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ENVIRONMENTAL PROTECTION IN PENINSULAR MALAYSIA :AN EVALUATION OF WATER POLLUTION POLICIES, 1981-2003

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ABSTRACT

The thesis examines the environmental pressure brought by developmental goals using water pollution in Peninsular Malaysia as its unit of analysis. In doing so, it explores the trend and magnitude of economic development indicators such as urbanization, population and industrial growth with special reference to manufacturing industry in the country. The study argues that development activity is a public policy demand towards which a government must strive to achieve at all costs. However, the price of developmental goals is always an environmental degradation of natural resources such as water. In the light of this, the study examines the various policy measures, actions and mechanisms put forward by the government to overcome the problem of water pollution in Peninsular Malaysia. The study also identifies issues associated with some policy mechanisms or instruments used by the government and administrative constraints likely to hinder the implementation of such policies and their effectiveness.

Methodologically, the study uses a quantitative method of analysis such as statistical regression to examine the correlation and magnitude of relationship between the chosen development indicators and water pollution. It equally uses the outcome model of analysis and statistical time series method to evaluate the effectiveness of the implemented policies in respect of the level of water pollution over the period under review.

The findings of the study show that more than 90% of water pollution is caused by development indicators. This contradicts the view of economists who often claim in different Earth Summits that ignorance and habits of people are the main causes of water pollution. With respect to the level of reduction in river pollution, in some years, the policy enforcement actions were very effective by compelling the identified sources of water pollution complied with policy requirements. However, there were many periods where the level of pollution in rivers became worse. This seems to suggest some weaknesses in the policy instruments used. Another issue includes financial constraints of the small scale industries to install appropriate treatment technologies required of them by the regulatory policies.

Specifically, the findings of the study show that the organic pollutants (measured by BOD) from Palm Oil and Rubber industries have been reduced to a certain extent due to vigorous policy enforcement actions and invention of appropriate technologies by research programs of the government to support these industries. However, the policy enforcements against river pollutants such as organic effluents from domestic sewage (NH_3N) discharges into water catchments remained problematic due to two reasons: rapid urbanization of the cities with housing congestion and lack of sufficient sewerage systems, especially in some urban areas. The findings also show that the policy enforcement actions have not been able to overcome excessive land clearing activities that lead to river pollutants such as suspended solid (SS). As such, it remains as one of the problematic sources of water pollution in Peninsular Malaysia today. This deserves a proper attention of the government through the refining of policy measures against the land clearing activities and cooperation of Federal Agency (DOE) with Local and State Authorities.

More importantly, the findings of the study reveal the likely hidden interactive effects between the pollutants on river catchments. The implication of such interactive effect, according to the study, for policy-makers is that policy efforts and

administrative enforcement actions might be ineffective to achieve the objectives of water pollution abatement programs if the policy instruments are stringent only in controlling the pollutant from one single source. Therefore, the findings suggest a holistic and simultaneous control and measures against all the identified sources of water pollution. This can only be done through a proper coordination among Local, State and Federal Government Authorities and total awareness of the people to give their initiations and supports to the government agencies.

Generally, the findings of the study show that the Malaysian government has achieved some success in controlling the water pollution problem in Peninsular Malaysia. The facts and figures of the study suggest that the water pollution problems would have been worst in Peninsular Malaysia due to rapid economic development via rapid industrial growth, urbanization, population and other economic activities if there were no policy control measures. However, there is an urgent need to pay adequate attention to the various identified issues and recommendations given by the study for future success of government policies in water pollution abatement objectives.

ملخص البحث

تبحث هذه الرسالة في ظاهرة التلوث البيئي الناتجة من النمو الاقتصادي بتركيز خاص على تلوث مصادر المياه كوحدة للقياس. وهي تتناول هذا الموضوع من خلال اختبار الاتجاهات العامة لمؤشرات النمو الاقتصادي مثل نمو سكان الحواضر والنمو الصناعي بماليزيا والتركيز على النمو الصناعي بشكل خاص. ومن ثم يتطرق البحث لاختبار العلاقة بين مؤشرات النمو والتلوث البيئي. فالأطروحة الرئيسية للدراسة تقوم على ادعاء أن التنمية الاقتصادية وتوابعها تعتبر هدفا رئيسيا للسياسة العامة لا يمكن التخلى عنه. لذا فإن السؤال الملح هو: كيف ستتمكن الحكومة الماليزية من حفظ التوازن بينها وبين هدف حماية البيئة؟ وعلى ضوء ذلك تمضى الدراسة لاستعراض السياسات والعمليات والإجراءات التي تم اتخاذها بواسطة الحكومة والقيود الإدارية التي يمكن أن تحد من فعالية التنفيذ.

