate air quality monitoring stations and collect consistent data. Indeed, in the following years CENICA must continue to support the monitoring activities in the main urban areas in order to consolidate *the National Air Pollution Information System*.

FIGURE 16. CENICA'S CAPACITY BUILDING SCOPE INSIDE MEXICO

FIGURE 17. CENICA'S CAPACITY BUILDING REGIONAL IMPACT

- ***STAGE 3. Niche management***

Since CENICA is still at *Stage 2*, the following stages starting from *Stage 3* should be regarded as a future agenda or program.

At this stage, CENICA is expected to define more properly and precisely its research priorities, which must be completely integrated to the environmental policy making processes. Research products, training courses and lab services must be of extremely high quality and easily differentiated from those provided by other research institutions, analytical laboratories and consultancy firms.

CENICA's projects, products and services must offer a tangible value added for its key stakeholders, as a key to organizational success. The institution's reputation is a major defense against external criticisms. It must be considered that within the environmental policy process all of

the stakeholders make a very close scrutiny of relevant actors like CENICA. CENICA should build a very strong reputation among the research community, Congress, NGOs, firms, government officials and the media. Groups such as the research community, legislators, firms, NGOs, government bureaucrats, and granting agencies all have perceptions of the research institution and its outputs. Each group has different criteria and influence, and these diverse "opinions" all contribute to the organization's positioning.

- ***STAGE 4. Institutional capacity assembled***

This stage implies that CENCIA has established a permanent performance evaluation system based on objective indicators related to activities, programs and projects and specific goals. These self-evaluation capabilities will allow CENICA to undertake *gap analysis* over goals and achievements.

- ***STAGE 5. Relocation***

At this stage CENICA must be focused on continuous improvement process based on quantitative feedback. It should be prepared to define and pursue new goals, modify targets and set new priorities.

8.3 Institutional performance

In order to increase its *market share* CENICA needs to build a formal communication strategy aimed to key external players and to enhance strategic partnerships. Niche management entails carving out a particular area for CENICA in the *marketplace* that could match its particular research and analytical capabilities. The long run success of CENICA highly depends on consolidating its unique role within the social environmental management system. CENICA must evaluate its own image and position in the *marketplace* and towards the most important stakeholders, in relation to relevant niches, markets, services and products. In reality, CENICA must assume itself as an element of a very broad *client-supplier chain*.

Although CENICA has *state of the art* technology it has not established a portfolio of key services and products for its most important *clients*, such as SEMARNAT, local governments, private firms, etc. Moreover, it has not been able yet to fully differentiate itself from other laboratories, research ad training institutions and consultants. As a result of this blurred position, SEMARNAT frequently hires consultants or labs for research or analysis, spending resources that could be allocated for CENICA itself.

In this context, CENICA should undertake new projects only if they are part or priority issues. Overloading projects has a crowding out effect and delays *time-to-policy*. Resources must be focused on higher priority projects and make them visible to relevant actors. Particularly CENICA should move forward building or taking advantage of its technical capabilities to address what is now regarded as the most relevant environmental problem in Mexico: ***water pollution***, where public information, monitoring systems and policy assessment are badly needed throughout the country.

SECOND STAGE. RESOURCE ALLOCATION (CATEGORIES)	EFFECTIVENESS ASSESSMENT		
	LOW	MEDIUM	HIGH
• Identify priorities in the environmental agenda and its own impact areas within these themes.			
• Identify key stakeholders. ▸ Federal Government. ▸ Local governments. ▸ Private sector agents. ▸ Research Institutions. ▸ Cooperation agencies. ▸ NGOs.			
• Set target activities or programs.			
• Develop and manage these programs in a way that supports the mission.			
• Define specialized services. ▸ Research. ▸ Lab analysis.			
• Establish key projects ▸ Estimate the size of the project to be produced. ▸ Set objectives. ▸ Estimate resources to execute them (human, technical, financial). ▸ Evaluate its benefit/costs.			
• Establish quality assurance practices.			
• Establish key products and services.			

9. CONCLUSIONS

- In this context, CENICA should undertake new projects only if they are part or priority issues. Overloading projects has a crowding out effect and delays time-to-policy. Resources must be focused on higher priority projects and make them visible to relevant actors.

- Particularly CENICA should move forward building or taking advantage of its technical capabilities to address what is now regarded as the most relevant environmental problem in Mexico: water pollution, where public information, monitoring systems and policy assessment are badly needed throughout the country.

- CENICA should develop a strong stand in information, monitoring, regulation and policy analysis in water pollution, even if this means a change in CENICA's agenda.

- CENICA should also embark in a systematic effort communication effort that would allow itself to build a clear profile under the eyes of its stakeholders and the public. Obviously, the stronger the organization's reputation and the more broadly based its support, the more resilient and policy relevant will CENICA become.

- CENICA can and should be a more proactive and protagonical actor in environmental policy making in Mexico.

