ENVIRONMENTAL IMPACT ASSESSMENT IN TAIWAN

by

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ABSTRACT

This thesis explores key questions in the design of an Environmental Impact Assessment (EIA) process in both the developed and developing countries. It draws lessons from the experiences of both types of nations in order to shape Taiwan's EIA system. In exploring and examining these issues, the literature is reviewed, and a case study is performed on EIA problems in Taiwan. The emphasis is more on institutional settings than on technical or procedural aspects. In the conclusion, the literature review and case study are comparatively analyzed in order to reach a set of propositions from which Taiwan may learn. Some recommendations on improving Taiwan's EIA system are then presented. The conclusion of this thesis is summarized as followed:

- Administrative discretion should be avoided in the process of EIA by specifying criteria in the screening stage.
- Formalized public participation channels should be provided during both EIA's screening and review processes.
- Government should respond to the public's growing environmental concerns by implementing EIA effectively.
- EIA should be used to broaden cost-benefit analysis in project planning. Also, its use as a means of economic benefit for a developing economy; a vehicle to choose among long-term, multi-dimensional development schemes; and a planning apparatus to achieve a more comprehensive planning process should be valued.
- Environmental managers and planners should be trained for effective EIA implementation. In addition, a national ecological inventory system should be established for better EIA data. The ability of both EIA model selection and application should also be strengthened by accumulating experience in performing EIAs.

Thesis Supervisor: Dr. Lawrence Susskind
Title: Professor of Urban Studies and Planning

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ABBREVIATIONS

BEP	Bureau of Environmental Protection
BOI	Bureau of Industries
CEPD	Council for Economic Planning and Development
CEQ	Council of Environmental Quality
CPA	Construction and Planning Administration
DSE	German Foundation for International Development
EES	Environmental Evaluation System
EIA	Environmental Impact Assessment
EIS	Environmetnal Impact Statement
KMT	Kuomintang, The Chinese Nationalist Party
NEPA	National Environmental Protection Act
NTU	National Taiwan University
ROC	the Republic of China
U.S.	United States
U.K.	United Kingdom
UN	United Nations
UNEP	United Nations Environmental Program

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CHAPTER 1 INTRODUCTION

1.1 What is Environmental Imapct Assessment (EIA) ?

Environmental Impact Assessment (EIA) procedures have been adopted in many countries, both developed and developing, since 1970. They were first introduced in the United States in the National Environmental Protection Act (NEPA) enacted in 1969. EIA is a systematic way of examing the likely consequences of proposed projects, policies, or programs. The main objective of an EIA procedure is to provide decision-makers with a picture of the likely environmental implications of alternative actions before decisions are made. The results of such assessments are typically assembled in documents referred to as Environmental Impacts Statements (EISs).

An EIS also provides a record of an agency's efforts to formulate alternatives, predict environmental consequences, and decide on a desirable course of action. At present, the typical EIS is required to include information on the following:

1. Environmental impacts of the proposed action.
2. Any adverse effects (negative impacts) which cannot be avoided if the action is implemented.
3. Alternatives to the proposed action.
4. The relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity.

5. Any irreversible and irretrievable commitments of resources which would be involved if the proposed action were carried out (U.S. NEPA, Section 102(2)(c)).

The requirement of an EIA procedure calls for more than a mere listing of the actions that the agency is considering. Rather, a comparative analysis of the environmental consequences of all of the alternatives is required. Such an analysis must include the "no-action" alternative. This requirement is intended to give both decision-makers and the public an understanding of the environmental and economic costs and gains associated with each alternative (Ortolano, 1984).

EIA was developed in the United States in the late 1960's as a direct consequence of increased public awareness of the negative environmental and social effects of development. Concern for the environmental quality was, at that time, an important political factor. Such increased concern for the environment was not confined to the U.S., but manifested itself in most industrialized countries as well. The use of EIA as an integral component of project appraisal is rapidly gaining influence in many parts of the world.

EIA's procedural advantages are numerous and are becoming widely recognized. It is not universally applicable, however, in the form it takes in the U.S. (see Diagram 1.1). It is interesting to see the process in which it has emerged and continue to evolve, first in the United States, then in the more industrialized countries, and more recently, in the developing

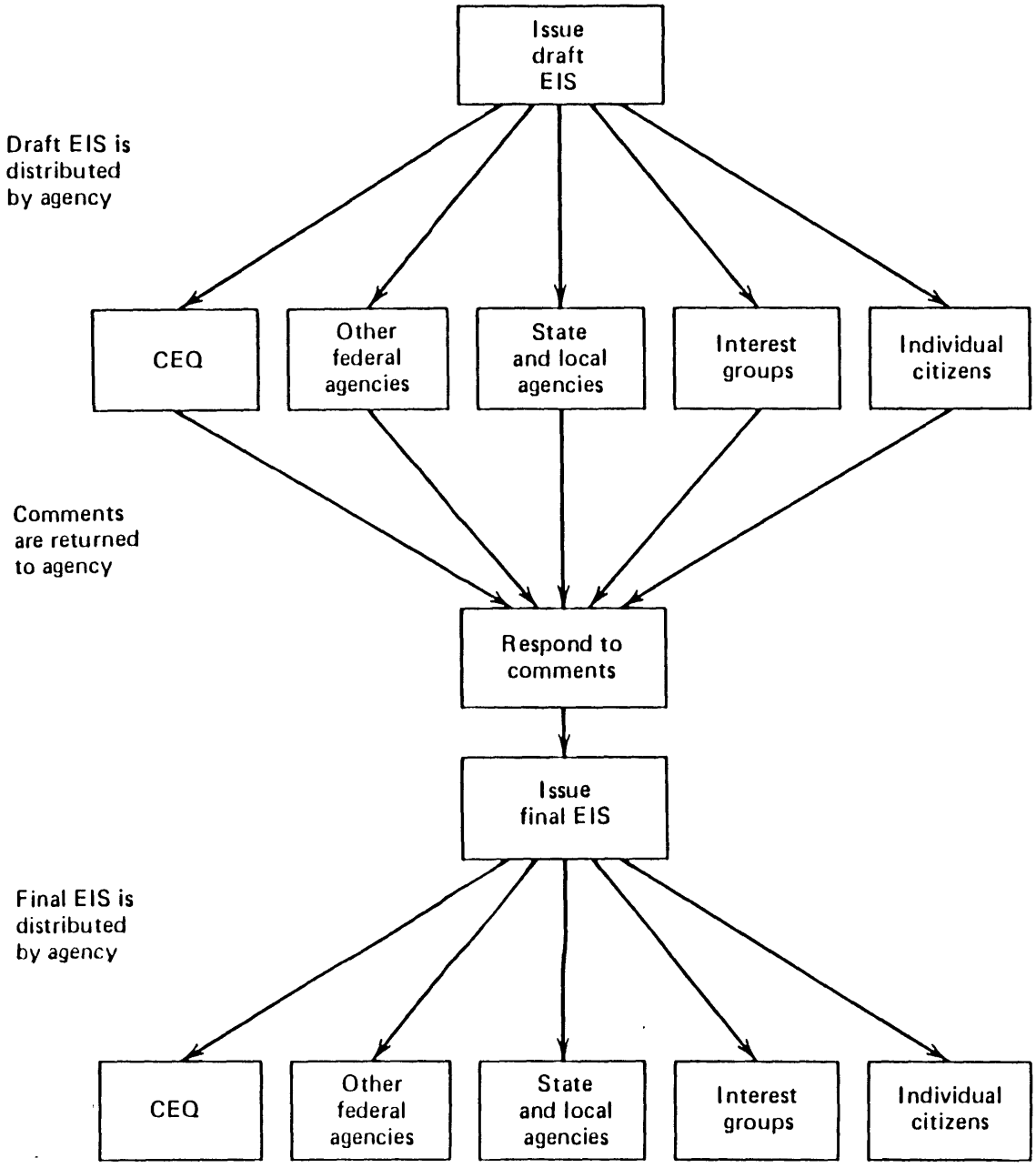


DIAGRAM 1.1 Process of review and comment on a draft EIS. Adapted from R. K. Jain, L. V. Urban, and G. S. Stacey, *Environmental Impact Analysis, A New Dimension in Decision Making*, 2nd ed., Van Nostrand Reinhold Co., copyright © 1981 by Litton Educational Publishing, Inc.

countries. There are, among other factors, marked differences in the political and administrative traditions of these countries, which help to explain the varying degrees of effectiveness in implementing the EIA whihin those countries (O'Riordan and Sewell, 1981).

1.2 EIA In Developed Countries

During the late 1960's, the protection of the environment and the desire for a sustainable use of resources became a matter of great public concern in North America and Western Europe. At the same time, international awareness of environmental problems increased, focusing on both resources and the environmental problems that international trade and development had created. The general public, as well as various interest groups, urged their governments to take action to prevent public and private entities from ignoring both the costs they levied on other parts of society and the long-term loss of productivity for future generations caused by their present actions. Governments and international interest groups alike urged international organizations to develop an acceptable apparatus for resolving international environmental protection and resource productivity policies.

When the U.S. government decided to pass an environmental policy act, it recognized the need for some procedural guidelines which would require public agencies to predict the effects of

their actions and to coordinate these predictions with the interests of other parties. EIA was thus included as a major component of the 1970 NEPA. Procedurally and technically, it was considered to be an instrument for ensuring that public actions were both sustainable and environmentally sound.

The NEPA stated national goals and objectives. It also contains the EIS as a remarkable action-forcing provision. The procedures for preparation and review of EISs are promulgated by the Council on Environmental Quality (CEQ), which is composed of three presidential appointees and located in the Executive Office of the President. The CEQ has no line authority over other agencies but does have a powerful coordinating ability, should the president choose to exercise it.

NEPA requires agencies to prepare a "detailed statement" on the environmental impacts of "major Federal actions significantly affecting the quality of human environment". This provision increased substantially the amount of information agencies considered and disseminated before it made decisions. The decision-making process used by federal agencies has thus been modified fundamentally by the EIS requirements. For all federal actions that are not "categorically excluded" (i.e. that are minor or unlikely to have significant environmental effects), a preliminary analysis is first used to determine whether anticipated impacts wil be significant enough to require an EIS. If the agency finds that no significant impacts are likely to occur, it follows CEQ (1978a) procedure for making that

information public. The decision not to prepare an EIS is then subject to public review and may be challenged by any citizen. If the preliminary analysis indicates that significant impacts to the environment are likely, the agency must prepare an EIS and give an opportunity to all interested parties to comment on the analysis and conclusions.

A principal task of those preparing an EIS is to forecast impacts of alternative actions. Within this context, "impacts" are defined as "the difference between the future state of the environment if the action took place and if no action occurred" (Munn, 1979). The goal of the EIS procedure is to require federal agencies to use the forecasts of future environmental consequences to evaluate alternatives thoroughly. This evaluation includes environmental, economic, and engineering considerations, and requires value judgements about how much environmental quality is to be "traded-off" to gain other dimensions of human well-beings such as economic benefits.

In the U.S., the favorable convergence of several important factors ushered in the introduction of the EIA system. The major factors were: (a) the wide publicity given to and growing awareness of the environmental repercussion of resources development schemes; (b) effective mobilization of a citizen-based environmental movement; and (c) the occurrence of the first two factors at a time when the courts were tightening their review of decision-making in the various federal government agencies (Anderson, 1973). Similiar development were seen in many developed countries. By the early 1970's, the political

atmosphere in these countries had become receptive to NEPA-like policy reform. O'Riordan and Sewell concluded from several case studies (1981) that EIA-type developments in project assessment would have occurred in many Western countries in the 1970's even without the passage of U.S.'s NEPA. The emergence of industrialized countries' EIA therefore took place during a period when environmental protection began to be viewed as an important political objective(Abracosa,1985).

The situation of EIA in European countries is, however, still somewhat different from that in the U.S. in a number of respects. In most European countries a substantial body of regulations for the consideration of land use and environmental issues already existed, and was often long-established. In particular, zoning laws, which require some kind of assessment of potential impacts on the environment, have existed for a many years and serve to limit the creation of "nuisance". Moreover, these laws are administrated in a much more integrated structure than that in the U.S., as the phenomena of competing jurisdictions between different levels of administration is less widewspread in Europe than in the U.S. Generally, a sense of hierarchy underlies all administrative structure.

Futhermore, in the European political and legal setting, major efforts were made to get the legislation correct at the first attempt, since the opportunity for subsequent adjustment either through the courts or through legislative review often does not exist for constitutional reasons (Von Moltke, 1984). As

a consequence, the introduction of EIA is a more complex process in Europe than in the U.S., and took longer to materialize.

A major exception is France, which adopted such legislation as part of its Natural Protection Act in 1976, mandating the preparation of EIS for all public or private development projects. The reason for the relative rapidity of French EIA was that the implementation of such legislation is firmly in the hands, and very much at the discretion, of the administration (Clark et al, 1984). It is notable that the French EISs tends to be brief documents and well-illustrated.

In 1975, Federal Republic of Germany introduced a cabinet resolution entitled "Principles for the Environmental Impacts Assessment of Federal Actions" which recommended procedures to be followed in conducting EIS. The Principles defined the content of an EIA and indicated the circumstances in which an EIS should be conducted. A wide range of federal projects were potentially covered by the Principle. The Principles were, however, basically an executive resolution, rather than a law which could be enforced by the courts. If a federal agency decided to conduct an EIA, the Principles guide the entire procedure. They required that the environmental consequences of proposed actions be predicted and evaluated, and the authorities were urged to find ways to avoid or reduce adverse environmental effects.

In the United Kingdom, there have been some attempts at materializing the EIA systems since the early 1970's (Catlow and Thirlwall, 1976). There is, however, no formal requirement for

EIA in the U.K. Land use planning, as well as pollution control legislation and procedures, embody both comprehensive project appraisal mechanisms and environmental protection standards and measures. Nevertheless, EIA has been carried out on an ad hoc basis by developers and public agencies within the context of public inquiries about development decisions, in the hope of smoothing the process of obtaining planning permission.

The Netherlands has been the driving force in the development of state-of-the-art EIA in Europe. In the mid-1970's, the Dutch government announced its intention to submit legislation of EIA. Since then, it has been engaged in an "protracted exercise of testing and analysis to define the best approach to the EIA issue" (Jones, 1984). The Dutch government finally introduced its Bill on EIA to the Parliament in May,1981. The Bill sets out the requirements of EIA in greater detail than has been previously undertaken anywhere else in Europe. Though a period of legislative evolution is expected, the action taken by the Netherlands is likely to provide important clarification for all the European countries.

The European Community has proposed a Directive on EIA that, if ratified, would be binding on the member states. The Directive proposes that, for defined categories of projects, the developer should submit an EIS when applying for authorization of such a project. The responsible authority should make this report public and consult with other relevant authorities before making its own assessment of the likely significant effects of the proposed project. The authority's assessment should be

published together with the decision on the project. The Directive, which has gone through more than twenty drafts, is currently under deliberation by the Council of the European Communities. If ratified, it is likely that the member states will have negotiated some modifications to the provisions (Haigh, 1983; Lee and Wood, 1980).

The Japanese cabinet in 1972 issued an administrative guidance minute that public works under the jurisdiction of the national government should be reviewed prior to construction to avoid the worst environmental impacts. The Environmental Agency established an EIA department and has attempted to persuade the Diet to adopt draft legislation for requiring EIA, but other government ministeries have blocked this legislation. Various ministries have, however, published EIA guidelines and carried out ad hoc assessments of their own projects. Japan's municipal governments, under greater pressure from local environmental interests, and responsible for local land use decisions, have, in a few cases, adopted EIA procedures. However, there is a marked preference for confining any action to administrative guidelines rather than legally enforceable procedures (Hase, 1981; Kato et al, 1981).

Australia also legislated its EIA system in the mid-1970's. In New Zealand, major projects requiring government auhthorization may also be subject to an EIA, though there is no direct legislation relating specifically to EIA.

1.3 EIA In Developing Countries

In contrast to the developed countries, the political atmosphere in the developing countries did not readily encourage the spontaneous development of anything similar to the developed countries' environmental movement in the late 1960's and early 1970's. Actually, prior to the 1972 United Nations Conference on the Human Environment in Stockholm, many developing countries viewed the environmental protection issues with significant suspicion. Concerns for the environment were thought to be either irrelevant or antithetical to the more pressing problems of underdevelopment (Johnson, 1970). There has been, however, a significant shift in this attitude since the late 1970's among many developing countries due to their past failure in development schemes which focused solely on economic growth. This experience enhanced the felt need for adopting a more integrated approach to development that would address not only the national growth of economy and concern for social equity but the preservation of the environmental resource base as well. Many developing countries' governments now regard environmental concerns as a basic part of the overall planning endeavor (Bassow, 1979). There are some developing countries, particularly in Southeast Asia, which have their own EIA incorporated into the planning processes more actively than others (Jalal and Thampi, 1979).

Thailand and the Philippines have both been involved

actively with EIA. In Thailand, the National Environmental Quality Act, as amended in 1978, authorizes the National Environment Board (NEB) to issue notification of the categories and magnitude of projects for which EIA is required. The agency responsible for permitting these projects should submit an EIA report, completed according to NEB guidelines, concerning the study and measures for the prevention and remedy of adverse environmental effects to the NEB for approval before further proceedings. The NEB has the authority to compel the production of information about the environmental impact of any proposed activity, but it lacks the power to issue regulations establishing a routine requirement for the submission of such data.

Environmental policy in the Philippines is embodied in Presidential Decrees. There is a formal EIA requirement, commanded in 1977, which is administered by the National Environmental Protection Council (NEPC) under the supervision of the Ministry of Human Settlements. Proponents of projects are required to submit EIA reports to the NEPC which identifies lead agencies responsible for enforcing the EIA requirements within the government's permit system. Guidelines published in 1979 for EIA preparation are similar to the US's NEPA mode. The EIA Review Committee of the NEPC examines project descriptions and, in some cases, may issue an Environmental Exemption Certificate if the project shall have minimal effects on the environment. Otherwise, the proponent must prepare an EIS for examination by the EIA Review Committee (Lesaca, 1982; UNESCAP, 1982).

The Republic of Korea enacted the Environmental Preservation Law in 1977, which required the EIA for major government projects. This was further strengthened by the establishment of Office of Environment (OOE) in 1981. In Brazil, the National Environmental Policy Law, which was enacted in 1981, established the EIA system; Kenya, Mexico, and the Dominican Republic have also introduced procedures for the impact assessment of certain projects. In Iran, section 7 of the Environmental Protection and Enhancement Act authorized the Department of Environment to require EIS in 1974. Malaysia and Indonesia both have programs or acts which make provisions for the creation of EIA a requirement for certain type of projects, though at present no legal requirement has been established. EIA was conducted in countries like India, Bangladesh, Pakistan, and Singapore on an ad hoc basis.