أما من حيث منهجية الدراسة فهي تتبع الأسلوب الكمي من خلال أسلوب تحليل الانحدار لتقدير مدى الاقتران بين مؤشرات التنمية وتلوث مصادر المياه. وهي كذلك تتبع أسلوب دراسة السلاسل الزمنية لوصف مدى فعالية السياسات المتبعة نحو خفض مستوى تلوث المياه خلال الفترة المحددة للدراسة.

إن معطيات الدراسة تشير إلى أن هناك معدلات ارتباط عالية بين عوامل النمو الاقتصادي وتلوث مصادر المياه. وهذه النتيجة تناقض ادعاءات بعض الاقتصاديين باعتبار جهل الناس وسلوكهم هو السبب الأهم لأحداث التلوث البيئي. ويبدو كذلك أن مدى فعالية السياسات في خفض معدلات تلوث المياه كانت متقطعة. ففي بعض السنوات يتم تنفيذ السياسات العامة بشكل فعال مما يؤدي إلى خفض معدل التلوث ولكنه قد يعود للتدني في العام الذي يليه مما يشير إلى ضعف أدوات التنفيذ، كذلك برزت مشكلة المحددات المالية التي تحد من قدرة الصناعات الصغيرة على إدخال التقنيات الضرورية للحد من تلويث المياه.

على وجه التحديد تشير معطيات الدراسة إلى أن مصادر التلوث العضوية الناتجة من صناعات زيت النخيل والمطاط أمكن السيطرة عليها بواسطة مزيج من فعالية تنفيذ السياسات الخاصة بها وإدخال تقنيات تم التوصل إليها بواسطة باحثين قامت الحكومة بتمويلهم- بينما كانت السياسات الموجهة نحو السيطرة على الملوثات العضوية الناتجة من نظم الصرف الصحي بالمدن غير فعالة. هناك سببين لذلك: السبب الأول هو النمو السريع والمضطرد للمدن والإسكان مع عدم مواكبة نظم الصرف الصحي لهذا النمو وهو الأمر الذي حدث في بعض المدن على وجه الخصوص. والسبب الثاني هو ضعف السيطرة على ظاهرة تنظيف مساحات واسعة من غطائها الطبيعي مما يؤدي إلى تلويث الأنهار بالمواد الصلبة العالقة. وهكذا فلا بد من انتباه الحكومة لهذا المصدر والسيطرة عليه لكي يمكن السيطرة على التلوث الذي يسببه مما يحتم التنسيق بين الحكومات المحلية والولايات والحكومة المركزية.

ومن النتائج الهامة التي تشير إليها معطيات هذه الدراسة احتمال وجود تفاعل بين الملوثات عند اختلاطها في مجري الأنهار. ويترتب على ذلك أن السياسات الموجهة نحو السيطرة على تلوث المياه ستظل غير فعالة طالما ركزت على واحد فقط من هذه الملوثات. لذلك فلا بد من إتباع أسلوب شمولي يتناول كل مصادر تلوث المياه في آن واحد. ويمكن أن يحدث هذا في حالة وجود تنسيق بين الحكومات المحلية والولاية والحكومة الفدرالية مع وعى المواطنين بأهمية الحوجة للوقوف وراء المؤسسات الحكومية الخاصة بحماية البيئة.

فعلى وجه العموم تبرز نتائج البحث أن حكومة ماليزيا قد تمكنت من تحقيق بعض النجاحات في السيطرة على مشكلة تلوث المياه. إذ يبدو من الحقائق والأرقام التي يتضمنها البحث أن مشاكل تلوث المياه كانت ستكون أسوأ بكثير عما هي عليه الآن- نسبة للنمو الاقتصادي والحضري والنمو الصناعي بمعدلات عالية- لولا وجود السياسات الموجهة نحو السيطرة عليها.