- Air pollution, still being an important issue, is not any more the most pressing environmental priority in the country. In the context of ephemeral local government administrations (3 years) there is the need to conclude CENICA endeavor around air quality, specifically aimed to consolidate an efficient operation of the National Air Quality Information System.

- CENICA should also position itself as a major contributor in toxics analysis and soil monitoring.

- CENICA could also become an important player on an incipient but broad scoped environmental issue in Mexico: contaminated land remediation.

- Technological evaluation for BPC management is and will be in the following years a *hot* topic. CENICA should support policy implementation, both to government and private sector agents.

- CENICA should use its considerable competitive advantages in providing credible and proficient information and leadership in environmental policy, specifically in regards to NOMs.

- CENICA should not compete with consultancy firms or commercial laboratories in the market for environmental services. CENICA must exploit its position as a prestigious and impartial institution providing the public debate and the policy making with valuable technical and scientific support. It may become also a key player in conflict resolution.

- CENICA must define priority training programs and exploit comparative advantages in regards to other research institutions and universities.

- CENICA needs to modify its training programs, moving away from short term activities to more formal and valuable initiatives that could be extended to foreign students and professionals within regional partnerships.

- CENICA should fully exploit its training capabilities, specific programs and courses could be productively extended to Central and Latin American countries.

- CENICA must link its research and information systems to the *National Environmental Information System* which SEMARNAT is to consolidate. Meanwhile, CENICA should make public its findings through all media possible.

- CENICA's research projects should be published in technical journals and not only in INE's or SEMARNAT's publications.

- In order to increase its impact on the S*ocial Environmental Management System*, CENICA must clarify its goals in training and research, setting tangible and measurable objectives. Also, it must focus on key issues and avoid wasting time and resources in activities or environmental

instruments that could more naturally be the subject matter of private firms, laboratories, consultants and certification agencies. (ISO 14000, environmental audits, etc.).

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STRATEGY	RESPONSIBILITIES	IN COORDINATION WITH	TOPICS	THEMES	PARTNERSHIP
CAPACITY BUILDING	International partnerships to promote technical cooperation.		Environmental management, hazardous wastes management, air quality, information management, environmental policy, waste chemical analysis, laboratory quality management, hydrocarbons analysis, sampling, modeling, soil remediation, analytic monitoring, hydrocarbons, human exposure, pollutants dispersion.	• Long term training of Mexican experts in Japan	• Hokkaido University, Environmental Ministry, Environmental Health Ministry, JICA, Chugai Technos, Nagoya Environmental Research Institute, Comotas Co, Nissei Sangyo, Waseda University, Others.
				• Long term Japanese experts in Mexico	
				• Short term Japanese experts in Mexico	
				• Short term training of Mexican experts in Japan	
				• Training courses	• DAMA (Colombia), CECOF (Costa Rica), El Salvador, Chile, Honduras
	Technical and scientific training courses.	SEMARNAT Offices	Hazardous wastes management	• Advise to tanning industry. Guanajuato.	
			Air pollution, hazardous waste management, municipal solid waste.	• Training courses, International Seminars, workshops	• INSP, CECOF, CESCOO, CENAPRED, others.
				• Local courses (within Mexico)	
				• Technical courses	
				• International seminars	
				• Regional courses (Latin America)	
RESEARCH AND INFORMATION	Propose air pollution and hazardous wastes research activities to provide reliable technical information for policy making (programs, regulation, criteria).		Hazardous waste management	• NOM-052. Hazardous wastes characterization.	
				• NOM-087. Biological waste management.	
				• NOM-098. Incineration.	
				• PROY-NOM-133-ECOL-1999. PCB's Handling specifications.	
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				• PROY-NOM-XX . Polluted soils with metals, criteria and methodologies for remediation. Technical review and sampling .	
				• PROY-NOM-004-ECOL-2001. Sludge, limits of pollutants content for their final disposal.	
			Air quality	• NOM-040. Emissions criteria in cement facilities.	
				• NOM-045-ECOL-1996. Diesel vehicles exhaust limits.	
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				• NOM-050-ECOL-1993. Vehicle exhaust gases limits.	
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				• NOM-085. Air quality.	
				• NOM-021-SSA1-1993. Air quality evaluation criteria. Technical review.	
	Conduct air monitoring projects from the Metropolitan Environmental Commission and propose technical specifications to improve air quality monitoring stations performance in local entities.	Pollutants Integrated Management Office (SEMARNAT)	Air quality	• Monitoring station operation	
				• TSP and PM characterization and monitoring.	
				• Acid rain	• Federal District Government
				• Design a monitoring network for OM	• Federal District Government