There is increased interest in developing countries in seeing that major projects are assessed, to ensure that likely environmental adverse impacts are avoided or ameliorated and beneficial effects enhanced. EIA is seen as a means for achieving this goal. This interest is shared by some major multilateral and bilateral international aid agencies.

As environmental awareness has increased, the Inter-American Development Bank has altered its assessmnet procedures to include the environmental factors. The Operations Manual Statement of the World Bank requires that environmental effects be considered during the project cycle by the Regional Office with the

assistance and supervision of its Office of Environmental Affairs. Since projects proposals are initially prepared by potential borrowers, the Bank does not have a formal requirement for EIA, but requires project proposals to demonstrate that sufficient attention has been paid to possible environmental problems. In general the World Bank is more concerned about the quality of environmental analysis and implementation plans than in the procedure or tools for assessment. In reality the Office of Environmental Affairs is too small and not powerful enough to exercise comprehensive review of the Bank's operations (Horberry, 1984).

The US Agency for International Development (AID) is unique among development agencies in that it must conform to a legally binding set of environmental assessment procedures. The origin of this legal requirement is NEPA, but it is actually mandated by the Foreign Assistance Act. The interpretation of USAID's responsibilities and the manner of implementation have evolved over the years. They also reflect the procedural changes in EIA implementation embodied in CEQ regulations under NEPA and an Executive Order concerning the environmental effects abroad of major federal actions.

The assessment requirements exclude certain project categories that are unlikely to have any adverse effects. Normally a two tier assessment procedure is reuqired which is designed to screen proposals for likely significant impacts which need further assessment. USAID also prepared numerous project planning guidelines designed to assist the implementation of its

environmental procedures in certain sectors by bureau and mission staff. It has several Indefinite Quantity Contracts with consulting firms and academic institutions for the conducting of environmental assessments and environmental profiles of countries which receive aid. Recently USAID has allocated considerable funds to the Environmental Planning and Management Programme administered by the Joint Evnironmental Service of both International Institute for Environment and Development (IIED) and International Union of Conservation of Nature and Natural Resources (IUCN). This program identifies and deploys the appropriate technical and planning expertise needed to implement the assessment procedures and other environmental planning tasks (USAID, 1983; Horberry, 1983, Johnson and Blake, 1980).

In 1984, the Asian Development Bank (ADB) established an Environmental Unit that is responsible for ensuring the environmental soundness of funding activities and managing the environmental projects that the ADB supports. The unit has no formal enforceable procedures, but it attempts to persuade project staff to incorporate environmental analysis into various key stages in the project cycle, and screens various project documents and decisions for possible environmental problems.

In most of the developing countries that are attempting to incorporate EIA into their system, the procedures adopted are more or less similar to those of the U.S. As a consequence of limited understanding of EIA, the actual implementation and level of performance in most developing countries has been quite poor (

Sudara, 1984). As will be discussed in later section, many problems need to be resolved in order to maximize the benefit of EIA.

1.4 Key Questions In the Design of An EIA Process

There are a number of questions that must be analyzed in designing an EIA process for either a developed or a developing country. Much of the focus has been on the techiques that should be used. This is unfortunate. It is more appropriate to emphasize the outcomes that EIA is meant to define.

1.4.1 How much administrative discretion is appropriate ?

Administrative discretion greatly affects the effectiveness of the EIA process. In West Germany, since its Principles take the form of a cabinet resolution rather than a law, they were not enforced by the courts. Unlike the citizens groups and individuals in the U.S., those in West Germany had no mechanism to force the implementation of EIA. Kennedy (1981) commented that since the ministers had the discretion of deciding whether an EIS would be needed, West Germany was still far from integrating the EIA into both agency projects planning and decision-making processes (Ortolano,1984).

Austrlia established the "Environmental Protection (Impact of Proposals) Act", EP(IP)A, in 1974. It differs from the U.S. NEPA in that the minister responsible for the project(the "action minister") is the only one who can decide that an EIS is required. This leaves much room for executive discretion. It is not surprising that, as reported by Hollick(1980), only 55 EISs

were perpared under EP(IP)A between 1974 and 1980. In this period, the U.S. has had well over 5500 EISs done (CEQ,1981). The relatively small(and inadequate) number of Australian EISs reflects, in view of the political climate in the late 1970's, the power of ministers to exercise discretion. As seen in many other developed and developing countries, administrative discretion hampered the basic intent of EIA system by allowing projects with potential impacts to avoid filing an EIS. It is, therefore, crucial to EIA's effectiveness to ask how much administrative discretion is appropriate or should be allowed.

1.4.2 How should public participation in EIA be encouraged and what form should it take?

In many developing countries, lack of adequate channels for public participation decreased the potential effectiveness of the EIA system. Rarely do the governments in the developing countries encourage such public participation in planning, litigation, or review of administrative processes as they do in developed world. In fact, there are many countries in which the public does not have adequate resources or access to information that can be used to independently assess or object to major development schemes, or to influence compliance of EIA. Most of the pressure for environmental protection and for EIA comes from technically informed sources, such as universities; and from the conditions attached to the funding of development projects by international development assistance agencies. As participation

is regarded as a means of both effectuationg EIA process and democratizing the institution, an EIA without participation is an "incomplete" process. The real concern involves the specifics of how public participation should be encouraged and in what form should it take.

1.4.3 How educated and environmental-sensitive must the population be for an EIA process to succeed?

It should be recognized that, even if there existed environmental concern in many developing countries, such awareness does not serve for environmental movement as it does in developed world (UN Conference on the Human Environment, Founex, Switzerland, 1971). In most of the developing countries, the environmental efforts did not stem from the broad mobilization of citizen-groups but rather from the awakening of the elite planning corps (Abracosa, 1984). Even to the present time, this awareness is difficult to translate into practiceal mobilization, especially to the under-educated mass that have to worry about daily sustenance. This is a fundamental problem in that, a wide, across-the-population concern to urge for an effective EIA system is lacking in developing countries. If the educational and affluence levels are correlated to the degree of general public's environmental concern, and the degree of concern can affect EIA's success, the issue that needs to be addressed is how educated and environmentally sensitive must the population be for an EIA to succeed.

1.4.4 How can EIA assist in widening the range of cost-benefit in project planning ?

Most projects planning without EIA process appear to have considered only economic and financial aspects in their cost-benefit analysis. Such "narrowness" of perspectives made projects planners and decision-makers unable to take into account various social, political, and institutional costs. In many cases, projects turned out disasterously for this reason. Irreversible environmental impacts may incur undue societal costs to local communities as well as political costs to decision-makers. Project appraisal with appropriate timing of EIA, i.e., in the early stage of planning, can help broaden the cost-benefit analysis while avoiding unnecessary costs of all kinds. An intriguing question is: how can EIA be useful in widening the range of cost-benefit analysis and what range should be assessed.

1.4.5 How should the economic cost of environmental degradation and mismanagement be assessed ?

As with other environmental measures, EIA has the utility of internalizing the externality of developmental activities. More importantly, it can assist proponents in understanding the economic consequences of environmental mismanagement, and the consequent degradation entailed, as well as the economic benefit

of employing certain environmental measures. This aspect is especially meaningful for developing countries where environmental goals are not put in as high a policy priority as is economic development. In those countries, therefore, EIA may serve not only as an environmental tool but also as a powerful economic instrument. The fact that a country is unaware of such instrument's usage, as is the case in most of these developing countries, can cause short-term economic loss, and environmental loss in the long run. Thus, the manner in which the economic cost of environmental degradation is assessed in EIA becomes important to the developing countries' economic development planning.

1.4.6 What time frame and what dimensions of impacts should be used in preparing EISs?

For many developing countries, choosing among various long-term developmental strategies is a hard decision-making problem. Thoughtful analyses are needed, especially in determining which kinds of technology are to be employed, what sectors of industry to be subsidized, and where the public investment should be allocated. Lack of long-term and multi-dimensional thinking will result in a misleading developmental path or in inefficient allocation of resources. EIA may be used as an aid in such a process. Understanding the potential aftermath of different options and forseeing the trade-off situations in the long run may benifit developing countries' policy-making, which is lacking

in those countries now. In this sense, the time frame and dimensions of impacts used in preparing EISs will be decisive factors for the planning process.

1.4.7 How should EIA be linked to overall comprehensive planning?

The problem of implementing environmental measures in many developing countries is basically one of effective incorporation of environmental factors into the overall planning scheme. To be specific, both coordinating and resolving conflict in the hierarchy of administration appear to be at the core of this complicated problem. This not only reflects the fundamental conflicts in economic and conservational goals in the developing countries context, it signifies that those countries do not have sufficient planning apparatus for reaching a comprehensive planning process. Improving the general planning scheme seems to be a very laborious job given the fact that institutional setting of these developing countries has not reached the stage of sophistication thta developed countries had. EIA may be used as an effective planning apparatus for such endeavor. What is left to be explored then is the linkage between EIA and overall comprehensive planning.

1.4.8 What are the technical problems ?

Some analysts argued that the most important influence on

EIA implementation in the developing countries is the quality of the technical and procedural models used in practice. Most of the early efforts to stimulate third world interest in EIA stressed methods and techniques. Other than the "people" problems in the institutional aspect, misunderstanding and misuse of the models, lack of base-line ecological data, and inadequate trained personnels are all the major aspects to the "technical" problems (Rogue, 1985). It has also been noted that the multi-disciplinary requirements of preparing an EIS can give rise to additional difficulties in personnel problem (Sudara, 1984). Among others, these technical issues influencing EIA's effectiveness should be addressed.

CHAPTER 2 UNDERSTANDING POSSIBLE ANSWERS ABOUT THE EIA QUESTIONS: A LITERATURE REVIEW

2.1 Formalized and Informalized Bases: Legislative and Legal Problems

In both the developed and developing countries, different legislative and legal factors influence both the adoption and implementation of EIA processes. Within the context of legal and political culture, this section will seek to explain why NEPA, as the forerunner of EIA legislations in the 1970's, was adopted and implemented in U.S. and why similar legislation may not prevail in other settings. Additionally, a detailed review on the EIA legislative needs in developing countries will follow, together with a critical discussion regarding the institution of EIA legislation.

2.1.1 Legal and political aspects of legislation

The very reception of EIA depends upon the responsiveness of what might be termed "the political culture" -- the framework of political institutions, laws, roles and responsibilities - that shapes policy formation and decision making. In the U.S. the political culture encouraged a lively response to NEPA for several reasons:

First, the U.S. courts are constitutionally guaranteed far more independence from the executive and legislative branches than is found in other countries, particularly in developing countries. It is probably true to say that it was subsequent judicial interpretation, and not the actions of Congress, which made NEPA so powerful. Without the prodding of the courts in the 1970's, it is doubtful whether the political and administrative response to NEPA would have been so profound.

Secondly, it was partly because of the political role of the courts that NEPA launched an already active environmental lobby into a new role as a quasi-public watchdog, protecting the nation from environmental abuse. After hundreds of cases and years of judicial interpretations, NEPA has "politicized" environmentalism to the point where a powerful, non-elected coalition representing largely middle class interests has considerable influence over both policy formation and decision making (O'Riordan, 1976).

Finally, NEPA has "exploited" the American dislike of secrecy and the control of information. The 1967 Freedom of Information Act in effect requires all governmental agencies to release information unless they can show that do so would be contrary to the public interest. While many agencies have abused this provision, it remains true that a great deal of information and policy analysis leading to decisions which affect the environment is generally more available to American the public without the official secrecy and ministerial discretion which shackle the free flow of information in most developing countries. Consequently, Americans are almost overwhelmed by a

sea of detail, and even the most conscientious environmental pressure groups cannot keep up with the hundreds of EISs that are produced each month (O'Riordan, 1976; Wade, 1975).

2.1.2 Legislative and regulative aspects:

Among the problems that concern the developing countries is that of environmental legislation. There are countries with no laws mandating EIA, which proceed on a case-by-case basis. There are others with comprehensive laws, regulations and guidelines covering all aspects of EIA. And, of course, there are many countries in between. There is no universal model for EIA legislation. It would be useful, however, for all countries to have a legislative framework for EIA, which would address several major environmental and political concerns. First, in determining which areas require EIA, one of the criteria for preparing the list of impacts may be special "sensitivity". The areas that most require EIA in a given country or a region are those which are most environmentally vulnerable. Second, such a framework should include a universal list of items to be considered in an EIA. Third, EIA review and the disputes arbitration procedure should be identified. Such procedures differ from country to country. Finally, the legislation should include penalties for non-compliance with EIAs. In this context, it may be effective to provide that EIA, in case of non-compliance, will be carried out by the reviewing body in the

developing country at the expense of the developer (Ahmad, 1984).

Some critics, however, have argued that the EIS requirement of NEPA legislation has been a disaster for the environmental movement in the U.S. (Fairfax, 1978). Environmental groups have become involved in a process which guarantees only procedural control over Federal activities. Since the courts, in general, have only permitted procedural review. Prior to the implementation of NEPA, agency decisions involving some development proposals had been successfully challenged in the courts under existing statutes. Since NEPA became law, environmental groups have directed their attention towards reviewing impact statements, in an effort to find procedural grounds to initiate litigation, instead of concentrating on substantive issues. Consequently, it may be argued that environmental groups have wasted considerable energy and resources. This constitutes a problem which goes to the core of EIA implementation (Clark et al. 1980).

2.2 EIA and Comprehensive Planning

Most developing countries now regard environmental concerns as part of their overall planning process. Many have formulated national policies and established programs to protect the environment (Kato, et al., 1981). A 1980 survey by the Centre for International Environmental Information (CIEI) noted that 102

developing countries had governmental agencies responsible for the environmental engagement, compared to only eleven in 1972 (CIEI,1980).

It is apparent that what the developing countries need from an EIA is not simply a report. There must be an integration of environmental concerns into the planning process from the very early stages of a project. Such integration permits the identification of real alternatives which can then be systematically evaluated and which can produce sound decisions. (Ahmad, 1984)

There are many problems in integrating EIA into a comprehensive resource planning process. The problems are most obvious in developing countries but some remain in the developed world.

2.2.1 Timing

To date, EIAs seem to have been used in most developing countries primarily as either remedial instrument or as a means to justify actions, mainly because EIAs are incorporated into the overall project planning process at too late a stage (Lim, 1985). Therefore, EIAs have rarely led to any serious consideration of alternatives or major modification of initial plans. In contrast, early timing of EIA effort can actually avoid damage to the natural and social environment, and could make adjustment to the project easier (Lo et al. 1985)

Usually, the core of the goal behind EIA, that is, the realization of the most socially cost-beneficial alternative to the proposed action, can be better attained with early initiation of EIA (Clark, 1984).

2.2.2 Public Participation:

Both private and public sector developers are aware that a failure to identify and consider issues of public concern may lead to the delay or abandonment of their proposals. This is a particularly serious problem in the United States because of the power of individual citizens to challenge decisions on projects by initiating litigation in the courts (Clark, 1980).

Practical difficulties in identifying those sections of the community to be consulted and in determining the most appropriate means of consultation are encountered by those preparing an EIS. These issues must be addressed, because the validity of the results of an impact statement may depend upon the degree of public involvement to which the assessment process is subjected (Bishop, 1975).

The timing of participation is an important consideration in the assessment process. Administratively, the favored option seems to be to delay participation until a late stage in the project planning process, when an impact statement provides a focus for participation. In addition, participation at this stage is easy to organize. Advocates of this approach argued

that participation before an EIS has been prepared will be based on partial knowledge, prejudice and misconceptions unless detailed information is available (Solandt, 1977).

Alternatively, it has been argued that there are considerable benefits in initiating participation early in the planning process (Gelhorn, 1975; Hogg, 1975). Early public involvement increases the probability that the proposals which are formulated will take account of public concerns. In addition, such involvement would reduce delays in obtaining project authorization, because many critical issues will have been resolved. Public involvement during impact assessment would ensure that issues of public concern can be considered during appraisal. Also, individuals and groups interested in a proposal may be valuable sources of information on areas likely to be affected by a project (Bisset et al. 1980).

2.2.3 EIA's Coverage and Validity:

In some cases, EIA procedure does not apply and even appears invalid. For instance, in the U.S., Congress has been prepared to intercede when compliance with NEPA has conflicted with other national priorities. In the case of Trans-Alaska Pipeline, considerable delay did occur. However, when the project appeared to be deadlock, Congress approved legislation exempting the proposal from any further review under the Act. The 1976 Alaskan Natural Gas Transportation Act precluded judicial review of the EIS. Similiarly, Congress allowed the Atomic Energy Commission

to issue permit to nuclear power plant when project was delayed in the courts (Beard,1975). In light of the fact that the total amount of exemption is small in view of the claims of delay, it is suggested that Congress does not consider that the disadvantages of occasional delay to outweigh the benefit of the EIA requirement (Clark,1980).

According to Lowry (1985), however, private sector investments in many countries are not covered at all by requirements for the coordination or preparation of an EIA. In many developing countries, government-chartered corporations are exempt from mechanisms that coordinate normal governmental agencies. In addition, even some governmental agency projects are exempted from having to prepare an EIA (e.g.,energy projects) when they are so important that it is felt that no delay or diversion can be countenanced. In the Philippines, for example, any Minister may initiate a request for an exemption. If he does so, however, the NEPC (National Environmental Protection Council) then will place full public responsibility for any adverse consequences on his agency. This can be regarded as intentional negligence of EIA, with priortized goals, in a overall planning scenario (Carpenter, 1985).

2.3 Inter-governmental Coordination

The machinery in place for the implemention of EIA by public agencies within the hierachy of government has a great deal to do

with the performance of EIA. There are several considerations, discussed below.

2.3.1 Status and Authority:

The status and authority of the EIA-responsible agency has been the major problem in developing countries, though it happens in the developed world as well. One of the common impediments to successful implemenation of EIA relates to the limited authority of the review agency. This limitation arises in part from the relatively lower status of the review agency in the governmental hierarchy. Such agencies in these countries also suffer from a lack of both resources and technical competency. These circumstances tend to weaken their legal and persuasive authority vis-a-vis that of other participants in the EIA implementation process (Lim, 1985). The status of the review agency within each government's hierarchy must be raised. It is known that the central environmental unit in developing countries usually function at a governmental level that is too low to compete equally with other groups which also have an interest in development planning. These environmental units are both inadequately funded and insufficiently staffed for the tasks assigned to them. Most importantly, they are not consulted at the inception of the decision-making process for economic development planning or natural resource management. In most cases, the course of projects and their soundness in terms of conservation and environmental quality can be best determined and controlled early in the process (Lim, 1985).

Environmental agencies at the subministerial level find it difficult to participate in policy formulation and decision making. Other priorities with the ministry (e.g. health or energy) may obscure, dilute, or distort the objective of sustainable use (Carpenter et al, 1985). Lower level agencies are at thus a hierarchical disadvantage in commenting on the practices of other ministries .