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APPROVAL PAGE

The thesis of Abdul Raufu Ambali has been examined and approved by the following:

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DECLARATION PAGE

I hereby declare that this thesis is the result of my own investigations, except where otherwise stated. Other sources are acknowledged by footnotes giving explicit references and a bibliography is appended.

Name: Abdul Raufu Ambali

Signature…… Date……..

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LIST OF KEY ABBREVIATIONS

ANOVA:	Analysis of Variance
BOD:	Biochemical Oxygen Demand
CAP:	Consumer' Association of Pinang
CO:	Carbon Monoxide
COD:	Chemical Oxygen Demand
df:	Degree of Freedom
DOE:	Department of Environment
EA:	Environmental Auditing
ECIG:	Export Credit Investment Guarantee
ECR:	Export Credit Refinancing
EIA:	Environmental Impact Assessment
EPSM:	Environmental Protection Society Malaysia
EQA:	Environmental Quality Act
EQC:	Environmental Quality Council
FIC:	Foreign Investment Committee
FOMAC:	Federation of Consumers Association Malaysia
FRTAM:	Federation of rubber Trade Association of Malaysia
FTZs:	Free Trade Zones
GDP:	Gross Domestic Product
HICOM:	Heavy Industries Corporation of Malaysia
H_1:	Hypothesis 1
H_2:	Hypothesis 2
ICA:	Industrial Co-ordination Act
IGO:	Intergovernmental Organization
IKW:	Indah Water Konsortium (Sdn. Bhd)
IPM:	Industrial Master Plan
IPCC:	Intergovernmental Panel Climate Change
Log:	Logarithm
loggdp:	Logarithm of Gross Domestic Product
logH.pollu:	Logarithm of Heavily Polluted Rivers
logindex:	Logarithm of index of industrial production for manufacturing industries
logpop:	Logarithm of Population
logS.pollu:	Logarithm of Slightly Polluted Rivers
logT.pollu:	Logarithm of Total Polluted Rivers
MARA:	Majlis Amanah Rakyat
MIPS:	Malaysian Industrial Policies Study
MNS:	Malaysia Nature Society
MVA:	Manufacturing Value Added
NDP:	New Development Policy
NEP:	New Economic Policy

NGOs:	Non-Governmental Organizations
NH_3N:	Ammoniacal Nitrogen
NOx:	Oxide of Nitrogen
OECD:	Organization of Economic Cooperation and Development
OPP1:	First Outline Policy Perspective
OPP2:	Second Outline Policy Perspective
PORIM:	Palm Oil Research Institute of Malaysia
PPP:	Polluter-Pays Principle
PP:	Precautionary Principle
RDAs:	Regional Development Areas
RRIM:	Rubber Research Institute of Malaysia
SAM:	Sahabat Alam Malaysia
SAMM:	Malaysian Laboratories Accreditation Scheme
SIRIM:	Standards & Industrial Research Institute of Malaysia
SMS:	Save Minimum Standards
SMR:	Standard Malaysian Rubber
SO_2:	Sulphur Dioxide
SS:	Suspended Solids
SSD:	Sewerage Services Department
SWT:	Subuhanaâ Wataāla
TCC:	Tripartite Consultative Committee
TSP:	Total Suspended Particles
UNCED:	United Nations Conference on Environment and Development
UNCHE:	United Nations Conference on Human Environment
UPP:	User-Pays Principle
UDA:	Urban Development Authority
WPI:	Water Pollution Index
WRI:	World Resource Institute
WWF:	World Wildlife Fund