STRATEGY	RESPONSIBILITIES	IN COORDINATION WITH	TOPICS	THEMES	PARTNERSHIP
	Represent the Ministry in international events related to sustainable management	Pollutants Integrated Management Office (SEMARNAT)	Air quality / hazardous waste management		
	Conduct research activities to determine environmental quality (air pollution and human exposure, hazardous wastes, land remediation)	Federal, local and municipal authorities	Air quality	• Air quality assessment in Chiapas, Guerrero, Oaxaca, México, Tabasco and Yucatán.	
				• Total suspended particles monitoring analysis.	
				• Nicotine, PM10 and PM 2.5 exposure in Mexico City.	• Health Ministry, ININ, JICA, Environment Canada, Columbus University
				• CO exposure on road traffic in Mexico City.	
				• VOC exposure in Mexico City.	• UAM-Iztapalapa
				• Sampling of acid rain.	
				• Ozone and NOx sampling. Mexico City	
				• PM 10 and PM 2.5 in-doors human exposure.	• District Federal Government
				• PM 10 and PM 2.5 human exposure impact on the frequency and severity of exacerbations from the chronic obstructive lung sick persons.	• INSP
				• PM10 y PM2.5 Characterization	• UNAM
				• Benzene monitoring in the Southern part of Mexico City.	• Centro de Ciencias de la Atmósfera-UNAM
				• TSP characterization.	
				• Particles characterization in Texcoco, Iztapalapa and Ciudad Universitaria	• PUMA, UNAM
				• Antioxidants as complement in asthmatic children in Mexico City.	• INSP
				• Air quality near an electric production facility. (Colima)	• INSP
				• Evaluation of the vertical profile of the atmospheric pollutants and of meteorological parameters.	
				• Industrial activity and air quality. (Sonora)	• SEMARNAT Delegation in Sonora.
				• CO, PM 2.5 and benzene exposure on road traffic in Mexico City.	
			Hazardous waste management	• Hydrocarbons polluted soils treatment.	• UAM-I
				• Waste management in Latin American countries.	• REPAMAR
	Develop and establish the National System of Air quality and other relevant databases of environmental degradation (Relevant pollutants characterization and quantification)	Urban, Regional and Global Pollution Research Office (INE) and Environmental Information Office (SEMARNAT)	Air quality / hazardous waste management		
	Develop or adapt air quality models.	Urban, Regional and Global Pollution Research Office (INE) and Environmental Information Office (SEMARNAT)		• TSP and wind trends.	• UAM-I, UAM-TO, UAM-X, UNAM
ANALYTICAL INFRASTRUCTURE	Develop analytic protocols to assure quality in measurement processes and pollutants characterization.		Hazardous waste management	• Analytical validation protocols for PBC, DDT and mercury.	• CEC
				• Other analytical validation protocols.	• UAM-Azcapotzalco
				• Heavy metals analytical validation protocols.	
				• Zinc sampling.	
				• Mercury sampling.	
				• Fuel Analysis	
				• Hazardous wastes analysis	

STRATEGY	RESPONSIBILITIES	IN COORDINATION WITH	TOPICS	THEMES	PARTNERSHIP
ANALYTICAL INFRASTRUCTURE				• Incinerated hazardous wastes ashes characterization in Jalisco, Tlaxcala, Mexico and Yucatan.	
				• Environmental Impact assessment study of a hazardous waste confinement. (Sonora)	
				• Eco/toxic evaluation in battery lixiviates.	
				• PROY-NMX-AA-001-SCFI-2001. Liquid waste and/or aqueous solutions.- corrosivity to carbon steel	
				• PROY-NMX-AA-027-SCFI-2001 Liquid waste.- pH determination	
				• PROY-NMX-AA-013-SCFI-2001 Solid waste.- pH determination	
				• PROY-NMX-AA-043-SCFI-2001. Waste.- Reactivity determination	
				• PROY-NMX-AA-037-SCFI-2001 Liquid waste. Ignitability in closed-cup.	
				• PROY-NMX-AA-041-SCFI-2001 Solid waste. Ignitability.	
				• PROY-NMX-AA-048-SCFI-2001. Waste.- Metals by atomic absorption spectrophotometry in products from the toxic compounds extraction test	
				• PROY-NMX-AA-020-SCFI-2001. Waste.- semi volatile organic compounds in products from the toxic compounds extraction test.	
				• PROY-NMX-AA-103-SCFI-2001. Waste.- volatile organic compounds in products from the toxic compounds extraction test.	
	Promover un sistema de certificación de laboratorios mexicanos a través de los procesos de acreditación y aprobación.		Air quality / hazardous waste management	• EPA 6010B • EPA8279C • NOM-PACCAM-002/93 • EPA9040B AND 9045 • EPA9030A • EPA9010B • EPA1020A • EPA79196A • EPA SERIE 7000 • Atmospheric monitoring • CENICA's lab accredited • Lab quality system development.	
	Participate in the accreditation and approval processes of analytical laboratories.	Underministry of Regulation	Air quality / hazardous waste management		
	Be an analytical and calibration reference lab.		Air quality / hazardous waste management		
	Establish and coordinate the technology evaluation programs in hazardous wastes and air pollution.		Air quality / hazardous waste management		

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