However, though the number of developing countries having environmental agencies had reached 110 in 1985, those agencies ranged from a full-fledged ministry of environment at one extreme to one or two officials sitting in the office of Premier or President at the other. Some argued that the ministers might not necessarily be the most effective in implementing EIA, because the officials in the Premier's office may sometimes wield more power, obtain cooperation from related ministers, and secure coordination (Ahmad, 1984). It is, therefore, hard to judge what kind of "machinery" may be the most effective for EIA implementation.

In the area of international assistance agencies, the level of attention devoted to EIA by the main UN agencies, including UNEP, is likely to add more formal legitimacy to an EIA policy in a developing country. Delegates return home from conferences or training seminars bearing official publications or declarations that support whatever claims they may have on governmental authority and resources, and may usually have more say in the hierarchical context (Horberry, 1985).

2.3.2 Roles Definition and Re-alignment

The low level of EIA performance in some developing countries has also been affected by the extent to which the roles of the various participants have been clearly defined. Procedural rules of EIA implementation without a clearer division of labor seem to create considerable role ambiguity and decrease accountability. Therefore, Lim (1985) suggested that EIA procedural rules must clearly define both the roles and the interactions of EIA participants.

The role of various governmental agencies not only needs clearer definition but also some extent of re-alignment. In the past, most proponents of development within developing countries rejected any environmental considerations. EIA may now be viewed as an instrument for long-term institutional change and EIA systems regarded as a policy tool for institutional adaptation. The successful implementation of EIA requires ongoing restructuring of its institutional framework. The initial prescription of an EIA system should be accompanied by a monitoring scheme to evaluate the system's performance outcome. Monitoring, as Lim (1985) described, should be followed by successive reformulations. Thereafter, a restructured framework according to realigned roles and values may result in better coordination among agencies and a higher level of EIA performance (Yiu, 1984; Abracosa, 1984).

2.4 Transferring EIA and Culture-Specific Questions

To a large extent, EIA experiences and expertise were transferred from developed countries such as U.S. to the developing ones. Recently, however, home-grown wisdom and understanding has become favored over foreign expertise in these "host" countries. This was a result of the growing awareness of the risks of bringing in foreign "experts", who lack knowledge of local conditions, and, being thus unable to properly grasp the need of local community, often prepare EISs which are wrong or misleading (Curi, 1981). It has been argued by Ahmad (1984) that EIA should be carried to as great an extent as possible, by domestic experts. Foreign experts, however qualified, cannot replace those who have knowledge of the nation and culture. It is not simply that the domestic experts understand the cultural context and the functional relationships better, but that they may also be able to create a political awareness or "lobby" within the country for the implementation of the EIA. Foreign experts, for all of their expertise, may prepare volumes of excellent EISs which could find themselves on the shelves of the Prime Ministers' or the Presidents' office with no action taken. (DSE/UNEP, 1984)

Other observers have noted that even the most sensitively crafted and carefully adapted techniques will fail to produce the intended effect unless they are used in an institutional

environment properly designed to make use of their results (Murelius, 1981). The simple notion of a decade ago, that all developing countries could and should use the same organizational and procedural arrangements to take advantage of EIA (Munn, 1979), has given way to the view that different countries will need to organize differently (Wandesforde-Smith et al. 1985).

With regard to the technical capacity of developing countries to implement an EIA policy, there are numerous guidelines, training courses, and consultants eager to transfer their expertise. Not all of these "products" are directly useful to environmental agencies. Also, the lack of technical expertise is not necessarily the greatest barrier to implementation. Many of the available guidelines were written to satisfy the interests of international organizations, not to meet the needs of domestic environmental agencies. Although there are some exceptions in cases where agencies have commissioned their own guidelines, many available materials simply reformulate traditional NEPA-style procedures and methods that with each republication, become further removed from real implementation conditions and would hardly be judged appropriate in most developed countries. The same situation can be said for EIA training courses. In addition, most workshops and seminars, while having some benefits for participants, do not succeed in transmitting methods which are likely to be sustainable or affordable in devloping countries. Possibly the best efforts of integrating foreign expertise are those connected to real projects or those based on well-designed practical case studies (Horberry, 1985).

2.5 Practicality and Cost-Effectiveness

For most developing countries, problems of cost-effectiveness is a matter of much more seriousness than it is in the developed world, though such problems are, of course, important to all nations.

A major criticism about EIA and thus results in relunctance to conduct it is because that EIA causes considerable costs and delay. Initially, EIA may be expensive to implement, especially in the area where little is known about its existing environmental and social conditions. Design changes due to EIS findings also increase capital cost. It of course may be argued that savings to local, regional, and even national economiesarising from the avoidance of undesirable impacts will outweigh the costs in the long run. Clark (1984) commented that once the procedures and techniques are established, the costs of EIA system will decline, and effectiveness may demonstrate further.

Most of the developing countries do not have the money to carry out costly experiments. High cost of preparing EISs have made EIA system not attractive to most developing countries. The "expensive" and "complicated" characteristics of EIS, as commented by participants in 1984 DSE/UNEP Conference, must be improved in order to draw attention on the benefit of effective EIA implementation from developing countries.

Developing countries lack not only money, but technical

expertise, equipment, instruments, and data. These constraints make it an absolute necessity to make EIA processes as simple and practical as possible (Cockerell, 1984). Sophisticated models and academically interesting ideas should be avoided if they are not essential. It is necessary to tailor the available solutions to a number of specific problems which arise in carrying out EIAs. This does not mean that developing countries should be put off with second rate or inferior EIAs, but that the methods must be practical, directed in a straight-forward manner to the problems at hand. (Ahmad, 1984)

Cost-effective EIAs may nevertheless be carried out through scoping and screening procedures. Those procedures can eliminate activities that do not need EIA and can also reduce the number of impacts to consider. Through proper environmental legislation it is also possible to avoid costly delays in the implementation of projects (DES/UNEP, 1984). A judicious selection process should, therefore, limit both the number of impacts to be studied and the depth to which they are studied, under the constraints of the limited resources in a developing economy. Over-zealousness can make EIA both impractical and cost-ineffective.

Alternatively, being "under-zealous" would also cause problems. Oversimplified EIA models with inadequate baseline data, experts, and analytic works, can make preparation of the EIS but a perfunctory job, which may lead to either undue endorsements of projects or unnecessary delay (Yien et al. 1985). Since the quantified impacts are predictions, not facts themselves, there is an element of uncertainty and risk which is

inherent in such impact assessment process. The questions to be asked are: what price are people willing to pay for eliminating risks and how much uncertainty is tolerated. The criteria of judging the practicality therefore consists of trade-offs the decision-makers must make, even before actually implementing EIA (DSE/UNEP, 1984).

2.6 Education and Training

In most countries, the lower level of performance of EIA systems can be explained by the attitude of the responsible agencies toward EIA. Responsible agencies are not found to be sufficiently conscious of the intention of EIA or are unwilling to initiate changes in their planning and decision-making process for early and full internalization of EIA (Lim, 1985).

Politicians in most developing countries, who are also the decision-makers, may not be aware of the possible detrimental effects of an development activity. Alternatively, the belief that a proposed development will improve their chances of re-election may cause them to disregard the long-term effects of the development, and not to favor the preparation of an EIS (Curl,1981).

The strenthening of environmental awareness and sensitivity in public agencies, government officials, politicians, and even developers appears to be a crucial need in effective EIA

implementation. Education and training in environmental conservation and protection, with emphasis on EIA, become very important. In 1984 Conference of EIA for Development held by DSE/UNEP in West Germany, a recommendation of Asian working groups states as follows: environmental education should be promoted to bring greater awareness to the media, politicians, consulting firms, universities and other groups whose works may be relevant for the application of a sound environment policy. It is also suggested by Ahmad (1984) that problems for developing countries' environmental education and training is on the need for management approach, rather than pure technical experts and methods.

In the U.S. and other developed countries, though EISs' quality has risen and EIA's role in decision-making process has become much more appreciated than decade ago, there are still some training problems (Lee and Wood, 1985).

There is a need for a careful review of training needs; that is, who needs training and what form that training should take. It is essential not to omit the training of important categories of staff such as lawyers and senior managers, and not to assume that all types of staff need the same type of training. Some staff will require extensive procedural and substantive training; others may require only attendance at carefully focused small workshops.

A distinction should be drawn between specialized technical training (for example in ecology) and training in EIA methods

(identification of impacts, comparion of impacts, etc.). Specialists have often been found to adapt poorly to working in interdisciplinary EIA teams and to communicate badly, and thus may require further training to overcome these deficiencies.

While guidelines are widely used and considered valuable, over-reliance on them may lead to environmental evaluations which are too descriptive, insufficiently analytical, and poorly integrated. In addition, post-project studies to determine the accuracy of predictions need be conducted to increase the efficacy of training.

Trainers also need training. Consultants from private firms and universities have frequently provided the early training, sharing the knowledge they acquired on the job. The U.S. is now in a position to provide guidance on training the trainers in other countries, especially developing countries (Wood, 1984).

CHAPTER 3 EIA IN TAIWAN : AN HISTORICAL REVIEW

3.1 General Backbround of Taiwan and Its Environmental Problems

3.1.1 An Overview

Taiwan has an area of 35,900 sq km, relatively the same size as the states of Massachusetts and Rhode Island combined. Taiwan's population in 1984 was 19 millions--the second highest density in the world (528 persons per sq km). With over 70% of its land area covered with uninhabitable high mountains, the remaining areas of the country are under severe development pressure. Taiwan has few natural resources. The government of the Republic of China (ROC) shifted onto Taiwan in 1949 following the Chinese Communist take-over of the Mainland. Since then, Taiwan has adopted a series of economic development plans: six consecutive 4-year economic development plans started in 1953 and one 6-year plan.

Land-reform was introduced in 1952. It produced significant changes in tenancy and ownership patterns. It also offered incentives to farmers to use their land more effeciently and led to the accelerated migration of farm labor to the cities. Based on an import-sustitution policy and subsequent export-expansion, Taiwan has achieved since the mid-1960's significant economic performance.

There are a number of indicators of this economic performance:

1. Taiwan's GNP has grown steadily and rapidly. Averaging growth of 8.6% a year from 1953 to 1984. The latest 14 years (1971 to 1984) reached an annual average of 8.9%. Per capita GNP rose from $50 in 1952 to $3,142 in 1985.
2. The average income of the top quintile dropped from 15 times that of the lowest quintile in 1952, to only four times in 1980's.
3. For the last three decades, the inflation rate averaged less than 9% per year. The unemployment rate has never exceeded 3%. Foreign reserve exchanges reached a record-high $ 25 Billion in 1985.
4. For every hundred households, the average numbers of telephones in 1984 is 76.9, TV sets is 101.5, and refrigerators 96.3. These figures are as high as in some developed countries.
5. The percentage of agricultural labor in the total labor force decreased from 56% in 1952 to 18.6% in 1983. Industrial employment has shifted rapidly from textiles in the 1960's, to petrochemical and steel in the 1970's, to the most recent electronics.
6. The export of goods and services represented 59% of total GNP in 1984. The export growth rate averaged 15 % annually from 1953 to 1982, and imports 11.6 %. Taiwan ranked 10th in the world in terms of total export in 1985 (Sources: Directorate-General of Budget, Accounting, and Statistics, Executive Yuan, ROC, 1950-1985).

3.1.2 Taiwan's Environmental Problems

Taiwan's environmental problems are exacerbating with high densities and rapid industrial development. Deterioration of air, water quality have become "more and more unbearable"(Ma et al. 1980). A survey conducted in 1985 showed that 57% of those interviewed felt "environmental protection should be regarded as more important than economic development", only 27% argued "economic development should be treated as more important".

Since the mid-1970's, environmental cases have been heard frequently and discussed at a national level.

* 1972, Philco-Ford electronics plant near Taipei had chemical solution polluted drinking water, dozens of workers injured, five of them died.

* 1978, the world's worst Hydrogen Cyanide (HCN) disaster occurred in South Taiwan. The chemical plant's leakage caused 407 harmed, 24 hospitalized, and one died.

* 1979, PCB (Poly chlorinated biphenyls) contaminated food oil in the processing plant. Thousands of victims suffered from long-term illness for having eaten the oil.

* 1980, Chroline leak in South Taiwan's industrial park, more than ten thousands were injured.

* 1982, State-owned Taiwan Metals and Minerals Company in North Taiwan was order to shut down because its levels of Sulfur Dioxide (SO_2) and Nitrogen Oxides (NO_X) emission was too high. The company's year-long emisssion also ruined the nearby forests.

* 1986, Industrial wastes polluted rivers in South Taiwan's shell-fish beds, an estimated loss of $ 8 Millions.

The environmental situation in Taiwan can be understood by the results of a 1986 survey listed below:

TABLE 3.1
A SURVEY OF THE ENVIRONMENTAL OPTIONS AT METROPOLITAN TAIPEI CITIZENS

(Unit:%)	very much	some-what	not sure	not much	not at all	don't know
1. Are you usually concerned about environmentally related problems?	34	42	0	13	7	4
2. In your opinion, are the general environmental pollution problems in Taiwan bad?	62	15	4	9	9	6
3. In your opnion, are you harmed by the pollution?	28	27	0	31	1	1
4. Do you agree with someone who said that the environmental problems of Taiwan are mainly caused by the economic development?	29	22	7	17	11	14
5. Are you inclined to vote for a legislative candidate if (s)he strongly advocates environmental protection?	16	28	37	5	12	2
	much better	somewhat better	the same	somewhat worse	much worse	don't know
6. Do you think Taiwan's environmental problems in the last 3 to 4 years were better or worse than now?	24	37	20	8	5	6
7. Do you think Taiwan's environmental problems in the next 3 to 4 years will be better or worse than now?	2	16	8	23	24	27
8. Do you know of the BEP?		Yes: 84		No: 16		
9. Have you heard of the EIA system?		Yes: 22		No: 78		
	very much	some-what	not sure	not much	not at all	don't know
10. Do you think the BEP has done a good job?	10	37	1	20	9	23
11. If the EIA system can effectively lessen the bad environmental effects from the economic development, would you like to see it implemented?	37	22	20	7	3	11

Source: United Daily News, Survey Service Center, Taipei. January 26, 1986.

Answers to questions 2 and 3 in this survey reflected, by and large, both the general public's prevalent impressions of Taiwan's "bad" pollution problems (a total of 77%), and a relatively high feeling on the part of the public that they are being harmed by such pollution (a total of 55%). Question 4's answers along reflect both an explicit public awareness of the environmental cost incurred due to economic development and a strong inclination to protect the environment. This survey actually displayed a paradigmatic shift, to some extent, in the general public's impression of a "high-growth/ high-pollution" economy. The results of question No. 6 and 7 can be understood as an reflection of the public majority short-term "environmental perception". They feel that the environmental quality in Taiwan is worsening: this year is worse than last year, and next year may be even worse.

Generally, the "bad" environmental situation in Taiwan originated from several factors:

1. Limited resources and available space, together with a high population density, make Taiwan extremely susceptible to developmental pressure. Uncontrolled and unauthorized developmental activities follow the rule of "tragedy of the commons" and damage the environment.

2. The national high-growth developmental model forced the "growth paradigm" to prevail for decades. No environmental perspective was considered in the early planning process prior to the mid-1970's. This resulted in a "government-led" polluting

economy.

3. The compartmentalization of environmental-related legislations and authorities led to the discoordination of control functions and fragmented implementation, which left the inter-related environmental problems unsolved.

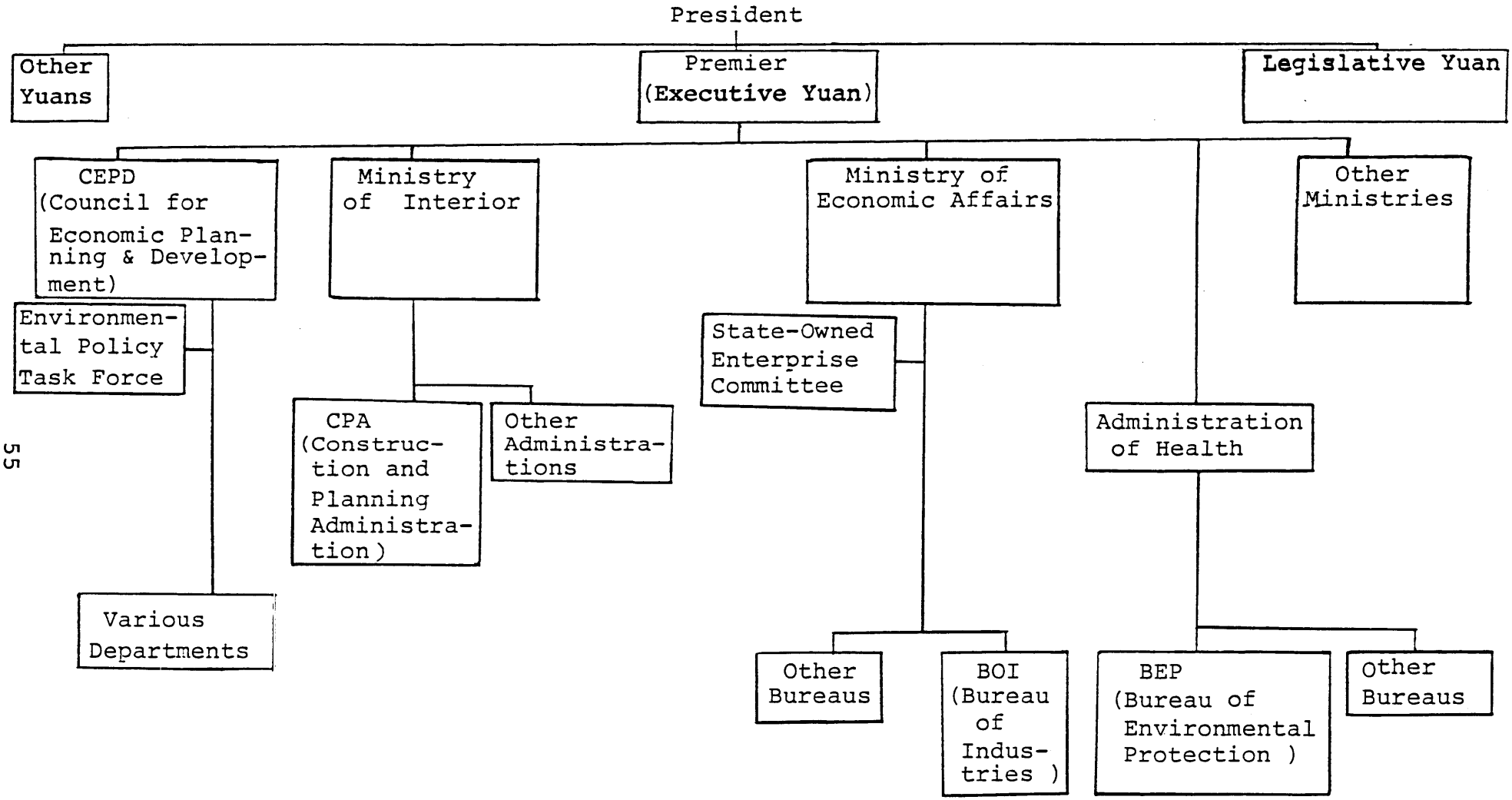
4. The enforcement agencies including planning agencies did not fully understand their duties, were not given enough power, had unsufficient enforcement powers, and were understaffed.