CHAPTER 1

INTRODUCTION AND RESEARCH METHODOLOGY

INTRODUCTION

Development is briefly defined as "a change from a given state to one that is a more preferred or desired state."[1] From economic point of view, the term development is most frequently used to refer to the level of per capita national income, and its growth over time. To a considerable extent, this is due to the ready availability of statistical estimates of national income of varying degrees of reliability for a large number of countries. In the 1950s and 1960s, development was often equated with modernization, industrialization, urbanization and westernization. Hence, it was seen as a process through which "poor countries gradually assume the qualities of industrialized nations."[2] In the 1970s, development had assumed a new meaning associated with distributional issues. Thus, the focus was on the "fulfillment of basic needs and growth with equity."[3] Today, it is now defined in line with three specific goals that encompass provision of basic needs, creation of development opportunities and reduction of inequality in a country. In other words, development is now viewed as multi-dimensional concept involving different aspects of human existence. As such, Henriot sought development as a process involving major changes in social structures, popular attitudes and national institutions as well as acceleration of economic growth, the reduction of inequality and the eradication of absolute poverty. Henriot has also extended the meaning of development to entail self-reliance and self-esteem.[4] The Henriot's conceptual

[1] Hashim H. et al., "Development and the Environment: Problems and Perspectives," in Consumers' Association of Penang (CAP), *Development and Environmental Crisis: A Malaysian Case,* (Penang: Sun Printers Sdn. Bhd., 1982), 29.
[2] Sailen, Dranath Ghosih, "A Plea for Re-examining the Concepts of Development and Re-orienting Science and Technology" in Sahabah Alam Malaysia-SAM (ed.), *Global Development and Environment Crisis-Has Humankind A Future?* (Penang: SAM, 1988), 43-44.
[3] Gustav, F. Papanek, "Economic Development Theory: The Earnest for a Mirage" in Michael Todaro (ed.), *The Struggle for Economic Development*, (New York: Longman Inc., 1983), 17-21.
[4] Peter, J.A. Henriot, "Development Alternatives: Problems, Strategies and Values" in Michael Todaro (ed.), *The Struggle for Economic Development*, (New York: Longman Inc., 1983), 27-28

meaning of development seems to have embraced the previous meanings attached to the term '*development*' since 1950s until the present time.

However, it is evident from various views of scholars on the term '*development*' that there is no consensus about the meaning of development among them. This is because every discipline tries to view development according to its own ideological lens and perspective. The meaning also keeps on changing along with time. Hence, development is a term, which has occupied the minds of many and fueled a heated discussion among scholars. It is not a totally economic issue, neither is it the exclusive concern of any particular discipline.

However, the point to be remembered is that development is not without costs. Today there is a growing view that it is impossible to separate development issues from those of the environment. All over the world, some people are being disadvantaged by the negative consequences of development. The indicators of such degradation are clearly evident all over the world.

The environmental degradation caused by the development process and its activities can be categorized into: climate change, ozone depletion, acid rain, toxic pollution, water pollution, extinction of species, deforestation, land degradation, fish depletion and non-renewable resource depletion. The greenhouse effect is a universally-accepted phenomenon in which certain gases such as carbon dioxide (CO_2) are significantly emitted from human development activities to the atmosphere, particularly due to burning of fossil fuels. Environmental Scientists such as L.R. Brown, C. Flavin and H. Kane have speculated about an anthropogenic greenhouse effect, which could lead to further warming of earth's average surface temperature and to climate changes in the nearest future. Carbon dioxide levels in the atmosphere have risen by about 25 percent since pre-industrial time due to human economic activities. Brown and Kane have argued that the effects of failure to have global warning against environmental damages are highly pronounced. The possible negative effects include the extinction of species that cannot migrate or adapt to changes in climatic condition of their habitats. They added that loss of agricultural productivity when weather patterns become hotter and drier are more erratic.[5]

Houghton et al., conclude in a research that over the past 100 years the global sea level has risen by 10cm to 25cm with the likelihood that this is related to the simultaneous rise in the global temperatures of 0.3^0C to 0.6^0C.[6] Accordingly, this could displace populations, destroy low-lying urban infrastructure, contaminate fresh-water supplies and alter coastal lines. Broome observes that "Human-induced global warming could possibly start a chain of events that could lead to the extinction of civilization or even humanity. This is a remote possibility, but exists."[7] Thus, the issues of global warming resulting from human economic activities are common characteristics of the environmental problem of today. Of all the various aspects of environmental degradation resulting from development activities, the magnitude of water pollution is highly pronounced.

The effects of water pollution are manifested in various parts of the world. The Soviet industry and agriculture discharged millions of tonnes of acids, petroleum wastes, metals and salts into waterways, after treating only a small proportion of these effluents. Forests have been cleared in areas in which reforestation is difficult, with the soil left free and washed to pollute the streams.[8] Over half of the newborns in Mexico City have high blood levels and diseases are spreading through contaminated water.[9] In China, studies have found that as many as 50 percent of the children have unacceptable high blood lead levels.[10] OECD countries are overwhelmingly the world's major polluters that contribute to environmental degradation.[11] The pollution emanating from these countries should come as no surprise because 40 percent of global Sulfur dioxide (SO_2) and 54 percent of industrial wastes by weight, which lead to global warming, come from those countries. Despite their long-standing and well-developed systems of waste management, industrial residues such as acid materials, heavy metals and toxic chemicals degrade soils, damage plants, endanger food supply and water pollution.[12] Thus, there are many pollutants which are injurious to human health. Needless to say, the growing pollution as a result

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[5] L.R., Brown, C., Flavin, and H., Kane, *Vital Signs 1996-1997*, (London: Earthscan, 1996), 66.
[6] Houghton et al. (eds.), *Climate Change 1995: The Science of Climate Change*, Contribution of Working Group I to the Second Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), (Cambridge: Cambridge University Press, 1996), 26, 29.
[7] J., Broome, *Counting the Cost of Global Warming*, (Cambridge: White Horse Press, 1992), 16.
[8] David, E., Powell, "The Social Costs of Modernization: Ecological Problems in the USSR," in *World Politics*, July, (1971), 618.
[9] WRI (World Resource Institute), UNDP and UNEP, *World Resource 1992-93*, (New York: Oxford University Press, 1992), 51.
[10] WRI et al., *World Resource 1998-99,* (New York: Oxford University Press, 1998), 59.
[11] WRI et al., o*p. cit*., (1992), 18.
[12] Ibid

of industrial activities is making access to clean water and adequate sanitation more difficult to provide.

Like many other countries, there has been a great concern that the magnitude of environmental degradation in Malaysia is increasing as development activities increase. In peninsular Malaysia, for instance, the forest area has declined from 69 percent of the total land area in 1966 to 55 percent and 47 percent between 1978 and 1990, respectively.[13] Forest depletion through land development, the construction of dams, mining, logging and shifting cultivation appear to be the most significant causes. The total estimate of the forest area flooded as a result of hydroelectric dams constructed to foster economic growth in the country is more than 100,000 hectares in two states of Perak and Terengganu, respectively.[14] One damaging aspect of forest exploitation is the construction of roads and tracks for various transportation activities in the country. More than 12 percent of the forest areas have been affected by such activities. As such, the productivity of the mangrove forests declined in the 1990s.[15]

Moreover, Malaysia is also a good example of a nation that faces serious problems related to industrial pollution of water. Though water being withdrawn for industrial and domestic usages is largely returned to the surface water system after being used, often in a polluted condition, it damages the water resource for other uses or degrades the environment at large. The depletion of water resources and their pollution in turn affect the total level of aquatic organisms such as fish stocks. Perhaps, the ongoing pollution and destruction of coastal habitats is more threatening to fishes in the long term than over-fishing. For example, wetlands, mangroves and salt marshes are being rapidly cleared for urban, industrial and recreational uses. These activities result in huge environmental pollution and other damages such as land water pollution, soil erosion, increasing floods and noise erosion.[16] Land clearance for logging, urban development and housing or land development has caused soil erosion and river siltation that lead to severe pollution of inland water. A study conducted by the Department of

[13] Othman, Abdul Manan, "Forest Resources in Malaysia," in *Proceedings of the National Seminar on Environment and Development*, July 9-11, 1990, (Malaysia: Kuala Lumpur,1991), 173-4. See also: P.C., Lee, "Multi-use Management of West Malaysia's Forest Resources," in *Biological Resources and National Development*, edited by Singh, K.G., (Malaysia: Kuala Lumpur, 1973), 93-4.
[14] Y.P. Tho, "Conservation of Biodiversity: International and National Perspectives," in *Proceedings of the National Seminar on Environmental and Development*, 1991, 266-70.
[15] P.F. Burgess, *Silviculture in the Hill Forests of the Malay Peninsular*, Research Pamphlet no. 66, (Kepong, Malaysia: Forest Research Institute, 1975), 6-10.