5. Relatively speaking, public awareness came very late. Only after the late-1970's have environmental groups gained influence and wide-spread concern.

3.2 The Legislative Settings

The "EIA Enforcement Plan" was officially promulgated in October, 1985. It was actually a joint product, originated from the executive branch and passed under the accumulated pressure of the Congressmen in the Legislative Yuan. The Plan underwent a long process of evolution prior to its promulgation. A major part of the ROC central governmental mechanism includes that Congress plays in questioning the executive sector, particularly with regard to the Premier and Ministers in the Executive Yuan.

In the last three decades, the first query brought up to the platform was in 1973, concerning the abuse of fertilizers in agriculture, which threatened the organic structure of land soil and eventually harm the cultivation ability of crops. In this query, Congressman Hwang asked that impacts on the natural environment from development activities should be paid adequate attention to. Both the numbers of queries, and the numbers of Congressmen who made queries on environmental-related issues has since been growing every year (see Table 3.2). It should be noted that a record-high opposition, to Taiwan's Fourth Nuclear Power Plant, was recorded in a co-signed query by 61 Congressmen in 1985, and succeeded in raising public awareness, and in having the executive sector halt the project.



D I A G R A M 3 . 2

GOVERNMENT STRUCTURE OF THE REPUBLIC OF CHINA ON TAIWAN

TABLE 3.2

ENVIRONMENTALLY RELATED QURIES IN THE LEGISLATIVE YUAN, R.O.C.

Year	Times
1973	1
1974	0
1975	1
1976	2
1977	3
1978	5
1979	6
1980	6
1981	9
1982	10
1983	18
1984	22
1985	89*

Note: The co-signed query by 61 Congressmen on the nuclear power plant was counted 61 times. If counted only one time, 1985's statistics should be 29.
Sources:
H. H. Michael Hsiao, 1982. " Who Cares About Taiwan's Natural Environment? China Tribune, 16-8, 188.
Legislative Yuan Public Report, 1982--1985.

Environmental legislation started only after the early 1970's and was compelled by the significant degradation of environmental qualities. Such legislation included the National Park Law in 1972; the Urban Planning and Zoning Law in 1973; the Solid Waste Disposal Law and Clean Drinking Water Act in 1974; the Air Pollution Control Law in 1975; the Cultural Resources Protection Law in 1982; and the Natural Ecology Conservation Act in 1984. This latest legislation on natural resources conservation was by far the greatest step toward combining ecological factors with the resource development process.

The Congressmen, being elected by their constituency every three years, obviously need to be very sensitive and attentive to

the concerns of the general public, to whom environmental issues have become increasingly important. In the United Daily Survey discussed in 3.1, the most interesting formulation of question No. 5 presents some enlightening suggestions to the legislators, i.e., that a more forceful environmental advocate has the better chance to be elected (44% to 17%) and therefore might be regarded as a better representative of the constituency. Although this survey's sampling process was conducted in the Metropolitan Taipei, which is highly urbanized and densely populated, the result still serves as a useful refernce to Taiwan's "environmental perception" as 85% of its population is urbanized.

The Congressmen were faced with the lobbying pressure from various interests groups, in addition to the general constituency There are three major environmental citizen groups: the Natural Ecology Conservation Association, founded in 1982; the Society of Environmental Protection, formed in 1978; and Environmental Quality Foundation, established in 1984. These groups, together with the newly organized Environmental Council of the Consumerism Foundation, Inc. exerted joint efforts in lobbying the legislative sector to adopt the EIA legislation. The political and economic influence of the group's leaders made their lobbying efforts effective. Occasionally, local Rotary, Lion Clubs and other business associations also join some environmental-related campaigns initiated by the environmentalists groups on an ad-hoc base.

The advocacy of college professors and other academians,

though somewhat un-organized, apparently played a crucial role in educating the public and in bringing new EIA concepts to Taiwan. For example, an "EIA Problem Workshop", jointly sponsored by the National Taiwan University's Graduate Schools of Environmental Engineering and Geography, and the China Times Daily, was held in June, 1985. Some 80 academians, environmentalists, Congressmen, and public officials attended. More than fifteen papers and case studies were presented. It was understood by the Congressmen that their capacity for effective representation may only be strenghtened only if their environmental perspectives were broadened through interaction with both the environmental groups and the academics.

Outside factors, seems to me, also influenced the formal adoption of the EIA by the legislative sector. Unlike other developing countries, however, Taiwan has no mandate from international development organizations (e.g. United Nations or the World Bank) because its seat was taken by the People's Republic in early 1970's. The external influences were, instead, academic and technically-oriented. Two groups are most influential. The first consistsof foreign environmental planning and resource conservation experts. Ian McHarg belongs to this group. Their advise through presentations, published articles, or interactive discussions, provided Taiwan with critical insights as to how EIA is used in industrialized countries.

The other group basically has the same characteristics, but has somewhat different intentions, and perhaps has an even more significant influence. This group consists of Taiwan-born and/or

grown Chinese who now serve as environmental specialists in the developed world's. They are invited annually to a conference known as National Development Conference. Every year, different participants are invited back to Taiwan. Since most are well-established scholars or experts in their respective fields, their discussions, which follow certain scheduled topics set by the government, are usually instructive and far-sighted in addressing the nationally-concerned problems. Due to their strong identification with Taiwan as their home country, their commitment to solving Taiwan's environmental problems are often expressed in indepth queries, intensive debates, and critical comments. The government, in turn, usually values their advices highly. In fact,suggestions for the enforcement of EIA system was one of the major topics presented to the Premier in the 1982 Conference, and the establishment of a higher-ranked entity in 1984 later resulted in the Task Force in CEPD.

3.3 EIA In Practice

Taiwan has the Bureau of Environmental Protection (BEP) established in 1982 in the Administration of Health, as a major agency responsible for EIA review and pollution control. The Construction and Planning Administration (CPA) in the Ministry of Interior is in charge of the natural resource and environmental planning issues such as the management of National Parks and natural ecosystem conservation. There is also a higher-leveled governmental entity known as the Environmental Policy Task Force , which is part of the Council for Economic Planning and Development (CEPD). This was set up in 1985, and mainly handles the nation's pollution control and environmental conservation policies. The CEPD is an Ministial-level agency responsible for the long-term developmental planning of the country.

In 1978, CEPD promulgated Taiwan's Comprehensive Developmental Plan. This Plan was an attempt by the central government to integrate a broader spectrum of considerations into the long-term national development scheme. It was obvious that the previous six 4-year and 6-year Economic Development Plans neither addressed environmental protection as a national policy issue nor spelled out the importance of conserving natural resources for more far-sighted planning. After the beginning of the six-year Plan in 1975, the central planners were alerted to the ever-growing public concern as well as to the significance of

integrating environmental factors into their developmental schemes. The CEPD took over the responsiblity of formulating the Comprehensive Plan, to meet such needs.

In this planning document, conservation and environmental protection were listed along with industrial development as sectorial priorities within the comprehensive framework. The Plan pointed out the lesson could be learned from the industrialized countries; that environmental problems should be avoided in the industrialization process. As a rapidly developing country, Taiwan was aware of the problems before it, and intended the Comprehensive Plan as a first attempt to score the music of development to a more integrated tempo. Additionally, the Plan's introductory chapter included a statement to the effect that an integrated perspective should be taken to "reach the highest effect of resources utilization". This underlying theme in fact made the re-organization of CPA in Ministry of Interiors in 1981 and the establishment of BEP in 1982 possible.

The first EIA was prepared in 1979, for a new cross-island highway project proposed by the Taiwan Provincial Government. The terminology of EIA was introduced earlier, however, in July, 1976, in a "Seminar on Contemporary Engineering Techniques" held in Taipei. Since then, many academics, mainly foreign-trained, had been advocating the establishment of EIA system. However, the institution of EIA system was not formally considered until the establishment of the BEP in 1982. In 1983, the Executive

Yuan gave an order stating that "any important public economic development project, together with any private projects with potential polluting effects to the environment, should have the EIS prepared in advance, so that the BEP can review the EIS and the licensing agency can thereafter make decisions on issuing official permits to the proposed action".

Though the "EIA Enforcement Plan" was promulgated only after mid-1985 by the BEP, more than eight EISs had been finished already by then (see Table 3.3). The phenomenon of so many EISs have been completed even before the Plan's mandate can be explained by the strong advocacy of the academics and the high level of concern from the general public. It should be noted that some of these "early-bird" EISs were requested as model-demonstration to the public by the Administration of Health and CPA.

Diagram 3.3 illustrates the operational procedure of Taiwan's EIA system. BEP makes suggestions, before going through this procedure, to the Council Meeting in CEPD which will make a decision on whether an EIS is required for proposed development project.

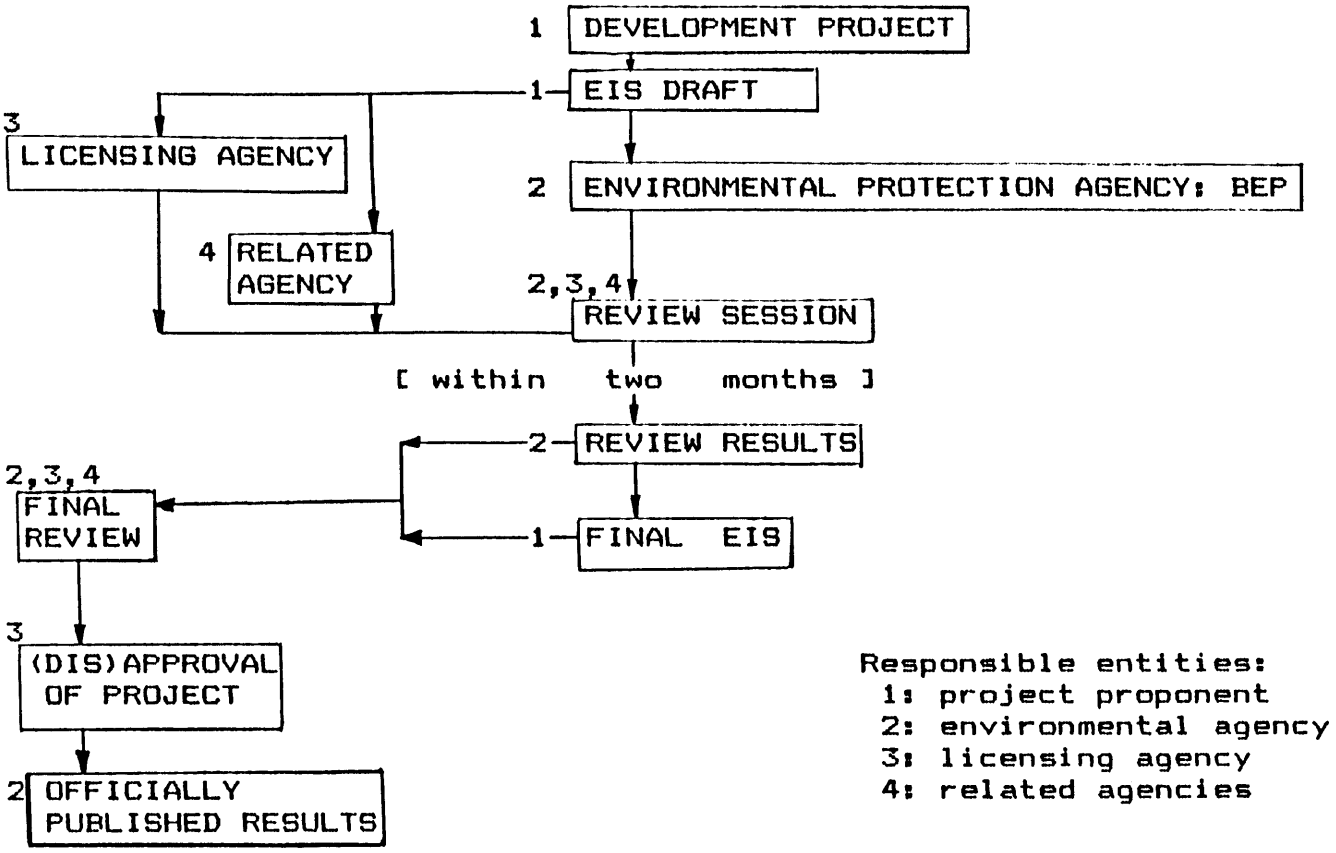
TABLE 3.3

EISs Completed Before 1985 in Taiwan

PROJECT NAME	TOTAL BUDGET ($Mil)	PRPONENT	PREPARER	PERIOD	EIS BUDGET ($'000)	PERCENTAGE OF TOTAL BUDGET (%)
New Mid-Island Highway	90	Taiwan Provincial Government	China Consulting Engineers, Inc.	7-8/1979	75	0.083
Fei-Tswei Reservoir	310	Taipei Metro. Reservoir Council	National Taiwan University	12/1979-11/1980	30	0.0097
Kuo-Shing Reservoir	500	Taiwan Provincial Government	China Consulting Engineers, Inc.	5/1981-12/1982	40	0.008
ShingTa Thermal Power Plant	1675	Taipower Company	Academia Sinica Physics Institute	5/1981-4/1987	230	0.0197
Coastal Industrial Park	27	Administration of Health	National Taiwan University	10/1980-9/1982	500	1.85
KaoPing Special Zone	45	Kao-Hsiung City Government	Da-Han Engineers Consultants	6/1980-5/1981	20	0.04
Ma-Chia Reservoir	N/A	Ministry of Economic Affairs	China Consulting Engineers, Inc.	4/1983-6/1984	35	N/A
Orchid Island Resources Development Project	N/A	Taiwan Provincial Government	National Taiwan University	4/1983-6/1984	111	N/A

Source: Bureau of Environmental Protection, BEP, Taiwan.

DIAGRAM 3.3: TAIWAN'S EIA PROCEDURE



Source: BEP, Administration of Health, Taiwan, ROC

To meet the requirement, a project proponent is responsible for having an EIS draft prepared and submit to BEP, the licensing agency, and other related agencies. The EIS should include the proposed action's aim, detailed content, current environmental quality of the project area, adverse effects which cannot be avoided if the proposed actions are implemented, any alternatives, and any environmental protection and/or conservation measures considered. After the draft EIS submission, BEP is responsible for chairing the review session. BEP has to incorporate the licensing and other related agencies'

comments into the review results within a two-months period. Upon receiving the review results, the project proponent must revise the EIS into a final draft and submit it for final review. The final review process, again led by BEP, must include the licensing and related agencies' comments, and the final results are forwarded to the licensing agency for final approval. After decision is made, BEP is responsible for having the major points of the review comments as welll as the EIS's results published in official documents.

The EIA Enforcement Plan also described the proposed training programs for EIA personnel, particularly public officials in related entities such as BEP, CPA, Ministry of Economic Affairs, and CEPD. The program includes domestic training and short term foreign training in developed countries like U.S. and Japan.

Since the establishment of BEP in 1982, some 15 EISs have been or are now being prepared, mainly for huge projects with potential significant impacts such as thermal power plants, municipal waste incinerators, and reservoir projects. It has been reported that all the environmental engineering and science departments in Taiwan's universities have recently been "overwhelmed" by new research projects, including EISs preparation.

Though the outlook for Taiwan's EIA endeavor seems optimistic, there exist a number of problems and impediments to the actual EIA implementation.

3.4 Implementation Problems

Based on the papers and case studies presented in the 1985 "EIA Problems Workshop", several conclusions may be made regarding Taiwan's current EIA implementation problems.

1. In many cases, EIA was carried out simply as a remedial function to actions already implemented. The aim of incorporating EIA into the overall planning process was usually not met. EIS became a mandated without actual meaning.

2. Some EISs were inadequately prepared, or were simply "environmental studies" and not assessment report at all. Insufficient data and lack of any consideration of alternatives make the quality of the over-simplified EISs unacceptable.

3. Public participation was not encouraged. No public hearing was required by laws.

4. EIS preparers were usually consulting firms or academic institutions assigned by the project proponent. The general public has the suspicion that preparers could conduct the EIS study without being influenced and/or biased by proponents' view.

5. Cultural factors also cause problems: Chinese are traditionally " bad-news adverse" and are inclined to see positive outcomes. However, EIA always presents "negative" impacts to alert people. This makes EIA an " disappointing and

discouraging" tool (Lo et al, 1985).

6. Alternatives sometimes are intentionally neglected. A "take it or leave it" attitude came from the project proponents.

7. A shortage of well-trained EIS review experts. These experts have been gradually lured away from the public service to the private consulting firms.

8. Lack of coordination and communication among public agencies with widely different views and expectations toward the EIA process exists.

9. Though having a great deal of foreign-trained specialists, Taiwan's general public the government sector were still "blinded" by foreign advisors' suggestions. Too much attention given to the foreign consultants and too little faith in domestic experts make the EIA still alien to most people.

CHAPTER 4 CASE STUDY : CEMENT PLANT/TAROKO GORGE NATIONAL PARK

National Parks in Taiwan are created to preserve the island's diminishing open areas and to provide recreational opportunities with a "conservation perspective". Both of the cases prsented in this thesis concern sites within the Taroko Gorge National Park in East Taiwan (see map 4.11). CPA (Construction and Planning Administration) in the Ministry of Interior is responsible for the planning , management, and operation of the National Park system. A Department of National Park was established under the CPA in 1982.

4.1 General Overview of the Taroko Gorge National Park and the Chung-te Cement Plant

The Taroko Gorge National Park has series of unusual geological formations. It extends along the Liwu River and Middle Cross-Island Highway. The Park has been described as "one of the most important scenic areas not only in Taiwan, but in the world". Taroko Park's boundaries (see map 4.12) were officially designated on May 20, 1984 by the Executive Yuan. The Master Plan for Taorko Park was completed in early 1985.

In a report to Taiwan's Forestry Bureau in 1966, the area was described as follows:

Taroko Gorge is one of the greatest spectacles of the world (Lurie, 1966).