Environment (DOE) on 86 rivers in 1990 found that 41 rivers (48 percent) were seriously polluted while another 14 rivers (16 percent) were slightly polluted. Surprisingly, only 31 rivers (36 percent) were found clean.[17] Likewise, the DOE's 2002 report showed that the number of rivers polluted or slightly polluted are 86 (71.7 percent) compared to 34 rivers (28.3 percent) reported as clean in the year 2000.[18] According to Sani, four rivers are seriously polluted due to organic matters (based on biochemical oxygen demand) from industrial and domestic effluent discharges.[19]

For years, the environmental consequences of the development process particularly water pollution have been the concern of government policy-makers, academicians, civil society groups and non-governmental organizations. On its part, the government has adopted policies and implemented programs aimed at rescuing the situation at large. However, the extent to which these policy instruments are effective in solving the problems or at least improving the situation of water pollution needs to be examined. This is the principal focus of this study.

A lot of responses to the inland water pollution have been witnessed all over the world. The United Nations and the national governments, both in the industrialized West and the Third World, have gradually started to evaluate their policies and approaches related to economic development and environmental water pollution. The shift is partly due to the realization that economic development without environmental consideration is harmful rather than beneficial. In other words, the economic growth of a nation without ecological consideration would not contribute to the overall improvement of the quality of life. Thus, since about two decades ago, most of the countries all over the world have adopted developmental policies that would protect their environmental resources.

In developing countries such as China, Indonesia and Nigeria, governments have adopted some basic policies designed to reconcile the conflict between industrial growth and water pollution. Since 1970s, environmental protection work has been carried out vigorously in all these countries. In new and expanded construction, an environmental impact study is required. In building a new industry,

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[16] CAP, *Development and Environmental Crisis: A Malaysian Case, op .cit*., (preface I).
[17] Sham Sani, *Environment and Development in Malaysia: Changing Concerns and Approaches*, (Malaysia: ISIS, 1993), 37.
[18] Department of Statistics, Malaysia, *Compendium of Environmental Statistics, (*Malaysia, 2002), 32.

pollution prevention, the construction project and the operation of the industry are designed simultaneously.[20]

The policy instrument mandates that the Environmental Impact Assessment (EIA) must be conducted for all new development projects in housing estates, dam constructions, industrial development, large-scale farming and highway construction that can result in environmental damage in general and water pollution in particular. In the light of this, all industries have been ordered to install approved waste-minimizing and pollution-prevention systems or devices to ensure the proper treatment of all industrial wastes before they can be discharged into water resources. The standards for effluent discharge for all categories of industries have also been set up.[21]

In the developed world, such as OECD countries, several economic policy instruments are in use to control water pollution. These include user charges, product charges and administrative charges to discourage polluting activities. The second are subsidies in the form of grants, soft loans and tax allowances, which may be used to encourage less polluting behaviour. The third economic policy measure is the deposit-refund scheme to encourage a more environmental-friendly disposal of waste. The fourth category comprises financial enforcement incentives, such as non-compliance fees and performance bonds, which provide an additional financial inducement to comply with existing water pollution regulations.[22] By 1988, 153 different economic policy instruments were said to be in use in various OECD countries to protect water pollution. As an illustration of national actions, France has an effluent charge related to water pollution, while Finland and Sweden have introduced a carbon tax on fossil fuel use. Australia, Belgium, the Netherlands and the United States levy effluent charges on wastes discharge into water. Denmark, Germany, New Zealand, Switzerland and United Kingdom impose different levels of taxation on leaded gasoline discharged into water resources. In other words, most of these countries use taxation policy actions to promote low-pollution vehicles. However, the

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[19] Sham Sani. (1993), op. cit., 38.
[20] O.P. Dwivedi and Dhirendra K. Vaypeyi, *Environmental Policies in the Third World: A Comparative Analysis*, (London: Mansell, 1995), 28-56, 208.
[21] Ibid
[22] OECD, *The State of the Environment*, (Paris: OECD, 1991), 84.