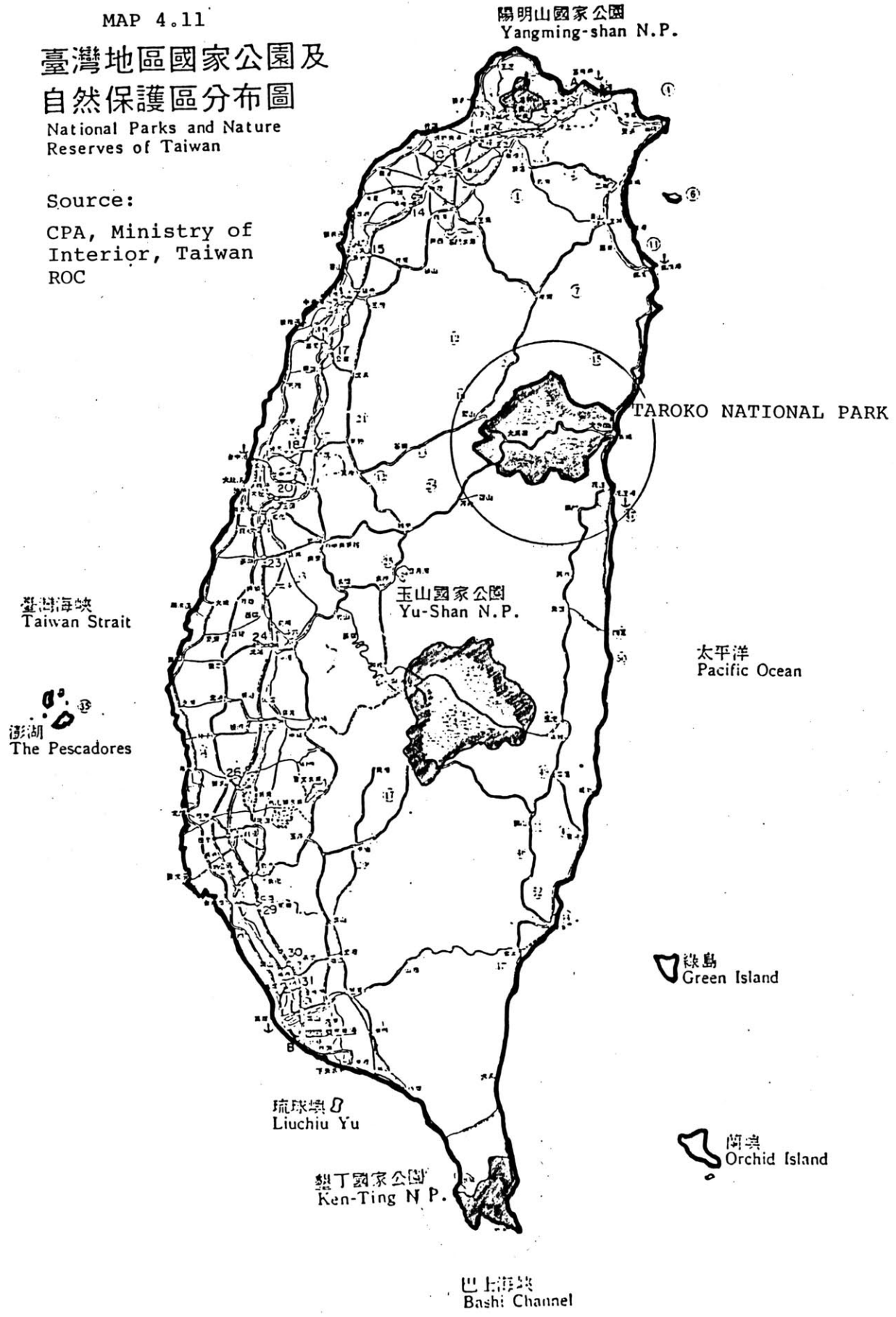
MAP 4.11

臺灣地區國家公園及自然保護區分布圖

National Parks and Nature Reserves of Taiwan

Source:

CPA, Ministry of Interior, Taiwan ROC



Also, in a letter to the Bureau of Tourism in 1971, an observer wrote:

> Taroko Gorge's most excellent scenic characteristics, including the steep and high marble gorge and the narrow and swift flow of Liwu River, create the apparent contrast of natural formation of land. Such characteristics will continue to be the most important attraction of international tourists (Collin, 1971).

In an evaluation submitted to the Ministry of Interiors in 1978, a consultant wrote:

> The Taroko Gorge's beauty in rock formation is astonishing,... should be designed as a national park, and treated as the "light-house " of Taiwan's tourists industry (Kubo Mikio, 1978).

Finally, Professor Ian McHarg, invited to view the Park by the CPA in 1984, stated:

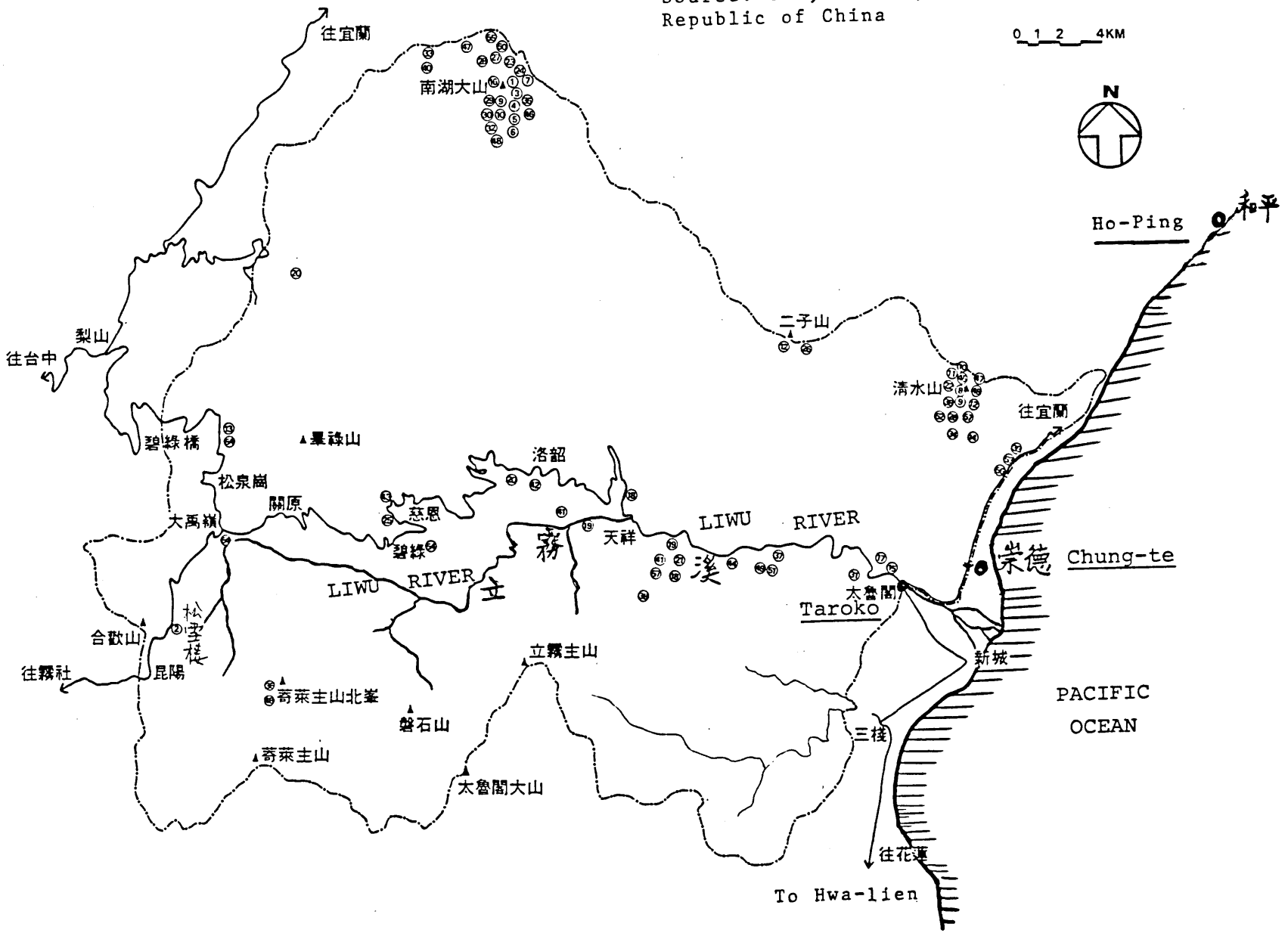
> Unquestionably, the Tarolo Gorge is a scenic resource of not only national, but international importance. This resource should be preserved for the people of Taiwan and generations yet unborn..... Taroko Gorge as a national shrine, a scenic resource of international statute,.....This area should be developed as a national and/or international tourists resort (McHarg, 1984).

The U.S. Bureau of Land Management used several criteria to evaluate natioanl parks: landform, vegetation, water, color, scarcity, man-made buildings, and adjacent area's scenic quality. Using these criteria, the Taroko Gorge National Park was evaluated "calss A" of very high quality by Professor Shin Wang at National Taiwan University's Geography Department in 1983 (Wang, 1983).

Twenty-seven mountain peaks in Taroko Park are close to 10,000 ft. high. The park contains the Liwu River and its tributaries with a magnificent marble gorge. Apart from the

MAP 4.12 BOUNDARY OF TAROKO NATIONAL PARK

Source: CPA, Taiwan,
Republic of China



Gorges itself, the surrounding environment covers an area of 92,000 ha. of land and supports a diversity of plants and wildife in a pristine setting.

The Park is the most frequently visited scenic spot in Taiwan. Approximately 1.6 million tourists come to Taroko Park each year. They generate about $ 25 million annual income for the local economy.

In April, 1981, the Taiwan Plastic Group (TPG) submitted a proposal to build a massive cement plant in the Chung-te area. The Chung-te Area is a development-prohibited zone, located at the alluvial plain of the Liwu River (see Map 4.12). The zone is within 2.5 miles from Taroko Park's entrance. The Chung-te area includes East-Taiwan's richest limestone and marble mines (estimated storage: 300 billion tons ; worth hundreds of billions of dollars). Limestone is a key material in cement production.

The proposed plant, if approved, would not only enhance the total income of the local quarrying and mining industries from $120 million to $ 437 million per year, but it would also increase the local tax revenue by more than $75 million a year. The area was originally designated "development-prohibited" when it was set aside for the aboriginal high-landers of East-Taiwan. Such ordinances are subject to change for industrial land-use only if approval is granted by the Bureau of Industries (BOI) in the Ministry of Economic Affairs.

East-Taiwan encompasses two counties: Hwa-lien and Tai-tung.

They are the least developed, least urbanized, and least populated parts of Taiwan. According to Taiwan's Comprehensive Development Plan published in 1978, the East-Taiwan Region (as one of the four Regions in Taiwan) has 23 per cent of the total area but only 3.6 per cent of the total population. Its out-migration rate is about -15%. The "under-developement " of East-Taiwan has concerned local politicians. They repeatedly advocated for more central government's investment in local infrastructure. In 1981, they endorsed TPG's cement plant proposal.

The TPG is the number one conglomerate in Taiwan (total assets: $ 2.2 billion, 1984) and the world's largest PVC (Poly vinylchloride) manufacturer. TPG is famous for its effective management and high productivity. Its chairman of board, Y.C. Wang, is one of the most important figures in Taiwan's industrial community. He plays an active role in public policy debates.

TPG's proposal aimed at building a cement plant with annual capacity of six million tons. TPG has put up a detailed plan for allocating the highlanders, building the infrastructure, and construction of the plant. It is estimated that TPG will invest at least half a billion dollars in this project. Starting in 1982, TPG has spent several millions in purchasing the land.

TPG's basic reason for initiating such a huge plant proposal was that the current cement market in Taiwan is literally an oligopoly. Y.C. Wang wanted TPG to enter the not-so-well-managed cement production industry. He believed that new technology and

management strategies might significantly lower the cost of production and therefore the cement price in Taiwan. Though the current cement industry has been in the doldrums since 1982, due to a depression in the building industry, TPG forecasts that future domestic demand for cement will be very strong.

The cement market is dominantly shared by five big cement companies which do not welcome newcomer. Among the heads of these companies are the former mayor of Taipei city, the national policy advisor to the President, and a member of the central committee of the ruling party, Kuomintang (KMT). They are quite influential and regarded TPG's proposal as an unwanted intrusion.

The Bureau of Industries (BOI) predicts an average growth of 4.4 per cent in domestic cement demand amounting to 30 million tons in year 2000. However, the government has discouraged the "over-growth" of the industry because of its energy-consuming and capital-intensive nature. Strategically, the government wants to limit the industry's exporting capacity. Cement is a relatively low added-value product. Thus satisfying the domestic market is the main objective. Additionally, the adoption of more stringent air quality standards also makes the cement industry unattractive.

4.2 EIS For the Cement Plant

TPG's proposal was submitted in 1981 to the local county government. From there it was passed on to the Taiwan Provincial government, and eventually to the Ministry of Economics Affairs.

In January, 1982, BOI granted "preliminary approval" for a change in Chung-te's land use from "development-prohibited" to industrial use. Though the Chung-te area was initially not considered to be, and in the end was not, included within the Taroko Park's boundary, a great public dispute over whether a massive cement plant commanding the entrance of Taroko Park should be built came into being. Before the final approval could be given, L.S. Chang, Director of the CPA (Construction and Planning Administration) led a task force to investigate. CPA requested that, after the investigation, an EIS be prepared before final approval (or denial) of TPG's request due to the project's potential impact on the Taroko Park. Premier Sun favored CPA's request and assigned the CEPD (Council for Economic Planning and Development) to complete the study. CEPD's task was to make suggestions to the Premier for a final decison.

Immediately after the requirment of an EIS was announced, TPG hired the Sino-tech Engineering Consultants, Inc., a leading civil and environmental engineering consulting firm in Taiwan to complete the impact study. In late 1983, Sino-tech started data collection and preliminary site evaluation.

Sino-tech used the Leopold Matrix method to prepare the required EIS. In order to fill out the 100 x 88 matrix (later reduced into 25 x 28) cells, Sinotech enlisted help. First, it invited a team of academics and specialists in the fields of biology, geology, air quality, environmental sciences,... and sociology to provide inter-disciplinary advices. This group

included Ian McHarg, who gave suggestions on setting up the general framework for assessment. Though his overlay method was not used, his suggestions regarding a national ecological inventory system for future EIS study was accepted. Second, for the purpose of deciding what weight should be placed on different dimensions of impacts, Sino-tech's staff attended public meetings and debates on the cement plant/National Park issue for several months. Because of the record-level public concern, Sino-tech had no troubles tracking public opinions. They attempted to incorporate the views of both the proponents and opponents values in this weighting scheme.

The draft EIS was completed in early 1984. The stated result was that: TPG's proposed cement plant in the Chung-te area "might cause significant environmental impacts" in the Taroko Park, specfically air and visual quality. Secondly, these potential impacts "may be mitigated considerably if advanced technologies in deep strip-mining with multiple hydraulic-drill face in tunnel construction and high-effectiveness electrostatic precipitators are installed".

The EIS was reviewed in two different arenas. First in the formal bureaucratic arena, and second in various public forums. Bureau of Environmental Protection (BEP) was the "official" reviewing agency designated by EIA Enforcement Plan. Given the national concern about the proposal, however, review responsibility was escalated by the Premier to the Ministerial level Council Meeting in CEPD. Attendants to this Council Meeting included the Chairman of CEPD, Ministers of Economic

Affairs and Interior, Directors of CPA and BOI, Head of BEP, and the local County Governor of Hwa-lien. The importance of this issue was fully manifested.

In the non-governmental sector, though not legally required, the review sessions were very visible. Major TV companies, newspapers, non-profit foundations, and environmentalists groups like the Natural Ecology Association organized public debates to discuss this issue. Many of these "semi-public-hearings" were broadcasted. Representatives from TPG, local quarrying and mining industries, local Hwa-lien county politicians, Sino-tech, academics, environmentalists, existing cement industries, and government officials from CPA, BEP, and BOI all participated. The general public was invited to the open forums, much like public hearings in the United States and other industrialized countries.

As the draft EIS became public, TPG tried to assure the skeptics that it will install the most effective anti-pollution facilities possible. Many academics, however, challenged the notion that industrial activities could be rendered harmless to the fragile ecology of Taroko Park. They also raised concern about the "second-order" impacts of other development activities would likely follow the building of cement plant. In essence, the choice became one of trading-off long-term enviornmental benefits for short-term local revenues.

In July, 1984, the new Premier Yu, who assumed his post in May, 1984, visited the Taroko Park and the Chung-te area. Right

after his visit, he announced that only high-technology, high-amenity-oriented industries would be permitted in the Chung-te area. He asked that Hwa-lien county be preserved as the major part of East-Taiwan's "tourist region" since it was not as developed (or as polluted) as other regions. Premier Yu was, before becoming Premier, the Chairman of CEPD and the head of Council Meeting. Thus he was already familiar with this cement plant issue. Though Yu's executive directive contained no explicit statement about TPG's proposed project, it was obvious that final approval would be denied.

TPG was fully aware of the significance of Yu's directive. In September, 1984, TPG announced that its proposed cement plant would be shifted to another site, Ho-Ping, farther from Taroko Park but still in Hwa-lien County (see Map 4.12). The final EIS for the original project was never issued.

4.3 Organizations and Coordination

The major intergovernmental conflict in this EIA was between CPA and BOI. As CPA took the stance of requiring an EIA, BOI was initially very relunctant to cooperate. Protecting National Park's environment was an obvious duty of CPA, but encouraging industrial development, especially revenue-generating ones, was a duty of of BOI's. As coordination was needed, CEPD's acceptance of the responsibility to review the EIS had a crucial effect in

managing, if not ameliorating, such conflict.

A noteworty point was, as mentioned, that the Premier decided to have the CEPD, rather than the BEP, review the EIS. This indicates that the status of BEP as a review agency of EIA process in the governmental hierachy is too low, and needs to be raised. Two possibile options for doing so include granting an independent ministerial status to the review agency, or placing it under a more powerful ministry directly in charge of development and planning. The ad-hoc nature of the Premier's order on shifting the responsibility from BEP to CEPD's Council Meeting was meant to address such problem. It can also be understood that the decision makers only want to perform this on an ad-hoc base since they, still do not want to see an established high-leveled EIA review agency having too much say on the entire development processes.

According to the Simon's organizational theory (Simon,1957) goals are often compromises, more "satisfactory" than "optimal", and are frequently used to adjust a situation rather than to solve it once and for all. The Premier's decision reflected not only individual values and commitment but also political considerations. The overwhelming demand from the pro-conservation citizen groups and the influential attitude of the existing cement industry cartel have had unquestionably positive effects on such a goal-setting. It was quite evident in this Taroko Gorge dispute. After the CEPD reviewed it, and after the Cabinet members tried to coordinate, the final decision still has to be made by the Premier solely.

The reasons for the result in this case were partly because of the hierarchical nature of the formal decision-making structure in the Executive Yuan. Initially, Ministers held conflicting point of view towards this event. Attendants of the Council Meeting did not work out an agreeable solution by coordination. In addition, the level of the external pressure of publc opinions and interest groups was too high to be overestimated. Finally, this Taroko--Chung-te issue is a controversy over paradigms, a dispute on economic-ecological determinisms. Decisions on this subject will affect the environment of Taiwan, in a generalized term, into posterity. No one in the Executive Yuan but the Premier can really be responsible for the consequences of such a decision.

In fact, such a decision still closely followed the directions given by an even higher-ranked officer, the President of the Republic of China (ROC). The President has emphasized the importance of the targeted high-tech industries recently in a national economic planning meeting. After all, this decision-making process exactly followed the extreme form of centralization in the formal organizational structure.

The director Chang of CPA adhered very consistently to the role he was assigned. Being an officer who is in charge of national parks management and conservation, he took a very firm stand in support of the environmentalist's groups. He integrated his organization's goal, the expectations toward his role, and his individual behavior quite well. But for the Minister of

Interior Lin, there exists some incongruousness in his role. Unlike the technocract Director Chang, the Minister bore more political burden and risks and was therefore more sensitive to outside pressures. Though being the very superior who is responsible for the protection of national parks, he still advocated for the cement plant that strict pollution control can keep the Park unchanged, because his own power source comes basically from those local politicians and industries who asked for uncontrolled development. In this sense, his role seems very ambivalent. Local prosperity and national park's conservation both appear to him to be very important and put him in a dilemma. It appeared that the consistency in policy that he stressed, in which he argued for the continuation of mining rights and granting approval to TPG, mirrors the inconsistency in his role-playing.

As Director Chang of CPA, a foreign-trained technocrat, insisted on the conservation of the Park by supporting the environmentalists. The latter have formed, if at all, a power base for the Director which he supposedly did not have before. Unlike the Minister Lin, he was appointed mainly because of his expertise and professional capability. The Minister Lin, on the other hand, took his position by climbing the political ladder, first in the local electral campaign and later in a provincial and central governmental bureaucracy. The reason why Minister Lin was so politically sensitive to local indignation is therefore understandable. Even so, the Director Chang still tried to manage the conflicting situation and narrow such

difference. He cited, very skillfully, what his superior said about having the firm belief in overcoming threat of pollution to the Park by employing new technology in the cement plant. In a sophisticated way he interpreted it into a commitment made by the Minister to spare no effort in conserving the Park. The difference between these two officers' views, though still sustained, became obscure, and the Director's role as a subordinate was kept intact.

TABLE 4.3

Organizations, Groups and Interests Involved

BEP (Bureau of Environmental Protection):
An agency under Administration of Health, having the responsibility of pollution control, setting emission standard, and EIA review.

BOI (Bureau of Industries):
An agency within the Ministry of Economic Affairs, responsible for the development of schemes in directing and supervising the development of private industries in Taiwan.

CEPD (Council for Economic Planning and Development):
An Ministrial-level agency in the Central Government, in charge of the long-term development planning of the nation. The Environmental Policy Task Force is one of the Deputy-Ministerial-level entity built in the CEPDin 1985, in charge of the environmental-related decision making.

CPA (Construction and Planning Adminsitration):
An agency under the Ministry of Interiors, responsible for public works, urban and regional planning, and national parks planning and natural resources conservation.

County Government of Hwa-lien:
The county government in East Taiwan, having the jurisdiction over areas including most part of the Liwu River Watershed, Taroko Gorge National Park, and Chung-te area.

Sino-tech Engineering Consultants, Inc.:
A private engineering consulting firm with expertise in civil, water resources, and environmental engineering. Sino-tech is the EIA preparer of the proposed Chung-te Cement Plant.

TPG (Taiwan Plastic Group):
The proponent of the Chung-te Cement Plant.

Natural Ecology Conservation Association :
A citizen group with environmental protection and conservation concern. Headed by Mr. F.H. Chang, a Minister without portfolio.

Cement Industry:
This industry includes 18 companies, five of those dominantly big. They manufactured 17 million tons annually, set the price, and shared the market. They wanted not to see TPG's proposed cement plant become a reality.

4.4 Methods and Techniques

The Leopold Matrix Method used by Sino-tech has been widely used since its inception in 1971. The matrix consists of a list of development actions, and a list of environmental parameters, the former along the horizotnal axis (columns) and the latter, the vertical (rows). This matrix is of the "open cell" type, which means that the cells are left blank and those investigating the impacts fill in the appropriate cell by forecasting what the impacts will happen as the intersection of each development action and each environmental parameter. The original matrix by Leopold includes 100 items on the horizontal list and a vertical list of 88; or a total of 8,800 possible interactions. The adjusted version used by Sino-tech involves a 25 by 28 matrix with actions and parameters relevant to a cement plant including

blasting, trucking, surface excavation, and drilling on the one hand; and atomospheric quality, scenic views and vista on the other.

Each possible interaction cell is divided diagonally into assessed magnitude and importance of the impact in the upper-left and lower-right corners respectively. A scale of 1 (least impact or least important) to 10 (greatest of impact or most important) is used to note the magnitude of impacts. The U.S. Geology Survey indicates that both magnitude and importance may vary from short to long term, thus a plus sign is used to show impacts which are beneficial in the short term and another sign sign for long-term benefits. Since no two cells are directly equivalent or comparable no summing up is possible. The resultanting EIS presents the results of the analysis in the form of a completed matrix. Attention is focused on cells with large numerical values. Actions causing large number cells along a single are also flagged for dicussion.

The matrix provided a grounded framework where project actions and environmental components can be related to each other. It also "forces" a decision by presenting results in a visual format. Thus, it is a useful tool for enabling the public and reviewers to interact.

Sino-tech divided its experts advisors into several sub-groups. Each sub-group was asked to submit scores of all cells. Scores then were averaged and those cells with the lowest scores were deleted. This process was repeated two to three times

during a three month period. More input from the public meetings and mass media, together with the queries from the Legislative Yuan, were included in later rounds. A final 25 x 28 matrix was then performed. Individual experts thereafter assesed the possible impacts in each cell to give the actual scores. These scores were the basis of Sino-tech's conclusion in its first draft EIS.

Some technical problems emerged in using this Leopold Matrix method: One, the matrix structure precluded consideration of higher order interactions while only channeled thoughts to the immediate future and solely to the pairs of interacting components. Longer term or indirect effects were left out of the assessment. Two, ranking using numbers on a subjective scale may result in adding or subtracting total scores for various sets of impacts. Results obtained in this manner are definitely false as numbers on an ordinal scale cannot be manipulated with plus or minus. As the EIA's intent was to achieve composite, both long-term and short-term, and accurate assessment of potential impacts, these drawbacks of Leopold matrix need to be addressed.

4.5 A Focus on Industrial Development Impacts

The existing cartelized cement companies, which have dominated Taiwan's market for a long time, were well organized. They cooperated in price-setting and market-sharing. While exerting substantial efforts to prevent TPG from entering "their" market, they hired specialists to argue against TPG's cement plant in terms of market saturation and other economic factors. In effect, they tried to form an indirect alliance with the CPA.

The companies also hoped the BOI would support them. But BOI had mixed responses. On the one hand, BOI was in favor of the EIA procedure because it might stop TPG's cement project. The cement industry, with its energy-consuming and high-pollution nature, was not something BOI wanted to expand. On the other hand, BOI was against the EIA procedure because if TPG's project was denied, this would continue the oligopoly of the current companies, which was bad for the national economy.

A long-term cement industry development policy became necessary, and in fact was ordered by the Economic Minister following the TPG dispute. The EIA, unexpectedly, triggered a planning process for this most important resource in Taiwan. It drew attention to the potential environmental impacts of this industry, and the inevitable trend of moving east due to the depletion of limestone on the Western Taiwan. From this perspective, the EIA had a beneficial impact. Though indirectly, this EIA gave TPG a chance to demonstrate that a more efficient technology and better management might be employed in a "dead"

industry. In the absence of the EIA requirement, the general public would not have been aware of the problems in the cement industry. The long-term plan for cement industry development in Taiwan wasstimulated by the EIA process.

As a result of the EIA process, a special region for local quarrying and mining was set aside, far from Taroko Park, with government-subsidized infrastructure to support a more productive local economy. It may well be said that, in the long-run, this EIA had positive impacts on not only local industries but also on more orderly regional development.

The most important industry to be positively impacted by this EIA was the tourist industry. Taroko Park will continue to be the leading tourist attraction in Taiwan. A study done in 1984 (Chiang, 1984) showed that "preserving the natural enviornment" was rated by both foreign and domestic visitors to Taroko Park as a top priority. 95 per cent of the local tourist industry's income derived from Taroko Gorge. The EIA in this case plus CPA's planning for Taroko Park may lead an unique East-Taiwan "Tourists Region", as requested by the Premier. This symbolic effort, centered with a world-famous park, may help to bring more attention from the international community.

4.6 Implications on Key EIA Questions

An ideal EIA, fully internalized into planning processes,

would contribute to a reduction in environmental costs of a proposed action, with minimal costs in terms of inter-organizational conflicts.

The major problem in this case was that policy-oriented, administrative discretion extensively influenced the EIA process. High-tech industry policy, plus the newly established national park system, "forced" the decision-maker to first ask for an EIS, and later to be inclined to disapprove the proposed project.

Coincidently, the policy and discretionary orientations were complementary to EIA's basic environmental objectives. It would be alarming, however, if policy was oriented toward a "growth paradigm" without control. To be more specific, if the government had decided to encourage cement export and marble exploitation, and the idea of national park conservation has not been so popular, executive discretion might have directed the final EIS to approve TPG's proposal.

The general public's concern in this event has reached a record level. The social pressure against the exploitation of natural resources and destruction of a scenic area marked a growing awareness across the population. The government noticed the wide-spread concern and responded accordingly by requesting an EIS. In fact, such public pressure, whether was anti-pollution or resources conservation, left the policy-maker little room to advocate for developmentalism.

Public participation, though not formally required, was very visible in this case. Sino-tech in the EIA process made use of

such public involvement in both collecting information and assessing impacts. Obviously, the above-mentioned public environmental concern resulted in a dynamic participation phenomena, even though formalized channels were lacking. This problem needs to be addressed.

After EIA procedure helped TPG incorporate social and political factors into its cost-benefit analysis, TPG decided to shift the cement plant to an alternative site. EIA left TPG with a good name for not polluting the Taroko while avoiding unquantifiable costs. It also was useful for the Premier to understand who is to pay the costs and who to gain the benefits before making a decision. However, a wider range of cost-benefit consideration in an EIA process was not yet generally appreciated.

Furthermore, in the long-term planning aspect, EIA made Taiwan's cement industry's long-term development plan materialize. EIA led the government to rethink its industrial policy in terms of energy consumption and added value, as well as its long-term resources utilization strategies. In fact, EIA may be able to play a crucial role in understanding the trade-off situations in future multi-dimensional resources development disputes.

Finally, the EIA process contributed to reforming institutions and reaching more comprehensive planning. As the principal participants, i.e., BOI and CPA, encountered some degree of conflict, EIA helped in reaching common adjustments. This stance

not only led to mutual learning and institutional adjustments over time but helped better incorporate environmental factors into an overall comprehensive planning framework. Through the coordination efforts in CEPD's Council Meeting, EIA was used as a planning tool in synthesizing both economic and conservational goals.

One crucial purpose of EIA, however, was missing in this case: alternatives were not considered. That is, the comparative analysis of environmental consequences of all the other possibilites was not explored. It was a basic goal of EIA to consider alternatives, including a "no go" one. The failure to consider this aspect of EIA surely hampered the effectiveness of EIA as an planning apparatus and ought to be carefully dealt within the future.

CHAPTER 5 CASE STUDY: HYDROPOWER PROJECT/ TAROKO NATIONAL PARK

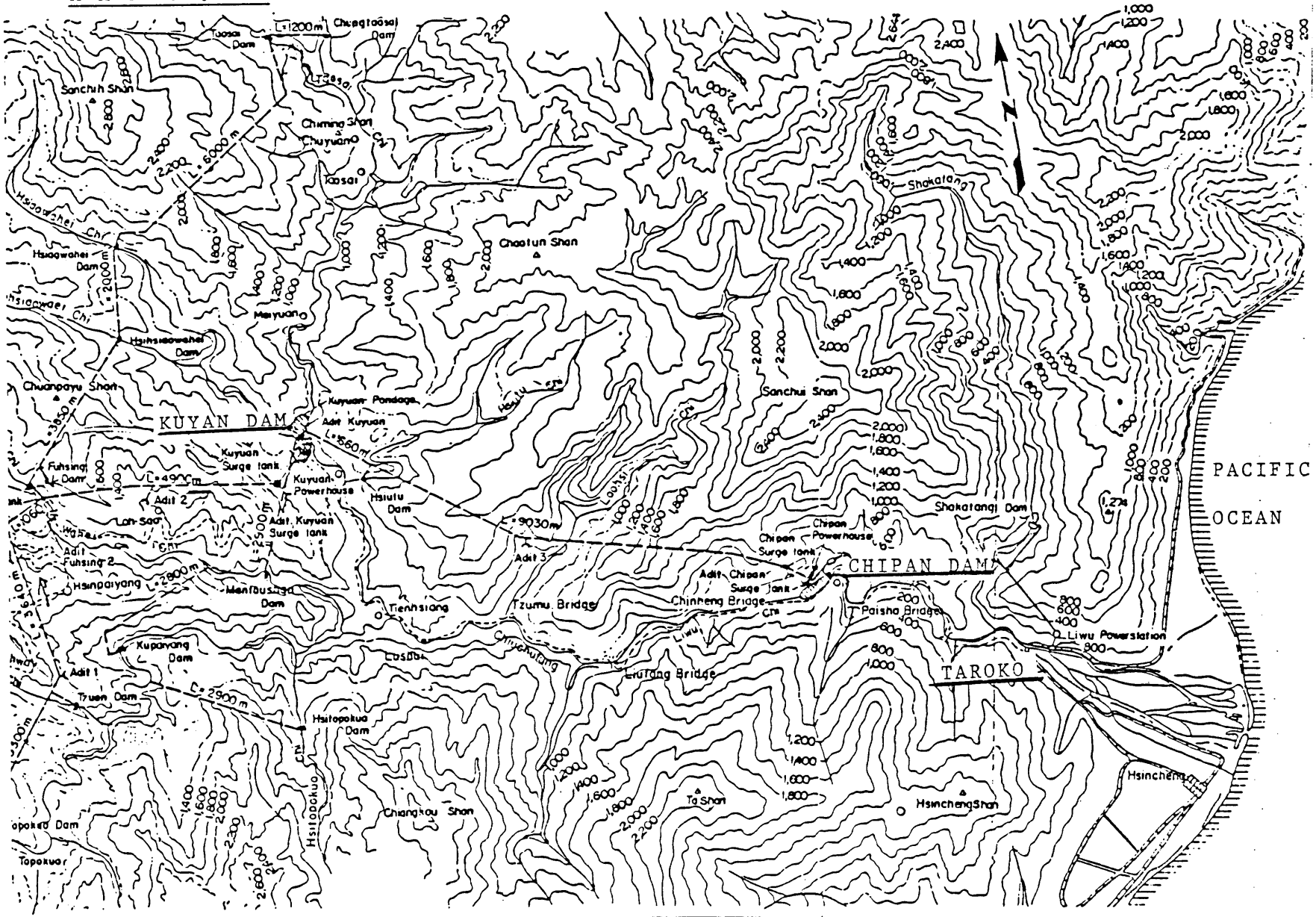
5.1 EIS For the Hydropower Project

Taiwan Power Company, the largest state-owned enterprise in Taiwan, initiated studies on the hydro-electric potential of the Liwu River in 1966. After the feasibility study, conducted by Japan's EPDC engineering company and reviewed by Electro-watt Engineering Services company of Switzerland in 1970 and 1972, a basic engineering design plan was prepared in 1974. This plan was then approved by the Ministry of Economic Affairs, as the "Liwu River Hydro-electric Engineering Plan", in May, 1979. The Liwu River is the main source of water flow into the Taroko Park.

The engineering plan includes two main power plants, located upstream and midstream respectively on the Liwu River (see map 5.11). Their capacities will be, respectively, 160 megawatts (Mw), and 90 Mw, a total installed capacity of 250 Mw. The initial benefit/cost analysis in 1972 indicated the B/C ratio will be 1.07. After the approval in 1979, the Taiwan Power company (later referred as Taipower) began construction of the roads leading to the project sites.

This hydropower project was proposed and approved, apparently, much earlier than the Taroko Park was designated. The basic reason for Taipower's initiating this project was that East-Taiwan's infrastructure was not sufficient in terms of power supply, and that the project could serve as an adequate energy source for East Taiwan.

MAP 5.11: GENERAL LAYOUT OF LIWU RIVER HYDRO-POWER PROJECT



SOURCE: TAIWAN POWER COMPANY, 1972.

The Liwu hydro-electric project's proposed budget is $ 410 million (1985). Its capacity, 250 Mw, is only 0.45 per cent of the overall installed capacities of Taiwan's power generation. After three years of road construction, work on the project stopped in 1982 due to the potential harm to Taroko Park. This stop was requested by CPA. With the support of the general public and the academics, the CPA succeed in temporarily postponing this hydro-power project. An Executive Order given from the Executive Yuan, asking that an EIS should be done before further construction, was issued in 1983. This Order declares that only if the EIS indicates insignificant impacts to the Taroko Gorge National Park will the project be allowed to continue. At this point, an amount of $ 30 million has been spent on the road construction process and the project was 14.61 per cent completed.

Taipower assigned the EIS preparation job to the National Taiwan University's (NTU) Graduate School of Civil Engineering. Professor C. L. Yien, scholar of international reknown in the field of water resources engineering, led a group of researchers in preparing the EIS. The "Environmental Evaluation System" (EES) method developed by the Battelle Lab of Columbus was used. In July, 1984, draft EIS was completed. Its main conclusions were: one, the original environmental quality of Taroko Park was only of medium rank,(68 per cent to the ideal condition); and two, that no significant impacts will be caused by the proposed project to the Park. The project was justified according to the

EIS.

CPA in the Ministry of Interior, however, was unsatisfied with the outcome of such EIS. Director L.S. Chang of CPA filed a petition to the Executive Yuan asking to escalate the level of review procedure with regard to this EIS, from BEP to CEPD, based on its national importance. Permission was granted by the Premier to this petition in 1985. Before the formal review process in CEPD's Council Meeting took place, CPA asked Professor S.C. Chang at the Geography Department, also in National Taiwan University to do the review study on the draft EIS. Prof. Chang was one of the leading environmental advocates in Taiwan. The review was completed in October, 1985, which reached the conclusion that the EIS's result was "erroneously misleading, analysis framework poorly-defined, and method used for assessment inappropriate". A major criticism of the draft EIS was that the assessment model, the EES which was particularly applicable to water resources projects, was not competently suitable for assessing the impacts on scenic areas. This review had an explicit comment on the proposed hydro-power porject's likely environmental impacts on Taroko Park -- "very significant".

On March 5, 1986, a Council Meeting, consisting of the CEPD's Chairman, Environmental Policy Tasks Force, BEP, CPA, Ministers of Interior, Economic Affairs, Head of the State-Owned Enterprise Committee, and the Chairman of Board of Taipower, met to review the draft EIS. At the meeting, Taipower tried to persuade those in attendance of the importance of the Liwu hydro-power project, especially to East-Taiwan's energy supply and

development. Other members, however, overwhelmingly opposed the project due to its potential impacts. After a lengthy debate, which was followed with great interest by the entire country, the Council Meeting determined that the draft EIS's conclusion should be invalidated, and that Taipower's Liwu River Hydro-power project should be halted. The reason was that the natural environment would be significantly damaged if the project was completed; that Taroko Park would no longer be a first-rate scenic area if water in the Gorge stopped for hydro-power storage; and that the low B/C ratio could not justify the project, considering its environmental cost. The review study done by Professor S. C. Chang was cited as a major document.

Headlines in the March 6, 1986 edition of the Central Daiy News, a newspaper run by the ruling party, KMT, proclaimed "Liwu River Hydropower Project Halted, Low B/C Ratio Plus Potential Environmental Impacts". The story described the debates in the Council Meeting the previous day and ended with a comment: "Though the final EIS report will not come out until later this year, the chance of approval on this project is very slight". Presumably, the KMT decision-making mechanism gave consent to such comment. It was also reported that, after the meeting, Taipower would seek options other than this project to supply East Taiwan's electricity. The Liwu River Hydro-power project was literally turned down.

5.2 Organization and Coordination

Basically this was a case of high-stakes inter-governmental conflicts. The dispute level is solely confined to the central government, with little local politics involved.

CPA asked for the EIA process. The Committee of State-owned Enterprises as well as Taipower regarded EIA as a project impediment. Though both parties sought, as their ultimate goals, betterment for East Taiwan, an agreement appeared hard to reach. The need for coordination in this case was obvious. Learning from the experience of the former case of cement plant/ Taroko park debate the previous year. CPA initiated the escalation of review agency's level from BEP to CEPD in a petition. Such an ad-hoc meeting to review EIS was once again convened in order to reach a resolution.

To the CPA, this mode of inter-governmental coordination proved useful in earlier dispute; therefore, CPA would like to see it happen again. The proponents of the project, however, were fully aware of the "denial" possibility in such coordination effort. Taipower therefore assigned the EIS preparation job to the NTU Civil Engineering Professor Yien, knowing that the result of the draft would be encouraging and the academic status of the preparer would be unimpeachable. As for the Premier, such ad-hoc Council Meeting was an ideal, solution, since it had already worked in a similar event before, serving the policy aim and helping to bring resolution.

According to Katz's and Kahn's theory (1966), an "open

system" organizational model includes both the organization and its relation with external groups. They described how an organization must function in several ways at the same time. First, it must find ways to maintain itself, to elicit the support, energy, and cooperation of its members. Second, it has to try to protect itself from pressures in the environment. Third, it needs to solicit resources and support from others and build linkages with other groups. The liaison between CPA and those external environmentalist groups pushing for EIA is a good example of this model. The CPA solicits resources not only from the academic people specializing in environment-related studies but also from foreign advisor like Ian McHarg.

CPA's cooperation effort with the BEP and the citizen groups was significant. Director L.C. Chang, a young technocrat holding an Master degree in planning from the U.S., joined forces with the professionals in BEP and the environmentalists in the pressure groups. CPA also obtained the political support from F. H. Chang, head of the Natural Ecology Conservation Association, a Minister without portfolio. Together with the pressure of a concerned public, CPA succeeded in having the EIA prevail in this issue.

The academics played very important roles in this case. With their professional expertise, they either help justify the project through preparing EIS, or invalidate the project through reviewing EIS. It should be noted that, Professor S. C. Chang from the NTU Geography Department was also one of the main scholars who supported CPA's effort in stopping TPG's cement

plant in earlier dispute. Most of the academics like S. C. Chang were very stringent proponents of high EIA performance. As the academics' expectation about EIA's effective implementation remains high and the demand from them stays forceful, the ardence and zeal from the sholars can be vital in eventually elevating EIA's performance level.

The goals of the EIA systems were perceived very differently by different groups. This phenomenon was understandable, since EIA was a newly installed mechanism. To Kuomingtang (KMT), the ruling Chinese Nationalist Party, setting up the system of EIA was a new way of re-distributing political power among proponents and opponents of development actions. Such a newly-initiated, technically-oriented public function like EIA, as expected by the members of the KMT central commi-ttee, which is the paramount decision-making mechanism in Taiwan, could always bring about some new debates, if not conflicts, between well-educated technocrats and power-entrenched politicians. It has been noted that a group of young, foreign-trained, articulate professionals were brought to public attention with the propagation of the EIA ideas. This resulted in a successful "new blood" inflow to the relatively conservative decision-making entity of the one-and-only ruling party in Taiwan.

TABLE 5.2

Organizations, Groups and Interests Involved

BEP (Bureau of Environmental Protection):
An agency under the Administration of Health, having the responsibility of pollution control, emission standard setting, and review of EIA. BEP was one of the attendants to the CEPD Council Meeting to review the draft EIS.

CEPD (Council for Economic Planning and Development):
The Ministerial-level agency in the Central Government, in charge of Taiwan's long-term development planning. The Environmental Policy Task Force is a Deputy-Ministerial-level entity built in the CEPD in 1985, handling issues concerning environmentally-related decision making. CEPD has the responsibility of reviewing major developmental proposals, either public or private, in the Council Mettings, based on the Comprehensive Development Plan of Taiwan.

CPA (Construction and Planning Adminsitration):
An agency within the Ministry of Interiors, responsible for the issues in public works, urban and regional planning, public housing, and national parks planning and natural resources conservation.

Natural Ecology Conservation Association of R.O.C. :
A citizen group with environmental protection and conservation concerns. Headed by F.H. Chang, a Minister without portfolio. The Association was one of the interest groups advocated for the EIA implementation.

National Taiwan University Graduate School of Civil Engineering:
The preparer of the draft EIS for Taipower's Liwu River Hydopower project. A leading academic institute in Taiwan.

National Taiwan University Department of Geography:
The preparer of the review study for the draft EIS assigned by CPA.

Taipower (Taiwan Power Company):
The proponent of the Liwu River Hydropower project, the biggest state-owned enterprise.

State-Owned Enterprise Committee:
A committee under the Ministry of Economics Affairs, supervising 18 state-owned enterprises, including Taipower.

5.3 Methods and Techniques

Professor C. L. Yien employed the Environmental Evaluation System (EES) method in this EIS work. The method was specifically intended for use in the assessment of water resource developments. EES is based on a checklist of environmental factors. It is, however, a checklist augmented by detailed guidelines on the use of information on each environmental factor. Further, according to Warner and Bromley (1974), it contains "explicit criteria for determining what constitutes an impact of a certain magnitude". The commitment to quantification in this method allows the derivation of conceptually simple techniques for summing impacts.

The checklist of environment factors is conceived in a hierarchical format which is used to subdivide the environment into 81 parameters. The first level of the hierarchy consists of four general environmental categories: ecology, environmental pollution, aesthetics and human interest. These are subdivided into a number of intermediate environmental components. The parameters were selected by a screening process on the basis of their significance for water resource development. Similar lists could be obtained for all types of development. To overcome the problem of comparing and summing impacts, parameters were weighted so that they were related to each other in terms of relative importance. Once such weighting has been accomplished

it is possible to sum impacts for each alternative and compare totals.

Techniques used in social psychology, i.e. the Delphi method, were adopted to derive appropriate weights as a method for the determination of "consensus from a panel of evaluators". Eight researchers from various backgrounds were asked to be panelist in Yien's study. One thousand points, termed Parameter Importance Units (PIU), were distributed among the parameters.

The next step in Yien's study involves the transformation of pre-development parameter estimates into measures of environmental quality to provide a quantified representation of environmental quality, which can be used in comparison with the post-impact situation. In this system environmental quality is scaled from 0 (very bad) to 1 (very good) and can be defined in a number of ways.

The transformation of a parameter estimate into a score for environmental quality is achieved by using a "value function". In this study, value functions are obtained for all parameters and relate parameter estimates to environmental quality. Value functions are devised for each parameter using the views of a group of experts. The procedure can be briefly summarized. First, information is obtained on the general relationship between the parameter and the quality of the environment. Then the quality scale of the value function is divided into equal intervals between 0 and 1 and parameter estimates are determined

for each of these intervals. This process is continued until a curve can be drawn. All stages in this process rely on the expertise and judgment of a group of experts assembled by Prof. Yien and must be repeated for each parameter.

The next step of Yien's EIS involves the use of results from predictive techniques. These techniques have considered impacts on all parameters in terms of the parameter measurement units. In the case of aesthetic factors it was expressed qualitatively (i.e., low, medium, or high). Each parameter quality score is mutiplied by the number of Parameter Importance Units allotted to that parameter, giving a final score for each parameter in Environmental Impact Units (EIU). Since all parameters can be converted into these units, the values obtained were summed to provide a total score for all impacts.

EES was also used to determine the probable environmental conditions of both the site and its environs should the development not proceed. In this way, the projected non-development and post-development situations were compared. The former evaluation (the environment without the project) is an expression of a future condition of the environment, while the latter is the expected state of the environment should the development proceed (Dee et al 1973). A difference in Environmental Impact Units between these two environmental states constitutes either an adverse (loss in Environmental Impact Units) or a beneficial (gain in Environmental Impact Units)

impact. The calculation can be represented mathematically as:

$$E = \sum_{i=1}^{m} (V_1)_i W_i - \sum_{i=1}^{m} (V_2)_i W_i$$

where:

E	is environmental impact
$(V_1)_i$	is a value in environmental quality of parameter i with a project
$(V_2)_i$	is a value in environmental quality of parameter i without a project
W_i	is relative weight (importance) of parameter i
m	is total number of parameters.

Alternative projects were evaluated in a similar manner in the Yien's study. Impacts were summed for each individual design. The individual sums were then compared and ranked in order of preference, the project with the least number of Environmental Impact Units being first choice and that with the greatest number coming last.

Using the EES has some drawbacks: EES conducts impact analysis at a macro-environmental level. The small scale level has been pushed into the background. Ideally an impact assessment should have investigations and predictions at both levels to give a truly comprehensive picture of impacts. This is exactly one widely criticized aspect of ESS. Its rigid, monolithic structure may lead to assessment with little flexibility.

One more obstacle in reaching the intent of ideal EIA is that the list of selected parameters is arbitrary and not typically good among other checklists methods (Andrew, 1973). Also, as can be noticed, all discrete parameters are isolated. Chances of interactions and chains of relation, e.g. the "River characteristics" and "Water surface area", which are actually related to "Apprearance of Water", were not explored at all. This apperared to be, however, the most important factor in the Liwu River--Taroko Goege scenic area.

5.4 A Focus on the Energy and Public Investment Decision Impacts

The proposed project was aimed at substituting the current East-Taiwan power supply system. It is using high-voltage cable to transmit electricity from North and West-Taiwan, which has been quite wasteful in terms of power loss and technical costs.

After the project was halted, Taipower had to look for other more costly options to supply electricity. This would have an impact on the overall power generation cost and, of course, on the utility rates to consumers of electricity. For the local East Taiwan region, the impact would be significant since it would remain energy dependent on the other regions of Taiwan. Even though this project's 250 Mw consists of only 0.45 per cent of the overall capacities in Taiwan and exerts no major impact on the general situation nationwise, it still would have a significant negative impact on local development due to the

limited scale of the community.

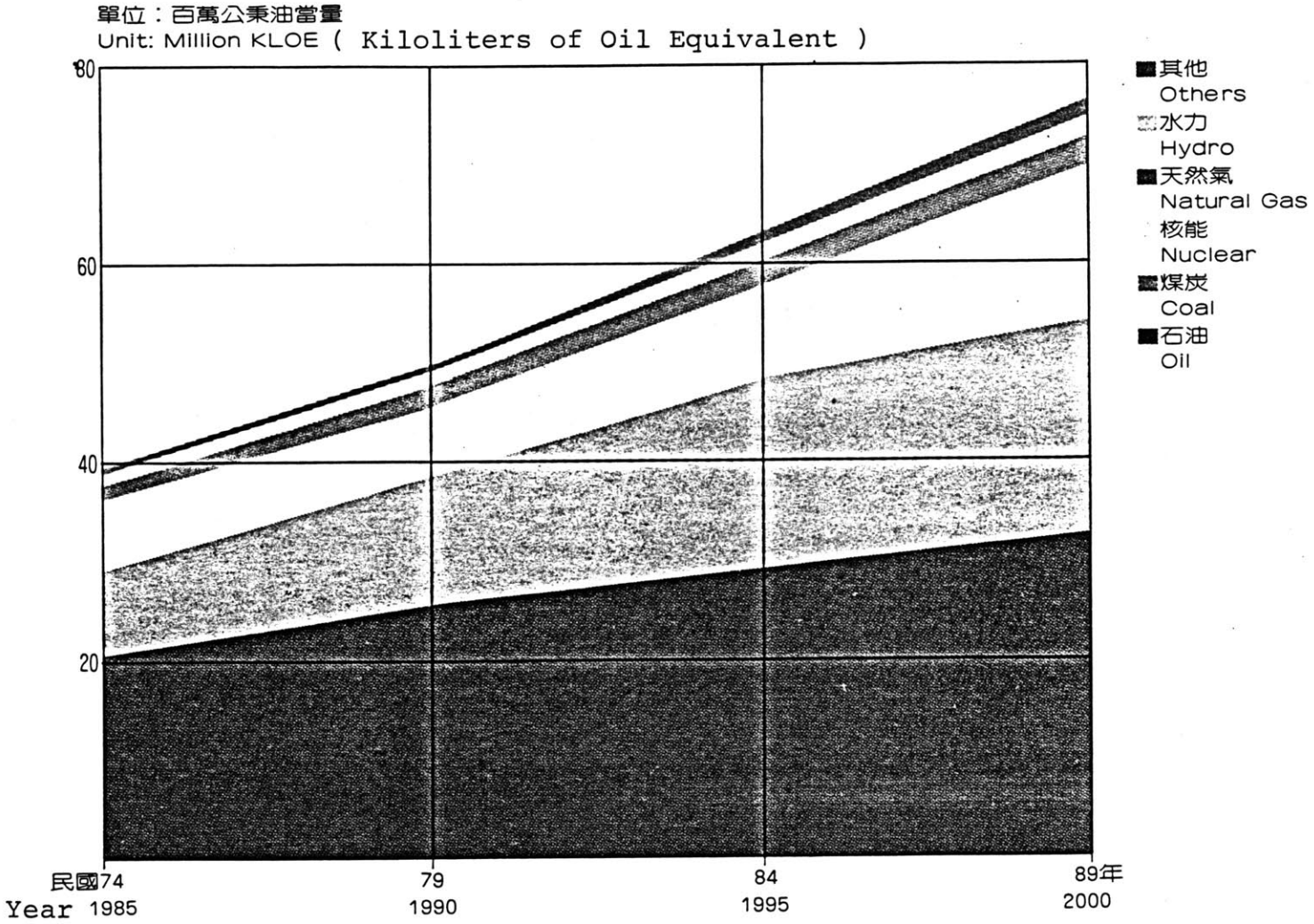
As seen in Figure 5.4, hydropower as a future source of Taiwan's energy supply will decrease from 4% to 3%, which represents only minor protion of total capacity and will be useful for peak-hour demand adjustment. The halt of the Liwu project actually will not impact the overall operation of Taipower. As the environmental concern goes up, however, more Taipower projects will face immense opposition and EIA requirement pressure. A recently proposed thermal power plant, together with a long-planned nuclear project, were both challenged on grounds of whether an EIS had been filed and whether environmental protection has been considered. Taipower, which is solely responsible for Taiwan's electricity generation, will be facing a higher cost, never before incurred, of anti-pollution equipment installation. Such cost will inevitably transferred to the general households and industries.

With regard to the public investment decision aspect, this EIA actually had considerable impact. After spending $30 million in preliminary road construction, CEPD still decided to halt this project in spite of Taipower's objection. An unusual philosophy emerged: a wrong decision should be, and will be righted. EIA here serves as a remedial instrument through a feedback machanism when a public investment decision is made too early to incorporate environmental factors. This should be viewed as a positive impact of EIA on the entire public planning process. In this case, access roads already constructed to the project site

FIGURE 5.4

FORECAST OF PRIMARY ENERGY SUPPLY IN TAIWAN

Source: Energy Committee, Ministry of Economic Affairs, Taiwan, ROC



can still be adjusted to provide tourist access. In future cases, if any, more careful planning with both public opinions incorporated and externalities considered can better the public investment decision-making. The lesson ought to be learned and remembered. EIA may be, in this case, viewed either as policy-instrument for long-term institutional adaptation and reform, or as a means through which the learning process of organizational change be possible.

In the whole process of this long debate, from 1982 to 1986, the public, the academics, and the press have been very active in participating in this discussion. It was said to be, after the resolution, the most thoroughly debated and longest public dispute in Taiwan.

5.5 Implications on Key EIA Questions

In this case, discretionary problems existed in the EIA process. The Premier approved the CPA's request for an EIS not because he knew the likely impacts but because he sensed the general public's overwhelming concern. In such a political atmosphere and under such social pressure, administrative discretion was therefore exercised, and was complementary to the intent of EIA. Since conflicting opinions existed in CEPD's Council Meeting, e.g., those between Taipower and CPA, it is very unlikely to have a rational or even scientific procedure to guarantee an EIS be filed if needed, should a great deal of

discretion exist.

The general public's concern on environmental quality, as illustrated by this event, was very high. Academics were asked to provide technical knowledge and conservation ideas with citizen groups and the general public. CPA's request on having an EIS, which obtained the Premier's consent, mainly served as a response to such across-the-population awareness. Prof. S. C. Chang's competent and serious review of the draft EIS, as an active environmental advocate's technical effort, prevented the hydroproject from continuing. In addition, CPA's attention and initiation, as urged by the public concern, lessened the possibility of a cursory review.

Additionally, the broad spectrum of public participation activities seen in this case resulted from wide-spread citizen concern. Given the government's tacit consent, the public for the first time learned that public debates in the form of open discussion may influence the decision-maker. The participation phenomena started in the academic discussion on theories of natural conservation and ecosystem's equilibrium, and then further expanded into the debate on environment/development trade-offs. Such ad hoc participation process appeared useful in this EIA procedure, especially in informing the decision-makers, i.e., the Premier and those attendants of CEPD's Meeting, what to expect. More formalized public participation channels, however, still need to be established in Taiwan's EIA and project appraisal system.

Furthermore, the benefit-cost ratio for the Liwu hydropower project was only 1.07, and did not consider other aspects of entailed costs. EIA in this case assisted to combine other non-economic such as environmental, social, and political factors into this benefit-cost analysis. It was therefore obvious that minor economic gains could not compensate for the environmental loss if the project materialized, and the project should have been halted. Adding EIA to the existing benefit-cost study, as seen in this case, surely helped to widen the range of considerations, and should be given more attention in Taiwan.

EIA showed another side to the economic consequences in this dispute: tourist income would be decreased if Taroko Park's quality be degraded by the hydropower project. Since over 95 per cent of the local tourist revenue relates to the Park, the everlasting protection and environmental management of this treasure, either in terms of revenue or natural beauty, should be enforced. Both local economy, and national as well as international sightseeing demands, are better served by having this EIA as part of decision process.

In the long-term planning aspect, EIA made Taiwan reconsider its energy strategy as well as regional development scheme. East Taiwan is now confirmed to be conserved as an unique "scenic region" in the Comprehensive Development Plan. EIA also helped to discern the trade-off situations between minor energy loss and sustainable resources development gain. EIA's use in this aspect could be further explored in Taiwan.

Moreover, EIA served as a planning apparatus in adjusting the institutional decision-making process. The hydropower project was eventually invalidated through the EIA procedure, even though considerable amount of money had been invested. The conflict resolution and coordination functions of CEPD would not have been successful without the help of EIA. In addition, Taipower gained the insights, whether willingly or not, as to include environmental considerations in its futural project planning.

EIA played a limited role of environmental advocacy, however, by suggesting remedial measures for a proposed action. The main reason for this limitation was that the ideas of EIA and comprehensive resources utilization did not come into being until the proposed action already had taken place. The timing of EIA, therefore, is very important in reaching a more comprehensive project planning process.

EIS might have functioned, in this case, as a perfuntory endorsement for the proposed action, without serving environmental goals at all. The notion of trying to justify the project in EIS was a major drawback to the intent of this EIA. Technical problems of either applying the inappropriate method or lacking relevant data, resulted in this situation. In this case, the EES model, mainly used for water resources project assessment, appeared unsuitable for the Taroko Gorge where the scenic quality (aesthetics) was of primary importance.

By and large, the lack of environmental concern, or even

sensitivity, in most proponent organizations, e.g. Taipower, is another intrinsic obstacle to effective EIA implementation. Environmental education, coupled with the propagation of EIA's ideas to public officials, need to be strengthened. This may be viewed as an expanded need to an environmental-concerned citizen education for a rapid developing society.

CHAPTER 6 CONCLUSION

6.1 Taiwan's Development Level in the World

As Table 1 indicates, Taiwan has experienced "high-growth", especially as compared to the entire group of developing countries. In this sense, it is more like a developed country.

TABLE 1. GNP GROWTH RATES OF DIFFERENT COUNTRIES

(UNIT: %)	1960-73	1973-80	1980-82
Taiwan	10.1	8.8	5.2
Developing counteries group (Average)	6.0	4.7	1.9
Developed countries group (Average)	5.1	2.5	0.4

Source: World Bank, World Development Report, 1983, page 27.

At the same time, as the World Bank's 1982 statistics show, Taiwan's per capita GNP is more closely aligned to developed countries.

TABLE 2. PER CAPITA GNP IN DIFFERENT COUNTRIES

UNIT: U.S.$ (1981)	
Taiwan	2,563
Developing Countries Group (Avg.)	987
Developed Countries Group (Avg.)	11,120

Source: World Bank, World Development Report, 1982;
Office of Directorate-General of Statistics, ROC, 1982.

Thus, in some respects Taiwan is more like a developing country; in others, it is closer to a developed nation. Given this phenomena, Taiwan's EIA system probably ought be shaped by the lessons from both sets of countries.

6.2 Lessons To Be Learned From Developed Countries

There are various lessons in the application of EIA process which could be learned from the developed countries. Those lessons concern certain aspects of administrative discretion, public participation, general citizens concern, and cost-benefit analysis.

6.2.1 Administrative discretion and EIA compliance

One major problem in the developed countries is in the area of adminstrative discretion in the EIA implementation process. In West Germany and Australia, for instance, ministers have the discretion of deciding whether an EIS is required. The same situation exists in many developed countries. The lesson to be learned is that: the more discretion that exists, the less the possibility of having an effective EIA system.

This is a major drawback in EIA's implementation, because the basic intent of EIA is hampered when the potential

environmental costs are not considered in the project planning, because projects likely to cause significant environmental impacts may not be asked to file an EIS to inform the public of those impacts. With such administrative discretion, both policies with higher priority and political figures with greater clout may dominate EIA concerns, no matter what the proposed actions and likely consequences might be.

There are several factors pointing to the necessity of avoiding administrative discretion in the application of the EIA system:

First, in the EIA screening process, having discretion actually does not enhance the political clout of the EIA-responsible agency. EIA screening sessions will become arenas for political struggle between those ministers related to the proposed projects. Discretion, therefore, is like a pie to be divided by various proponents and opponents. While ostensibly enhancing the EIA-responsible agency's clout, but actually increases the clout and input of all other parties to each projects. More discretion, therefore, only means less clout. On the other hand, the EIA screening session can be a more rational and scientific appraisal process if less discretionary problems exist.

Second, the decision-maker having the discretionary power will be under great pressure from many sources, including internal bureaucratic conflicts, involving difficulty of coordination; and the lobbying efforts of external developers,

which are difficult to satisfy. Dealing with such problems can simply waste the energy and time of the decision-maker. In addition, such problems are difficult to solve since both the proponent and opponent of EIS cannot be satisfied.

Finally, in case no EIS was prepared due to a discretionary decision, and a proposed project turns out to be a disaster with undue impacts, the decision-maker will have to bear the entire blame, along with the responsibility for any attendant social or political repercussions. If the project becomes an ordinary success without significant impacts, however, credit will rarely go to the EIA decision-maker. There is no reason, therefore, to have an EIA system with many potential victims risking their political lives by exercising their discretion.

EIA's discretionary problems should therefore be avoided. One major approach to solving this problem would be to improve the content of legislation: spell out in such legislation the specific criteria and scope of projects that need an EIS. Principal criterion should focus on the dimension or scale of the potential impacts. Systematic techniques should be used to incorporate different factors such as project nature (e.g. power plant); location (e.g. sensitive area); size (e.g. budget over specific amount).

Taiwan has quite the same discretion problem in EIA procedure. The Council Meeting of the CEPD makes the decision on whether a proposed project needs an EIS. If no agreement can be reached in the Council Meeting, the Premier exercises his

discretion to make a decision. The Council Meeting is basically a political coordination entity, rather than a technical review one. Fortunately, the policy priority of the environmental protection has been high recently in Taiwan, and the social pressure is therefore considered by the government. If not for the Premier's consent given to the CPA's request, there might be no EIA for the studied case at all. Therefore, a more technically-oriented agency other than CEPD, such as BEP, ought to be designated as the decision agency. In addition to a set of detailed criteria, a penalty system should also be included in the legislation.

6.2.2 Public Participation

A second lesson to be learned from the developed countries concerns the public participation in the EIA process. More formalized public participation opportunities can help better attain the intent of a fully internalized EIA.

Developing countries should examine the developed countries' experience in having various levels of public interaction in an EIA process, through participation, to reach more accountability in project planning. This is important for several reasons:

First, a great deal of highly localized, unquantified, but valuable information will be discovered in the participation procedure. Such procedures may also provide some otherwise unobtainable information to data inventories in the process of

project study and appraisal, or serve as extra checks on inaccurate forecasts.

Additionally, decision-makers can get to know what the forecasted impacts actually mean to the group of people to be affected. Quantified data can be interpreted and evaluated through public interaction to facilitate a more humanistic assessment. Not even technical experts, predictive machines, or otherwise evaluation can be as useful as the informed participation. In this sense, public participation will bring the decision-makers a more grounded sense of what the assessed impacts mean, a very important consideration to the decision-makers.

Finally, participation can serve as an early warning system for the decision-makers as to what the results of proposed policy or plan might be. The decision-makers would therefore know in advance what to expect, whom to consult or to meet with privately, who will be their allies, and how to negotiate if any conficts exist. In some cases, difference between public expectation and policy ends can also be clarified and bridged in the process of open discussion.

Since public participation is, generally speaking, not encouraged by Taiwan's government, no formal channels are available for EIA public input. In the case study, however, a wide range of public involvement has taken place. Public debates, somewhat akin to the public hearings in the EIA review process in the U.S., were organized and drew significant

attention. This notion of public review for EIS, though not legally requried, was extensively employed for the first time in Taiwan's project appraisal process. It is apparent that the demand of the general public for access into the decision-making process is growing stronger. A formalized and more extensive procedure of informed participation, both at the screening and review stages, utilizing the assistance of academic institutes and environmental protection agencies, should therefore be established by Taiwan's EIA legislation.

6.2.3 General Public's Growing Environmental Awareness

The third lesson from developed countries concerns the general population's broad awareness concerning environmental quality and the consequent social pressure. From the government's perspective, the systematic implementation of EIA will help to respond to the public's concern, which may win the government considerable support from its citizens. On the other hand, the general public's awareness of both the impacts on human health and on the irreversible nature of natural resources may lead to a more effective implementation of the EIA system, as well as a more sustainable scheme of resources development.

Taiwan has an income distribution of high equality and Taiwan's level of affluence has improved considerably in the last three decades. The result of a 1985 survey, mentioned in section 3.1.2, indicated that 56.9 per cent of the citizens identified

themselves to be "middle class". In the same survey, 59 per cent of those interviewed answered: "the environmental protection should be regarded more important than economic development". This survey has demonstrated a certain trend, i.e., the environmental awareness has been widely held within the existing social context of a middle class boom. From the case study, we understand that the concern for environmental conservation from the general public has been strong. The case drew significant attention, gained wide publicity, and brought the issue to a national level. Major media, including TVs and newspapers, also helped focus nation-wide attention on the debate.

Thus, the social setting in which Taiwan's environmental measures such as EIA were promulgated is more like that in developed countries', where environmental movement prevails across the board of the entire population, than that it is to the developing countries. The willingness to spare some time and thoughts to care about the environmental quality is not a triviality to Taiwanese but a necessity, and it is no longer limited to the upper class' esoteric, aesthetic taste and appreciation.

As a result, the college-educated citizens, environmental pressure groups, and the academics in Taiwan, who are gaining influence in the social context of a growing middle class, have played a crucial role in having EIA materialized. They should be able to keep playing the role in enforcing the effective implementation of the EIA system, through various social pressure

means, as their counterparts did in the developed countries. The government should, therefore, pay sufficient attention to the public concern by responding more actively in EIA enforcement.

6.2.4 Broadened Cost-Benefit Analysis

Another lesson that could be learned is that EIA brings perspectives from a broader spectrum into the cost-benefit analysis during the project appraisal process. This includes the avoidance of undue costs in not only economic and political but societal aspects as well. In this sense, the narrowness of dealing only with the financial aspect of project planning can be overcomed. Those unquantifiable and hidden costs of a wider range can be properly addressed. Additionally, benefits of human health, environmental amenity, and management of resources can also be considered.

As discussed in 3.2, Taiwan's Fourth Nuclear Power Plant was halted in 1985 by the executive sector due to the record-level opposition from the citizens. Lack of communication with the public in terms of risk and safety, cost and benefit, before starting the project was the focus of wide-spread criticism. The postponement resulted in various costs: higher finacial costs due to the delay, the social costs of laying off hundreds of technical workers, and political costs of local people's and general citizens' indignation. Additionally, the Taipower's Chairman of the Board lost his job. If there were an EIA

procedure, such multiple costs could actually be avoided in the future and the benefit of having the nuclear plant be further understood.

Taiwan's decision-makers, as well as society in general, can therefore use EIA as a tool for understanding who pays the costs and who gains the benefits in a much broader sense, in a project planning and appraisal procedure.

6.3 Lessons To Be Learned From the Developing Countries

Additional lessons can be drawn from developing countries' experiences in EIA implementation. Those lessons are in the areas of the economic consequences of environmental mismanagement, long-term multi-dimensional planning, EIA as an apparatus for comprehensive planning and institutional integration, and in other technical areas.

6.3.1 Economic consequences of environmental mismanagement

In most developing countries, environmental goals are not considered to be of a high priority in the overall national policy. Growth and economic development is the main, if not the only, concern. In the late 1970's, however, some developing countries began to become aware of the economic consequences of installing environmental measures, including EIA. This resulted from the realization, through various experiences, that economic

costs of environmental degredation and mismanagement would greatly exceed those would be incurred if the the environmental measures were utilized

A 1975 ILO (International Labor Organization) study, for example, concluded that due to the U.S.'s 1970 NEPA requirement, South Korea and Thailand has increased their export to the U.S. during the early 1970's in those items such as preliminary steel, non-ferreous metals, chemical products, fertilizers, and pesticides, but decreased considerably in the exportation of items such as canned vegetables and fruits, fish, fibers, and other "clean" products. The total value change in gross export was found to be, however, negative. Since many polluting industries moved overseas from North America, because in the developing countries environmental regulations were not as stringent as in the U.S. As a result, these developing countries were earning less foreign exchange while polluting their environment.

This has been a typical condition that developing countries have experienced in the last decades. Environmental resource exploitation, therefore, should not be as sufficient a condition as the labor differentiation, for developing countries, to continue to embrace the manufacturing industries which cannot survive in the developed world. While the economic benefits of having EIA, among other environmental measures, are more appreciated by the developing world, the trade-offs in terms of economic gain and loss will lead those countries toward a much

more environmental-sensitive stage.

As a developing country with export-led economy, Taiwan ought to take such lessons to heart, especially in its role in the international labor division of industries, and appreciate the economic benefit side of EIA procedure. Taiwan's EIA system can and should play the role of making its industrial development more economically beneficial as well as environmentally sound.

6.3.2 Long-term multi-dimensional planning

Another lesson to be learned from the developing countries concerns the EIA's utility for long-term multi-dimensional planning in a national development scheme formulation. For example, in choosing among various technology transfer options, developing countries would like to be able to foresee the long-term effects of multiple alternatives. An effective EIA may assist in understanding the potential aftermath of alternative choices, that is, what kind of technology is worth developing in the long run, and what to choose to avoid the potential impacts. EIA can help decision-makers in discerning the long-term trade-offs. Most developing countries obviously need this tool.

Also, EIA can be useful for developing countries in negotiating with multi-national corporations. It can be employed to rationalize, if not limit, development activities with unwanted environmental impacts within a more extensive time-frame and multiple dimensions. A very recent case is illustrative:

Taiwan is considering granting permit to a du Pont plant producing Titanium Dioxides (TiO_2). Though the BOI(Bureau of Industries) welcomed such foreign investment, the requirement of an EIS leave the government more chips in bargaining for a more favorable deal, in terms of economic returns and environmental soundness.

Evidently, Taiwan should look into the use of EIA as a vehicle for choosing among long-term multi-dimension development schemes.

6.3.3 EIA as an apparatus toward institutional integration and comprehensive planning

A large segment of the literature discussing the environmental policy performance in developing countries points mainly to institutional problems as the primary constraint in integrating environmental concerns into the comprehensive planning scheme. The problems are basically questions of effective "integration" of environmental factors into the general development planning framework. More specifically, integration refers to the organizational task of both coordination and conflict resolution in the fragmentary structure of administration. These problems also reflect, to a large extent, the intrinsic difficulties of synthesizing economic and conservational goals in the developing countries, particularly since these goals are usually competetive or conflicting in

nature.

The use of EIA in developing countries can be a step toward better and more comprehensive planning through coordination and collaboration, bringing environmental perspective into the general planning framework. In addition, EIA can be regarded as an apparatus for long-term institutional change and a policy instrument for institutional adaptation and reform. EIA offers an opportunity to improve existing planning and decision-making processes without creating additional complicated bureaucratic machinery. It therefore bypasses laborious administrative routes and serve as an effective planning tool.

Such "integration" problems exist in Taiwan, too. Though the Comprehensive Development Plan of Taiwan incorporated environmental factors into the overall planning scheme in 1978, individual project planning has not yet reached a stage of thorough integration. The current bureaucratic system in the government is full of various conflicting ends with little environmental sensitivity. Consequently, Taiwan should take advantage of using EIA as a vehicle in enhancing its planning mechanism beyond its current stage, saving resources and efforts, and in heading towards a more comprehensive planning level.

6.4 Lessons On the Technical Aspects

Most of the technical problems faced by the developing countries also exist in Taiwan's EIA process. For the most part,

they involve the failure to adopt and apply appropriate methods, lack of personnel, and lack of data.

For the case of Liwu Hydropower project, the applicability of a certain assessment model, the EES, to the target area was challenged. This illustrate that the ability to select and employ the appropriate methods needs improvement. Utilizing sophisticated methods and techniques basically presents no problems for the well-trained Taiwanese experts. Where the problem really lies is in the ability to compare various models and the judiciously choose the most applicable and practical one among them. This ability needs to be strengthened through the experiences accumulated through conducting multiple EIAs.

With regard to personnel problem, Taiwan does not lack technical specialists in fields related to EIA, but is in need of management approaches as well as managers. To be specific, environmental planners with technical background and interdisciplinary management ability are desperately needed, both in the EIS preparation and review stages. Proposed training program should therefore focus in this direction. Furthermore, training should be given to the public officials, especially those holding executive positions with power over major development activities, in order to enhance the environmental sensitivity and understanding of the decision making process.

The last, but certainly not least technical problem concerns data. In developing countries, baseline ecological data encompassing a considerable period of time are hardly available.

Such a situation make the impact prediction, evaluation, and monitoring very difficult. One of the underlying reasons is that basic science research including baseline data collecting and processing is widely ignored in the developing countries. Instead, applied sciences and engineering are always emphasized. Though this general inclination may be hard to reverse, a system of "national ecological inventory", as suggested by Ian McHarg in 1984, may appear to be useful. An interacting bio-physical system incorporating the inventory data and other quantitative models (e.g. hydrologic, erosion, ground water, wildlife population,...etc.) could then be created and serve as a more complete basis on which to build future EIAs.

Taiwan encountered such data problems both in EIA process and in other scientific research endeavors. Given the small size of Taiwan, its rapid growth and frequent conflicts in resource utilization, and its wealth of environmental scientists, such an inventory approach should be appropriate to either general planning or EIS work.

6.5 Recommendations

To sum up, it is recommended that several steps be taken to improve Taiwan's EIA implementation:

1. Specify criteria in the screening process of EIA, for projects that need EISs, in the legislation to avoid administrative discretion.

2. Provide formalized and more extensive public participation channels and procedures, in both screening and review stages, of EIA system.
3. Enhance the effectiveness of EIA implementation to respond to the public concern; and utilize the across-the-population environmental pressure to urge a more effective EIA implementation.
4. Use EIA system as a tool to broaden cost-benefit analysis in project planning.
5. Utilize EIA as a means of economic benefit for a developing economy; a vehicle to choose among long-term, multi-dimensional development schemes; and a planning apparatus to achieve a more comprehensive planning process as well as institutional integration.
6. Strengthen the model selection and application ability through accumulated experience by performing EIAs.
7. Train environmental managers and planners needed for effective EIA implementation.
8. Establish a national ecological inventory system for better EIA data.

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